

Will Digital Revolution be Disruptive for the Inclusive Finance in Bangladesh? The Case of the Microfinance Industry

Uddin, Helal
Ritsumeikan Asia Pacific University

Munim K Barai
Ritsumeikan Asia Pacific University

<https://doi.org/10.5109/6622878>

出版情報 : Evergreen. 9 (4), pp.909-923, 2022-12. 九州大学グリーンテクノロジー研究教育センター
バージョン :
権利関係 : Creative Commons Attribution-NonCommercial 4.0 International



Will Digital Revolution be Disruptive for the Inclusive Finance in Bangladesh? The Case of the Microfinance Industry

Helal Uddin* and Munim K Barai

Ritsumeikan Asia Pacific University.

*Author to whom correspondence should be addressed:

E-mail: h-uddin@apu.ac.jp

(Received October 22, 2022; Revised December 12, 2022; accepted December 15, 2022).

Abstract: Large and small microfinance institutions or MFIs represent the face of Bangladesh's inclusive finance sector. They continue to play a significant part in providing the poor with access to financing that supports their economic improvement. But the digital revolution in the overall financial sector through Fintech and mobile banking has posed a significant challenge to the survival of the smaller MFIs in the industry, though several major players like BRAC, Grameen Bank, and ASA have incorporated both mobile banking and Fintech into their financial operations. This research aims to determine whether the introduction of mobile banking has proven to be a disruptive innovation and whether they would benefit from incorporating mobile banking and Fintech into their financial operations. The study finds that most small participants in the microfinance market already find that mobile banking is disruptive innovation. Although they would benefit from implementing Fintech and mobile banking into their business operations, they are severely constrained by the costs and human resource requirements. This paper proposes the consolidation of the financial activities of smaller MFIs through mergers to mitigate the threat of mobile banking and Fintech.

Keywords: Bangladesh, Disruptive Innovation, Fintech, Inclusive Finance, Mobile Banking.

1. Introduction

Arguably, microfinance has proven its worth as one of the most effective means to fight hunger, poverty, and low living standards among the poor in Bangladesh and the developing world¹⁾. Bangladesh, as a pioneering country in microfinance²⁾, has seen the massive use of this tool to give the underprivileged access to and inclusion in finance³⁾. Indeed, microfinance emerged to cover poor people, which banks and other financial institutions failed to reach due to remoteness and high transaction costs⁴⁾. As a financial product, however, the dynamics of microfinance have also undergone changes in the long years of its existence. For example, microfinance evolved from microloans and became the seed fund of social business ventures to sustain itself in a competitive market. Nonetheless, rapid technological advancements through FinTech and the digital revolution in the financial sector around the world have posed a direct challenge to the inclusive financial industry, such as microfinance. In fact, digitalization has become a buzzword in our daily lives, including all financial spheres.

The terms fintech and digitization are frequently used in business and finance. Moreover, financial institutions are far ahead of the rest of the service organizations as financial technology, or Fintech is a major innovation in

the financial industry. Indeed, Fintech has significantly changed the finance industry in advanced countries and around the world⁵⁾. In its definitional essence, "financial technology is concerned with building systems that model, value, and process financial products such as stocks, bonds, money, and contracts" (p.1)⁶⁾. Schueffel⁷⁾ defined Fintech as "a new financial industry that applies technology to improve financial activities.". Dorfleitner et al.,⁸⁾ have used "Fintech" to denote companies or representatives of companies that combine financial services with modern, innovative technologies. When it comes to digitization, Brennen and Kreiss⁹⁾ define it as "the material process of converting analog streams of information into digital bits." digitalization or digital technology not only changes the paradigm or structure of the business unit but also makes the service available to the maximum number of users or customers. So, Fintech is a process that combines technology with financial services to make financial products easier to reach and use by the customer.

Currently, a large number of studies are available that deals with Fintech, its advantage, disadvantages ^(74), 77), and its components that have been developed and introduced to help the financial industry. Crowdlending,

crowdfunding, and fundraising; blockchain, cryptocurrency, big data, mobile banking, neo-banking, digital wallets, InsurTech, etc., are a few examples. However, due to various security concerns and the shortage of appropriate infrastructures, the acceptance level of these products does differ in different countries. For instance, the U.S., the U.K., and Japan permit all fintech components in their financial markets without many restrictions. On the other hand, some countries like India and China have accepted a limited number of fintech components. In Bangladesh, however, the law only permits the use of mobile banking and crowdfunding (Inflow)¹⁰⁾.

Mobile banking is a highly adopted financial tool both in advanced and emerging economies. There were 8304 million mobile subscribers worldwide in 2019; 73 percent of mobile phone users were using mobile banking services. The dominant industry for mobile banking is mainstream banks and non-banking financial institutions such as pension funds, insurance companies, and investment companies. Bangladesh seems to have kept pace with the world when it comes to subscriptions to mobile phones and the use of mobile banking. By July 2021, there were 171.85 million active mobiles in Bangladesh, and mobile banking reached 107.02 million¹²⁾.

The expansion of mobile service in Bangladesh is helping users to make phone calls and short messaging services (SMS). Moreover, with the data revolution network revolution from 2G to 5G, a mobile device is good enough to do all the jobs that a PC can do; even higher education is provided through mobile devices¹¹⁾. Thus, the mobile phone is considered making a competitor to the personal computer in various features. Banks have already offered mobile banking services to their customers. As a result, the banking industry in Bangladesh has been able to reach remote areas where maintaining physical branches was almost impossible. Furthermore, operating such distant branches required high establishment or sunk costs. Thus, the introduction of mobile banking services and their broader adoption will have important implications for bankers and customers alike. How will this development impact the microfinance industry, which has remained a linchpin of inclusive finance in Bangladesh? This has become a big problem for the country because microfinance is still seen to help the economy grow.

During the pandemic, Bangladesh Bank, the central bank of Bangladesh, and the government provided the necessary facilities to the microfinance industry to offer mobile banking to their customers. Due to that initiative, a large customer base has been developed that has access to mobile banking and other fintech components. The Bangladesh Microcredit Regulatory Authority (MRA) has offered an idea of the size of this customer base. MRA reports that in 2021 there were 747 licensed NGO microfinance institutions with 20,955 branches serving 35.2 million customers in Bangladesh¹³⁾. However, a tiny

number of microfinance organizations, such as Grameen Bank, BRAC, and ASA, offer mobile banking services so far. That leaves most microcredit institutions outside of the Fintech adopter league.

About a quarter century ago, Christensen¹⁴⁾ warned that established companies could either become victims of disruptive innovation or answer the call. Given the future of Fintech and the growing popularity of mobile banking in Bangladesh, the question here is whether Fintech, specifically mobile banking, will prove to be a disruptive innovation for the country's microfinance industry. The main objective of the research is to answer this question.

This research attempts to find answers to all those questions and give the literature a new direction to discuss in the future. Based on the answer to the question, the study will investigate the impact aspect of the innovation. Finally, the study will explore how the microfinance industry can answer the call for disruptive innovation in mobile banking. This study used Christensen's disruptive innovation theory to determine whether Bangladesh mobile banking is disruptive or not, and it created a new framework by combining two prominent adoption theories, Roger's diffusion of innovation and Tornatzky and Fleischer's technology, organization, and ecological theories.

The paper has four more sections. Section Two includes a brief literature review. Section Three discusses the methodology for the theoretical development of the paper. The discussion and analysis of the results are done in Section 4. Section 5 concludes the paper.

2. Literature Review

Technological advancements in telecommunications and information technology have revolutionized the banking industry. The delivery of financial services has experienced significant changes during the past few years¹⁵⁾. Currently, the global banking industry has been becoming more turbulent and competitive. Every bank worldwide tries to attract new customer segments by offering advanced tech-based services and new strategies. That emphasizes building customer satisfaction by providing better products and services at their doorsteps at minimum costs. The financial system in Bangladesh is following the world trend. However, the extent of adoption of Fintech, and mobile banking in particular, in the microfinance industry is one specific issue worthy of examination in the context of Bangladesh. The literature review tries to give an overview of mobile banking and Fintech in the world and Bangladesh.

Fintech, or more specifically, mobile money and mobile banking, is one of the best e-finance platforms that added value in this digital age¹⁶⁾. Laukkanen and Kiviniemi¹⁷⁾ argue that mobile banking is a mode of banking interaction in which a bank connects with customers via a mobile device such as a cell phone, smartphone, or personal digital assistant (PDA). Shareef (p.54)¹⁸⁾ contends that "mobile banking is a specific type,

as well as an extension of certain functional features, of Internet banking where consumers can seek different kinds of financial services from banks using a mobile device under the wireless application protocol (WAP)." channels that used to offer mobile banking: direct telephone calls, short message service (SMS), mobile internet applications, and specific mobile apps¹⁹⁾.

Some studies focus on the FinTech adoption process. That includes Maroofi and Nazaripour²⁰⁾; McNeish²¹⁾ etc. Studies also tried to locate several theoretical models that had been applied in the current literature to analyze the customer adoption process of the new technology/service, such as the Technology Adoption Model (TAM)²²⁾, Theory of Planned Behavior (TPB)²³⁾, Unified Theory of Acceptance and Use of Technology (UTAUT)²⁴⁾, Task Technology Fit Model (TTF)²⁵⁾, and Diffusion of Innovation Theory (DOI)²⁶⁾.

Baabdullah²⁷⁾ analyzes the factors contributing to mobile banking use by Saudi customers. In a survey, he found that performance expectancy, price value, facilitating conditions, hedonic motivation, habit, system quality, and service quality significantly impact mobile banking use. Singh and Srivastava²⁸⁾ analyze the factors that influence the adoption of mobile banking in India based on the theoretical analysis of the six influencing factors: perceived ease of use, computer self-efficacy, social influence, perceived financial cost, security, and trust. Using a Likert scale questionnaire survey, they discover that all variables in the adoption of mobile banking in India are statistically significant.

Trust and comfort with modern technologies, financial literacy, and overall transparency influence the adoption of FinTech.

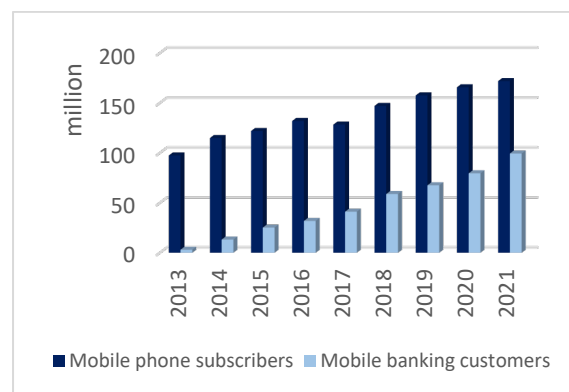


Fig. 1: Mobile subscribers and mobile banking users in Bangladesh.

(Source: Khatun, Mitra, and Sarker¹²⁾)

Fintech, especially mobile banking, has played an active role in Bangladesh's economy during Covid-19. It shows a positive outcome during the lockdown and shutdown period. A study by Khatun, Mitra, and Sarker¹²⁾ explains that mobile banking transactions such as cash in, cash out, P2P, P2B, salary and utility bill payments, etc., have significantly contributed to the rise in people's digital financial access during this pandemic⁷²⁾. Bala²⁹⁾ explores the satisfaction level of mobile banking in rural areas of Bangladesh. They conclude that mobile banking is very reliable in financial transactions, which helps increase user satisfaction. It was explained that mobile banking reached mass people through print and mass media. Nisha, Idrish, and Hossain (p.156)³⁰⁾ identified mobile banking in Bangladesh as a successful case. Their research mainly concentrated on mobile banking adoption by individuals.

The industrial adoption of Fintech has been highlighted by Varma³⁷⁾; Urumsah et al.,³⁸⁾ Matsepe and Lingen³⁹⁾; Najib et al.,⁴⁰⁾; Mu and Lee⁴¹⁾; Awa and Ojiabo⁴²⁾ and Mohtaramzadeh, Ramayah, and Jun-Hwa⁴³⁾. Varma reports the adoption of Fintech in SMEs, Yan et al.,⁷⁶⁾ concentrate on the banking industry, Jünger and Mietzner³⁵⁾ analyze financial institutes and Najib et al.,⁴⁰⁾ explore the food industry. An updated literature review has been presented in Table 1.

Table 1: Summary of selected studies

Author(s)	Year	The theme of the study	Adaptor focus	Key Findings
Mobile Banking				
Chuang, Liu & Kao ³¹⁾	2016	Mobile Banking	Individual	Mobile banking is easy to use, reducing the service charge significantly.
Singh and Srivastava ²⁸⁾	2018	Mobile Banking	Individual	Perceived ease of use, computer self-efficacy, social influence, perceived financial cost, security, and trust
Baabdullah et al., ²⁷⁾	2019	Mobile Banking	Individual	Performance expectancy, price value, facilitating conditions, hedonic motivation, habit, system quality, and service quality have a significant impact on to use of mobile banking
Daragmeh, Lentner, & Sági ³²⁾	2021	Mobile Payment	Individual	Risk, perceived usefulness, subjective norms, and perceived ease of use assists in adopting Fintech.
Deb, Deb, and Roy ⁷¹⁾	2019	Mobile Payment	Individual	Financial Cost, Perceived Security and Privacy, Convenience, and Network/Internet facilities

		Fintech		
Ryu ³³⁾	2018	Fintech	Individual	Legal risk has the biggest negative effect, whereas convenience has the strongest positive effect on Fintech adoption.
Tun-Pin et al., ³⁴⁾	2019	Fintech	Individual	The perceived ease of use, perceived usefulness, social influence, personal innovativeness, security concern, and perceived enjoyment influence the adoption of FinTech.
Jünger and Mietzner ³⁵⁾	2020	Digital Banking (Fintech)	Individual	Trust and comfort with modern technologies, financial literacy, and overall transparency influence the adoption of FinTech.
Abdul-Rahim ³⁶⁾	2022	Fintech	Individual	The perceived benefits significantly influence FinTech adoption in Malaysia.
Varma ³⁷⁾	2019	Fintech	SME	Perceived benefit is one of the determinants of the fintech adoption of Indian SMEs. Cost is not a determinant factor for fintech adoption.
Urumsah et al., ³⁸⁾	2022	Fintech	Firm	Customer pressure, competitive pressure, organizational readiness, top management support, and knowledge of information technology significantly influence Fintech adoption.
Matsepe and Lingen ³⁹⁾	2022	Fintech (A.I., cloud computing, and DLT)	Firm	Adopter traits, technology usability, industry characteristics, organizational leadership, characteristics, and factors were influential towards technology adoption.
Najib et al., ⁴⁰⁾	2021	Fintech	SME	Knowledge, safety perceptions, performance expectations, social influence, facilitation conditions, and price values affect FinTech adoption.
		Others		
Mu and Lee ⁴¹⁾	2017	Third-party payment (TPP)	Individual	Compare the factor(s) influencing adopting Fintech (TPP) between China and Korea and find that China is more concerned about cost and Korea is more concerned about security.
Awa and Ojiabo ⁴²⁾	2016	ERP adoption	Firm	ICT infrastructures, technical know-how, perceived compatibility, perceived values, security, and firm size are the main determinants of ERP adoption.
Mohtaramzadeh, Ramayah, and Jun-Hwa ⁴³⁾	2018	E-commerce	Firm	Cost of adoption, top management support, competitive pressure, and government support are the factors that affect the e-commerce adoption

Source: Constructed

Bangladesh started its mobile banking services in 2011 through a private bank (BRAC Bank), bKash. Since then, several banking and financial institutions have started mobile banking operations. Almost half of the mobile subscribers use mobile banking services (Fig. 1) throughout the country. When we analyze the adoption level of mobile banking, it shows an upward trend. Almost all banks included mobile banking in their service manual. In line with banks, some non-banking financial institutions and microfinance institutions offered mobile banking facility.

The literature has already revealed the rewards of digitalization and mobile banking; it allows microfinance to reduce their transaction costs and loan defaults rate at a minimum level; thereby, mobile banking increases the efficiency of MFIs.⁷⁴⁾ Even though MFIs in Bangladesh have highly benefited from mobile banking operations, Graham Wright, the founder of MicroSave Consultant, said the future of microfinance is either adopting Fintech

or dying. The world trend of digitalization also supports Graham Wright hypothesis. Still, only a few big MFIs took the initiative to adopt mobile banking in their service manual. But the rest, almost 99 percent MFIs, lag behind. Therefore, the question arises, why? It is high time to answer the question. Otherwise, a big number of microfinance institutions will go out of the market. The best knowledge of the researchers, literature only deals with the factors influencing to the adoption of mobile banking or Fintech considered at the individual level. Some research considered the benefits and obstacles of mobile banking in different industries. But research mainly concentrating on MFIs and Bangladesh is missing. Therefore, this research is an initiative to fill the current literature gap. In exploring the research question, current research assumes the following hypothesis.

Hypothesis 1: Mobile banking is a disruptive innovation for MFIs in Bangladesh.

Hypothesis 2: The adoption of mobile banking and Fintech will benefit the MFIs in Bangladesh.

3. Methodology and Theoretical Framework

3.1. Research Method

Several research methods could be applied to answer the research question, such as qualitative or quantitative. But this research follows a mixed methods approach. This research developed an analytical framework to accept or reject our first hypothesis (Fig 3). To tackle the second hypothesis, this research has developed another theoretical framework (Fig 4). The required data were collected from respected microfinance organizations and current literature.

3.2. Disruptive Innovations

The word 'innovation' is overly complex to express in words. The most prominent and accepted definition given by 'Innolytic.ag' as "Innovation is a process by which a domain, a product, or a service is renewed and brought up to date by applying new processes, introducing new techniques, or establishing successful ideas to create new value." Daft⁴⁴⁾ describes innovation as creating or adopting marketable innovative ideas. Kylliäinen⁴⁵⁾ introduced four types of innovations based on how new the technology is and how it affects the market: incremental, radical, sustaining, and disruptive.

Christensen¹⁴⁾, in his seminal work, discussed two types of innovations: sustaining and disruptive. Over time, sustaining innovation improves the current product's quality to retain highly demanding customers. On the other hand, disruptive innovation was seen as inferior because it serves the low-end or new niche customers. Here 'disruption' is deemed to be a process whereby a smaller company with fewer resources can successfully challenge established incumbent-related or non-related businesses. The impact of disruptive innovation is extraordinarily complex; one sector's innovation can threaten another industry. For example, there was no relationship between a mobile phone and camera film at the initial stage. However, as mobile phone features have advanced, they have become a mortal threat to the camera and film industries.

Baiyere and Roos⁴⁶⁾ explain disruptive innovation as an innovation that is regarded by existing market as unfit and unsuitable for its mainstream customers yet disrupts the business model of such companies. Therefore, Bower and Christensen⁴⁷⁾ mentioned that managers must be aware of ignoring innovative technologies that don't initially meet the needs of their mainstream customers. Because experience, market knowledge, and resources do not work in cases of disruptive innovation.

Christensen and Rosenbloom⁴⁷⁾ introduce disruptive innovation with the hard disk drive example. Every small disk drive is considered a disruptive innovation. Because small-sized disk drivers challenged and made the larger-

sized disk drives redundant, they went out of the market. They explain the theory in terms of two dimensions, performance and time. The historical and future expected performance of the current mainstream market is shown in line 'A.' It's a slightly upward-sloping curve. Over time, customers expecting more sophisticated performance, and the current suppliers work to meet customer expectations. This type of customer-sustaining innovation is known as sustainable innovation, even though sustainable customer expectations are very higher than the existing suppliers. But they have a minimum performance acceptance level. In Fig. 2, the accepted level of performance can be expressed as the line "A₁" below the line 'A.' If a new product or service meets the minimum customer expectation at a lower cost, customers are willing to accept new product or services⁴⁸⁾.

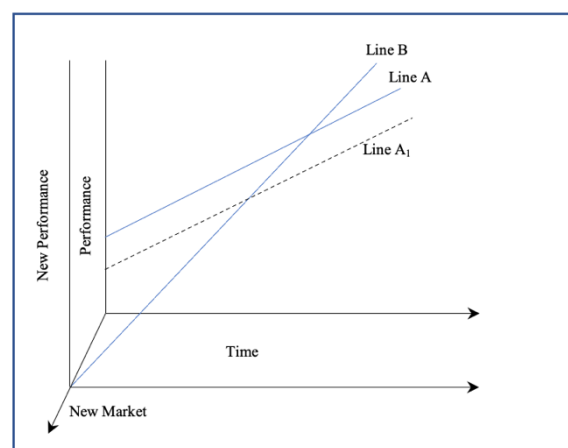


Fig. 2: Disruptive innovation model (Source: Dan and Chieh (2008)⁷³⁾)

Over time, disruptive innovation improves their performance and defines current market performance in their ways. This new performance measurement meets the customer's minimum expectation but can't compete with the mainstream firm. On the other hand, it is initially not considered fit to meet the current market performance at line 'B'. Therefore, it either serves a new customer segment (a niche market) or a lower-than-expected customer.

Table 2: Summary of keywords of disruptive innovation

Authors and Year	Keywords of Disruptive innovation
Thomond and Littice (2002) ⁵⁰⁾	Radical Innovation, Discontinuous Ownership
Govindrajan and Kopalle (2006) ⁵¹⁾	Underperformance, New feature Niche Market Simple and Cheap Low-end market entry
Hardman et al. (2013) ⁵²⁾	Ignore by the mainstream market Expensive Initial Low performance New value addition

	Market goes from Niche to Meso, and finally, Macro
Nagy et al. (2016) ⁵³⁾	Radical Discontinuous Low-end innovation
Clayto et al. (2015) ⁵⁴⁾	Low-end market Market creator Initial low performance

Source: Constructed.

In the literature, there have arguments and counter arguments when an innovative considered to be a disruptive. According to Christensen et al.,⁴⁹⁾, innovation can only be regarded as disruptive when it fulfills one of the two conditions: first, it originated in a low-end market. It moved upstream to higher-end markets, or it has to create a new market foothold. Table 2 is a summary of some of the most critical elements that have been said about disruptive innovation in the current literature.

The key characteristics of disruptive innovation fall under three heads: market, technology, and environment. Each category has one or more characteristics (Table 3). An innovation will be considered disruptive if it meets one or more characteristics from all three groups. For example, UBER Taxi introduced modern technology by introducing ridesharing, and as a result, the external environment, such as the government, introduced new institutions for that modern technology. However, UBER taxi entered into the mainstream market. Here, UBER meet Technology and Environment characteristics but it did not meet the market condition. As a result, we cannot consider the UBER taxi to be a disruptive innovation. Clayto⁵⁴⁾ also shows the same conclusion regarding the UBER taxi case.

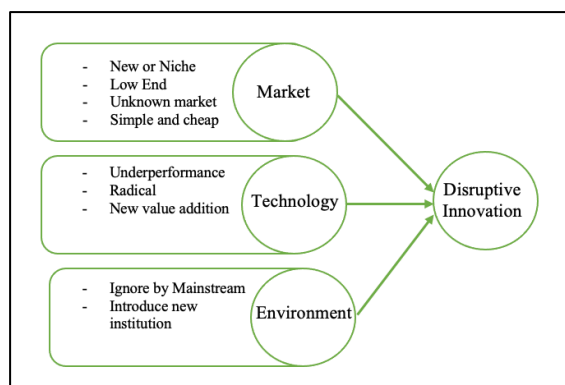


Fig. 3: Measuring Disruptive Innovation

3.3. Adaptation of Disruptive Innovation

The two prominent theories discussed in the literature when analyzing the adoption process of new technology or innovation. The first and most widely used one is called Diffusion of Innovation (DOI), introduced by Gabriel Trade in 1903. But the current model of diffusion of innovation theory we used was constructed by Everett Rogers. The DOI theory suggests that firms' innovative technology adoption is influenced by two factors: innovation characteristics and organizational

characteristics. Innovation characteristics include reliability, advantage, compatibility, complexity, trialability, and observability.

On the other hand, organizational characteristics include centralization, complexity, size, slack, formalization, and interconnectedness. The DOI theory didn't include the risk of new adoption. So, when Al-Jabri and Sohail⁵⁵⁾ used the diffusion theory to look at mobile banking in Saudi Arabia, they added new aspects of perceived risk.

The second adoption theory is called the Technology, Organization, and Environment (TOE) theory, introduced by Tornatzky and Fleischer in 1990 in their seminal work 'The Process of Technology Innovation.' The TOE postulates that an organization adopts an innovation based on three factors; first, the 'technology' defines the current technologies and technical expertise that the firm is currently using; second, the 'organizational' context refers to the current firm's internal strength and strategy, or as we can call it, its control environment. The third component, the 'environment,' is the external business environment over which the firm has no control, such as the industrial sector⁵⁶⁾. A group of researchers argued that TOE is the extended version of DOI⁵⁷⁾ and includes the environment as a key component in the adoption process. But TOE did not focus on the perceived risk in their adoption framework.

Gangwar, Date, and Ramaswamy⁵⁸⁾ conducted research to identify the determinants of cloud computing adoption using TOE methods. They classified relative advantage, compatibility, complexity, organizational readiness, top management commitment, and training and education as the main determinants of cloud computing. Awa and Ojiabo⁴¹⁾ explore the determinants of ERP adoption using the TOE Framework. They identified ICT infrastructures, technical know-how, perceived compatibility, perceived values, security, and firm size as the main determinants of ERP adoption. Cruz-Jesus, Pinheiro, and Oliveira⁵⁹⁾ explore the factors that influence the adoption of customer relationship management (CRM) software with the help of the TOE structure. Data quality and integration, top management support, competitive pressure, and technology competence influence the adoption of CRM. Varma³⁷⁾ identified that the benefits of Fintech significantly affected fintech adoption. Xie et al.,⁶⁰⁾ explored how individuals and organizations considered monetary costs when adopting recent technology.

Based on the above discussion, we have developed a new framework in Fig. 4 to access modern technology adoption behavior. The development has been done with the framework proposed by Kitamura⁵⁾. The main determinants of adoption can be categorized under three heads: relative advantage, ability to adapt, and awareness (possible cyber threat). Comparative advantage is the perceived benefit that an organization will receive after adopting innovative technology. This can be assessed by the perceived cost of operation, efficiency, and

accessibility. The firm's ability to adopt new technology can be evaluated by its current digitalization status, technical expertise, and available financial and human resources. The possible threat can be prevented by

offering proper data security, building strong trust with the customer, and taking appropriate action for uncertainty avoidance.

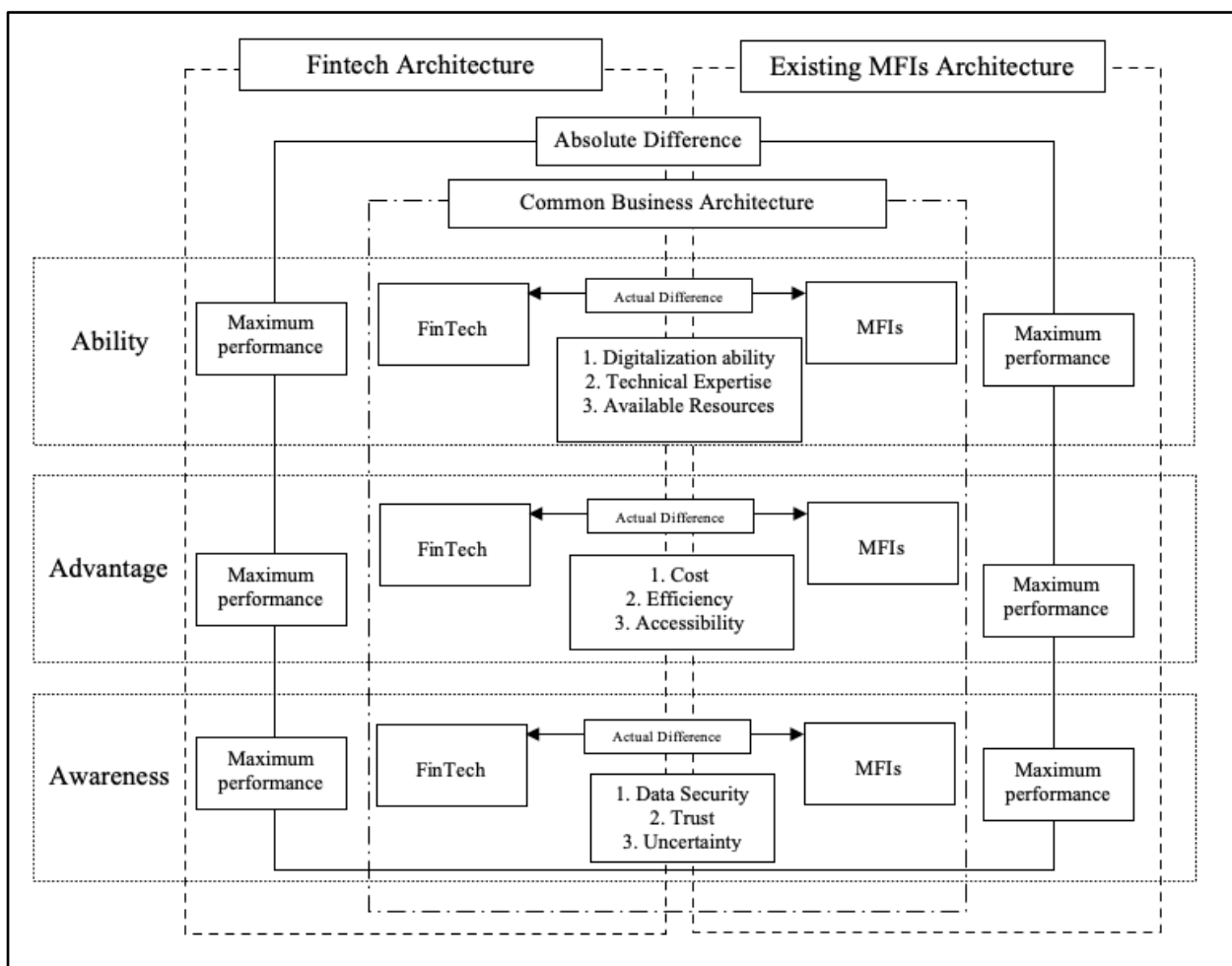


Fig. 4: Conceptual framework

4. Discussion and Analysis

4.1. Mobile Banking Industry in Bangladesh

Mobile banking started in Bangladesh in 2010 with the help of BRAC Bank and the GSM mobile service using USSD (unstructured supplementary service data) called bKash. Initially, it was considered unfit for mainstream customers; bKash targets unbanked and poor clients who remained far away from the formal banking industry due to force or self-restriction⁶¹.

MFIs in Bangladesh are working hard to cover all segments of the poor, but due to the policy and scope limitation(s), a good number of poor remain out of the financial basket⁶². Initially, mobile banking targeted those uncovered poor clients. For example, as presented in Fig. 4, the dotted line represents microfinance and its performance. Over time, MFIs have added new features like insurance, receiving remittances, and so on to meet the market's needs. What literature has been identified as sustaining innovation? When mobile banking was

introduced in 2011 by bKash, it did not attract mainstream markets such as bank and MFI clients. Initially, it was considered that mobile banking was not suitable for mainstream customers, such as general and corporate clients. But over the period, bKash and other mobile financial services have proven their service performance and become one of the mainstream banking operations in Bangladesh. It shows remarkable growth in Bangladesh, where, as of January 2022, the total number of mobile banking clients stood at 114 million (68.26% of the total population). It can take all unbanked and underbanked customers under the umbrella of mobile banking.

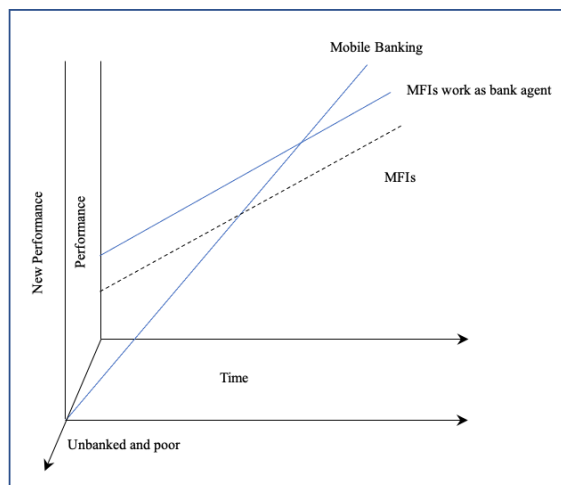


Fig. 5: Bangladesh mobile banking service

If anyone owned a mobile phone (cellphone or smartphone) with a subscription to a mobile operator, s/he could subscribe to mobile banking. The cost of adopting mobile banking is almost zero. The cost of sending money out is a bit high: 2 percent of the total. Therefore, some researchers considered it an entry into the high-end market. On the other hand, some researchers argue that except for cash-out, all other services, such as cash-in, cash transfer, shopping, top-ups, and payment of utility bills, are free of charge. Hence, it should be considered a low-end market entry.

There is no doubt that mobile banking changes the current market paradigm by introducing new technology, that a mobile device is sufficient to perform all banking transactions. This modern technology added new value to the individual customer and the mainstream banking industry. Bangladesh introduced a new regulation called the "Bangladesh Mobile Financial Services (MFS) Regulations, 2018" in 2018 to regulate the recent technology introduced in the new market. In 2022, the old regulation was replaced by the Bangladesh Mobile Financial Services (MFS) Regulations 2022.

Based on the above discussion and the framework presented in Fig. 3, we may conclude that mobile financial service is a disruptive innovation in Bangladesh. That also implies that we accept our first hypothesis, "Mobile Banking is a Disruptive Innovation in Bangladesh."

4.2. Response to the Disruptive innovation

The modern business model is an independent, interdependent activity where blending key resources with technology creates societal value. The nature of the modern business environment has changed compared to traditional businesses. It has now evolved into a rapidly expanding, highly dangerous, innovative ecosystem. As a result, firms continually redefine their market and business model. The business environment drastically changes in the era of digitalization. The entire disruptive innovation becomes old quickly, and the lifetime of new products and services becomes truly short.

Bangladesh is well-known to the world for the contribution of microfinance to economic development. Almost 746 microfinance institutions operate in Bangladesh. The country feels an emergency when it finds that traditional banks hesitate to cover unbanked and underbanked poor people due to distance and high cost. Now, different fintech components reduce the distance and transaction costs. As a result, the traditional banking industry became interested in covering the unbanked poor and underbanked population with more sophisticated services at the customers' doorsteps. For example, in December 2021, City Bank and bKash agreed to provide a microloan to their customer on demand. On June 2, 2022, Bangladesh Bank (Bangladesh's central bank) issued a notice to all scheduled banks to launch digital microfinance (disbursement via Fintech such as internet banking, mobile apps, mobile financial services, and e-wallets), and Bangladesh Bank also established a BDT 1 billion fund to facilitate digital microfinance. Hence, microfinance organizations, as incumbents, face pressure throughout their existence.

Fintech, such as mobile banking, is a disruptive innovation threat to incumbent microfinance organizations. Birkinshaw⁶³⁾ stated that when incumbents face disrupters, their natural response is to fight fire with fire. Frambach and Schillewaert⁶⁴⁾ explain that when incumbents face any innovation, they have two main ways to respond: full adoption or full rejection. Zach, Nicolau, and Sharma⁶⁵⁾ found that incumbent firms react to disruptive innovations in three ways: they can keep doing business as usual, adopt the innovation quickly, or embrace it later. Birkinshaw⁶³⁾ identified four ways to respond to disruptive innovations; double down, retrench, move away, and fight back.

The process by which incumbents use their resources to take over a new disruption or create an environment in which the disruptor faces a high barrier to market entry is known as doubling down. For example, when Disney faces threats from the online streaming industry, it acquires Pixar and Marvel. Retrenchment is a process that analyzes the weakness of disruptive innovation to make it more challenging to enter the market. For example, cryptocurrency is a threat to the traditional banking industry. As a result, several banks and financial institutions work with the central bank and policymakers to ensure that cryptocurrencies can't enter the local market. Move away is a strategy that identifies its strengths and moves forward with them in a new market. For example, Fujifilm moved to the healthcare, imaging, and materials firm industries when it faced its current crisis. Fightback is an approach incumbents take to update their policies against innovation. This process is also called adaptation. For example, the digital media challenged The New York Times, and in response, The New York Times created NYTimes.com.

In the case of Bangladesh's microfinance industry, what policy would be the best fit for them to survive in the new

business environment? In Bangladesh's microfinance industry, only a few microfinance institutions can fight against traditional banks. As a result, it's challenging for them to double down or retrench. Microfinance can't redefine its market, clients, and all related stakeholders to move away from the current market. The best approach for Bangladesh's microfinance industry is to fight back or, as we call it, adopt innovative technology. Hill and Rothaermel⁶⁶⁾ also conclude that incumbents must adopt modern technology for long-term survival. Adopting recent technology does not mean buying the technology and training staff; creating a value proposition for their stakeholders is also required. In such cases, incumbents must possess both knowledge and capabilities to adapt to innovations. Here the question is, to what extent is Bangladesh's microfinance industry ready to adopt Fintech in its organization handbook? And what kind of advantages did MFIs gain from using Fintech?

4.3. Fintech Adoption by Microfinance Industry in Bangladesh

Every organization is eager to extend its services to a wide range of customers in the competitive market environment. Banking and financial institutions are not an exception. Every day, financial institutions introduce new methods and products to their customers to retain and increase their customer base. Fintech helps financial institutions provide accurate and timely services based on customer demand. As a result, Shaikh and Karjaluo⁶⁷⁾ found, Fintech is among the latest in a series of recent technological wonders. With the benefits and success rate in mind, all financial institutions are rushing to adopt Fintech as soon as possible. But organizations must go through an adoption process based on how things are now and what the benefits will be in the future.

4.3.1. Related advantage of Fintech in the microfinance industry

Clearly, Fintech has accelerated financial transactions in the banking industry. Microfinance is not an exception. But before adopting Fintech, the microfinance industry must analyze the relevant advantage in terms of cost, efficiency, and accessibility. One of the primary motivations for MFIs to adopt Fintech is the transaction cost. Khanam¹⁰ explained that if microfinance uses mobile banking services for its customers, it can reduce its operating costs significantly. In one pilot project initiated by BRAC in 2017, BRAC reported that in their pilot project, BRAC saved around BDT 1.5 million (USD 179,000) only by digitalizing their reporting system⁶⁸⁾. Khanam¹⁰ also said that mobile banking could cut the cost of providing services to microfinance clients by 50%.

According to Hanouch and Rotman⁶⁸⁾, loan collection from one center, on average, requires two to two and half hours. It only takes 10 to 20 minutes if microfinance uses FinTech components in mobile banking. Instantly, Fintech (mobile banking) increases microfinance

efficiency by 6–7 times. In the same pattern, it increases cash management efficiency by 1.4 times and the efficiency of loan disbursement by six times. According to G.B. (2016), assessing clients' credit risk requires two weeks. The available data allows Robo-advisor to assess customer credit risk quickly. This multiplies the efficiency of microfinance. As a result, microfinance reassigns employees to explore new areas.

There is no doubt that FinTech reduces the world's distance. Within a few clicks, one can transfer millions of dollars from one part of the globe to another. Cryptocurrency fuels the speed of cross-border fund transfers; one can even transfer funds without exchanging local currency. In the same way, mobile banking reduces the national boundary. Within the national boundary, microfinance or a bank can reach any part of the country without any physical branch office (OECD, 2020). According to BRAC (2017), Fintech allows BRAC to offer microfinance services in some water-locked areas of Bangladesh, which was not possible before.

4.3.2. Ability to adopt Fintech by Bangladesh Microfinance Institutions

The digitalization scenario of Bangladesh's microfinance industry is not at a satisfactory level. Before taking any steps to adopt a new strategy, the organization must assess its adaptability. Organizations must keep a digital database with fintech components such as mobile banking, Robo Advisor, cloud finding, and digital wallets. UNCDF (2019) conducted one study with a sample of 16, 14 of which were from the top 25 microfinance institutions and the remaining two from the top 100. They found that 81 percent of microfinance used loan management systems, 75 percent used real-time web-based loan management systems, and only the big 4 microfinance (BRAC, ASA, Sajida Foundation, and Grameen Bank) developed their digital management system. By 2017, only three microfinance institutions (BRAC, Rural Reconstruction Foundation, and Sajida Foundation) had started pilot projects in digital field application (DFA) for loan origination and collection. UNCDF also revealed that the senior management of most of the small-sized MFIs lacks awareness and understanding of DFA and has no future or strategy to move forward.

Remarkably, except for a few big players like Grameen Bank, BRAC and Sajida Foundation, BURU-Bangladesh, etc., no microfinance organization is interested in adopting fintech components such as mobile banking, data analytics, and big data to develop credit-scoring and financial advisory models. Many microfinance managers considered blockchain irrelevant to the microfinance sector or too early to adopt it.

Another vital point to consider when assessing the capability to adopt Fintech is technical expertise. Without appropriate technical expertise, microfinance will become a disaster to adopt such a big strategy as Fintech.

Microfinance organizations are labor intensive; only 30% of microfinance firms have more than 100 employees and the rest have fewer than 100. Even if we dig in more, we see that 30 percent of microfinance has only 1–10 employees, and at least five people should be in the top management and the rest in operation. Getting technical experts becomes highly challenging for this small microfinance firm when the situation is critical.

Based on the website observation of the top 25 (based on branch and employee) microfinance organizations, we found all 25 microfinance organizations have their website, 21 microfinance organizations use their domain email address, and only 12 microfinance organizations have their I.T. department. If this is the situation of the top 25 microfinance institutions, then we can imagine the rest of the microfinance sector. Even a few microfinance companies own their I.T. department, but I.T. employees are limited, and some I.T. executives do not know about Fintech or big data. Current literature also explores that, in microfinance, technical expertise has no or extremely limited ideas regarding Fintech and blockchain⁶⁹).

Table 3: MFIs Branches, Employees, and Clients

Branch-Range	MFIs	Employee-Range	MFIs	Client-Range	MFIs
1-10	485	1-10	238	1-1000	61
11-50	136	11-20	134	1001-5000	366
51-100	34	21-50	106	5001-10000	63
101-200	19	51-100	162	10001-100000	156
More than 200	14	More than 100	48	More than 100000	42

Source: Microcredit Regulatory Authority, Annual report-2019

Another fundamental issue in finance is that every organization evaluates the cost and benefit, or in simple terms, net present value (NPV), before adopting a new strategy. If the result is positive, or sometimes in a non-negative situation, the firm agrees to adopt a new strategy. Fintech adoption requires a huge amount of investment. On the other hand, some organizations may adopt FinTech by merging with a third party. For example, BRAC first introduces mobile banking in Bangladesh by merging with bKash. Even though BRAC outsourced its mobile banking to bKash, it incurred a high cost. On the other hand, developing an application requires a considerable investment (from the U.S. \$65,000 to \$500,00). In contrast, most microfinance institutions cannot invest this money, especially the smaller ones.

Table 4: Cost of developing apps in USD

Type of Apps	The USA	Ukraine	India
Banking Apps	500,000	175,000	105,000
Investment Apps	180,000	60,000	30,000
Consumer Finance	240,000	80,000	50,000

Insurance Apps	300,000	100,000	75,000
Lending Apps	270,000	90,000	65,000

Source: <https://spdload.com/>

4.3.3. Related Awareness of Fintech

Data privacy and data protection are now global concerns. Several governments undertook the multi-billion-dollar project to protect their national privacy and security. For example, in the fiscal year 2021, the U.S. government proposed an \$18.87 billion budget for cyber security.

Several studies have been done and published to explain the cyber security situation in Bangladesh. Bangladesh, for example, is ranked second in the world regarding malicious infection, according to Security Bulletin 2015. According to Haque⁷⁰), in 2015, approximately 34552 mobile phones with Internet Protocol (I.P.) were infected; 69.55 percent were affected by the local virus, and 80 percent were affected by spam. The National Cyber Security Index was prepared by the Estonia-based e-Governance Academy Foundation, where Bangladesh placed 85th as a dangerous country among 188 countries.

The typical recurring news headline is cyber-attacks on different financial and governmental organizations. The primary motivation for a cyberattack is either to steal confidential information or to reap financial benefits. For example, a Burmese hacker attacked the Bangladesh National Defense College. A cyber-attack became a hot topic when Bangladesh Bank faced a heist of around U.S. \$81 million from Bangladesh's Central Bank. After the central bank attack, some commercial banks in Bangladesh also faced similar attacks on online banking and ATMs.

The recent technological development in the financial industry has become a big concern for policymakers and the public. A popular fintech component that has been used in Bangladesh is mobile banking. When a worm hacks a mobile, then the security of mobile banking becomes a big concern. A loss of trust in digital technologies (mobile banking) could prevent FinTech adoption. Even in the worst case, it can cause a bank run. Hence, the government is taking its time to adopt all fintech components.

Even though it is considered that there are significant risks involved in mobile banking, mobile banking operators adopt the Payment Card Industry (PCI) Data Security Standard (DSS) compliance framework to make this service secure. PCI DSS is an international security management policy, procedures, network architecture, software design, and other critical protective measures that secure personal information to protect and make a safe financial transaction platform over the internet and e-payments system. Moreover, most mobile banking institutions create public awareness through mass media communication not to share personal information such as

OTP, PIN, and National Identity (NID) information with a third party.

Although some giant microfinance companies are doing well in data management, most players in the industry have failed to acquire international standards. While mobile banking operators secure their databases to protect their customers by adopting international standards (PSI DSS), the scenario is not satisfactory in the case of the microfinance institute. Moreover, some MFIs maintain their data center but do not have a disaster recovery center. They usually maintain data backup at the data center on the same premises. In the event of a disaster or other unforeseen situation, these MFIs risk losing their entire database.

From the above scenario, we feel there is no way to adopt innovative technology in this advanced technological era. The same pattern also applies to microfinance. The future of microfinance is to adopt Fintech or die, said Graham Wright, the managing director of MicroSave.⁷¹⁾ In the case of Bangladesh, we observed a few giant microfinance organizations that had already adopted a few components of Fintech, such as mobile banking and digital applications. By implementing Fintech, microfinance has enormous potential to reduce costs and increase labor efficiency. They also have the scope to extend their services where a physical branch is impossible.

From the above discussion, we can conclude that the adoption of mobile banking will benefit the M.F. industry in several ways. Therefore, we are certain that we can accept our second hypothesis.

5. Conclusion

Microfinance and Bangladesh are considered synonyms of each other. The success of microfinance is acknowledged all over the world. The primary motivation of microfinance was to serve poor, unbanked, and underbanked customers by offering small loans and other financial services. However, recent technological development has reduced distance and increased efficiency. Moreover, Fintech has changed the paradigm of the banking industry. Financial organizations such as banks are accepting and adopting fintech components. One mobile device can perform all financial transactions in this digital age. In this era of digitalization, microfinance organizations worldwide, especially in Bangladesh, are far behind in the adoption process of Fintech.

This research finds that Fintech components, such as mobile banking, are disruptive innovations and threaten traditional microfinance organizations because mainstream banks now offer digital microfinance services to their customers. In these circumstances, MFIs must adopt Fintech, or they will become victims of this disruptive innovation. Based on our analysis, we identified that Fintech brings a significant advantage to MFIs. It will reduce their operating costs and improve

efficiency and productivity. Nonetheless, it requires considerable investment to adopt Fintech in its operations. Thus far, only a few microfinance firms have adopted Fintech. As Graham Wright said, the future of microfinance is either adopting Fintech or dying. If MFIs do not adopt Fintech on time, soon, they may disappear from the financial market, and many of their employees will become jobless.

Adaptability has emerged to be another major concern for small MFIs in particular. Indeed, only a few big microfinance institutions have been using digital applications. Due to the shortage of resources, small firms face the constraints of buying financial technology and hiring the technical workforce for their adoption and smooth operations. They find it difficult to develop their own applications or outsource them from third parties. Surprisingly, some of them don't even feel that they require them. Fintech remains far from their minds. Some MFIs are doing well and competing with commercial banks regarding addressing security concerns. Once again, small-scale microfinance organizations are facing challenges in this area too.

In this situation, the study draws the following recommendations.

First, small-scale microfinance institutions can conglomerate together to become financially more powerful. This may, in turn, help them adopt new technology.

Second, as the MRA is the regulatory and controlling body of MFIs, it can help all microfinance organizations set up IT departments of their own and increase the digitalization process. This should accelerate the adoption of Fintech by the FMIs, and. This may help all MFIs' adoption process slowly.

Third, The cost of fintech infrastructure is one of the biggest concerns for MFIs, particularly for small and local microfinance organizations. To address this issue in a realistic manner, the MRA may develop a unified fintech architecture and rent this facility to them at a minimum cost.

Finally, most microfinance organizations are worried about cyber security embedded in the Fintech adoption. As a result, they are not inclined to adopt Fintech in their operations. In this case, the MRA and the ICT Ministry of Bangladesh may work together to strengthen the security of microfinance organizations and initiate training programs to make a safer IT environment for the Microfinance Industry.

Limitations

This research has focused only on the Inclusive finance industry of Bangladesh, especially the microfinance organizations. So, the conclusion and recommendations drawn in the study may not apply to other developing and/or developed countries and other industries as well.

Acknowledgments

This paper is a partial outcome of a research project on inclusive finance in Bangladesh and India of the Center for Inclusive Leadership (CIL) of the Ritsumeikan Asia Pacific University (APU). However, the opinions expressed in the paper are the authors' own.

Reference

- 1) Y. Suzuki, M.K. Barai, B.K. Adhikary, & M. K. Wanniarachchige, "The Grameen Bank "Empowering the Poor" Model of Microcredit: An Institutional Comparison with the Traditional Mode of the Japanese Banking System," *The Journal of Comparative Asian Development*, **10**(1), 129–156 (2011).
<https://doi.org/10.1080/15339114.2011.578487>
- 2) H. Uddin, M.K. Barai, "Islamic microcredit: The case of Bangladesh," *Journal of Accounting*, **6**(1) 49-64, (2016).
- 3) MK. Barai, BK. Adhikary, "The success of microcredit in Bangladesh: Supplementing 'group lending' explanation with institutional understanding," *Review of Integrative Business and Economics Research*, **2**(1) 471- 490 (2013).
- 4) Y. Suzuki, H. Uddin, & M.D. Miah, "A comparative study between the Grameen and Islamic modes of microfinance in Bangladesh with reference to Islamic microfinance in Pakistan". *Dilemmas and Challenges in Islamic Finance*, 111–126 (2018).
<https://doi.org/10.1201/9781315105673-8>
- 5) K. Kitamura, "The future of fintech in the context of the Japanese Main Bank System," *Future of Business and Finance*, 247–260 (2019).
https://doi.org/10.1007/978-981-15-0327-6_17.
- 6) R.S. Freedman, "Introduction to financial technology: Complete Technology Guides for Financial Services", Academic (2006).
- 7) P. Schueffel, "Taming the beast: A scientific definition of Fintech," *Journal of Innovation Management*, **4**(4), 32–54 (2017).
https://doi.org/10.24840/2183-0606_004.004_0004
- 8) G. Dorfleitner, L. Hornuf, M. Schmitt, & M. Weber, "Definition of fintech and description of the fintech industry,". *FinTech in Germany*, 5–10 (2017).
https://doi.org/10.1007/978-3-319-54666-7_2
- 9) J.S. Brennen, & D. Kreiss, "Digitalization," *The International Encyclopedia of Communication Theory and Philosophy*, 1–11 (2016).
<https://doi.org/10.1002/9781118766804.wbiect111>
- 10) M. J.J. Khanam, "Regulatory Challenges and Social Opportunities of Financial Inclusion through FinTech in Developing Countries with Reference to Bangladesh," *Master's Thesis*, Ritsumeikan Asia Pacific University, Oita Japan. (2020).
- 11) A. Mishra, and S. Mandvi, "Influence of technology in learning macro skills of English in a multicultural classroom: a case study of students' perception." (2021): 13-22." *Evergreen - Journal of Novel Carbon Resource Sciences & Green Asia Strategy*, **8**(1), 13-22 (2021). <https://doi.org/10.5109/4372256>.
- 12) M. N. Khatun, S. Mitra, & M.N. Sarker, "Mobile banking during covid-19 pandemic in Bangladesh: A novel mechanism to change and Accelerate People's financial access," *Green Finance*, **3**(3), 253–267 (2021). <https://doi.org/10.3934/gf.2021013>
- 13) Microcredit Regulatory Authority, Annual Report, 2020, https://drive.google.com/file/d/1IGhogK1nxX-tK_qrN4RnEFRD5GaRia21/view?usp=sharing.
- 14) C. M. Christensen, "The Innovator's Dilemma: When New Technologies Cause Great Firms to Fail. Boston," *MA: Harvard Business School Press*, (1997).
- 15) I. Ryan, "Impact of Internet Penetration for the Economic Growth of Indonesia," *Evergreen- Joint Journal of Novel Carbon Resource Sciences & Green Asia Strategy*, **05**(02), 36-43, (2018).
- 16) W. Chaouali, N. Souiden, & R. Ladhari, "Explaining adoption of mobile banking with the theory of trying, general self-confidence, and cynicism," *Journal of Retailing and Consumer Services*, **35**, 57–67 (2017).
<https://doi.org/10.1016/j.jretconser.2016.11.009>
- 17) T. Laukkanen, & V. Kiviniemi, "The role of information in mobile banking resistance," *International Journal of Bank Marketing*, **28**(5), 372–388 (2010).
<https://doi.org/10.1108/02652321011064890>
- 18) M. A. Shareef, A. Baabdullah, S. Dutta, V. Kumar, & Y. K. Dwivedi, "Consumer adoption of mobile banking services: An empirical examination of factors according to adoption stages," *Journal of Retailing and Consumer Services*, **43**, 54–67 (2018).
<https://doi.org/10.1016/j.jretconser.2018.03.003>
- 19) T. Laukkanen, & J. Lauronen, "Consumer value creation in mobile banking services," *International Journal of Mobile Communications*, **3**(4), 325 (2005).
<https://doi.org/10.1504/ijmc.2005.007021>
- 20) F. Maroofi, M. Nazaripour, "Mobile banking acceptance of the market," *World Applied Sciences Journal*, **28**(12), 1975-82 (2013).
- 21) J. McNeish, "Consumer Trust and Distrust: Retaining paper bills in online banking," *International Journal of Bank Marketing*, **33**(1), 5–22 (2015).
<https://doi.org/10.1108/ijbm-08-2013-0088>
- 22) F.D. Davis, "Perceived usefulness, perceived ease of use, and user acceptance of Information Technology," *MIS Quarterly*, **13**(3), 319-340 (1989).
<https://doi.org/10.2307/249008>
- 23) I. Ajzen, "The theory of planned behaviour: Reactions and reflections," *Psychology & Health*, **26**(9), 1113–1127 (2011).
<https://doi.org/10.1080/08870446.2011.613995>
- 24) V. Venkatesh, J. Thong, & X. Xu, "Unified theory of acceptance and use of technology: A synthesis and the road ahead," *Journal of the Association for*

- Information Systems*, **17**(5), 328–376 (2016). <https://doi.org/10.17705/1jais.00428>
- 25) D.L. Goodhue, & R.L. Thompson, “Task-technology fit and individual performance,” *MIS Quarterly*, **19**(2), 213–236 (1995). <https://doi.org/10.2307/249689>
 - 26) K.K. Kapoor, Y.K. Dwivedi, & M.D. Williams, “Rogers’ innovation adoption attributes: A systematic review and synthesis of existing research,” *Information Systems Management*, **31**(1), 74–91 (2014). <https://doi.org/10.1080/10580530.2014.854103>
 - 27) A.M. Baabdullah, A.A. Alalwan, N.P. Rana, H. Kizgin, & P. Patil, “Consumer use of Mobile Banking (M-banking) in Saudi Arabia: Towards an integrated model,” *International Journal of Information Management*, **44**, 38–52 (2019). <https://doi.org/10.1016/j.ijinfomgt.2018.09.002>
 - 28) S. Singh, & R.K. Srivastava, “Predicting the intention to use mobile banking in India,” *International Journal of Bank Marketing*, **36**(2), 357–378 (2018). <https://doi.org/10.1108/ijbm-12-2016-0186>
 - 29) T. Bala, I. Jahan, M.A. Amin, M.H. Tanin, M.F. Islam, M.M. Rahman, & T. Khatun, “Service quality and customer satisfaction of mobile banking during COVID-19 lockdown; evidence from rural area of Bangladesh,” *Open Journal of Business and Management*, **09**(05), 2329–2357 (2021). <https://doi.org/10.4236/ojbm.2021.95126>
 - 30) N. Nisha, S. Idrish, & M. Z. Hossain, “Consumer acceptance and use of mobile banking services in Bangladesh,” *Green Banking in Bangladesh and Beyond*, 155–182 (2015).
 - 31) L. M. Chuang, C.C Liu, & H. K. Kao, “The adoption of fintech service: TAM perspective,” *International Journal of Management and Administrative Sciences*, **3**(7), 1–15 (2016).
 - 32) A. Daragmeh, C. Lentner, & J. Sági, “FinTech payments in the era of COVID-19: Factors influencing behavioral intentions of “Generation X” in Hungary to use mobile payment,” *Journal of Behavioral and Experimental Finance*, **32**, 100574(1–12) (2021). <https://doi.org/10.1016/j.jbef.2021.100574>
 - 33) H. S. Ryu, “Understanding benefit and risk framework of fintech adoption: Comparison of early adopters and late adopters,” *In Proceedings of the 51st Hawaii International Conference on System Sciences*. January 3 - 6, (2018), Hilton Waikoloa Village, Hawaii
 - 34) C. Tun-Pin, W.C. Keng-Soon, Y. Yen-San, C. Pui-Yee, J. T. Hong-Leong, & N. Shwu-Shing, “An adoption of fintech service in Malaysia,” *South East Asia Journal of Contemporary Business*, **18**(5), 134–147 (2019).
 - 35) M. Jünger, & M. Mietzner, “Banking Goes Digital: The Adoption of FinTech Services by German Households,” *SSRN Electronic Journal* (2019). <https://doi.org/10.2139/ssrn.3368133>
 - 36) R. Abdul-Rahim, S.A. Bohari, A. Aman, & Z. Awang, “Benefit–Risk Perceptions of FinTech Adoption for Sustainability from Bank Consumers’ Perspective: The Moderating Role of Fear of COVID-19,” *Sustainability*, **14**(14), 8357 (2022). <https://doi.org/10.3390/su14148357>
 - 37) A. Varma, “Fintech Adoption Choices of Small Businesses: A Technology Organization Environment (TOE) Framework study,” *Accounting and Finance Research*, **8**(2), 86–98 (2019). <https://doi.org/10.5430/afr.v8n2p86>
 - 38) D. Urumsah, R.F. Ispridevi, A. Nurherwening, & W. Hardinto, “Fintech adoption: Its determinants and organizational benefits in Indonesia,” *Jurnal Akuntansi & Auditing Indonesia*, **26** (1), 88–101 (2022). <https://doi.org/10.20885/jaai.vol26.iss1.art9>
 - 39) N. T. Matsepe, & E. van der Lingen, “Determinants of emerging technologies adoption in the South African financial sector. South African Journal of Business Management,” **53**(1) (2022). <https://doi.org/10.4102/sajbm.v53i1.2493>
 - 40) M. Najib, W. J. Ermawati, F. Fahma, E. Endri, & D. Suhartanto, “FinTech in the Small Food Business and Its Relation with Open Innovation,” *Journal of Open Innovation: Technology, Market, and Complexity*, **7**(1), 88. <https://doi.org/10.3390/joitmc7010088>
 - 41) H. L. Mu, & Y. C. Lee, “An application of fuzzy AHP and TOPSIS methodology for ranking the factors influencing FinTech adoption intention: A comparative study of China and Korea,” *Journal of Service Research and Studies*, **7**(4), 51–68 (2017).
 - 42) H. O. Awa, & O.U. Ojiabo, “A model of adoption determinants of ERP within T-O-E framework,” *Information Technology & People*, **29**(4), 901–930 (2016). <https://doi.org/10.1108/itp-03-2015-0068>
 - 43) M. Mohtaramzadeh, T. Ramayah, & C. Jun-Hwa, “B2B E-Commerce Adoption in Iranian Manufacturing Companies: Analyzing the Moderating Role of Organizational Culture,” *International Journal of Human–Computer Interaction*, **34**(7), 621–639 (2017). <https://doi.org/10.1080/10447318.2017.1385212>
 - 44) R. L. Daft, “A dual-core model of organizational innovation,” *Academy of Management Journal*, **21**(2), 193–210 (1978). <https://doi.org/10.5465/255754>
 - 45) J. Kylläinen, “Types of Innovation – The Ultimate Guide with Definitions and Examples,” *Viima*, (2019). <https://www.viima.com/blog/types-of-innovation>.
 - 46) A. Baiyere, J. Roos, “Disruptive Innovation at the Bottom of the Pyramid-can they impact on the Sustainability of today’s Companies?” *Trends and Future of Sustainable Development*. 325–336 (2011).
 - 47) J.L. Bower, & C.M. Christensen, “Disruptive technologies: catching the wave,” *Long Range*

- Planning*, **28**(2), 43-53 (1995). [https://doi.org/10.1016/0024-6301\(95\)91075-1](https://doi.org/10.1016/0024-6301(95)91075-1)
- 48) C. Baden-Fuller, A. Dean, P. McNamara, & B. Hilliard, "Raising the returns to venture finance," *Journal of Business Venturing*, **21**(3), 265–285 (2006). <https://doi.org/10.1016/j.jbusvent.2005.02.009>
- 49) C.M. Christensen, R. McDonald, E.J. Altman, & J.E. Palmer, "Disruptive Innovation: An Intellectual History and Directions for Future Research," *Journal of Management Studies*, **55**(7), 1043–1078 (2018). <https://doi.org/10.1111/joms.12349>
- 50) P. Thomond, and F. Lettice, "Disruptive innovation explored. In Cranfield University, Cranfield, England". Presented at: *9th IPSE International Conference on Concurrent Engineering: Research and Applications* (CE2002), 17-28 (2002).
- 51) V. Govindarajan, & P.K. Kopalle, "Disruptiveness of innovations: measurement and an assessment of reliability and validity," *Strategic Management Journal*, **27**(2), 189–199 (2005). <https://doi.org/10.1002/smj.511>
- 52) S. Hardman, R. Steinberger-Wilckens, & D. van der Horst, "Disruptive innovations: The case for hydrogen fuel cells and battery electric vehicles," *International Journal of Hydrogen Energy*, **38**(35), 15438–15451 (2013). <https://doi.org/10.1016/j.ijhydene.2013.09.088>
- 53) D. Nagy, J. Schuessler, & A. Dubinsky, "Defining and Identifying Disruptive Innovations," *Industrial Marketing Management*, **57**, 119–126 (2016). <https://doi.org/10.1016/j.indmarman.2015.11.017>
- 54) C.M. Christensen, M.E. Raynor and R. McDonald, "What is disruptive innovation? Twenty years after the introduction of the theory, we revisit what it does—and doesn't—explain," *Harvard Business Review* (2015).
- 55) I.M. Al-Jabri, M.S. Sohail, "Mobile banking adoption: Application of diffusion of innovation theory," *Journal of electronic commerce research*, **13**(4), 379–391 (2012).
- 56) L.G. Tornatzky, & M. Fleischer, "The process of technological innovation," *Lexington Books*, **16**, 45–46 (1991).
- 57) V. Ilin, J. Ivetić, & D. Simić, "Understanding the determinants of e-business adoption in ERP-enabled firms and non-ERP-enabled firms: A case study of the Western Balkan Peninsula," *Technological Forecasting and Social Change*, **125**, 206–223 (2017). <https://doi.org/10.1016/j.techfore.2017.07.025>
- 58) H. Gangwar, H. Date, & R. Ramaswamy, "Understanding determinants of cloud computing adoption using an integrated TAM-TOE model," *Journal of Enterprise Information Management*, **28** (1), 107–130 (2015). <https://doi.org/10.1108/jeim-08-2013-0065>
- 59) F. Cruz-Jesus, A. Pinheiro, & T. Oliveira, "Understanding CRM adoption stages: empirical analysis building on the TOE framework," *Computers in Industry*, **109**, 1–13 (2019). <https://doi.org/10.1016/j.compind.2019.03.007>
- 60) J. Xie, L. Ye, W. Huang, & M. Ye, "Understanding FinTech Platform Adoption: Impacts of Perceived Value and Perceived Risk," *Journal of Theoretical and Applied Electronic Commerce Research*, **16**(5), 1893–1911 (2021). <https://doi.org/10.3390/jtaer16050106>
- 61) GSMA Mobile and Development Intelligence, (2012) https://www.gsma.com/mobilefordevelopment/wp-content/uploads/2012/10/2012_MMU_Annual-Report.pdf (accessed July 5, 2022)
- 62) H. Uddin, "Constraints to the Development of Islamic Microfinance: The Case of Bangladesh" *Doctoral dissertation, Ritsumeikan Asia Pacific University* (2019).
- 63) J. Birkinshaw, "How incumbents survive and thrive," *Harvard Business Review*, **100**(1):36-42 (2022).
- 64) R.T. Frambach, & N. Schillewaert, "Organizational innovation adoption: a multi-level framework of determinants and opportunities for future research," *Journal of Business Research*, **55**(2), 163–176 (2002). [https://doi.org/10.1016/s0148-2963\(00\)00152-1](https://doi.org/10.1016/s0148-2963(00)00152-1)
- 65) F. J. Zach, J. N. Nicolau, & A. Sharma, "Disruptive innovation, innovation adoption and incumbent market value: The case of Airbnb," *Annals of Tourism Research*, **80**, 102818 (2020). <https://doi.org/10.1016/j.annals.2019.102818>
- 66) C. W. L. Hill, & F.T. Rothaermel, "The Performance of Incumbent Firms in the Face of Radical Technological Innovation," *The Academy of Management Review*, **28**(2), 257-274 (2003). <https://doi.org/10.2307/30040712>
- 67) A.A. Shaikh, & H. Karjaluoto, "Mobile banking adoption: A literature review," *Telematics and Informatics*, **32**(1), 129–142 (2015). <https://doi.org/10.1016/j.tele.2014.05.003>
- 68) M. Hanouch, and S. Rotman, "Microfinance and mobile banking: blurring the lines?: Microfinance, CGAP focus note **88** (2014).
- 69) Digital Transformation of MFIs in Bangladesh, UNCDF (2019). <https://www.uncdf.org/article/4484/digital-transformation-of-mfis-in-bangladesh>. (Accessed on July 29, 2022)
- 70) A.K.M. Haque, "Need for Critical Cyber Defence, Security Strategy and Privacy Policy in Bangladesh-Hype or Reality?" *International Journal of Managing Information Technology*, **11**(1), (2019). <https://doi.org/10.5121/ijmit.2019.11103>
- 71) S. K. Deb, N. Deb, and S. Roy. "Investigation of Factors Influencing the Choice of Smartphone Banking in Bangladesh," *Evergreen - Journal of*

- Novel Carbon Resource Sciences & Green Asia Strategy, **6**(3), 230-239, (2019).
- 72) M. K. Barai. "Quantitative Easing-II and the State of Japanese Banks' Portfolio Rebalancing and Financial Performance." *Evergreen - Journal of Novel Carbon Resource Sciences & Green Asia Strategy*, **9**(3), 605-618 (2022). <https://doi.org/10.5109/4842517>.
- 73) Y. Dan Y, HC. Chieh, "A reflective review of disruptive innovation theory," *InPICMET'08-2008 Portland International Conference on Management of Engineering & Technology* 27, 402-414 (2008).
- 74) M. Uwamariya, C. Loebbecke, S. Cremer. "Mobile banking impacting the performance of microfinance institutions: A case study from Rwanda", *International Journal of Innovation and Technology Management*. 17(01):2050001 (2020).
- 75) Z. Temelkov "Fintech firms opportunity or threat for banks?", *International journal of information, Business and Management*. 10(1):137-43 (2018).
- 76) C. Yan, AB. Siddik, L. Yong, Q. Dong, GW. Zheng, MN. Rahman, "A Two-Staged SEM-Artificial Neural Network Approach to Analyze the Impact of FinTech Adoption on the Sustainability Performance of Banking Firms: The Mediating Effect of Green Finance and Innovation," *Systems*, **10**(5), 148 (2022).
- 77) M. Imamov, N. Semenikhina, "The impact of the digital revolution on the global economy," *Linguistics and Culture Review*, **5**(S4):968-987 (2021).