# Impact of Informational Capabilities on Market Access of Smallholder Farmers during COVID-19: A Study in Bangladesh

by

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**Abstract**

Market accessibility, as an essential livelihood criterion in today's commoditized world, needs a group of buyers and sellers to transact values among themselves through negotiation. Communication – an exchange of information for mutual understanding – plays a vital role in this negotiation.

Information and communication technology (ICT) is an umbrella term encompassing vast arrays of communication and information processing tools and techniques. Access to ICTs is not sufficient enough to actualize its transformative and empowering benefits; what it needs is Informational Capabilities – some combination of resources and skills that enable individuals to 'function' and make decisions independently which gives the real essence of meaningful human development.

To examine the impact of informational capabilities on smallholder farmers' access to the market in Bangladesh during COVID-19, several research articles, newspaper reports, websites, and published book sections were studied. Systematic literature review substantiated a gap in the research field which needed to be explored thoroughly by an empirical study. With this end in view, a detailed research design and data collection plan were formulated. According to this research plan, key informant interviews were done to have a dataset of rich insights from knowledgeable persons. The dataset was analyzed using a widely accepted method among qualitative researchers known as Thematic Analysis. After analyzing the data, four underlying themes were discovered that have relevance to the study context and research topic: use of ICTs for better market access by smallholder farmers in Bangladesh during COVID-19 can be different in terms of generational, geographical, infrastructural aspects, and can be challenged by existing market systems dominated by intermediaries. These themes constitute the current study's contribution to the field of knowledge.

Future implications of this study might be a quantitative analysis of the themes employing a much larger sample size for validating the findings.

## Preface

This thesis is an original work by S M Asif Ur Rahman. The research project, of which this thesis is a part, received research ethics approval from the University of Alberta Research Ethics Board, Project Name: “Market Access for Farmers during COVID-19”, No. Pro00125434, DATE: 2022-12-07.

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I am grateful to all my respondents. Without your wholehearted support, this research would not be possible. Did I forget to thank Neela, my key informant/ non-paid research associate?

My wife Bably deserves a special mention for always helping me defocus. I've got to say it is no less important as it makes refocusing a powerful imperative.

Afraa, Maryam, and Aayan – all for you, you for all – my three musketeers!

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# CHAPTER 1: INTRODUCTION

## Introduction to chapter

This thesis report entitled "Impact of Informational Capabilities on Market Access of Smallholder Farmers during COVID-19: A Study in Bangladesh" is made to fulfill partial requirements for the degree of Master of Arts in Communication and Technology under the Faculty of Arts of the University of Alberta. As the title says, the research tried to investigate a specific community's access to and freedom of efficient, meaningful utilization of information and communication technologies (ICTs) – theoretically termed as informational capability – especially during adverse situations like the COVID-19 pandemic.

As one of the oldest professions in the world, agriculture has sustained human civilization for the last 12000 years. In search of a source of food that is safer than hunting and hoarding, ancient human beings started depending on intelligent use of land which ultimately took the form of today's agriculture. According to the recent World Bank data[1], close to 1 billion of the world's population is involved directly in agriculture, that is, one in every seven people is engaged in farming for livelihood. Nevertheless, the percentage of the population engaged in agriculture is sharply and gradually dwindling, from 44% in 1991 to 28% in 2018. Factors like decreasing arable land due to rapid industrialization and increased pressure from growing population, crop loss relating to natural calamities, and farmers seeking alternative income-generating sources – are all impacting attempts to raise agricultural yields to feed the world's population. Whereas traditional farming techniques are mostly incapable of keeping pace with the ever-increasing demand, modern technological know-how is taking place in improving farming art and science.

With the advent of information and communication technologies (ICTs) such as artificial satellites, mobile phones, computers, the internet, and robots and drones, collecting and

[1]https://data.worldbank.org/indicator/SL.AGR.EMPL.ZS?end=2019&name_desc=false&start=1991&type=shaded&view=chart

analyzing massive amounts of data to connect with distributors and consumers effectively has become effortless. As a result, smallholder farmers - generally rural marginalized populations - can get easier access to updated crop-related information. Contacting potential customers and having crucial market-oriented information like customer needs, demand and supply, and current market prices – all are easily possible through ICT devices. This also enables agriculture extension officers to better connect with and provide solutions to remote underprivileged farmers.

These benefits of applying ICTs in agricultural production and marketing even proved true and more functional during the COVID-19 pandemic when the whole world was going through unprecedented restrictions like lockdowns and social distancing to contain the spread of the virus. It takes at least two or more persons or organizations to start and run the communication – physically or virtually. However, COVID-19 put an imperative on social distancing as the SARS-CoV virus causing the pandemic is droplet-borne, meaning it spreads from person to person whenever they are in close contact. As a direct response to the COVID-19-induced restrictions on public gatherings and movement, many industries became increasingly reliant on ICTs. For example, educational institutions arranged for online lectures and assessments.

Similarly in the agricultural sector, communication among producers, distributors, and consumers is an integral element. However, farmers – especially the marginal ones in underdeveloped and developing countries - faced extraordinary challenges in accessing the markets for both input and output. A few of them initiated using digital information and communication technologies like the Facebook marketplace, Messenger, YouTube videos, WhatsApp, etc. to connect with distributors and consumers effectively. The evidence says these small groups of farmers are mostly resource-poor in terms of land holdings and experience in farming but are younger, more educated, and technology-oriented. Sometimes, these younger farmers lead the seniors in their family or neighborhood to use ICTs in agricultural production and marketing.

The current research, hence, aims at exploring opportunities and challenges of using ICTs in solving smallholder farmers' issues related to access to the market during adverse

situations like the pandemic, with a regional focus on the global south in general, and Bangladesh in particular.

**Purpose of the study**

The Research question this study intends to answer is:

*What challenges and opportunities did ICTs pose to smallholder farmers regarding Bangladesh's market access during COVID-19?*

This research aims to analyze, under the select theoretical framework, the impacts of ICTs on the market accessibility of smallholder farmers in Bangladesh. From a broader perspective, the research tries to investigate marginal farmers' 'Informational Capabilities' – a set of conditions that make them capable of using ICT tools and techniques for real benefits like achieving social, cultural, political, and economic freedom to be and to have what they value most. The study is set amid COVID-19 and in a geographic location that represents the underprivileged global south. The researcher expects the findings would have general applicability in similar situations and in other regions considered to be part of the global south.

Within the specific scope of the study, however, there are some limitations. Firstly, this study focuses on the smallholder farmers in Bangladesh in general, though there might be significant differences, as seen in some research articles, inside this study group in terms of age and gender perspectives. Sector-wise studies on smallholder farmers classifying them into different groups like cash crops, food, fruits and vegetables, fisheries, dairy, and poultry can generate ideas about more efficient use of ICTs for better market accessibility because each of these product categories demands different market linkages.

**Preview of Literature**

An extensive literature search on this research topic shows that a good number of academic and journalistic resources already exist on the theme of ICT practices of

smallholder farmers before and during COVID-19, and these practices range from agricultural production to communication – mainly extension services. Major applications of ICTs found in this literature concern IPM (Integrated Pest Management), weather-smart farming, electronic extension services (e-extension), and the use of smart devices like drones, smartphones, digital cameras, etc. to increase yield. However, one vital aspect of ICT – its ability to connect resource-poor marginal farmers to the market by bypassing middlemen – is surprisingly overlooked. Hence, this study aims to fill this gap in the literature.

ICTs play an important role in communication. In the developed world, rapid technological advancement brings newer technologies to the market almost daily, and the shorter lifespan of these technologies quickly outdates them. It results in the availability of yesterday's expensive high-tech in the underdeveloped global south at much more affordable prices. However, ICT capabilities – access to or possession of ICT devices like computers, smartphones, and the internet – project a partial advancement of human society; to justify real development, it needs to make sure ICTs are and can be, properly used by the community in solving their day-to-day and extraordinary problems. This way ICTs enable individuals to become and to have what they value most. This view of holistic human development was made popular by the Nobel laureate economist Amartya Sen. The theoretical framework for this study, though, is borrowed from another development scientist Björn Sören Gigler who proposed a concept of Informational Capability (IC), keeping in line with Sen's Capability Approach (CA), to evaluate ICT's impact on real growth and welfare of marginal communities.

**Preview of Methodology**

This research is, by nature, a descriptive or exploratory case study. To form a basic understanding of the topic, various secondary sources of information – research articles, published books, newspaper reports, and websites were consulted. To fill up the gap in the existing literature and to contribute new knowledge to the field, primary research was

conducted in the form of key informant interviews. Conversations with the respondents were transcribed and coded for thematic analysis. Research findings show four underlying themes by which the impacts of ICTs on smallholder farmers' access to the market can be explained and evaluated from a global south perspective.

As already mentioned, the study employs a widely popular qualitative analysis technique known as thematic analysis (TA) in which data, primarily interview transcripts, are studied carefully and repeatedly to find commonalities among responses. Common ideas are tagged with each other, in this case with the help of computer software, and are given distinctive code names. At a later phase, usually after multiple rounds of revisiting the codes, some underlying themes emerge that can explain the whole findings from a newer, elevated perspective. For a successful TA, the six-phase procedure proposed by Braun and Clarke (2012) was adopted.

**Summary**

As discussed, the research is going to study a local case of smallholder farmers' ICT use/ non-use in accessing markets during COVID-19, and it is set in the southern region of Bangladesh. Through this study, the researcher aims, broadly, to generalize findings in similar geographic settings and during similar emergency periods.

For better understanding, the thesis has been divided into five major chapters. Following this introductory part, Chapter 2 will review relevant literature that formed the basis of this current research. Chapter 3 will elaborate on the specific plan and methods of doing the research. Chapter 4 discusses the findings and analyzes the results. Finally, in Chapter 5, the researcher concludes the entire thesis with future directions and implications of this research in the field of knowledge.

## CHAPTER 2: LITERATURE REVIEW

### Introduction to chapter

COVID-19 pandemic unsettled the world beyond anyone's imagination. It not only took millions of lives but also disrupted the lives of those who survived it. This is a phenomenon that will have a lasting impression on the history of the world and human civilization. Much research has been carried out to trace the impacts of, as well as responses to, the pandemic in different sectors. As such, the pandemic disrupted the lives of smallholder farmers around the globe. Smallholder farmers are generally resource-poor which makes them vulnerable in terms of taking alternative ways for their livelihood.

This study explores the challenges faced by smallholder farmers during the COVID-19 period in accessing markets – both as sellers of agricultural produce and as buyers of farming and non-farming inputs, and how their ability to use information and communication technologies (ICTs) had an impact on their access to the market.

The research area is the southern region of Bangladesh which might provide insights relevant to many other countries in the Global South having similar or comparable social, technological, and economic parameters.

The primary purpose of this chapter is to highlight the gap in the available literature and rationalize the current study regarding smallholder farmers' access to the market using ICTs during COVID-19. Another major purpose is to set up a background for the whole report. To make the research findings easily accessible and understandable to a wider audience, this chapter attempts to orient uninitiated readers and make space for common understanding.

As a first step, a number of literature was collected from the online sources – newspaper articles, academic research papers, book sections, and websites. The researcher applied a systematic process to find out and sort relevant literature from the internet. At the onset, two repositories were selected for searching for papers: Academic Search Complete and SCOPUS. Later on, another search engine - Google Scholar - was used to broaden the scope of the search. Here are the details of the search process along with its yield:

| Table 1: Literature Search and Yield | | | | |
|---|---|---|---|---|
| **Date of search** | **Database** | **Search string** | **Records found** | **Records exported** |
| 2.2.22 | Academic Search Complete/ EBSCO | Agri* AND ICT | 631 | |
| | " | Agri* AND ICT AND Developing countries | 63 | |
| | " | Agri* AND ICT AND Bangladesh | 4 | |
| | " | Agri* AND ICT AND COVID-19 | 9 | 9 |
| | SCOPUS | Agri* AND ICT | 1151 | |
| | " | Agri* AND ICT AND Developing countries | 165 | |
| | " | Agri* AND ICT AND Bangladesh | 19 | 19 |

| | | | | |
|---|---|---|---|---|
| 16.2.22 | Google Scholar | ICT in agri marketing in developing countries during COVID-19 | 25500+ | 31 (Taken from first 10 pages of 100 articles) |

This literature review chapter is structured as a four-part discussion on four major topics. Part 1 introduces the general conditions of the smallholder farmers in Bangladesh and the determinants and challenges they face accessing the markets. Part 2 focuses on ICTs and their impacts on the market accessibility of smallholder farmers. Part 3 reflects on the impacts of COVID-19 on smallholder farmers along with some measures taken in different parts of the Global South to mitigate those impacts. Finally, in Part 4, the theoretical framework for this research is presented with reference to Gigler's concept of informational capability.

Following the four-part discussion is a concluding part that makes an overall analysis of the reviewed literature which culminates in finding out a gap in the existing research and finally establishing a rationale for the current study.

*Broad Objective:*

The three major broad topics the research centers on are smallholder farmers, market accessibility, and the role of ICTs during the COVID-19 pandemic. The broad objective of this research is to conceptualize the impact of ICTs that enable or deter smallholder farmers' access to the market during COVID-19.

*Research Question:*

The research question that this paper is going to answer is:

*What challenges and opportunities did ICTs pose to smallholder farmers regarding access to the market in Bangladesh during COVID-19?*

It is difficult to specify the exact number of articles and research papers studied for the purpose of this research. However, a strategy suggested by the library of the University of Arizona (Library) was followed to search, select, and review available relevant literature. As the first step, the research topic and scope were selected. In Step 2, relevant pieces of literature were identified using online search engines like SCOPUS, EBSCO, and Google Scholar. In the next step, all these sources and literature were critically analyzed in terms of geographic locations and publication period. Geographic locations for the search were specified as developing countries and Bangladesh. To specify the publication period, the phrase 'COVID-19' was added as it limited the search for papers published since January 2020. As the last step in the literature review process, the resources were categorized according to key themes like impacts of COVID-19, market accessibility of smallholders, ICT in agriculture marketing, etc.

## PART 1: SMALLHOLDER FARMERS AND MARKET ACCESSIBILITY IN BANGLADESH

### *Smallholder Farmers and Agriculture in Bangladesh*

With a population of 173 million where around 1329 persons live in each square kilometer (3441/$mi^2$), Bangladesh ranks 8$^{th}$ position worldwide in terms of population. Another way to say it, 2.15% of the world's population lives in Bangladesh (Worldometers, 2023). On average, people in Bangladesh have only 0.125 acres of cultivable cropland under each head, and it is decreasing day by day due to factors like increasing population, industrialization, fast urbanization, and diversification of agriculture (Palash & Bauer, 2017).

Despite these facts, the economy of Bangladesh is mostly agrarian. Tropical weather and the Ganges-Brahmaputra-Meghna flood plains make the country a highly fertile land. Almost half of the arable land here is categorized as double-cropped areas (48.2%), while 26.3% and 17.2% are categorized as single-cropped and triple-cropped areas, respectively (Dr. J. Timsina & N.Guilpart). Main food crops include rice, wheat, potato, maize, pulses, and oilseed while jute and sugarcane are cultivated widely as cash crops. In recent years, the

scope of agriculture has spread out to include tea, seasonal fruits, and freshwater fish as export-oriented crops. According to Wikipedia sources, the country is among the top producers of rice (third), potatoes (seventh), tropical fruits (sixth), jute (second), and farmed fish (fifth) (*Agriculture in Bangladesh*, 2023).

Smallholder farmers are important for the country's economy as close to 85% of the total 15.2 million farms in Bangladesh are classified as marginal or small (BBS, 2019). Smallholder farming which employs close to 41% of the country's total workforce has a 14.7% contribution to the country's GDP (Haque & Habib, 2021).

The government of Bangladesh defines a smallholder farmer as one 'with the ownership of 0.05 to 2.49 acres of cultivable land' (FAO, p. 144). Smallholder farmers in Bangladesh are 'resource-poor in terms of land holding' (Osmani & Hossain, 2016, p. 10). As most of the farmers in the country are marginal or smallholders, the country's economic growth vastly depends on the production and economic performance of these smallholder farmers.

*Determinants of market accessibility*

Traditionally, smallholder farming in Bangladesh has been mostly done for subsistence rather than for commercialized purposes which are gradually changing (Razzaque & Hossain, 2007). Access to the market is considered an important precondition for the 'transformation of the agriculture sector from subsistence to commercial production' (Salami et al., 2010, p. 26).

Various researchers have tried to list the determinants of market accessibility for smallholder farmers. Sharma identified several factors that hinder smallholder farmers from accessing profitable commercialized agro-markets: unreliable market information, high transportation costs, poor quality, and high cost of agro-inputs (Sharma et al., 2012). Osmani and Hossain (2015, p. 163) mention 'farm size, household labor, income from livestock and farm income' as factors determining smallholder farmers' attitude towards accessing agro markets.

In a recent paper, Ojulu (2021) has come up with an extensive categorization of the determining factors based on a review of a number of articles. Here the author has classified all prominent factors into four categories:

i) Socio-economic factors: Smallholder farmers' age, gender, alternative income possibilities, level of education, years of experience in farming, cultivable land in possession, size of family, the output level of the farm, etc. can have an impact on deciding to participate in the market. For example, surplus production is a good driving force for smallholder farmers to sell in the market.

ii) Institutional factors: Smallholder farmers' memberships in any group, access to extension services, credit facilities, transport, processing and storage facilities, and government policies and regulations act as institutional factors. For example, if the government imposes restrictions on movement, smallholder farmers face difficulties selling their products.

iii) Market factors: Access to and availability of market information regarding price, demand, and supply, along with the distance between buyers and sellers can act as determining factors to access commercial markets. For example, updated price information and direct communication between potential buyers and sellers minimize intermediary costs and increase profit for both groups.

iv) External factors: Natural forces and events like climate change, floods, wildfires, cyclones, epidemic outbreaks, etc. work as external factors determining market accessibility. For example, the COVID-19 pandemic and associated financial crises geared up many smallholder farmers to look for alternative ways to buy and sell things.

Arias points out three major factors that influence smallholder farmers' access to the market: appropriate incentives, access to and ability to use assets productively, and the existence of efficient infrastructure (Arias et al., 2013).

*Significance of market accessibility*

Smallholder farmers' easy access to the market is a necessary precondition for agricultural commercialization and overall economic development because it is expected to increase the purchasing power for food and reallocate incomes to high-valued non-food agribusiness sectors (Davis, 2006). Osmani and Hossain, in their article (2016, p. 11), have referred to a good number of authors, like Fritz (1996) and Selnes et al. (1996), who have identified market accessibility as a 'major determinant of competitive advantage.' On the other hand, Narver and Slater (1990) establish through their empirical study a positive relationship of market accessibility with profitability, and in the same way Greenley (2005) finds that between sales growth and market orientation.

In reality, due to the scarcity of post-harvest processing, storage, and transportation facilities, most of the smallholder farmers in Bangladesh cannot capitalize on the benefits of the commercialization of agriculture. Realizing this, authorities are taking up initiatives, under private-public partnership (PPP), to bring about a change so that smallholder farmers depend and engage more in market-orientation (Azad, 2015).

*Market accessibility challenges for smallholder farmers*

Market accessibility denotes a two-way scenario: in one way, smallholder farmers sell their produce and in the other way, they buy other necessary goods – mainly agro inputs like seeds, fertilizer, pesticides, and contract labor. A number of potential factors have been identified from a review of available literature that may obstruct smallholder farmers from accessing markets (Changalima & Ismail, 2022; Chikuni & Kilima, 2019; Hlongwane et al., 2014; Jari & Fraser, 2012; Magesa, 2015; Magingxa et al., 2009; Mbitsemunda & Karangwa, 2017; Ngugi et al., 2007; Omiti et al., 2009; Wale et al., 2021):

i) Infrastructural challenges: Limited, inefficient transport and storage facilities demotivate smallholder farmers to reach for distant bigger markets, whatever profitable they may look.

ii) Financial challenges: Besides land holdings and household income, bureaucratic difficulty, lack of collateral, and high interest rates deter farmers from securing credit from banks and other financial institutions. As a result, they fall easy prey to informal financial intermediaries.

iii) Lack of information and communication: Because of the unavailability of needed information on time, smallholder farmers fail to know current demand and supply conditions in the market which poses a threat of losing market opportunities.

iv) Inefficient value chain: Market intermediaries make the agricultural value chain unnecessarily longer, resulting in smallholder farmers becoming dependent on them. Intermediaries take this opportunity to exploit farmers by dictating market linkages and produce prices.

v) Psychology or mindset of farmers: Market accessibility demands smallholder farmers to come out of their comfort zone of farms and employ new knowledge and technologies like digital devices, information technologies, etc. Comparatively aged and less educated farmers try to avoid any attempt by themselves to connect to markets and rely on the middlemen.

vi) Legal environment: Farmers have to deal with the legal and political environment. Favorable government policies motivate smallholder farmers to maximize profit by selling their products in both national and global markets.

In light of the market accessibility challenges identified by these authors, rural smallholder farmers are underprivileged in comparison to their counterparts in urban areas, and also to the medium- and large-scale farmers. Infrastructural and financial backwardness play the most determinant role in market accessibility in developing and underdeveloped countries that are commonly introduced by the umbrella term - the global south. In addition, traditionally longer and inefficient marketing value chains bundled with the risk-averse mindset of the smallholder farmers aggravate the conditions. In the absence of proper and

updated information and communication, smallholder farmers fail to capitalize on the market opportunities.

## PART 2: ICT INTERVENTION AND MARKET ACCESSIBILITY FOR SMALLHOLDERS

'A properly designed ICT system easily increases the marketing coverage by opening the business to many customers and suppliers' (Nyangarika & Ngasa, 2020, p. 202). In a recent research article, Sekabira et al. (2023, p. 01) studied how ICT and other digital technologies have impacted smallholder farm households during and in the post-COVID-19 scenario: 'Different digital modalities were adopted to ensure continuous food production, access to inputs and finances, and selling surplus production among others. This was largely possible using ICTs to deliver these services digitally'. Besides infrastructural supports like road transportation, storage and processing facilities, and product exhibition facilities, access to timely information and communication services are also instrumental to the improvement of the quality and quantity of the produce (Lashgarara et al., 2011).

In their research paper, Chete and Fasoyiro (2014, p. 69) studied women smallholder farmers' access to the market and the role ICT can play in that. The results of this study show that besides poor literacy and insufficient access to ICT devices (mainly smartphones), 'poor understanding of the use of ICT … for agricultural transactions' deter women smallholder farmers' profitable participation in the agricultural market.

Another study by Fan and Salas Garcia (2018, p. 01) establishes a 'positive direct effect of internet and phones on farmer's market participation and volume decisions' in both national and international markets.

However, ICT interventions do not always result in successful market accessibility. Adegbidi presents a case study of Benin in which he casts light on how ICT-based initiatives to link small-scale farmers to market became unsuccessful because of faulty policy and

focus. 'The main result was that farmers were not the main targets of the ICT-based market initiatives, nor were they intended to be the direct beneficiaries of the projects' (Adegbidi, 2012, p. 261). To overcome these issues, he recommends greater transparency and proper management of resources aimed at the execution of ICT projects.

In a recent study done in South Africa, Nwafor et al. (2020, p. 01) found that 'ICT-based market information sources significantly influenced market participation' of the farmers, though ICT is not the only factor; other factors like 'age, additional income and membership of farmer cooperatives' also determine the intensity of the farmers' access to the market.

## PART 3: IMPACTS OF COVID-19 ON SMALLHOLDERS

COVID-19 created some unprecedented challenges for rural smallholder farmers in developing countries. The impacts, according to Siankwilimba et al. (2022, p. 02), have been more intense than that is attributed to global warming or climate change. After reviewing more than 60 recent academic papers, the authors found that COVID-19 'negatively impacted all known extension models' and concluded that these models 'cannot be used in isolation but need to be combined to develop a hybrid' that suits different stakeholders.

Kabir and Chowdhury (2023, p. 20) studied COVID-19-related reports and articles from leading newspapers in Bangladesh, Canada, and Trinidad and Tobago (T&T) intending to compare the impacts of the pandemic on the agricultural sector. They found a few similarities among the newspaper reports though the country contexts are different. Common issues reported in the Bangladeshi and Canadian newspapers include 'labor crisis, disruption in the supply chain, economic loss of farmers, curtailment of farm production, and wastage of farm products' whereas the issue that got the most coverage in Trinidadian

newspapers is 'possible risk of food insecurity due to restrictions and delays in food imports' because T&T relies on import for around 85% of their food[2].

Historically, pandemic-induced quarantines and panic have an impact on human activities and economic growth (Hanashima & Tomobe, 2012). Agriculture as an economic activity is also not immune to that. Limited access to essential inputs like labor, seeds, fertilizers, and pesticides coupled with risks of getting infected and losing near ones in the pandemic can create long-term trauma in farmers. Therefore, it is important to provide them with logistic and mental support.

Kumar and Singh (2022) made an extensive list of the impacts of COVID-19 on the agro-food supply chain. Some of the impacts are commonly found in other studies like high production and distribution costs, poor accessibility and unavailability of key intermediaries, transport restrictions, supply and distribution uncertainties, capital shortage, etc. In addition, they mention international trade barriers, food quality, and safety issues, commodity price volatility, delayed farming due to the lack of migratory workers, and shifts in consumer buying behavior.

Mbugua et al. (2021, p. 1294) did an empirical research based on primary data to see the impacts of COVID-19 and subsequent lockdown on market access of smallholder farmers in Uganda. The authors conclude that 'the impact of COVID-19 lockdown affected farmers' access to the factor of production such that few of the respondents were able to access their farms for their activities, farm input, and market to sell their produce. The study also indicated that most of the respondents were selling their produce at a lower price compared to the normal price, therefore affecting the overall income and well-being of the smallholder farmers.'

[2] https://oxfordbusinessgroup.com/analysis/aiming-revival-targeting-reduction-costly-food-imports-and-bolstering-development-agricultural

*Studies on measures taken and/ or proposed to mitigate the impacts of COVID-19:*

Prabasini et al. (2021) reviewed and compared agricultural extension approaches taken by different countries during the COVID-19 pandemic. They showed that due to differences in agricultural systems, and facilities, and the spread of false information, countries took different measures to communicate with farmers. However, the majority of countries have used simple apps like WhatsApp, YouTube, and ZOOM what the authors have termed as cyber extensions. In this paper (Prabasini et al., 2021), the difference between the global south and north is evident: the United States Department of Agriculture and agricultural agencies had interactive websites and online platforms for communicating with farmers whereas developing countries in Africa and Asia (India, Nepal, and Indonesia) suffered from weak infrastructure and lack of facilities.

In another recent paper, Baffoe-Bonnie et al. (2021, p. 03) presented the cases, from Sub-Saharan and South Asian regions, of alternative extension and advisory approaches because of COVID-19 protocols restricting direct human interactions. The authors identified three common means of communication being used in agricultural extension: mobile phones, radios, and TVs. In their study, farmers from India and Kenya are seen depending on mobile phones and apps like WhatsApp whereas China used their own version of that called WeChat. Radio talk shows in association with local radio stations helped 'educate and inform farmers on good agronomic practices in developing countries' like Uganda and Somalia. Another useful but expensive communication medium - television- was used by extension experts from FAO and academia, particularly in Gabon and Malawi. Though all of these media have their respective problems, the authors suggested some way-outs as well like government-private partnerships in building electricity and telecommunication infrastructure, more tailored interactions between extension workers and farmers, and overall skill development of rural farmers.

Kumar and Singh (2021) proposed a number of strategies to reduce the impact of COVID-19 on the agro-food supply chain. Some of these include a fast-paced, quick response, and collaborative supply chain, coordination and resource sharing among stakeholders, risk and reward sharing, multiple sourcing, and process digitization.

China has shown several good practices to respond to COVID-19. In their study, Zhan and Chen (2021, pp. 04-05) mentioned several government initiatives for facing emergencies like this pandemic. Particularly, their introduction of a 'green channel' for uninterrupted transportation of fresh and perishable agro products proved to be effective in minimizing delay and wastage. It was a joint initiative among the ministries of agriculture, transport, and public security that 'prohibited unauthorized roadblocks for vehicles transporting agricultural products and inputs'. These initiatives were further strengthened by smartphone apps 'allowing a courier to leave an order in a convenient spot for customer pick-up, without person-to-person interaction'.

## PART 4: ICT AND INFORMATIONAL CAPABILITY

The theoretical framework for this study is borrowed largely from Björn Sören Gigler's Alternative Evaluation Framework (AEF) which he has proposed and used in many of his studies. Gigler presents his AEF as an expansion to Amartya Sen's Capability Approach (CA).

With the advent of globalization and rapid diffusion of technologies, classical indices for measuring human development – like gross domestic products (GDP) and gross national products (GNP) are gradually being replaced by newer indices like the human development index (HDI). Similarly, in terms of access to information and communication, traditional concepts of universal accessibility (UA) – ownership of technology devices like computer, mobile phone, and internet services – are also giving way to proper, efficient use of the technology itself that comes from 'experience, skills and knowledge' (Mansell et al., 1999, p. 03) – essentially indicating to building and nurturing capabilities. On *effective use* of ICT, Gurstein (2003) says, 'people can derive real benefits from ICTs depending on the way they are making use of ICTs in their daily lives and how well they have integrated ICTs into their social, productive, and cultural activities.'

In quite the same way, in his introduction to the concept of the Capability Approach, Sen views the freedom of individuals as a basic building block for development. 'Attention is

thus paid particularly to the expansion of "capabilities" of persons to lead the kinds of lives they value – and have reason to value…Greater freedom enhances the ability of people to help themselves and to influence the world, and these matters are central to the process of development.' (Sen, 1999, p. 527).

ICT is important for development. Heather Hudson indicates a causal link between ICT and development: '…ICTs, as a means of sharing information, are not simply a connection between people, but a link in the chain of the development process itself' (Hudson, 2001, p. 170). To see whether ICTs can influence people's well-being and development in society, it is necessary to measure people-centric effects like a person's income generation, political bargaining power, social acceptance, leadership roles, access to public services etc. (Gigler, 2004).

In reality, though, most of the ICT-related studies attempt to establish and evaluate the impacts of *access* to ICT on overall human development. Gigler here finds a reason: 'One of the reasons for choosing the ICT access variable over the ICT usage variable is the difficulty of measuring use. Access can be measured much more easily and is also much more readily available in survey data sets' (Gigler, 2015, p. 6).

In an evaluation of Sen's CA, Alampay (2003, pp. 01- 02) writes, '…while access to…(ICTs) is a prerequisite to its usage, individual differences, capabilities, and choice also play a role on the use, value, and application of (ICTs)'. In today's 'knowledge-based and information driven' society, Alampay continues, ICTs are considered as providing competitive advantage: 'Access to ICTs allows for more opportunities and provides people knowledge and information that can be used to expand their choices in the lives they value.' However, there are differences among people and communities which entail different capabilities to translate the same bundle of goals and goods (in this case, ICTs) that they value.

Sen's CA takes a multidimensional approach to human welfare which 'moves away from an income-based utilitarian perspective to a nonmaterial view of development' (Gigler, 2015, p. 15) incorporating the social, cultural, economic, and political well-being of individuals. Poor, marginalized communities are resource-poor – it does not merely mean

they only lack money and other financial assets. In reality, they lack many other resources like better health care, education, professional and legal advisory services, leisure and entertainment, access to bank credit, and other necessary information, etc.

Sen's capability approach, as Gigler (2015, p. 24) points out, is 'theoretically underspecified when it comes to groups'. Gigler rationalizes his expansion of Sen's original concept of CA to operationalize this to evaluate the effects of development policies on groups (Stewart, 2001). Due to his preoccupation with ICT and empowerment of the marginalized communities, Gigler introduced a new concept called 'Informational Capability (IC)' that enables him to measure and evaluate the impacts of ICT interventions on poor people's development agenda.

ICT capability and Informational capability – though sound similar, have significant differences between them. Whereas ICT capabilities indicate a person's ability to use ICT-related tools and techniques – computer, internet, mobile phone, social media apps, etc., 'the concept of informational capabilities is much broader and relates to the role of information itself and the ability to analyze and place information into one's own sociocultural context' (Castells, 1995; cited by Gigler, 2011, p. 08).

Informational capability, as Gigler (2015) describes, consists of four components:

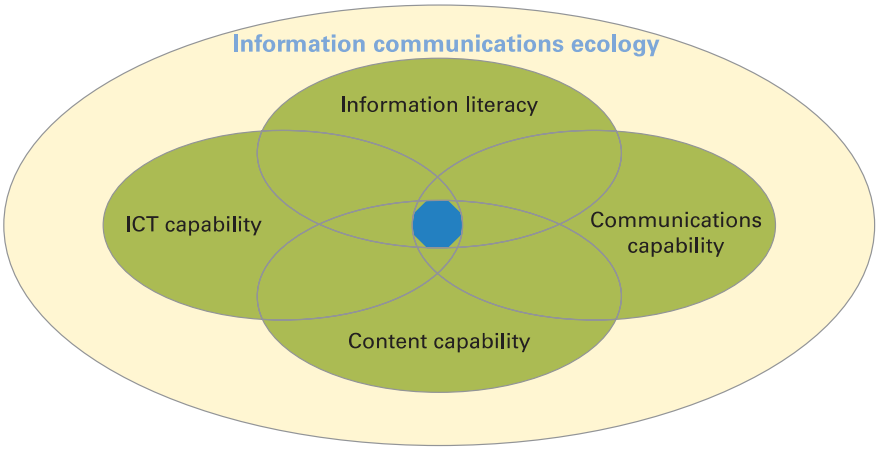
A) ICT capability: A person's ability to effectively use ICT tools (computer, smartphone) and techniques (apps, social media).

B) Information literacy: Ability to find, process, evaluate, and use necessary information (market price, weather forecast).

C) Communication capability: Ability to effectively communicate in both formal and informal settings (group chat with family members, extension services).

D) Content capability: Ability to produce and share local content (audiovisual clips, photos) with others through the network.

Gigler presents his concept of informational capability with the help of the following graphic:




*Source:* Gigler 2004, based on McClure 1994.

Figure 1: Concept of Informational Capability

Therefore, the concept of informational capability emerges as a more suitable means to measure the real development of poor communities through the use of ICTs. In comparison to traditional asset-based approaches that assume a 'direct and linear relationship between improved ICT access and enhanced socioeconomic development' (Gigler, 2015, p. 14), the multi-dimensional perspective of the informational capability approach signifies the 'expansion of capabilities' or, 'real freedom' as Gigler quotes from Sen (1999, p. 18).

The current research, as discussed above, concerns an expansion of a particular capability or freedom of the smallholder farmers to access the market during the pandemic. The factor under scrutiny that could/ might affect this expansion of capability is not only the access to but the effective use of ICTs which entails measuring what Gigler terms as

'informational capability' of this community. Applying Gigler's framework to study the impacts of ICTs on smallholder farmers' access to the market, hence, becomes meaningful. meaningful.

## ICT and smallholder farmers' market accessibility during COVID-19: A Research Gap

From the analysis of relevant literature available online to date, it is found that several studies have been carried out on topics like ICT and its impact on agricultural production, communication, and extension services – historically in general, and during COVID-19 period in particular. One study even cast light on smallholder farmers' empowerment during the COVID-19 period through digital/ smart integrated pest management. However, no such studies have yet been done on the conditions of market accessibility of the smallholder farmers – who are thought to be one of the most vulnerable but integral parts of our society – and the actual or potential effect of ICT in improving their conditions, especially during the COVID-19 period. Therefore, this current research emphasizes casting light on this knowledge gap and aims to contribute to this realm of particular knowledge.

## Summary

This chapter started with some specific objectives and purposes to meet, like setting up a background for the study, orienting uninitiated readers with the theoretical framework of the research and finding a gap in the available literature on the research question. As discussed above, in light of the secondary data there exists a research gap in terms of smallholder farmers' market access during COVID-19 and the impact of ICT in it. Hence, in the next chapter, the researcher lays out a detailed plan regarding how to explore the topic empirically to fill up the knowledge gap.

## CHAPTER 3: RESEARCH DESIGN AND METHODOLOGY

### Introduction to chapter

This thesis research entitled "The Impacts of Informational Capability on Smallholder Farmers' Access to Market during COVID-19: A Study in Bangladesh" is descriptive or exploratory by nature and is submitted to fulfill the partial requirements of the Master of Arts program in Communication and Technology (MACT) under Faculty of Arts in University of Alberta.

The purpose of this chapter is to explain the research methods applied throughout the research. The methods – starting from sample selection to data collection, analysis, and presentation of the data – are all used keeping in mind the research question this study aims to answer:

> *What challenges did smallholder farmers in Bangladesh face accessing the market during the COVID-19 pandemic, and how ICT played its role in overcoming those challenges.*

This chapter is structured as follows:

Part 1 discusses the overall research design and methods for data collection – primarily secondary data which is available in academic and journalistic sources – with the objective of finding out a knowledge gap. Part 2 describes the methods applied in selecting respondents. Part 3 rationalizes the choice of the research setting – why the specific location was selected for data collection. Part 4 introduces the research instruments – the questions, language, and technology used to collect data from the respondents. Part 5 explains the research procedure – what the researcher did before, during, and after the collection of firsthand data from the respondents. Finally, in Part 6, the plan for data analysis is laid out. The chapter ends with a conclusion part that summarizes all major points of the whole chapter.

### Research design and data collection methods

As per research type, this is a case study design based on semi-structured interviews with key informants. In the simplest words, a case study is a general term for the exploration of an individual, group, or phenomenon (Sturman, 1997). In a comprehensive definition, Yin (1984; cited by Zainal, 2007, p. 02) says, 'case study research method is an empirical inquiry that investigates a

contemporary phenomenon within its real-life context'. According to Denscombe (2010, p. 35), case studies 'focus on one (or just a few) instances of a particular phenomenon to provide an in-depth account of events, relationships, experiences or processes occurring in that particular instance'. This kind of study, he adds, is particularly useful in small-scale research. One of the reasons for the case study method to become widespread among researchers is the increasing concern about 'the limitations of quantitative methods in providing holistic and in-depth explanations of the social and behavioral problems' (Zainal, 2007, p. 01).

To qualify as a case for study, as Denscombe (2010, p. 44) says, a person, an organization, or a social event should be a 'self-contained entity' and have 'fairly distinct boundaries'. Among the advantages of the case study method, it studies the phenomenon 'within the context of its use' (Yin, 1984; cited by Zainal, 2007, p. 04) or the already existing natural setting 'that forms the basis of the investigation' (Denscombe, 2010, p. 37). Another advantage is that, unlike quantitative approaches which deal only with limited, pre-existing variables, the case study approach can analyze the complexity of an unlimited number of variables, and thus ultimately help derive new hypotheses (Starman, 2013). In the current study, the researcher's main goal behind designing the research was to concentrate on a specific context (smallholder farmers in Bangladesh) and a specific phenomenon (market access during COVID-19) alongside determining a hypothesis (whether ICT was having an impact). This is why the case study method here was relevant.

With this end in view, a number of available literature was collected from online sources in the forms of newspaper articles, academic research papers, book sections, and websites. A systematic search process was applied to find out and sort relevant literature from the internet. At the onset, two repositories were selected for searching for papers: Academic Search Complete and SCOPUS. Later on, another search engine - Google Scholar - was used to broaden the scope of the search.

The initial search, in Academic Search Complete and SCOPUS, was done in the first week of February 2022, followed by a second search - in Google Scholar- during the third week of the same month.

Since more than a year has passed from the last date of literature search, the researcher was curious to know about recent developments in the field and searched again in the Google Scholar but this time specifying the timeline from year 2020 to 2023. Surprisingly, this search resulted in an impressive stock of new empirical studies that were mostly done in the South Asian and African regions. More or less, these studies focused on ICT impacts on agricultural production and

resilience of the farming communities. However, no search attempt returned any specific result on the impact of ICTs on market accessibility of smallholder farmers during COVID-19 – a research gap this study aims to fill up.

The purpose of collecting primary data is to enrich the realm of knowledge by filling up the gap(s) in existing knowledge. To generate rich insights from the respondents, one-to-one semi-structured interviews were arranged in which respondents were encouraged to share their observations with as many details as they liked. The ten interview questions were supplied beforehand to further facilitate the discussion. Moreover, the respondents' native language Bangla was used for conversation which also might have motivated them to share their thoughts and experiences from broader perspectives. Interview durations ranged from 35 to 55 minutes which ensured respondents had sufficient time to expand their thoughts with enough details. A special arrangement was made for the two respondents (representing the smallholder farmers) who did not have a computer or smartphone to participate in the interview. Another respondent – an extension officer from the area – set up her work laptop with an internet connection in the field for these two persons to engage in conversation with the researcher. Other than these two, all respondents joined in the interview sessions from either their offices or their homes.

**Selection of respondents**

Type of research and type of information needed helped the researcher specify Key Informant Interview (KII) as the most suitable technique for primary data collection. Usually associated with qualitative studies, KIIs are semi-structured, in-depth interviews to capture knowledgeable participants' perceptions of the research topic (Akhter, 2022).

At first, the researcher collected a database of government extension officers from the regional radio broadcasting center. This database is used by the radio center to invite experts to talk to and solve farmers' problems through online extension programs. From this database, experts were contacted over the phone. After a successful first contact, a short list of 11 potential respondents was made. These potential respondents were then supplied with a formal invitation letter through email to participate in the research interview, along with an informed consent form and interview script containing topics to be discussed. Among these 11 contacts, 9 persons finally participated in online interviews. This method of participant selection is known as purposive sampling. In this method, the researcher uses personal judgment to select experts from within the community. The

inherent bias arising from the personal judgment of the researcher, as Tongco (2007) describes, contributes to the efficiency of sample selection.

In addition, a few respondents referred to other key informants suitable for the research – which is known as snowball sampling. This technique is used when samples with the target characteristics are not easily accessible (Naderifar et al., 2017). Among the 5 referrals, 3 persons consented to be interviewed. Here snowball sampling method was used to minimize the geographical distance between the researcher and the respondents.

Finally, a pool of 11 key informants was made with people having working knowledge of the livelihood of smallholder farmers in Bangladesh.

During this whole period, COVID-19 impacts were still present along with the requirements of social distancing. International travel to the research area was expensive and challenging for the researcher. For these reasons, Key Informant Interview (KII) using online communication tools like Facebook Messenger, Google Meet, and ZOOM was considered to be the most appropriate method to communicate with respondents for data collection and other necessary information.

Table 2: Respondents Selection.

| | Initial contact | Turn out |
|---|---|---|
| Database from radio station | 11 | 9 |
| Personal contact | 1 | 1 |
| Referral/ Snowball sampling | 5 | 3 |
| Data loss due to technical error | | 2 |
| Effective Sample size | | 11 |

## Research Setting

The research centers on smallholder farmers in Bangladesh. The reason behind choosing Bangladesh broadly as the research setting is primarily personal as the researcher is coming from this country and it seemed more convenient in terms of sample selection, and data collection. Moreover, the socio-political, economic, and technological background of the country is similar to many other countries in the Global South.

The research was done in Edmonton, Canada, where the researcher is currently stationed for his studies in a master's program at the University of Alberta. However, the specific setting of the study is the southern region of Bangladesh. A reason behind choosing this location as a research setting is that it is one of the least commercially developed areas in the country where agriculture is still a major provider of employment for local people. As the study focuses on particular attributes of smallholder farmers, the selection of this region, hence, has a good relevance to the overall research design. The researcher had to weigh the difficulties of doing this research remotely against the presumed benefits of being physically present in the research setting. The pandemic-induced restrictions on social gatherings and high expenditure of international travel made the researcher decide to stay in Edmonton and use online communication tools to conduct the research.

## Research Instruments

Research instruments are the specific tools and techniques used to collect data from respondents. For this research, respondents were supplied with an informed consent form along with an interview script during the first contact. They were requested to read, understand, and give written consent in favor of participating in the research as key informants.

The interview script had ten fundamental open-ended queries followed by a concluding question asking for their feedback and suggestions regarding the research itself. The fundamental questions were set in light of the theoretical framework (Gigler's Informational Capabilities) the research is based upon.

The very first question inquired about the respondent's connection to smallholder farmers in Bangladesh – how they were related to the topic. This was followed by four questions that were directly adapted from the theoretical framework to know about respondents' ICT capability, informational literacy, communication capability, and content capability. The following four questions (questions no. 6 to 9) were intended to learn about smallholder challenges in terms of

market accessibility during the pandemic and how they acted to overcome those challenges. Question no. 10 was a direct inquiry into the role of ICT in solving problems of market accessibility – the research question this study aims to answer. Finally, the respondents were encouraged to make any suggestion or concluding remark on the topic and the whole research process.

The interviews were carried out in Bangla for practical purposes as it is the native language of both the researcher and the respondents. Moreover, the key informant's native language is 'likely to play a role in building up a rapport and gaining trust' (Marschan-Piekkari & Reis, 2004, p. 232).

Technology played an undeniable role in the research. Specially, during data collection, it helped solve the geographic divide between interviewer and interviewee. Both the researcher and respondents used internet-based communication tools and techniques. Respondents chose one appropriate app from Google Meet, Facebook Messenger, and ZOOM to take part in the interview. The researcher gave them priority to propose their preferred time and date for the interview so that the huge time zone difference between Bangladesh and Canada did not become an issue (13 hours during DST).

**Research Procedure**

Research is a highly engaging intellectual process having multiple interconnected steps. Usually, these steps follow a logical progression map, though deviations and overlaps are also normal. In the following flowchart, the researcher presents a logical progression map that he adhered to, from the very first step of generating tentative research topics to finally preparing a presentation of the research findings for the general public.

To generate rich insights from the respondents, one-to-one semi-structured interviews were arranged in which respondents were encouraged to share their observations with as many details as they liked. The ten interview questions were supplied beforehand to further facilitate the discussion. Moreover, the respondents' native language Bangla was used for conversation which also might have motivated them to share their thoughts and experiences from broader perspectives. Interview durations ranged from 35 to 55 minutes which ensured respondents had sufficient time to expand their thoughts with enough details. A special arrangement was made for the two respondents (representing the smallholder farmers) who did not have a computer or smartphone to participate in the interview. As a solution, another respondent who works as an extension officer in the area set up her work laptop with an internet connection in the field for

these two persons to engage in conversation with the researcher. Other than these two, all respondents joined the interview sessions from either their offices or their homes.

There were some challenges as well in conducting online interviews. At least four of the potential respondents did not show up or failed to connect during interviews. Audio files of two full interviews could not be saved because of network disruption. Time zone variations had the researcher wake up in the middle of the night because that was daytime for the respondents on the other side of the globe. Finally, the importance of repeatedly reading and re-reading the transcripts in search of codes and themes cannot be overemphasized. There is no assurance, as it seems, of being successful in coding or discovering themes after any certain number of readings.

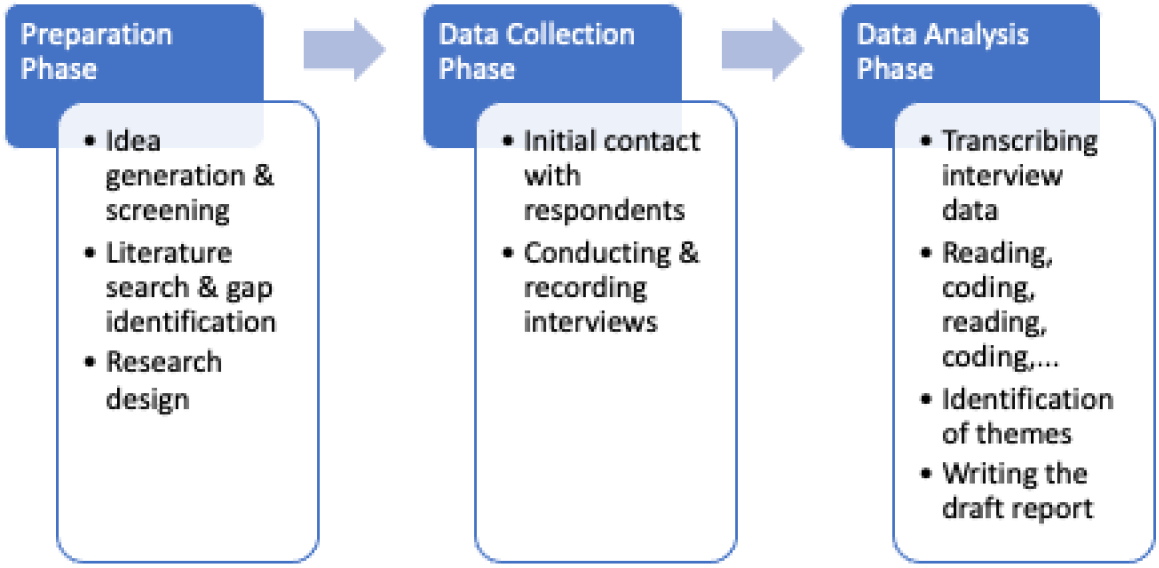



Figure 2: Research Process

**Data Analysis Plan**

The researcher adopts the method of thematic analysis to analyze collected data. Thematic analysis (TA) is an immensely popular method of qualitative data analysis. Reason behind its popularity, as Braun and Clarke (2012, p. 58) indicate, is its comparative ease of use: 'TA is only a method of data analysis' that makes it useful to even the novice researcher who can code and analyze qualitative

data systematically, 'which can then be linked to broader theoretical or conceptual issues'. It thus makes qualitative research and results easily accessible to a wider audience (Braun & Clarke, 2012). This quality of TA links it with an inductive approach to data analysis. Inductive analysis takes a 'bottom-up approach… (in which) the codes and themes derive from the content of the data themselves' (Braun & Clarke, 2012, p. 58). However, in reality, as the authors warn, a completely inductive analysis is not possible 'as we always bring something to the data when we analyze it'. Therefore, properly done thematic analysis is a combination of both inductive and deductive approaches.

In the current study, the way the researcher analyses data is also a compromise between these two approaches: empirical data is collected under an already established theoretical framework (top-down, general to specific, deductive approach) and then coded to discover underlying themes (bottom-up, specific to general, inductive approach).

Braun and Clarke (2012) suggested a simplistic, self-explanatory procedure for thematic analysis which was followed as a guideline in the current research. Here are the six steps to follow for thematic analysis:

Step 1: Getting familiar with data through reading and rereading textual data.

Step 2: Generating initial codes, as many as possible, from across the whole data set.

Step 3: Searching for themes from similarity and overlapping of codes.

Step 4: Review potential themes, now in relation to the entire data set as a quality check.

Step 5: Defining and naming themes having unique, singular focus characteristics.

Step 6: Produce a report on the underlying themes and the story they tell altogether.

Identifying themes from codes is a unifying process that also acts as a way of data reduction. 'Theme identification', according to Ryan and Bernard (Feb 2003, p. 85), 'is one of the most fundamental tasks in qualitative research'. In their article on techniques to identify themes for qualitative analysis, the authors say themes can be identified on the basis of 'quick word counts to laborious, in-depth line-by-line scrutiny' (Ryan & Bernard, Feb 2003, p. 85). It is possible to find out themes both from the data and from already existing theoretical understanding, that is to say, themes may come out from both inductive and deductive reasoning.

The four dimensions of Gigler's theoretical framework (informational literacy, ICT capability, communication capability, and content capability) were used to answer the research question of the study. The interview transcripts were made from the deep insights of the key informants. In this case, interview transcripts were studied repeatedly to find out redundant ideas, or codes. Similar codes were then grouped under themes based on commonality - a qualitative data analysis method known as thematic analysis. From the coded data four major themes emerged which answer the research question. In this way, thematic analysis of the coded data links together the four new themes and the theoretical framework of Gigler.

**Reliability and Validity**

Evaluating the quality of research is essential if findings are to be utilized in practice (Noble & Smith, 2015). Failure to evaluate a study or 'the soundness of the methods applied, the accuracy of its findings, and the integrity of assumptions made, or conclusions reached', as Long and Johnson (2000, p. 30) say, could result in such unexpected consequences like 'wasted research effort and time, and adoption of harmful practices'. Two factors – reliability and validity – have been traditionally regarded as evaluation tools for assessing the quality of research (Long & Johnson, 2000; Patton, 1990).

In the simplest sense, validity refers to the integrity and precision of the methods undertaken so that the results represent the data, while reliability is the extent of dependability with the employed analytical procedures that indicates consistency of getting similar results in different iterations (Long & Johnson, 2000).

In qualitative research, the concepts of validity and reliability are quite similar and often interchangeable. Since these types of studies rely heavily on the subjective effect of both the interviewee and researcher, the examination of trustworthiness is at the center of discussing and assessing validity and reliability (Golafshani, 2003). For example, Lincoln et al. (1985, p. 316) say: 'Since there can be no validity without reliability, a demonstration of the former [validity] is sufficient to establish the latter [reliability]'.

Unlike quantitative studies, there are no statistical tools to measure validity and reliability in qualitative studies. On the contrary, Noble and Smith (2015, p. 02) have proposed a number of

'methodological strategies to ensure the trustworthiness of the findings'. Some of these are applied in the current research.

Firstly, semi-structured interviews were recorded so that it was possible to revisit the data as often as needed to check with key informants' responses and themes emerging out of those. Secondly, transcripts of the interviews were sent back to the respondents for their feedback on whether the transcripts reflected their thoughts properly and truthfully – a concept known as respondent validation or member check. Most of the respondents agreed that the transcripts were accurate while a small portion (two out of the eleven) either added or corrected a few numerical data.

**Summary**

The purpose of this chapter on Research Design and Methodology was to introduce the methods applied in this current study to answer the research question of how the use of ICTs impacted the market access of smallholder farmers in Bangladesh during the pandemic. The research topic stemmed from a systematic review of available literature. To fill the gap in current knowledge, semi-structured key informant interviews were conducted for which respondents were selected through personal contact, a formal database of subject experts, and referral of other respondents. The research was set at a geographic location that represents the global south, thus enhancing the broader applicability of the findings. Research instruments used in the study – interview script, informed consent form, the native language of the respondents, and communication techniques like email, ZOOM calls, and WhatsApp – all are conducive to the topic of the study itself. Finally, interview data analysis was guided by an established method of thematic analysis for identifying codes and themes.

## CHAPTER 4: FINDINGS AND DISCUSSION

### Introduction to chapter

The research explores market accessibility by the smallholder or marginal farmers in Bangladesh during the COVID-19 pandemic.

Objectives of this study include collecting insights from key informants and analyzing those to have a clear understanding of how information and communication technologies (ICTs) can have an impact on smallholder farmers in solving their market accessibility problems during emergencies like the COVID-19 pandemic. Another objective is to know whether smallholder farmers face different and/ or bigger challenges using ICTs compared to large-scale farmers.

Both primary and secondary data were utilized in this research. Secondary data was collected by library and online research of published academic and research papers. For primary data, semi-structured interviews with farmers and key informants were carried out. Respondents were deliberately selected through referrals, supplied with questions beforehand, and invited to take part in semi-structured interviews regarding the research topic - to come up with more insightful opinions. A total of 11 interviews of a duration of about 35 to 55 minutes each, were conducted over ZOOM at pre-scheduled times. Recorded interviews were then transcribed and coded with the help of a software (Taguette) for qualitative analysis.

This current chapter is composed of six sections: following this introductory part are data presentation, data analysis, and discussion parts - all of which cast light on the collected data and their relation to the research problem, i.e., smallholder farmers' use of ICT in solving their market accessibility problems during the pandemic. This chapter also demarks its limitations and future implications for researchers. Finally it ends with an overall summary of all the findings.

## Data Presentation and Findings

A series of steps were taken to select key informants. Firstly, a database was collected from the regional radio broadcasting office in Khulna. This radio channel regularly broadcasts programs focused on local farming needs and issues, and for this, they pool and update a list of agriculture experts – mostly government agri-extension officers who are more knowledgeable and better communicators – to invite them to participate in talk shows aired from the channel.

Secondly, the researcher's personal contacts were utilized which include friends and university juniors. And thirdly, interviewees also referred to suitable key informants, also known as snowball sampling, because it is useful in at least two ways: it helps reach respondents who are otherwise unreachable or difficult to reach (Naderifar et al., 2017), and it produces some distinctive and emergent information (Noy, 2008) characteristic of the socio-cultural background of the respondents. Moreover, interviewees were not only limited to government extension officials, rather they included farm journalists, TV reporters, market system experts, and smallholder farmers as well. As a result, the group of key informants interviewed for the research formed a well-diversified sample.

A total of 17 respondents were initially selected, contacted, and invited through email to take part in one-to-one online interviews. Among them, 13 persons consented and participated, though audio recordings from two interviews got corrupted. Finally workable data set stood to be 11. This sample of respondents comprised three categories: agriculture extension officers (both from the government and private sectors), farm journalists, and smallholder farmers. Here is the final composition of the respondents:

| | Table 3: Interviewee Profile | | | | |
|---|---|---|---|---|---|
| **Sl. no** | **Professional designation** | **Affiliation** | **Involvement with Farming** | **Experience in Farming (in years)** | **Identifier** |
| 1 | Farm Journalist | Private TV channel | Collaboration between extension workers, farmers, researchers, and policymakers | 22 | R1 |
| 2 | Agriculture Development and Financial & Market Inclusion Coordinator | Nobojatra- a USAID funded non-government organization (NGO) | Agricultural project design, research, innovation, adaptation with climate, financial inclusion, input-output market, etc. | 7 | R2 |
| 3 | Agriculture extension officer | Government's Ministry of Agriculture | Providing extension services to farmers | 5 | R3 |
| 4 | Regional Farm Broadcaster | Government's Ministry of Agriculture | Providing agri information services | 7 | R4 |
| 5 | Agriculture extension officer | Government's Ministry of Agriculture | Providing extension services to farmers | 17 | R5 |

| | | | | | |
|---|---|---|---|---|---|
| 6 | Agriculture extension officer | Government's Ministry of Agriculture | Providing extension services to farmers | 5 | R6 |
| 7 | Agri marketing officer | Government's Directorate of Agri Marketing (DAM) | Planning and managing marketing channels that carry produce from farm to consumers. | 5 | R7 |
| 8 | Economic Recovery and Livelihood Development Coordinator | International Rescue Committee (IRC)- a non-government organization (NGO) | Agricultural project design, research, innovation, adaptation with climate, financial inclusion, input-output market, etc. | 22 | R8 |
| 9 | Agri marketing officer | Government's Directorate of Agri Marketing (DAM) | Planning and managing marketing channels that carry produce from farm to consumers. | 29 | R9 |
| 10 | Farmer | Independent | Farming for earning a livelihood. | 28 | R10 |
| 11 | Farmer | Independent | Farming for earning a livelihood. | 6 | R11 |

Respondents shared their years of experience ranging from 5 to 29 years whereas at least four of them had more than 20 years of involvement with agriculture.

Respondents were asked ten specific questions to share their thoughts on how smallholder farmers dealt with COVID-19 in terms of accessing the market and what role information and communication technology (ICT) played in their lives during the pandemic. There was a final question that asked about their overall impression and suggestions regarding the study itself.

Semi-structured interviews were scheduled at mutually accepted dates and times. Respondents were supplied with interview questions beforehand with a view to gathering rich insights from the conversation by offering them preparation time (Maras et al., 2021). Each interview was conducted over online video conferencing, in Bangla, and ran for 35 to 55 minutes. The online interviews were recorded as audio files. Following the interviews, the audio files were then transcribed and translated from Bangla into English before conducting the analysis.

A few trends were identified from the review of the collected data.

**Use of social media for networking:**

Several social media platforms were actively used by the smallholders during the pandemic. Among these, Facebook, YouTube, and WhatsApp are mentioned by most of the respondents. Smallholders primarily started to use these platforms to get connected with friends and families, however, more educated, and younger farmers initiated to use these platforms to access markets. They offered their produce with the help of the Facebook Marketplace so that potential customers could place orders for their daily necessities without going outside. Farmers arranged for vehicles to drop the produce at customers' doorsteps. In this way, smallholders were able to build up marketing networks bypassing the market intermediaries and could access the market during the pandemic.

Among the four components of Gigler's Informational Capability framework, communication capability refers to a person's ability to share ideas and information effectively in both formal and informal settings. Social media platforms like Facebook and WhatsApp did not only enable the farmers communicate with friends and family, rather

these helped them to get connected with extension workers and customers alike. As a result, access to market became a possibility for many of the smallholder farmers.

**Collaborative approach to problem solving:**

Traditionally, smallholder farmers in Bangladesh live in a close-knit society where their houses are in close vicinity, and they see one another and spend time both in and outside the fields. They are also fond of having informal conversations among themselves regarding issues in family, business, and other daily affairs. In these conversations, they usually share crop-related problems, and seek advice from the experienced ones.

During COVID-19, as the respondents identified, the smallholder farmers used their mobile phones to get connected with their peers as there was restriction on mass gathering. With the help of the lead farmers, they formed online groups in Facebook and WhatsApp. These groups became a platform for sharing crop- and market-related knowledge, problems and solutions. Extensions officers also utilized these groups because farmers could post photos of their crop or animal.

One component of Gigler's Informational Capability Framework is content capability by which he indicates to a person's ability to produce and share contents – photo and audio-visual material. Since there was restriction on public gathering due to the pandemic, smallholder farmers who could afford smartphones used their devices to communicate and consult with their peers and experts. In this way, ICT-enabled virtual meetings replaced physical meetings in their collaborative approach to problem solving.

**COVID-19- related misinformation:**

One respondent was indicating to COVID-19- related misinformation in which people became concerned about the risk of getting infected by the farm products. The ministry of agriculture and the Directorate of Agro Marketing (DAM) jointly fought against the

damages caused by the misinformation. As a quick direct response, DAM launched a mobile app by which both farmers and customers could communicate. Two mini trucks were arranged to collect products from farmers and drop those at customers' doorsteps.

Gigler's third component in the Informational Capability Framework is information literacy which indicates a person's ability to source, evaluate, and utilize information when necessary. Spread of misinformation like the one described above could critically destabilize access to market on the part of the buyers and sellers alike. However, some of the smallholder farmers could communicate with the customers through online marketplaces and sell their produce without risking COVID-19 infection. In this way, the threat of misinformation was tackled with the help of ICT.

**Diversification:**

COVID-19 brought about diversification in crop variety, extension services, and marketing process. Younger and more educated smallholder farmers were interested in cultivating newer varieties of fruits and vegetables. YouTube videos played a significant role in disseminating new knowledge. Both government and non-government extension workers started programs to familiarize ICT-enabled communication techniques to be connected with the farmers. On the other hand, smallholder farmers began to think about moving their products towards customers' end by themselves instead of relying on the intermediaries. The lead farmers guided the others to accumulate their small portions of crops, place ads in Facebook Marketplace, and deliver those to customer doorsteps.

The fourth component of Gigler's Informational Capability Framework is ICT capability which refers to a person's ability to effectively use ICT tools and techniques like computer, smartphone, social media etc. In the conversation with key informants, it was found, many smallholder farmers who considered smartphone and internet connectivity to be unnecessary expenditures bought their first smartphones during the COVID-19 period. These devices helped their kids attend online classes, and at the same time they could get connected with friends, colleagues, extension officers, and potential customers. In this way,

the pandemic played a catalytic role in enhancing ICT capability of the smallholder farmers which paved way to better access to market.

Multiple rounds of revisions throughout the transcripts helped the researcher to come up with four underlying themes that determined ICT's role or impact on smallholder farmers' access to the market during COVID-19. The analysis resulted in four underlying themes arising from the interviews:

1. ICT use has a generational perspective
2. ICT use has a geographic/ regional perspective
3. ICT use has an infrastructural perspective
4. ICT is in a confrontational relationship with the traditional market system.

**Theme 1: ICT use has a generational perspective**

Several respondents stated that they believe the younger, more educated generation is more prone to using ICT in agriculture compared to the aged farmers who are mostly illiterate. Here is what a non-government extension officer said:

> *Almost every farmer in the region has mobile phones. However, access to and use of smartphones is primarily limited to the younger generation of farmers. In comparison, aged farmers have very little to almost no access to smartphones. … In terms of personal computers again, smallholder farmers usually have very little access to such devices through their children going to schools in the cities. (R2)*

A senior farmer from the study area supplemented her notion:

> *I can't say all are using these technologies nowadays. A small portion of the younger, progressive farmers (referred to as lead farmers) have access to ICT through smartphones. (R10)*

They also observed that many families having school-going kids bought their first smartphone during the pandemic to ensure their kids could attend online classes. For example, one of the local farmers commented:

> *People of my age (around 45 years) usually can't use smartphones properly, but younger people can. …my daughter who passed her school finals this year knows how to do many things on a smartphone which I don't know. … I don't know but my kids know how to use mobile phones for multiple purposes. … a few days back I found some leaves were turning red in my watermelon field, and my daughter took some pictures which I showed experts in the agriculture office for advice. … As the pandemic hit, and restrictions were imposed on public gatherings, I bought two mobile phones – one basic phone for myself and one smartphone for my daughter. Because we needed to keep in contact with people. Before COVID-19, we usually kept contact through face-to-face meetings. But the pandemic compelled us to rely on mobile phones. (R11)*

Some of the respondents commented that many university students, urban professionals, and foreign remittance earners had to return to their villages during COVID-19, and they used their ICT skills and devices to help seniors in farming. One government extension officer recalls:

> *One interesting thing happened (during the pandemic) when a good number of small entrepreneurs – basically students, and who lost their jobs, got back to their village homes and started using their ICT skills to help their families sell their produce online. (R9)*

A more elaborate account of this is found in the comment of another government official:

> *A large group of people lost jobs and had to come back to rural areas during the pandemic who ultimately began farming. These groups also include students and foreign remittance earners as well. They are generally well-educated, more enthusiastic, and better acquainted with the latest technologies including ICTs. … Especially, the newer generation of smallholder farmers is more active on YouTube and Facebook, which has resulted in diversified fruit cultivation. (R7)*

Respondents found younger generation of farmers was more interested and successful in online trading of agricultural products. A veteran farm journalist mentions:

> *Online markets were only accessed by the more educated and more financially stable farmers. Online cattle market grew in prominence because the farmers in this field are usually younger, financially sound, and more educated. … They attempted to sell their products using online trading sites like Facebook marketplace. (R1)*

This was supported by another government officer working in the agro-information services department:

> *…some smallholder farmers who have come to farming quite recently (i.e., during the pandemic) are rather better educated and know the use of technology far better than many senior farmers. (R4)*

It is evident that the pandemic caused a newer, younger generation to get involved in agriculture. This younger generation, unlike their senior counterparts, has education and better technological skills to utilize which helped many traditional farmers to cope with the market accessibility issues arising from COVID-19.

**Theme 2: ICT use has a geographical/ regional perspective**

Digital divide is still prominent in developing countries like Bangladesh where most of the ICT activities take place in urban/ city areas. On the other hand, people in rural areas lack the knowledge, skills, affordability, and connectivity to benefit from ICT adoption. It has been seen during the pandemic that most of the online market activities were centralized in urban areas whereas farmers in remote rural areas could not find any way to sell their products at a proper price. There was a farm journalist among the respondents, and he said in this connection:

> *Poultry farmers in urban and semi urban regions were another group (besides cattle market) benefitted by online egg markets. But those in rural areas were severely affected, some of them went bankrupt. (R1)*

Another respondent who works for the government's agro-information services department indicated the digital divide:

> *There was a govt initiative, in 2009, to supply tablet computers, along with modems, printer, scanner, personal computers to the best farmers' groups in each Upazila, however, the use of those devices was not very widespread. Lack of interest and proper training is a major drawback. (R4)*

The two local farmers who participated in the interview also had a common view on this topic:

> *Not all, but a few people have smartphones. Around 2 households among 10 have smartphones. Other than this, almost all have basic feature phones… Only one house in our village has a (laptop) computer which belongs to a young boy who studies in the city. (R10)*

> *Smartphones are not quite available; you can find only 2 out of 10 people having their own smartphones. Only one or two persons might have personal computers at home. (R11)*

However, a contrasting image was presented by the other government extension officers. An extension officer (R3) working in the region for the last 5 years mentions she has seen "2 to 3 persons in every family have access to smartphones".

**Theme 3: ICT use has an infrastructural perspective**

Transportation and other related infrastructure like storage and processing facilities are equally, if not more, important to build up and take care of besides ICT infrastructure in

developing nations like Bangladesh. Crisscrossed by hundreds of rivers, many regions in the country still lack proper road connectivity. This negatively affects smallholder farmers' access to markets. Both of the local farmers pointed out this issue:

> *We have infrastructural problems as well for which we lose profits. Transport vehicles could reach our village if there was a bridge over the river. (R10)*

> *When the pandemic struck, there was a scarcity of agro products resulting in price hikes. However, we could not take advantage of the high price because of the lack of transport and communication with the potential buyers. Every farmer – large or small – suffered the same ordeals (during the pandemic). The challenge of reaching crops to markets was true for all. (R11)*

One of the government extension officers shared her views in this respect:

> *(During COVID-19, smallholder farmers) had to face both financial and connectivity challenges. Usually, local farmers never like to take their unsold products back home. So, transportation and communication were the biggest obstacles smallholder farmers faced during the pandemic (by selling products at whatever price they got). … Lack of storage and processing facilities can also be the reason. (R6)*

Another colleague from the same department supported her opinion:

> *Transportation was one of the main obstacles alongside the lack of cold storage. As a result, a huge quantity of crops was damaged. … We have an acute shortage of cold storage, and this problem became magnified during the pandemic months. (R3)*

A respondent (R9) working in the government's agro marketing directorate and having the longest experience working in this sector talked about the scarcity of proper crop collection points in rural areas and suggested building up roofed collection points to save products and farmers from harsh weather conditions.

One respondent working for an international NGO pointed at a different type of infrastructural problem:

*Our (cellular connectivity service) providers are still incapable of offering reasonably priced internet packages to smallholder farmers. … Both cost and network/ connectivity act as limiting factors for smallholder farmers. (R8)*

**Theme 4: ICT is in a confrontational relationship with the traditional market system**

In a multi-layered market system like in Bangladesh, ICT has to confront and overcome major challenges coming from market intermediaries. Marketing channels for agricultural products in Bangladesh are considerably longer and generally include several layers like wholesalers, stockers, retailers, transportation services workers, etc. If the farmers and ultimate consumers lean towards an ICT-enabled online market system, this huge population engaged in the market system might become jobless. A smallholder farmer shares his experience:

*Before the pandemic hit, we used to have contact numbers of a few wholesalers whom we usually contacted over the phone. During the pandemic, everything changed, and we had no contact with the wholesalers. … this went on for almost 3 years, and we incurred a huge loss. … Very recently some of those wholesalers have started again to send a truck or two, and we are hoping the situation will improve day by day. And we are still communicating over the phone for market accessibility. (R10)*

Another respondent who is a market system expert and working in the government's directorate of agro marketing (DAM) commented on this:

*Crop market in Bangladesh is mainly controlled by syndicates of middlemen who collect products from local farmers and transport those to bigger centralized markets. During the pandemic, transportation and other related services like hotels were closed, which created unprecedented obstacles for smallholder farmers (in market accessibility). (R7)*

Another senior market system expert and DAM official, however, pointed out a problem with the mindset of the smallholder farmers that causes obstacles in the way of ICT use in market accessibility:

> *I saw a rise in the number of small-scale entrepreneurs who were trying to collect products from the smallholder farmers and deliver those to consumers' doorsteps. Interestingly, most of those initiatives failed to continue after the pandemic was subdued; this could be because people in this part of the country are traditionally extremely social, and they love to meet others face to face and gossip. … ICT alone has limited prospects, at least from a Bangladeshi perspective, in solving market accessibility problems of the smallholder farmers; it could rather be a helping hand for a group of farmers in communication with the middlemen or customers. (R9)*

This respondent continues to say that about 4 million people are directly involved in the market system as intermediaries, and if ICT is promoted as a means of better profitability and market access for smallholder farmers, these intermediaries would be jobless and become a burden on the society.

There were, however, contrasting views regarding the use of ICTs and market intermediaries as well. Interestingly, respondents employed in non-government organizations (NGOs) saw ICTs in a more positive light than their counterparts in government organizations. A local NGO official recollects:

> *During COVID-19, it was evident that ICT can play a significant role. There are several online market platforms in the country like Chaldaal.com, and Pandamart.com that sell perishable products, and local smallholder farmers need to get more access to these platforms. (R2)*

She has been supported by another respondent who has long-term experience of working in an international NGO:

> *The online markets that grew out of necessity during that (pandemic) period are still functioning. Many experts used to consider online markets to be highly ambitious in*

*our country's context, but it has proved to be a reality now. …As a market system expert, unlike many others in the development field in our country I don't see the intermediaries as a challenge to overcome… with the help of ICT, these intermediaries would have no reason to exist in the system other than becoming a part of this system, for example, by providing ICT solutions. ICT should not be seen as a barrier but rather as a blessing. (R8)*

**Analysis of the Data**

The free version of the qualitative data analysis software named Taguette was used to attach codes to the interview transcripts. Coding is a process in qualitative data analysis in which 'some aspect of the data is assigned a descriptive label (or codes) that allows the researcher to identify related content across the data' (n.d., 2020). A total of 20 different tags were created to codify all the transcripts:

**Table 4: Tags and frequency of appearance**

| Sl. | Tag | Frequency | Sl. | Tag | Frequency |
|---|---|---|---|---|---|
| 1 | COVID challenges/ impacts | 53 | 11 | ICT training | 19 |
| 2 | COVID initiatives | 57 | 12 | ICT tech | 36 |
| 3 | Collective approach | 10 | 13 | Info platforms | 26 |

| | | | | | |
|---|---|---|---|---|---|
| 4 | General suggestion | 15 | 14 | Info source | 36 |
| 5 | ICT access | 75 | 15 | Interviewee profile | 13 |
| 6 | ICT capability | 67 | 16 | Large scale farmer | 8 |
| 7 | ICT mindset | 11 | 17 | Lead farmer | 15 |
| 8 | ICT prospects | 50 | 18 | Market accessibility | 47 |
| 9 | ICT recency | 10 | 19 | Market intermediaries | 25 |
| 10 | ICT tools | 36 | 20 | Smallholder issues | 42 |

The specific research method applied here to analyze collected data is termed as Thematic Analysis (TA). Virginia Braun and Victoria Clark, in their book chapter, entitled *Thematic Analysis* proposed a six-phase procedure to carry out TA for any qualitative research which was followed in the current research (Clarke & Braun, 2021). Here are the six phases for analyzing qualitative data:

> Phase 1: Familiarising with the data: Usually done by reading and rereading the textual data which is the interview transcripts in this case.
>
> Phase 2: Generating initial codes: Codes, as 'building blocks of analysis', provide a summary or describe the data.

Phase 3: Searching for themes: A data reduction process, where the researcher actively reviews the codes to identify similarities or overlaps and clusters them as unifying themes.

Phase 4: Reviewing potential themes: It is a kind of quality check where the researcher goes through the whole code set to further refine themes to avoid redundancy.

Phase 5: Defining and naming themes: Here the researcher clearly states the uniqueness of the theme(s) in such a way that they have a clear singular focus, are related but not redundant, and address the research question(s).

Phase 6: Producing the report: In the final stage, themes form a descriptive framework in relation to the conceptual framework and research question(s).

Consequently, the coded transcripts helped the researcher to come up with four underlying themes that determined ICT's role or impact on smallholder farmers' access to the market during COVID-19. The themes are as follows:

1. ICT use has a generational perspective
2. ICT use has a geographic/ regional perspective
3. ICT use has an infrastructural perspective
4. ICT is in a confrontational relationship with the traditional market system.

The capability approach, developed by the Nobel laureate economist Amartya Sen, focuses on evaluating individual well-being and development based on their capabilities, freedoms, and opportunities rather than merely on material wealth or income. The approach emphasizes the importance of enhancing people's capabilities so that they can achieve things they value doing/ being (Gigler, 2011).

In light of Sen's capability approach, Sören Gigler proposes a framework or concept that tries to establish ICT as an agent that enables individuals to achieve more progress and

enjoy more freedom- ultimately bringing about real human development. Informational capabilities – as Gigler terms this concept – refers to a person's capacity to turn information into a valuable asset – by gathering, sorting, analyzing, evaluating, and finally using that information effectively.

Gigler's informational capability framework has four components – informational literacy, ICT capability, communication capability, and content capability – which have implications for the market accessibility of smallholder farmers. Here's how these components can relate to their market accessibility, especially during emergencies like the COVID-19 pandemic:

1. Informational Literacy: A person's ability and skills to 'find, process, evaluate, and use' needed information is crucial for any successful endeavor (Gigler, 2011, p. 08). As smallholder farmers in Bangladesh generally lack formal education, they have to rely mostly on traditional knowledge and their own experiences for solving farm-related issues. However, with the help of ICTs, they could have access to the vast domains of updated knowledge spanning from agricultural best practices like crop selection, integrated pest management, and weather-smart farming, to marketing policies and strategies like demand-supply analysis, competitor analysis, target marketing, setting unique selling propositions for products, etc. All these help to remove barriers to market accessibility.

2. ICT Capability: The most significant benefit of ICT capability – as it denotes the possession of, and skills to use, digital tools and techniques – is its ability to overcome the barriers of time and space. With the help of ICTs, advisory services are available 24/7 round the year, and online marketplaces are spread over the whole world without any physical intervention. Thus, accessing markets could no longer be challenged by pandemic-infused movement restrictions.

3. Communication Capability: Smallholder farmers need to access the markets both as buyers (for agro-inputs like seeds, fertilizers, machinery, etc.) and as sellers (of their produce). Proper market access, hence, requires a two-way communication channel.

As communication capability denotes a person's ability to communicate in informal and professional settings, proper orientation with ICTs like smartphones, the internet, and social media platforms could help smallholder farmers understand customer needs, manage expectations, nurture relationships, and thus remove obstacles in market accessibility.

4. Content Capability: Digital content like product images, audio-visual clips, nutritional and safety disclosures, certifications, etc. create a positive impact on customers. Regular updates in social media platforms and online marketplaces could help smallholder farmers connect with customers more effectively, tailor their product offerings, and overcome market accessibility problems.

With the application of ICTs, Farmers could access market information, leverage digital tools, communicate effectively, and promote their products, thereby enhancing their ability to reach and engage with markets more effectively. These capabilities would enable farmers to make informed decisions, expand their customer base, and improve their market competitiveness.

**Discussion**

From the preceding discussion, a new conceptual framework could be drawn to relate smallholder farmers' use of ICT for better market access with four conditions or determinants: infrastructure, mindset, existing market system, and location. All these elements, on the other hand, are broadly associated with, and determined by, the overall socioeconomic context of the country.

Some other findings were not significant enough to emerge as themes but are worth mentioning here. Firstly, there was a significant difference in perception among government extension officers and smallholder farmers regarding access to or possession of smartphones. Whereas extension officers think that smartphones are widely available, or almost half of the households have at least one smartphone in their possession, the

smallholder farmers interviewed gave a contrasting view saying smartphones are very rare, and only 2 among 10 households may possess one.

Another contrasting view is found concerning the position of market intermediaries. Some of the respondents hold the view that intermediaries are an integral part of the long value chain which is essential for the smallholder farmers' access to market. They also worry about the fate of the huge number of intermediaries if ICT is going to replace them. However, other groups of respondents hold different views regarding intermediaries. They believe that ICT is the final solution for future day's market accessibility. They also believe that intermediaries can find themselves fitting in the changed scenario, for example by providing ICT-related services and solutions to farmers and customers.

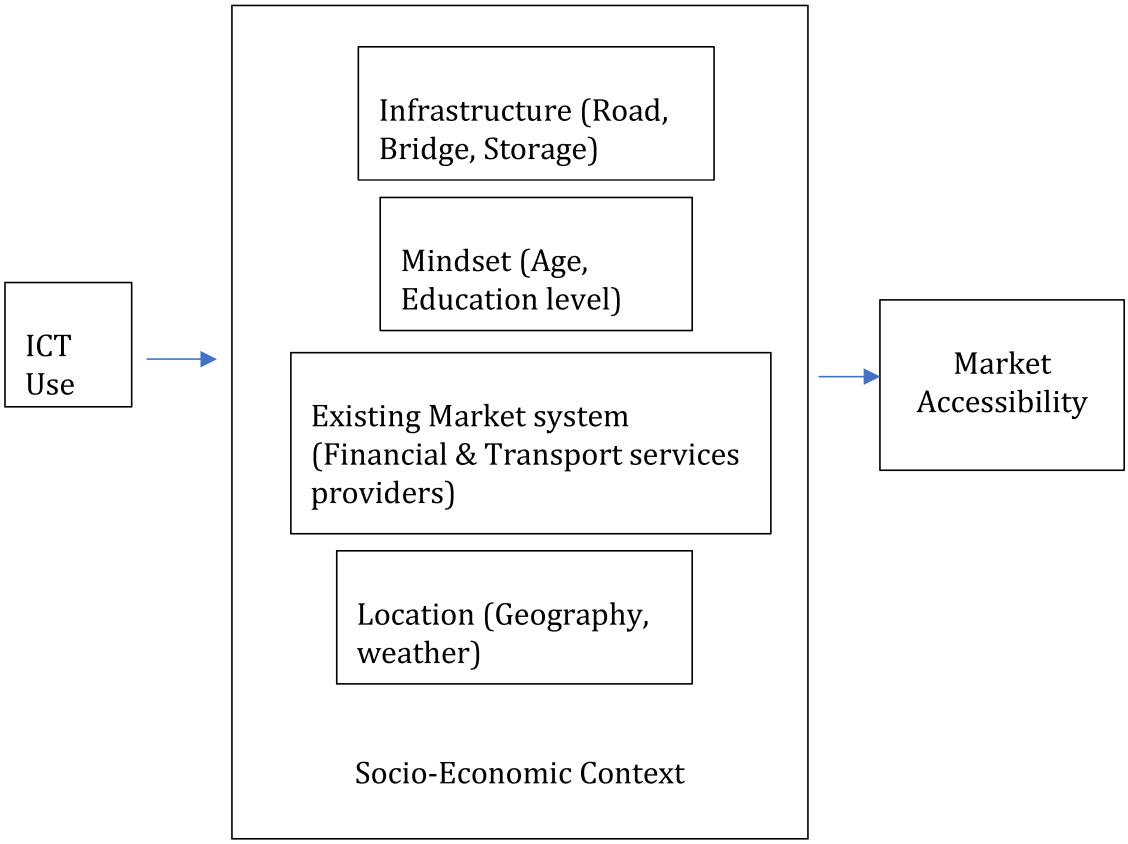



Figure 3: Determinants of ICT use for market accessibility

## Limitations and future implications of the research

The current research is based on the evaluations of key informants from a specific region of the country. A larger sample taken from a wider geographic context may bring about newer perspectives on ICT use in solving smallholder farmers' market accessibility issues. On the other hand, crop-specific studies might be more helpful in sorting out problems and finding solutions.

## Lessons for the policy makers

This research focused the impact of informational capability on the smallholder farmers' access to the market during the COVID-19 pandemic. More precisely, it tried to explore the challenges and opportunities of using ICT in rural Bangladesh to enhance market accessibility amid the movement restrictions of the pandemic. Evidence from the literature review and thematic analysis of the interview data project some policy interventions that could be of interest to the law makers. Here are some lessons and way-outs for the development policy makers of the Global South:

- Physical infrastructure – road connectivity, bridges, processing and storage facilities – is equally, if not more, important as digital or ICT infrastructure. This is particularly relevant for the developing countries where the smallholder farmers are resource-poor in terms of land holding, general education, and bargain capacity.

- Changing mindset through awareness build-up programs – both on national and local levels can be a game changer. Respondents in the study region tend to bypass technology, especially in farming-related issues. One reason, as came out of the interview, could be the close-knit society where people prefer seeing each other face to face over virtual meetings. Mass awareness programs, including making ICT tools and apps farmers-friendly could change the scenario. For example, rugged, weather-proof smartphones along with image-based apps could be more popular for illiterate farmers who work the whole day in open fields, under the sun and rain.

- Keeping costs affordable could be another priority. As came out from the interview, high overhead costs of smart devices along with recurring maintenance costs demotivate smallholder farmers to start using ICT. A recent study done by the Bangladesh Bureau of Statistics shows that '48.2% people find internet expensive and 35% of the people consider internet usage tools expensive' (TribuneDesk, 2022) .

**Summary**

Key findings from the analysis of data show four underlying themes help explain smallholder farmers' access to the market during the COVID-19 pandemic with the use of ICTs. Younger and better-educated people use ICTs more than illiterate seniors. ICT use for market access is more evident in urban areas where the Internet and other ICT establishments are available. Participating in the market is also influenced by the availability of infrastructural support like bridges, road communication, storage and processing facilities, crop exhibition facilities, etc. Finally, the existing value chain dominated by market intermediaries is a major obstacle to smallholder farmers' access to markets.

A couple of other findings are also mention-worthy. One is regarding a difference in perception regarding the possession of smartphones by smallholder farmers. And the other is about the relative importance of market intermediaries.

With all these results and findings, the study now proceeds to the final chapter to make some concluding remarks along with directions and implications of the current research for future researchers.

## CHAPTER 5: CONCLUSION

### Introduction to chapter

Information and Communication Technology (ICT) is an ever-evolving sector. With its evolution, it is continuously reshaping almost every aspect of people's lives from education, health care, business, and entertainment, to interpersonal relationships. ICT, in Tamukong's (2007, p. 04) words, 'is a generic term used to express the convergence of technologies and information services.' Since communication is at the center of whatever people do, and technology is taking up a role as a mediating factor, studying or understanding communication without technology nowadays is almost impossible.

On the other hand, data or information in the new millennia is introduced as 'new oil', though in a slightly expanded intonation from what the British mathematician Clive Humby originally meant in his speech back in 2006. Data, like the crude, is raw, valueless, and unusable until it gets extracted, refined, and channeled through proper media to be used in the value-generating activity. As Jon Suarez-Davis writes, in the new data-centric economy, it should focus 'less on simply exploiting a resource, and more on building equitable and sustainable relationships consumers' (2022). 'Right to information and knowledge is an important entitlement and its absence can be a contributing factor to poverty' (Gigler, 2011, p. 10).

With the above-discussed understanding, this research aimed to study smallholder farmers' access to the market by projecting Informational Capabilities – access to and ability to use ICT in a meaningful way – as an essential precondition. The particular research question that the study tried to answer was to examine the challenges and opportunities that ICTs pose to smallholder farmers regarding access to the market in Bangladesh during COVID-19.

This concluding chapter is structured as follows: the introductory part leads to a summary of findings and contextualizing those in the field of knowledge, followed by directions and implications for research in the future. Finally, a conclusion formally ends the chapter as well as the report.

## Summary of Findings

The Key findings of the research are four underlying themes that were discovered through thematic analysis of the interview transcripts:

Finding 1: ICT use has a generational perspective. Younger, more educated generations of smallholder farmers have better access to, and more interest in, using ICT, which resulted in their wider access to the market during COVID-19.

Finding 2: ICT use has a geographical perspective. Most of the online marketing activities using ICTs during COVID-19 were centered in urban areas due to the availability of better ICT facilities like networks, electricity, smart devices, etc.

Finding 3: ICT use has an infrastructural perspective. Infrastructures like road communication, bridges, storage, and processing facilities play a major role in determining market accessibility. For example, it was shared by respondents, that many smallholder dairy and poultry farmers had to dispose of their produce because of the lack of cold storage.

Finding 4: ICT is in a confrontational relationship with the traditional market system. In a long value chain dominated by intermediaries, ICT has to fight for its place in the market. Some market system experts say ICT will render a huge population jobless who earn their livelihood from this sector. There were opposing views as well which see market intermediaries as evolving with the necessity, like taking up ICT services and solution provider roles.

## Findings in Context

As was discussed in the literature review chapter, this research is unique in terms of the research question it tries to answer. Available empirical studies either tried to focus on ICT useability in agriculture in general or by smallholder farmers in particular. No research has yet been done keeping in mind the market accessibility of the smallholder farmers.

At least one recent article confirms this lack of available studies in this particular field: 'There are a lot of research conducted on online marketing but studies related to agricultural products counted few and the research based on the possibilities of online marketing of agricultural products were rarely found'(Ajitha et al., June 2021, p. 95).

Therefore, the current research is expected to make a foundational contribution to a field of research considered important by many but neglected by all.

**Future Direction**

No research can answer an ongoing query in its entirety. Likewise, this current study also has some limitations along with unresolved questions.

Firstly, the number of key informants for this research is very limited. The researcher contacted 17 respondents with an initial plan of interviewing at least 15 respondents. However, at least four of them did not/ could not show up in the online interview. Finally, the audio files of the two interviews failed to be processed and saved due to technical difficulties. Ultimately, the respondent number stood at 11 which is below the required standard number of 15 to 35 (Kumar, 1989).

The second limitation has more to do with the scope of the research as the sample of the study represents the whole smallholder farmer community. However, it is evident, that further studies with more focused sample groups may generate insights significantly different from this current study. For example, similar studies should be done on the market accessibility of farmers producing different crops like vegetables and fruits, food crops, cash crops, and poultry and dairy products.

While analyzing the interview transcripts, one question remains unresolved: a huge perceptional gap between government officials and smallholder farmers regarding access to or possession of smartphones. While government officials' idea sounds very optimistic that most of the smallholder farming households have at least one or more smartphones,

farmers think this number is not very impressive, saying only one or two households in every ten might have smartphones.

## Conclusion

The current research tried to examine the impact of ICT on smallholder farmers' access to the market during the COVID-19 period in the southern part of Bangladesh. In other words, it tried to find answers to what opportunities and challenges smallholder farmers in Bangladesh face regarding accessing both input and output markets, and what role ICT plays in that.

The researcher asked these questions to several key informants who are closely related to smallholder farmers in the particular region and analyzed their responses under the guidelines of thematic analysis. Applying an inductive or bottom-up approach to this analysis (which could mean loose threads of ideas tied together to form a rope of theory: researcher's conceptualization), four underlying themes were discovered in relation to the research question.

In simple terms, these themes indicate factors, or conditions, that determined the use of ICT in market access by smallholder farmers in Bangladesh during COVID-19. The overall findings of the research can be summed up in one unified hypothesis: Younger, more educated generations of smallholder farmers close to urban regions were more capable of accessing markets directly bypassing market intermediaries where there were sufficient infrastructural support facilities.

The answer to the question of whether this hypothesis could be tested on a larger population, analyzed with the help of proper mathematical and statistical rigor, and proved to stand out as a theory is: "It Depends!"

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**Informed Consent Form**

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**PARTICIPANT CONSENT FORM**

**Title of Study:** Impact of Informational Capabilities on Market Access for Farmers during COVID-19: A Study in Bangladesh.

**Contact Information**

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You are being invited to take part in a research study. Before you take part, a member of the study team is available to explain the project and you are free to ask any questions about anything you do not understand. You will be given a copy of this form for your records.

**Why are you being asked to take part in this research study?**

You are being invited to take part in this study because of your leadership and your experience in the farming community. Informational capability has a significant impact on farmers' access to the market, however farmers' informational capabilities vary on the basis of their financial and other resources which is why they need extraordinary efforts to cope up with emergency situations. The purpose of this research is to explore those extraordinary efforts that enabled smallholder farmers in Bangladesh to access market during COVID-19.

**What is the reason for doing the study?**

As already specified, the researcher will try to explore how the smallholder farmers in Bangladesh accessed markets during COVID-19, and what role Information and Communication Technology (ICT) played in that. Moreover, this study will also try to focus on the ways smallholder farmers' use of ICT is different from that of other mid-scale and large holder farmers in the region.

**What will you be asked to do?**

You are being invited to take part in an interview. The interview will be a one-on-one, online conversation of around 45 to 50 minutes, and based on a set of questions supplied to you at least 3 (three) days prior to the scheduled date and time. For this online interview, we will use ZOOM/ Google Meet platform. Please do not worry if you do not have access to an internet-connected device; I will arrange for that by a friend/ associate.

The full interview session will be digitally recorded, and your spoken words will be transcribed (written in text format) for analysis for the research purpose. I respect your

privacy, hence if you wish, you may switch off your device camera; only your spoken words will be recorded. Even after I transcribe the audio, I will send the text document as email attachment for you to have a look into and confirm for correctness. However, since I'll have a strict deadline to submit the research paper to the university, I would request you to confirm correctness within 3 (three) days of receiving. I will consider it to be correct if I do not get any update after the specified period (3 days).

With your consent, study information will be stored in a secure data repository to facilitate future research.

**What are the risks and discomforts?**

You are unlikely to experience risks or discomforts by taking part in this research. As a part of the research interview, your opinions and ideas may become known to a broad community both in academia and in agricultural industry, so you are encouraged to contribute as much as you like. It is not possible to know all of the risks that may happen in a study, but as a researcher I have taken all reasonable safeguards to minimize any known risks to you.

**What are the benefits to me?**

While there may not be any direct benefit to you for participating in this research, results from this study may help me learn about the significance of ICT in smallholder farmers' market accessibility, and the findings may benefit others in future formulating policies and practices for farmers' adoption of ICT for agriculture.

**Do you have to take part in the study?**

Being in this study is your choice. If you decide to take part, you can change your mind and stop being in the study at any point until January 31, 2023. After that point I cannot remove you from the study because data will have been analyzed in full. To withdraw from the study please contact me, S M Asif Ur Rahman [smasifur@ualberta.ca] or my supervisor Dr Gordon Gow [ggow@ualberta.ca].

Even if you remain in the research study, you may choose to withdraw some or all of your responses by contacting either of the persons above by the same deadline (January 31, 2023). Individual interview transcripts will be sent to you via email, and you will have 3 (three) days to review the contents and remove, change, or withdraw anything that you like or do not like. We will be unable to withdraw data after January 31, 2023, because by that time data analysis will be completed along with the thesis paper mostly written.

**Will you be paid to be in the research?**

Being a student researcher, it is difficult for me to pay you for participation, but I will arrange for a light snack as a token of courtesy which my friend/ associate in Bangladesh will hand over to you on the day of the interview.

**Will your information be kept private?**

During this study I will do everything I can to make sure that all information you provide is kept private. No information relating to this study that includes your name will be released outside of the researcher's office or published by the researcher unless you give me your express permission. Sometimes, by law, I may have to release your information with your name so I cannot guarantee absolute privacy. However, I will make every legal effort to make sure that your information is kept private.

When your interview is transcribed, I will assign a pseudonym (fake name) to protect your identity. If you would like to choose your own fake-name, please say so in the interview. If you would like me to use your real name, please indicate this on the signed consent form on the last page of this document.

During and after analysis, electronic data will be password-protected and stored on a secure Google drive at the University of Alberta with the help of the research supervisor Prof Dr Gordon Gow. When not in use, paper copies of data will be kept with me in a locked cabinet.

The information from this study will be seen only by members of the research group. On occasion, this data will need to be checked for accuracy. For this reason, your data, including your name, may also be looked at by people from the Research Ethics Board at University of Alberta. As per the University of Alberta policies, this research data will be stored for a minimum of 5 years after the end of the study to facilitate re-use of the data by approved researchers. Any personal information (i.e., your name, address, telephone number) that could identify you will be removed or changed prior to sharing study data with other researchers. Any researcher who wants to use this data must have the new project reviewed by an ethics board and sign an agreement ensuring your confidentiality and restricting data use only to the approved project. Your data may be linked with other data for research purposes only to increase the usefulness of the data, as subject to scientific and ethical oversight as mentioned above.

**What if you have questions?**

If you have any questions about the research now or later, please contact S M Asif Ur Rahman at [smasifur@ualberta.ca] and/ or Dr Gordon Gow at [ggow@ualberta.ca].

If you have any questions regarding your rights as a research participant, you may contact the University of Alberta Research Ethics Office at [reoffice@ualberta.ca] or 780-492-2615 and quote Ethics ID Pro00125434. This office is independent of the study investigators.

**How do you indicate your agreement to be in this study?**

By signing below, I understand:

- That I have read the above information and have had anything that I do not understand explained to me to my satisfaction.
- That I will be taking part in a research study.
- That I may freely leave the research study at any time.
- That I do not waive my legal rights by being in the study

- That the legal and professional obligations of the investigators and involved institutions are not changed by my taking part in this study.
- That I agree to the data being stored as part of a data repository (where applicable)

**SIGNATURE OF STUDY PARTICIPANT**

_____ Pseudonym (if necessary)

Name of Participant

_____ _____

Signature of Participant Date

**SIGNATURE OF PERSON OBTAINING CONSENT**

_____ _____

Name of Person Obtaining Consent Contact Number

A copy of this consent form has been given to you to keep for your records and reference.

## Interview Script

: Hello, my name is Asif, and I will be conducting today's interview.

: First, I would like to thank you for participating in the interview and I hope we will be having a very informative conversation today.

: To begin with, I would like to know about you. Would you please tell us about your **connection** to smallholder farmers in Bangladesh? How are you related to agriculture? Are you an extension officer/ farm journalist/ farmer?

**ICT capability**: How much access do you think smallholder farmers have to ICT tools like personal computers, smart phones, tablet computers?

**Informational literacy**: How do farmers find necessary information regarding market price, demand and supply etc.?

**Communication capability**: Tell us something about the ways smallholder farmers communicate with family members and friends. How do they communicate professionally with extension officers, Govt. officers, market agents etc?

**Content capacity**: What do you think the smallholder farmers use the internet for? Do they create and share anything with others?

: Do you think, in general, smallholder farmers in Bangladesh face any **challenges** in terms of market accessibility for their produces? What about new challenges during the **pandemic**?

: What could be the **causes** behind those challenges? Tell us about **as many of them** as you can.

: What did smallholder farmers **do** during pandemic to market their products? Did you notice any extra-ordinary effort from them to overcome those challenges?

: Do you think smallholder farmers get **less access** to market compared to mid-scale and large farmers? Why or Why not?

: Do you think **ICT** can be used more in solving the farmers' problems of **market accessibility**? Why or Why not?

: Do you have any final comment or suggestion to make?

Thank you again for your time and cooperation!

Wish you have a nice rest of the day!