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Impact of Mobile Financial Services on Financial Inclusion in Bangladesh

Nahid Akhter
M. A. Baqui Khalily

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Abstract

Competition in financial markets and the drive for higher market share are the major drivers in expansion of financial services, which has higher impacts on growth and financial development in countries like Bangladesh. Innovation in finance, either as a new product or a new process, has contributed to such competition and expansion of financial services. Technology and innovation has positive impacts on production and efficiency, and in turn, to growth at the macro level and institutional performance at the firm level. Two key factors are perceived as major determinants of acceptance of technology by users: usefulness and ease of use. Positive perception of usefulness and ease of use is influenced by low transaction cost, ensures security, improves convenience and minimise transaction risk for the users of financial services. Mobile technology is one of the financial innovations, which has multi-dimensional impacts. In technical terms, it improves efficiency and financial inclusion. The paper investigates the impacts of mobile financial services on financial inclusion in Bangladesh. The outcome shows that the need for mobile financial services is beyond any question. Mobile financial services have brought major changes in financial products and institutional structure. It can reach excluded low-income and micro and small entrepreneurs, which will have wider impact including growth and poverty alleviation. Our analysis shows positive role of mobile banking on financial inclusion. The findings do suggest that the role of banks and MFIs to expand services in inaccessible areas can be effective if they are complemented by mobile money and appropriate regulatory framework.

Keywords: Financial Inclusion, Technology, Mobile banking, Bangladesh.

Impacts of Mobile Financial Services on Financial Inclusion in Bangladesh

Nahid Akhter [a]
M. A. Baqui Khalily [b]

1. Introduction

Competition in financial markets and the drive for higher market share are the major drivers in expansion of financial services, which has higher impacts on growth and financial development in countries like Bangladesh. Innovation in finance, either as a new product or a new process, has contributed to such competition and expansion of financial services (Horne, 1985). Benefits are derived from financial innovations by both providers of financial services (financial institutions) and users of services (depositors and borrowers). On the supply side, the benefits are development of quality financial products, increase in efficiency, and decrease in transaction cost, among others (Adewoye 2013; Arnaboldi and Claeys 2008; Ilyas *et al*. 2015; Hosein 2013; Weigelt and Sarkar 2012). The demand side factors can be derived from the theory of technological acceptance model (Davis 1989). The theory states that two key factors are major determinants of acceptance of technology, as perceived by users: perceived usefulness and ease of use. Positive perception of usefulness and ease of use is influenced by low transaction cost, ensures security, improves convenience, minimise transaction risk for the users of financial services (Frame and White 2002; Horne 1985; Lee 2009; Luo et. al. 2010; Mbogo 2010; Mallat 2007; Mehta 2013;Viehland and Leong, 2007).

Technology and innovation has positive impacts on production and efficiency, and in turn, to growth at the macro level and institutional performance at the firm level. Mobile technology is one of the financial innovations, which has multi-dimensional impacts. In technical terms, it improves efficiency and financial inclusion (Horne 1985; Frame and White 2002; Mbogo2010). Not only on the one hand, it ensures efficient uses of resources and higher level of profitability, and on the other hand, it contributes to growth – local and national economy. Because of the transfer of resources from one place to another; from one region to another region, and from one country to another, it increases mobility of money resources and thereby it has multiplier effects on the regional and macro economic growth.

Mobile banking or mobile financial services (MFS) have brought major revolution in financial markets. There is no doubt that mobile banking and mobile financial services will have larger impacts. A recent estimate shows that MFS has contributed 4.2 percent to the global economy or GDP. More than 4.5 billion individuals have uniquely subscribed MFSs. The penetration rate is expected to reach 72 percent of adult population by 2020. It has contributed to employment creation. Some 17 million jobs were directly supported by mobile ecosystem. This is expected to reach 20 million jobs by 2020 (GSMA 2016). Furthermore, it has been contributing to expanding mobile insurance services, and expansion of health services.

[a] Nahid Akhter is a Senior Research Associate at Institute for Inclusive Finance and Development (InM), Bangladesh.
[b] M. A. Baqui Khalily is a former Professor of Finance, Department of Finance, University of Dhaka, Bangladesh and a former Executive Director of InM.

As of December 2015, the GSMA report on the State of the Industry Report – Mobile Money, emphasised on three key findings: (i) strong growth is emerging in new regions including South Asian countries, where more than a third of all registered mobile money accounts were opened in 2015; (ii) In 2015, there were 29 cross-border mobile money initiatives connecting 19 countries, and by volume, international remittance was fast growing with 52 % growth over 2014; and (iii) customers are using mobile money more than ever – in December 2015, there were over a billion transactions.

In South Asian countries, mobile money has made major headway into providing financial services. In Bangladesh, in October, 2016 alone, total number of transactions reached128 million, growth of 9.19 percent over the previous month, amounting to total transactions of BDT 206 billion. There were inward remittances of BDT 75 million in October, 2016; cash-in transactions amounted to BDT 89.5 billion compared to BDT 19.5 billion as cash-out transaction (Bangladesh Bank 2016). Most of these transactions are P2P transactions. Evidences are quite strong in other countries. In India, in 2015-16, mobile banking transactions amounted to INR 4,040 billion from a total number of transactions of 389.5 million. One of the important developments that has taken place in India compared to other SAARC countries is savings through mobile, commonly known as Mobile Wallet. Some INR 205 billion was transacted in mobile wallet from a total number of transactions of 603 million (India 2016). In Pakistan, MBS has progressed quite well with higher rate of growth. In the last quarter of 2015-16, the value of MFS was Rs.543 billion from some 118.7 million numbers of transactions. Although at a slow pace, savings through mobile account has grown at a higher rate. Deposits in the last quarter of 2015-16 grew by over 60 percent to Rs.13 billion from the previous quarter (Imauddin 2016).

Financial institutions that had difficulty providing services to the poor using their traditional financial production technology, now can offer financial services using the mobile technology at relatively low cost. Government agencies also find it appealing because of the multi-dimensional effects of MFS, and revenue maximising instruments. They are coming forward with required legal and policy supports to expand MFSs with higher degree of security and taxation.

There is no unique and universal form of mobile money or financial services. They vary from country to country because of the stated goals and available structure. As noted above, MFSs offer diversified financial functions. This includes payments to traders and shopkeepers, payments of utility bills, P2P transfers between individuals and remittance within the country or between the countries. Who offer these services? There are different modes of offering services – (a) banks only; (ii) telecommunication providers, and (c) combination of (a) and (b).

Technological advancement and diversification of institutional arrangements have changed landscape for financial development – from postal savings institutions to banks; from branch banking to branchless banking on the supply side. This advancement has multi-dimensional impacts. They, as noted earlier, are: (i) convenience, and the payment effects when households or farms can make payment for utility services; (ii) financial inclusion effect when mobile technology leads to increase in intensity of access to financial services in addition to security and safety of funds; (iii) institutional effect where new institutions can now venture into providing financial services in excluded households and farms in both accessible and inaccessible areas;

(iv) ease to do business effect when cooperatives and micro finance institutions (MFIs) in the less explored areas like mountainous or coastal belt regions can now be more effective in transferring financial resources and offering financial services to its members; (v) remittance effect when the hardworking poor migrants can remit money to their families either from within the country or abroad at low transaction cost using secure means for improving their quality of life; (vi) informational effect when bank account holders can access to their accounts for transactional information. List of the potential effects of MFS can be longer if one recognises all economic activities at the micro level.

The basic objective of this paper is to assess impact of mobile banking on financial inclusion in Bangladesh. The paper is structured as follows. After the preface, section 2 describes the development of mobile financial services in Bangladesh. Section 3 shows the framework and technical approach to understand the overall objective of the study. Section 4 describes the data that has been used. Section 5 presents socioeconomic characteristics of the household. Section 6 describes the impact of mobile banking on financial inclusion. Section 7 describes the regulatory approach and section 8 describes the role of government in advancing mobile financial services. Section 9 presents the major challenges that has been faced by the sector to expand properly and finally, section 10 suggests a range of broad and specific policy recommendations.

2. Development of Mobile Financial Services in Bangladesh

In Bangladesh, with the network support from two mobile companies i.e., Banglalink and Citycell and software solution support from Sybase 365, Dutch Bangla Bank limited (DBBL) for the very first time in Bangladesh started mobile financial services on March 31, 2011. In July 2011, BRAC Bank Limited established a subsidiary called “bKash” to facilitate banking services at the household level and in unbanked areas with different products. They have started offering mobile banking with a VISA technology platform for money transaction. They have also brought-in a useful way of transferring international remittances. The service charges of these two leading mobile banking services are given in the appendix A.

Over the past five years, other commercial banks like, Bank Asia, Mercantile Bank, Trust bank, Prime Bank Limited, Islami Bank Bangladesh Limited etc. designed their mobile banking products and entered into the market of mobile banking. BRAC Bank and DBBL are the two dominant players in the market. Currently total twenty-eight banks in Bangladesh are licensed to provide mobile banking services. Up to March 2017, seventeen (17) banks have lunched their mobile banking services. Moreover, not only the poor, but also many well-off individuals are using those services because of its convenience. In a short span of time, mobile banking has flourished at a geometric rate because of higher intensity of mobile users (120.73 million as of October 2016) and diversification in mobile financial services.

Most of the users of mobile banking services use it for transfer of fund and security. More than three-quarters use it for remittance of money and one-quarter for security reason (Bangladesh Bank 2012). The dominating purpose of the rural users either receiving remitted money. In urban areas, payment service is the primary reason for using mobile banking. The same policy paper predicted about development of mobile banking in future as almost three-fourth of the users have desire to continue using the mobile financial services. With wider mobile network

backed by appropriate set of policies, mobile financial services will expand and contribute to higher intensity of financial inclusion. From regulatory standpoint, Bangladesh Bank has approved only the bank-led model to operate in Bangladesh. Permitted Mobile Financial Services by Bangladesh Bank are listed as follows,

- Disbursement of inward foreign remittances.
- Cash in /out using mobile account through agents/Bank branches/ ATMs/Mobile Operator's outlets.
- Person to Business Payments - e.g. a. utility bill payments, b. merchant payments.
- Business to Person Payments e.g. salary disbursement, dividend and refund warrant payments, vendor payments, etc.
- Government to Person Payments e.g. elderly allowances. Freedom-fighter allowances, subsidies, etc.
- Person to Government Payments e.g. tax, levy payments.
- Person to Person Payments (One registered mobile Account to another registered mobile account).
- Other payments like microfinance, overdrawn facility, insurance premium, DPS, etc. (Bangladesh Bank, 2017)

The guidelines provided by Bangladesh Bank allow only a bank-led model to perform mobile banking services and P2P highest transaction of about BDT 10,000 per day and BDT 25,000 per month (this may change with the passes of time) (Table 1). The bank-led mobile banking means that a client's "mobile-account" will rest with the bank and clients can access his/her account through mobile device. This will be a non-chequing account. Among the various transactions through mobile banking, P2P transaction is most popular. Other services like, P2B or B2P are limited. This is the outcome of financial innovation. The brief of Mobile Financial Services (MFS) in Bangladesh is given in Appendix-B.

Table 1
Mobile Banking Transaction Limit Set by Bangladesh Bank

Sl. No.	Type of Transaction	Per Day	Per Month
1	Cash in	BDT 15000 (maximum 2 transactions)	BDT 100000 (maximum 20 transactions)
2	Cash out	BDT 10000 (maximum 2 transactions)	BDT 50000 (maximum 10 transactions)
		For any cash in transaction in a certain a/c, not more than BDT 5000 can be withdrawn from that a/c within next 24 hours	
3	Person 2 person transfer	BDT 10000 (no limit in transaction number)	BDT 25000 (no limit in transaction number)

source: Bangladesh Bank (2017)

As of March, 2017, registered clients reached to 50.429 million and total number of agents reached almost 0.72 million. Total number of mobile bank accounts was 24.57 million. Total number of transactions reached BDT. 250.47 billion in March 2017, growth of 12.18 percent over the previous month. This included inward remittances of BDT 77.1 million, cash-in transactions of BDT 106.68 billion compared to BDT 96.196 billion as cash-out transactions.[1] (Appendix-B)

A recent amendment (2015) and updated amendment in 2017 by Bangladesh bank set a limit for transaction numbers, cash-in and cash-out of mobile banking. In the amended instruction, agents will not be permissible to deposit money in his or her mobile account more than two times daily and 20 times monthly. Similarly, agents are also not allowed to withdraw cash more than two times daily and 10 times monthly. Before any transaction, the banks are also required to follow "Know your customer" guidelines provided by Bangladesh bank.

The critical question is, has expansion of mobile banking contributed to financial inclusion in Bangladesh? No paper, to the best knowledge of the authors, has yet addressed the issue of impact of mobile banking or mobile financial services in Bangladesh, although some papers sporadically show that mobile banking has expanded for financial services to micro and small enterprises (e.g., Donner and Escobari, 2010; Jang, Fong and Insu).

3. The Framework

There are several approaches to understand growth and impacts of MFS in developing countries including SAARC countries. We can at least think of three major approaches. They are: (i) transaction cost approach; (ii) Inclusive finance approach; and (iii) empowerment approach.

Formal banks generally offered services to its customers or clients through branches. The branches have been located more in commercial centres or economically active areas. The rationales are deposit potentials and investment opportunities. Until otherwise subsidised by the government or central bank, banks have expanded its areas of operations from the perspective of profit maximisation. Although in recent decades, branch density has increased in developing countries, particularly in South Asian countries, quite a large number of adult population remains inaccessible. Such inaccessibility is due to high transaction cost of providing financial services to the potential clients and also due to high cost of receiving financial services by the clients. A financial market is deemed to be efficient if transaction costs of banks and clients converge. It will only converge when transaction cost is low. Therefore, banks through its branches have not been able to provide financial services to every adult individual. In last few decades, agent banking in Southeast Asian countries became quite successful, particularly in Indonesia. Yet there are significant numbers of adult populations that are left-out of the network of banks. One of the important drivers for the growth of MFS is low transaction cost. Parvez, Jaheed, *et al*., (2015) mentioned that MFS users of Bangladesh were inquired to chose the most crucial uniqueness of Mobile financial services and 91 percent MFS users graded 'low transaction cost' at the top. The spread of MFSs across the globe is driven by profitable operations because of low transaction cost. Because of low transaction cost and ease of access, financial institutions do have advantages of economies of scale and scope.

[1] [1 lac = 0.10 million and 1 crore = 10 million]

The 'inclusive finance' approach makes the institutions more focused. The stated objective then becomes reaching out the excluded adult population or households. Availability and uses of technology is present in excluded individuals and regions. But when payments of utility bills become dominating purpose of the users of MFSs, then it really does not talk of improving intensity of inclusive finance. It speaks of offering multi-dimensional services to those who have bank accounts. This is strengthening their extent of financial uses through diversifying financial products by the financial institutions. The 'financial inclusion' approach should have higher marginal effects on the new users of services. Furthermore, when we speak of providing financial services to the excluded because of the market failure of formal banks, we are speaking about low-income households and micro or small enterprises. They will require services beyond 'payment services'. They will require savings, credit and insurance services. Therefore, our argument of 'inclusive finance' approach should be for these financial services through mobile technology.

The 'empowerment approach' underscores the need for empowering the 'less-empowered' or neglected segments of the society. The segment that has remained less empowered or neglected is the women. Access to finance does empower them. This is well established empirically in Bangladesh and elsewhere in the world. In Kenya, access to MFSs has empowered the women and made them also more economically active. The 'empowerment' approach will enable the banks and technos to target women in their approach to promote MFSs.

In this paper, we focus on assessing impact of access to mobile banking on financial inclusion. Mobile banking is an outcome of technological advancement and new financial innovation. Therefore, the framework that we use to understand the impact is essentially impact of mobile banking as financial innovation on financial inclusion.

Before we use a framework for understanding growth and impacts of mobile banking, we need to recognise the kind of financial services that can be offered in mobile baking. In the financial model new innovations take place due to different reasons.

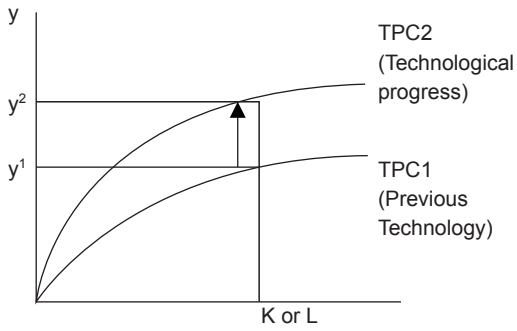
Generally, financial system offers mainly six types of services. They are: (a) transfer of funds, (b) pooling of funds, (c) risk management, (d) generation of information for financial decisions and solving problems of asymmetric information and moral hazard, and (f) payment services. But market does not act perfectly all the time and various crises arise periodically (Merton 1992). Market imperfections like incomplete markets, asymmetric information restrict the members to perfectly avail required financial services. This exists also because of lack of appropriate financial production technology, and consequently not all groups of society receive financial services (Tufano 2002). Financial innovations like mobile banking have solved the problem of transfer of fund in remote areas, payment services from work place or home, mobilisation of savings from remote areas where branches find it difficult to operate.

How does financial innovation benefit providers of financial services? Financial institutions provide financial services to the users of financial services as long as providing such services maximise profit through reducing transaction cost and increasing productivity. By duality, this benefits users of financial services; financial deepening as well as area deepening of financial institutions takes place. As a result, financial inclusion increases and financial institutions will

be more efficient. Financial development increases with such efficiency. This can be graphically represented.

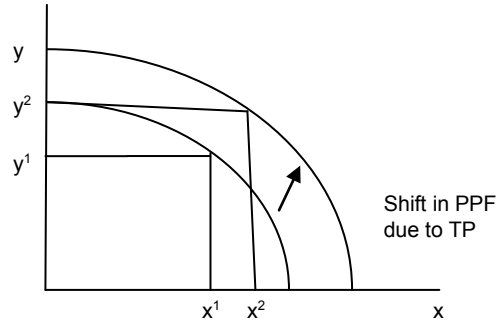
Efficiency of financial intermediation is also determined by the technological innovations and progress. Mobile technology has improved efficiency through higher labour and capital productivity and scale advantage. As a result, the expected rate of return on investment will be positive and higher (Figure 1). This can be graphically represented, and figure 2 shows that outward shift in production possibility frontier with positive change in technological progress.

Figure 1
With Technological Progress, Higher Output Level Given the Same Capital or Labour



Source: Author's own illustration

Figure 2
With Technological Progress, Production Possibility Frontier Shifted to the Higher Level of Production



Source: Author's own illustration

With the technological progress (TP), there will be two types of output gains: (i) there will be more output given the fixed or previous inputs, and (ii) there will be higher output by using lower combination of inputs. Technological innovation allows firms to produce more outputs with same or fewer inputs resulting a shift in the total product curve (TPC). Figure 1 shows high financial output with technological progress given the same level of inputs.

When technological change occurs, the production possibility frontier (PPF) shifts outward. Change in (one or more) resources or technology or removal of any institutional barrier will shift the PPF out. If any technological change took place, the nature of the PPF-shift depends on the type of technological change. This can be occurred in the production of one good or in the production of all goods. Outward shift of the PPF represent economic growth. An outward shift means that it is possible to increase the production of one good without decreasing the production of the other. Figure 2 shows that outward shift in production possibility frontier with change in improved financial service/ transaction caused by mobile technology. With the use of mobile technology, financial services has expanded at relatively low labour cost; enabling banks to expand financial services with higher labour and capital productivity. This will be clear from a simple discussion of how mobile banking works.

Mobile banking services can be offered through either mobile using mobile agents or own mobile accounts. Mobile accounts are required to be opened with a bank. In Bangladesh, both the modes are popular but mobile agents are more popular than the other. The marginal cost of providing mobile financial services through agents is quite negligible. Like any other account, mobile banks accounts are quite flexible in fund transfer, payment of utilities and bills. One can also save in mobile bank account through wallet services. The major investment for mobile banking is the fees that need to be paid to the mobile operator. To be more precise, it is a popular form of financial service as it requires less paper work, cheap and can spread in different corners of the country. In fact, in many cases a household does not even need to open a mobile banking account as one can send and receive money through agents, thus, making the services easily accessible. Apart from transaction costs, there is no account maintenance fee for mobile financial services. With financial production technology and the mode of offering mobile banking services, marginal cost of capital and labour will reduce. Therefore, one would expect higher level of output and lower use of marginal capital and marginal labour. Financial outputs refer to mobile financial services.

4. Data

We use the data of the study on 'Access to Financial Services in Bangladesh, 2015', of the Institute for Inclusive Finance and Development (InM) to assess intensity of financial inclusion and its determinants. The survey was carried out in 2014 and covers about 8449 households drawn from all over Bangladesh (63 districts) through a stratified random sampling technique. The scope of survey was limited to only one district of Bangladesh, i.e., Rangamati district.

Access to finance is defined as access to different financial services – deposits, credit, payment services, remittance service and any other formal financial services that are offered by banks and micro finance institutions. The variables included household level characteristics, region (rural and urban), types of financial services accessed and mobile banking related information.

5. Socioeconomic Characteristics of the Household

Socio-economic characteristics of households need to be discussed to get an idea about which types of households are accessing financial services through mobile banking. This analysis will include various household characteristics such as annual income, land asset holding, occupation, age, education, migration, poverty status and so on. It has been seen that the

comparatively well-off households are mostly using mobile banking services (Table 2). Those households are better in terms of annual food and non-food expenditure, income and land holding. Even a higher percentage of non-users households (30.74%) are below poverty line compared to the mobile banking user households (18.74%). The most apparent disparity among the two types of households is in having migrant members. Above 34 percent of the mobile banking user households have at least one local migrant member, which is tiny for the nonuser mobile banking households, only around 8 percent. Therefore this discussion illustrates that financially better-off households who have at least one migrant member are mostly using mobile banking services.

Table 2
Household Characteristics with Respect to Access to Mobile Banking (2013)

Sl. no.	Determinants	Have Access to Mobile Banking (n=2270)	Don't have Access to Mobile Banking (n=6179)
1.	Annual food expenditure of the HH	80148	70258
2.	Annual non-food expenditure of the HH	587910	43762
3.	Local migration (any member of the household)	34.05	7.85
4.	Household head's primary occupation is agriculture	20.52	18.50
5.	Household head female	7.31	11.15
6.	Age of household head	47	47
7.	Education of household head	5.23	3.64
8.	Average annual income of household	204862	143798
9.	Land holding (decimal)	65.11	48.24
10.	Percentage of HH below poverty line	18.74	30.74

Source: Author's own calculation

6. Impacts of Mobile Banking or Money

Research on impacts of MFSs is very scanty in developing countries. This is equally true in South Asia. Nevertheless, some research analysis on the impact of mobile money exists in Bangladesh (e.g., Lee *et al*. 2015; Khalily *et al*. 2015)

As mentioned before, we have used the data of the study on 'Access to Financial Services in Bangladesh, 2015', which was focused on the access of financial services in Bangladesh. The survey also focused on mobile banking. In the context of mobile banking, we assessed (i) intensity of access to mobile banking; and (ii) impact on financial inclusion based on the 'financial inclusion' approach. The results are reported below.

Table 3 measures the intensity of access to financial services and reports the role of mobile banking in Bangladesh. Since the study was based on survey of some 8449 households, it

provides information of unique access of households to financial services and the intensity of access to mobile financial services. Essentially, it avoids duplicate counting of the overlapping users of services.

Table 3
Intensity of Access to Mobile Banking in Bangladesh

	Access to Mobile Banking (%)		Have Own Mobile Banking Account (%)		Using Mobile Banking through Others Account (%)	
	Individuals (Age ≥18)	HH level	Individuals (Age ≥18)	HH level	Individuals (Age ≥18)	HH level
National Division	13	26.87	2.96	7.72	12.16	25.4
Barisal	21	43	2	6	21	42
Chittagong	10	26	3	8	9	22
Dhaka	14	27	2	6	13	25
Khulna	9	18	3	8	9	17
Rajshahi	11	23	5	12	10	21
Sylhet	9	24	2	7	9	22
Rangpur	21	37	4	9	21	36
Region						
Rural	12.22	24.63	2.47	6.55	11.53	23.55
Urban	16.07	34.90	4.70	11.86	14.37	31.46
Poverty Status						
Non-poor	15	30.36	4	9.64	13	28.37
Poor	9	18.40	1	2.95	9	17.87

Source: Author's own calculation

The above table provides several findings. First, based on households, some 27 percent of the households have access to mobile financial services using either own mobile account or others' accounts. Second, despite relatively higher percentage of households having access to mobile banking, only around 13 percent of the adult populations have accessed mobile financial services. Third, intensity of uses of MFSs varies by divisions with higher access in Barisal and Rangpur; the one purpose is internal remittance (Appendix-C). It is expected that the higher the percentage of migrant workers the higher the remittance flow in that locality. Fourth, intensity of uses of MFSs is higher in urban areas than in rural areas. Fifth, in terms of poverty status, non-poor households have used more than the poor. Finally, there is ample scope for expanding mobile financial services in Bangladesh because of the fact that only thirteen percent of the adult populations have had access to MFSs in 2014-15. These findings give us good understanding of who uses the mobile financial services. Through Logit regression, we assessed the probability of households with different characteristics using the mobile financial services.

A logistic regression analysis has been conducted to examine the association between the dependent variable, i.e., the log of the odds-ratio and the independent variables. Here the dependent variable represents the log of odds-ratio of access to mobile banking, i.e.,

$$logit\big(P(Y)\big) = log\left(\frac{P(y)}{1-P(y)}\right) = \alpha + \beta(y)$$

And the independent variables are various socio-economic characteristics of the households, like, migrated member, household head's age, education, gender, main occupation, poverty status of the household, rural and urban variation etc. The model has been adjusted by geographical variation of the household.

The logit regression model will be run by as follows,

$$logit\left(P(Y_{ij})\right) = P_{ij}\alpha_{pc} + IP_{ij}\alpha_{ipc} + B_{ij}\alpha_{ibc} + X_{ij}\beta_y + Z_i\gamma_y + \varepsilon_{ij}^{y} \quad \text{.....(1)}$$

Where,

$logit\left(P(Y_{ij})\right)$ = Log of odds ratio of access to mobile banking i in division j,

P_{ij} = Migrant member (dummy),

IP_{ij} = Household head's primary occupation is agriculture (dummy),

B_{ij} = Age of household head, Z_i = Vector of division characteristics,

ε_{ij}^{y} = Nonsystematic error reflecting, in part, unmeasured determinants of Y_{ij} that vary over households.

Along with the logit regression co-efficient, the marginal effects of the explanatory variables on the dependent variable are also shown for the ease of interpretation.

For the binary explanatory variables, marginal effects assess discrete change, i.e. the change in predicted probabilities due to the binary independent variable changes from 0 to 1. Marginal effects for continuous variables assess the instantaneous rate of change.

There is a clear significant relationship among the national migration and use of mobile banking. It is quite expected, as usually migrant members of the households send money to their family through various medium of transaction. And now a day, mobile banking is one of the most popular medium of transaction.

The results are reported in Table 4. We have reported both Logit coefficients and marginal coefficients.

The results as reported in Table 4 shows that the households with someone migrated within the country have higher probability to use MFSs. The marginal probability was estimated at 0.43, the highest probability. Second, households in rural areas are more expected to use MFSs. This is quite expected because of the fact that internal remittances are sent mostly to the households in rural areas. Third, Non-poor households have higher probability to use the services compared to the poor. This suggests that poor households are more or less likely to be left out from using mobile financial services. This might be the reason for their access financial services of the Micro Finance Institutions (MFIs). Similarly, education has positive impact on using

MFSs. The educated individuals are more likely to use the services of mobile banking than the less educated individuals. Individuals with profession in non-agriculture have higher probability to use MFSs. All these results were statistically significant, and corroborate the findings that we derived from Table 4.

Table 4
Determinants of Mobile Banking at the Household Level (n= 8243)

Variables	Logitcoeff.	Marginal Effect
National migration	1.93***	0.43***
HH head female	-0.36***	-0.06***
HH head – occupation agriculture	-0.045	-0.008
HH head age	-0.005*	-0.001*
HH head education	0.09**	0.017***
HH head edu square	-0.003**	-0.001**
Poverty status (1 for poor)	-0.51***	-0.088***
Regional dummy (Rural=1)	0.75***	0.14***
Total income	0.0000009***	0.00000016***
Note: *** p<0.01; ** p<0.05; * p<0.10		

Source: Author's own calculation

Now let us bring the issue of impact of mobile banking on financial inclusion in Bangladesh. Impacts of access to financial services will depend on the intensity of access of mobile financial services. The results are reported in Table-5.

Table 5
Impact of Mobile Banking on Access to Financial Services in Bangladesh

Variable	Bank		Bank and MFIs	
	Access to Bank	Marginal effect	Access to Bank and MFIs	Marginal effect
Mobile banking via own account	1.272***	0.303***	0.77***	0.13***
Mobile banking (other accounts)	0.279***	0.069***	0.30***	0.06***
Region (rural=1)	-0.413***	-0.102***	-0.33***	-0.07***

Source: Author's own calculation

We have reported only the significant logit coefficients of two groups – banks only and banks and MFIs. The other variables that we included in the model estimation were regional dummy variables and selected characteristics of the households.

The mobile banking has positive impacts on access to bank financial services and services of both banks and MFIs. Access to bank financial services increases with mobile banking. But the probability of positive impact is higher for the households having own mobile account. The estimated marginal probability was 0.30, compared to 0.069 when using mobile accounts of others. This is quite expected because mobile services are offered through banks in Bangladesh. The probability reduces when we consider access to financial services of both banks and MFIs. Finally, marginal effect on financial inclusion is higher in urban areas. This is also expected, as the mobile financial infrastructures are available more in urban areas.

The conclusion of the analysis of the impact of mobile banking or money on financial inclusions is, it has contributed positively to financial inclusion. But the findings do also lead to conclusion that there is an urban-bias and non-poor bias in providing mobile financial services in Bangladesh. This is equally true in other SAARC countries as the sector is still at the nascent stage, not in terms of intensity, but in terms of scope and versatility.

The Boston Consulting group (BCG) Study on Impacts: The BCG conducted the survey on the socio-economic impact of mobile financial services in five countries including India, Pakistan, Bangladesh, Serbia and Malaysia in 2011. The study reported several important findings. First, MFS will drive financial inclusion with varying degree, ranging from a 20-percentage point increase in financial inclusion in Pakistan to a five percent increase in Malaysia. In other three countries (Bangladesh, India and Serbia), intensity of impact will be around 10-12 percent. Second, MFS will accelerate economic growth in India by 5 percent and by around 2-3 percent in Pakistan, Bangladesh and Serbia in 2020. The study further estimated that income inequality will reduce by 5 percent by 2020 because of supporting poor population and micro and small entrepreneurs with savings and credit, increasing flow of domestic and international remittances and transfers.

All these results do provide information about very positive impacts of mobile financial services. Impacts will be higher on economic growth and income inequality as well as poverty reduction because of increasing flow of resources through mobile technology and provision for savings and credit.

7. Regulatory Approach

Regulation of mobile financial services is an area of major concern for the central bank. It becomes a concern when banks and mobile operators offer mobile financial services. Banks are regulated by the central bank, and mobile operators are regulated by a separate agency, for example, in Bangladesh, it is BTRC. Mobile operators are crucial part of providing financial services. The strong argument for regulation is to ensure financial stability with growth. This is justified when mobile financial services include savings, credit and insurance. We focus on the broad issue of regulation.

In most countries including Bangladesh in South Asia, mobile financial services are bank-led. That means, banks provide financial services through mobile accounts and the agents in conjunction with telecom operators. In Bangladesh, most banks have been offering mobile financial services either directly by banks or through establishing subsidiary. When they offer direct services, they appoint their own agent network. The principal holds major share in the subsidiary company to ensure that focused services are provided.

In 2011, Bangladesh Bank issued guidelines for MFSs and updated in December of the same year. Under the guidelines, two ownerships structures can exist – MFS could operate as a wing of the banks, and MFS can be provided under a subsidiary with 51 percent share of the primary bank. A draft new guideline was issued in 2015 that are likely to have significant changes, important being single entity (bank or non-bank) will not have ownership of more than 15%, and interoperability.

Mobile financial services will involve multiple institutions. In many countries, particularly developed countries, it is provided largely techno operators. In South Asian countries it is bank-led.

As long as money is the raw material of the financial products and is being offered through banks, regulation should be in the hands of the central bank. But central bank will not only regulate or monitor the behavior of the banks and subsidiaries but, should ensure flexibility and create appropriate environments for expanding mobile financial services. The ultimate outcome should be expansion through minimising risk for the financial system.

8. The Role of Government in Advancing MFSs

Mobile financial services are at the different levels in different countries. Moreover, there cannot also be any regulatory approach or a set of role of government that can be applied in all contexts and all countries. A government should play a role in creating enabling environment for developing a financial system that is largely mobile based. Enabling environment should ensure flexibility for the operators and the banks.

We consider that the government role can be elucidated based on the seven pillars of developing mobile financial services. The seven pillars can be broadly classified into four groups. The World Economic Forum in 2011 identified the seven pillars for developing MFSs. In Table-6, we present the seven pillars as classified into four groups.

Table 6
Seven Pillars of Developing Mobile Financial Services

Institutional Environmen	Market Environment	End-user Environment	Adoption and Availability
1. Regulatory Proportionality - Financial sector regulation - Telecom sector regulation - MFS regulation - Policy and coordination **2. Consumer Protection** - Regulation - Enforcement and administration	**3.Market** competitiveness - Financial sector competitiveness - Telecom sector competitiveness - Innovation **4. Market Catalysts** - Government leadership - Data collection and monitoring - Other market catalysts	**5. End-user Empowerment and Access** - Financial literacy - Financial empowerment - Mobile penetration **6. Distribution and Agent Network** - Supporting infrastructure - Agent network development	**7. Adoption and Availability** - Adoption - Mobile payment diversity - Mobile financial diversity

Source: World Economic Forum, The Mobile Financial Services Development Report, 2011

Government has keen interest in the development of mobile financial services even in the context of using the services. It can provide subsidy and other financial benefits to the targeted groups through using MFSs. This will reduce cost of transfer and minimise leakage. More importantly, beneficiaries will receive it at a very low transaction cost. But from the perspective of a bigger picture, government should contribute to the development of MFSs as a financial system. The critical role that government can play is to ensure protection of consumers and financial stability through appropriate legal framework. It is needed because multiple agencies are involved in it.

9. Challenges

Consumer literacy and awareness play an important role in mobile internet or money adoption and empowering people with knowledge and information. In Bangladesh, as revealed in our survey, around 56 percent of the households do not have any idea about mobile banking or mobile financial services. Even in the USA, more than fifty percent of the adult populations have 'safety' concern about using mobile money. These findings do clearly suggest that there is need for consumer literacy and awareness.

Security and efficiency is another area of challenge. Mobile financial services should not be developed because it helps consumers and because everybody is talking about it. Individual approach will be required for selecting clients or subscribers. National identity smart card should be the basis for selecting clients. This will reduce risk of financing terrorism or informal use of money in informal inter-country border trade or business. For controlling criminal activities, the central bank has recently set a limit for transaction numbers, cash-in and cash-out of mobile banking in Bangladesh (Bangladesh Bank, 2015).

Savings and credit through mobile technology need to be clearly perceived. Bangladesh is yet to enter into 'mobile wallet'. But it is used in India and Pakistan, for example. There are other countries that are mobilising savings and offering credit. Where the wallet should be opened? Should be technoco operators or the banks? Security of money or savings needs to be clearly examined. This has to be examined from the perspective of safety and institutional accountability and guarantee.

Development of infrastructure and competition: Many operators operate in a country; and also many banks operate. Jointly they are offering mobile financial services. Government as well as the central bank should ensure that infrastructures are development and competition exists. This will help institutions to expand services with scale economy and offer the services at low cost.

10. Conclusion

Growing mobile network in Bangladesh has brought forth new possibilities, which comprises larger usage of cell-phones, smart-phones and internet service. Along with the technological advancement, new mobile banking services have been commenced. The increase in technology usage in the urban areas is influencing consumer behavior, payment techniques and purchasing habits eventually. And a number of people from all levels are using this service. It is an easy, cost-effective, secured and affordable way to send and receive money. Financial

services, like, bill payment, transfer of funds, depositing or withdrawal of cash through mobile telecom could play a significant role.

Mobile financial services have brought major changes in financial products and institutional structure. It can reach excluded low-income and micro and small entrepreneurs, which will have wider impact including growth and poverty alleviation. In South Asian countries, it has made headway. The need for mobile financial services is beyond any question. It can play a complimentary role in expanding financial services in mountainous and other inaccessible areas. MFIs have been playing role in financial inclusion in Bangladesh and other South Asian countries as well as in many developing countries. Our analysis showed positive role of mobile banking on financial inclusion. The findings do suggest that the role of banks and MFIs to expand services in inaccessible areas can be effective if they are complemented by mobile money. Central bank should also collaborate with institutions like MFIs or cooperative that can expand financial inclusion through using the mobile technology. While banks may be driven by profitability or central bank may be driven by their commitment to financial inclusion, mobile financial services should be provided with appropriate regulatory framework for the participating institutions. This should not be forgotten.

Our final point is that research on impact or efficiency of mobile financial services is largely absent in Bangladesh. Whatever studies are available; there is none on impact of mobile money. There is a need for further research on the impact of mobile money both at the micro and macro levels. There should be study on what should constitute optimum regulation for mobile money. However, we conclude that mobile financial services should be bank-led.

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Appendix-A

Charges of two Leading Mobile Banking Service Providers (DBBL and BRAC) in Bangladesh

Service type	DBBL	Bkash (BRAC Bank)	IBBL (proposed charges)
Registration Fee	Free	Free	Free for customer
Cash-in	1% of the transaction amount or Tk. 5 whichever is higher	Free	Free for customer and agents will get a commission from IBBL as per different transection slabs, for example, for 50-1000 tk. 1, 1001-5000 tk.2 and so on
Cash-out	2% of the transection amount or tk. 10, whichever is higher	Slab based; starting from tk. 5 for tk 100 to tk 135 for tk. 10,500, for bigger amount, charge is 1.25% of the amount.	From tk.50 to tk 150 charge is tk.4, tk.151 to tk 500 charge is tk 8, tk. 501 to tk 1000 charge is tk.12, tk. 1001 to tk.10000 charge is tk. 10 per thousand and over 10000 upto 25000 charge is 1% of the amount
Fund Transfer (P2P)	Free	Tk. 2/ Transection	Tk. 2/Transection
Merchant Payment (P2B)	Free for customer	Free	Free for customer . Merchant will pay 0.5% or tk. 5 whichever is higher as commission.
Mobile Top-up (P2B)	Free for customer	Not mentioned	Free for customer. Telco will provide commission as per agreement
Salary Disbursement (B2P)	Free	Not mentioned	Free for customer. Corporate househ will provide commission as per agreement
Allowance Disbursement (G2P)	Free	Not mentioned	Free for customer. Government may provide as per rate, if any.
Remittance disbursement	Free	Not mentioned	Free for customer. IBBL will provide the Telco and agent charge
Tax, levy payments (P2G)	Not mentioned	Not mentioned	As per Govt. set charges, if any

Source: Inam T. & B. Islam (2013)

Appendix-B

Mobile Financial Services (MFS) in Bangladesh (March, 2017)

Sl. no.	Description	Status
1	No. of approved Banks	28
2	No. of Banks started to convey the service	17
3	No. of agents	717046
4	No. of registered clients (in lac)	504.29
5	No. of active accounts (n lac)	245.70
6	No. of total transaction	151,778,574
7	Total transaction in taka (in crore BDT)	25,046.67
8	No. of daily average transaction	4896,083
9	Average daily transaction (in crore BDT)	807.96
10	Inward Remittance (in crore BDT)	7.71
11	Cash In transaction (in crore BDT)	10,667.48
12	Cash Out Transaction (in crore BDT)	9,619.61
13	Person to Person transaction (in crore BDT)	3,743.51
14	Salary Disbursement (Bank to Person) (in crore BDT)	404.69
15	Utility Bill Payment (Person to Bank) (in crore BDT)	180.09
16	Others (in crore BDT)	423.58

Source: Bangladesh Bank (2017)

Appendix-C

Division Wise Percentage of Households have Internal Migrant Members

Sl. no.	Description	Percentage (%) of Internal Migrants
1	Barisal	30.57
2	Rangpur	20.12
3	Rajshahi	15.66
4	Dhaka	14.93
5	Khulna	12.84
6	Chittagong	9.97
7	Sylhet	5.36

Source: Author's own calculation

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Institute for Inclusive Finance and Development (InM)

- PKSF Bhaban, Agargaon, Dhaka-1207, Bangladesh
- InM Training Centre, House # 30, Road # 03, Block : C
  Monsurabad R/A, Adabor, Dhaka-1207

Telephone: +880-2-8181066 (Agargaon), +880-2-8190364 (Monsurabad)
Fax: +88-02-8152796, Email : info@inm.org.bd; Web: www.inm.org.bd