

Designing A Cross Platform Mobile Wallet Service for Bangladesh- A Service Design Approach in A Developing Country

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Thesis for a Master of Business Administration
(UAS) - degree

The Degree Programme of Service Design
Novia UAS, Turku 2022



DEGREE THESIS

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Degree Programme: Service Design

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Title: Designing A Cross Platform Mobile Wallet Service for Bangladesh- A Service Design Approach in A Developing Country

Date 31.10.2022 Number of pages 58

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Abstract

The purpose of this Master's thesis is to design a mobile wallet service for Bangladesh. Bangladesh is a developing country with more than 168 million people, and available mobile wallet services have higher cost of usage. Customers cannot transfer funds from one wallet service provider to another wallet service provider's wallet. Moreover, there is an increased number of fraudulent activities with the mobile wallet users in Bangladesh, due to low security and lack of regulatory actions.

The aim of this study was to analyze the current situation in mobile financial market in Bangladesh and address those common problems. The main objective of this thesis is to come up with a better solution that can reduce or eliminate the existing problems faced by the customers through integrating bank into the process directly.

As a theoretical background, design thinking, service design, mobile wallet service types, commercial banks of Bangladesh and the most common internet fund transfer methods used by banks are explored. In methods and tools double diamond framework was used to explore the research tools needed for the study. Interviews, survey and workshops were conducted to get insights into the problem and co-create a solution. A prototype was developed with UX design tool Figma. Finally, the prototype was tested in a close environment by a Lecturer and 3 mobile wallet users of Bangladesh.

In conclusion it can be said that the proposed service can open door for a new business to come forward that can provide a better solution to the existing mobile wallet problems in Bangladesh. A business model canvas was included to visualize the idea.

Language: English

Key words: design thinking, service design, mobile wallet,
mobile finance,

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Abbreviations

ATM –	Automated Telle Machine
B2B –	Business to Business
BD-RTGS –	Bangladesh Real Time Gross Settlement
BDT –	Bangladeshi Taka
BEFTN –	Bangladesh Electronic Fund Transfer Network
BRAC –	Bangladesh Rural Advancement Committee
NFC –	Near Field Communication
IBFT –	Internet Banking Fund Transfer
IPO –	Initial Public Offering
KYC –	Know Your Customer
NPSB –	National Payment Switch Bangladesh
POS –	Point of Sales
USSD –	Unstructured Supplementary Service Data

1 Introduction

Bangladesh is a densely populated country with more than 168.5 million people (worldometers, 2022). This huge population opens big doors for business for different sectors and financial sectors also grow by offering different services. It's a matter of great concern that the digital development of the sector is not developed in pace with the current technological development around the globe.

In Bangladesh there are many mobile wallet services provided by different providers. Most of those wallets and services are subsidiaries of different banks or financial institutions. bKash, Rocket, Nagad and cellFin are some major mobile wallets services operating in Bangladesh. All these services are independent, and a financial custodian is involved to safeguard the fund according to the central banks' regulation. In most cases the custodian is the bank itself, providing the mobile wallet service.

In this thesis the mobile banking services or the mobile wallet services will be analyzed in depth to find out the services provided by the wallet service providers, customers segments of mobile wallet services, the way different services are provided by the mobile wallets, and scope for improvements for the mobile wallet services with a service design thinking approach.

2 What is a mobile wallet?

According to Investopedia, A mobile wallet is a mobile app that works as virtual wallet and stores payment information on a mobile device. A mobile wallet is a convenient way for monetary transactions like in-store payments and pay bills with listed merchants. (Kenton, 2022.)

There are several types of mobile wallets, e-wallets or digital wallets being used around the world. Popular wallet services Google Wallet and Apple Pay store debit and/or credit cards' information, and uses smart phones' built in Near Field Communication (NFC) features to safely make the transaction/payment using the stored and selected card. Both the payment systems can make online purchases from an app or website and handle the checkout process automatically with pin code or biometric verification. (Raghavan, 2022.)

Other types of payment system include “Swish” smartphone app from Sweden and “MobilePay” smartphone app being used in a few countries including Finland, they work as a payment gateway to transfer funds between bank accounts by using mobile number as the unique identification number. Users can transfer money and make in-store payment using the QR codes (PPRO, 2022.)

Four of the above-mentioned wallets and payment systems use their respective mobile phone applications to make transactions but do not store any funds on their own. There is another type of mobile wallet that works like financial accounts and stores funds on its own and can be used to transfer funds between accounts with phone numbers, unique short account ID and QR codes. Examples include Revolut, N26, Paysera, Monzo and Monese. Among these companies Revolut offers its private users a physical debit card for use. The debit card costs a user a onetime payment of 7 to 10 Euros. Revolut also offers some premium services that can be claimed with premium subscriptions and a premium debit card. Different premium plans are available to choose from and offer different premium service bundles. (Revolut Bank UAB, 2022.)

None of the above-mentioned wallet/account service providers charge any fee to its private users for money transfer and bill payment. But there is another type of mobile financial wallet service prevalent in Bangladesh. Some of the commonly used mobile wallets are bKash, Rocket wallet and Nagad. The wallet users can put money into their wallet without any charges but need to pay a small fee for fund transfer between wallet accounts and to withdraw money. How these fees can be reduced will be the focus of this thesis.

3 Purpose of the study and project timeline

In this chapter the purpose of the study and a project plan will be presented. The purpose of the study is presented with in description of the mobile wallet service provider’s current practices, and the scope for a new service to be introduced, why a new service can be introduced and how it can help the customer. In the project plan timeline, the work progress is shown with a chart.

3.1 Purpose of the study

The purpose of the study is to design and develop a new service that can compete with the existing services and bring more customer-oriented results. The existing services require the customer to pay fees for most of the services and have security issues. In this thesis a new service is aimed to be designed and developed that can reduce the fees for the users, increase the security of the mobile application, and offer more customer-oriented services

bKash was launched as the first mobile wallet service in Bangladesh with the view to provide financial solution to the mass people in 2011. It is a subsidiary of BRAC Bank Limited. Bringing financial services to people who do not have a bank account or cannot operate a bank account (bKash Limited, 2011.). It only required a mobile number at that time but, later required National Identity document to open an account (bKash Limited, n.d.). It needed time to grow and with a huge marketing campaign over time, it saw its success in a very short period. Though bKash is the most popular and widely used, there are many other banks that followed in their footsteps and are trying to get a part of the market share. Rocket, Nagad, OkWallet, iPay are currently on the rise, but bKash remains the market leader.

All the wallets offer account opening with no fee except, Rocket wallet that requires euro 0.2 equivalent to open an account and that money cannot be used. None of them has a monthly or yearly charge. Offers fund transfer from one wallet to another wallet, payment services, bill pay services. While the payment for shopping does not have any fee, a customer needs to pay almost euro 0.5 equivalent or 2% (whichever is larger) per transaction for each fund transfer. A customer can deposit and withdraw cash to and from the wallet from designated shops and ATMs. The deposit requires no fee, but the withdrawal has a 1.85% fee on the amount withdrawn. (bKash Limited, n.d.)

How the services are provided is quite interesting, a customer with a mobile phone can use the service upon registration. A customer can use the USSD (Unstructured Supplementary Service Data) codes for the service or can use the app on their smartphone. In the beginning the services were solely USSD code dependent, but for the last few years the app version of the wallets is available, and all the new wallets that appeared in last few years had their mobile app available upon launch (Qadir, 2022.).

Fund transfer between different wallets is not yet allowed. Even though all the wallets are of concern (of a bank), transferring funds to the bank account is also subject to a fee and transferring to different bank account is not yet possible. Designing a cross platform solution,

can be seen as a solution to reduce the services fee for the customer, and can enable the customer to transfer funds between wallets with ease, otherwise it's hard for people to manage many different wallets for different needs. Moreover, it is expensive to pay 1.85% for each transaction for a mobile wallet. Redesigning the service can make it cheaper, as well.

3.2 Project timeline

Figure 1 below shows how the project has progressed in different stages of this study period. The idea of this project was thought of during the Research and Development course as a thesis plan and later considered as the topic for the thesis with the approval of the supervisor.

Project Timeline

Work	Nov 21	May 22	Jun 22	Jul 22	Aug 22	Sep 22	Oct 22	Nov 22
Development of thesis plan								
Thesis first draft submission								
First Thesis seminar								
Updated first draft submission								
Survey and interview questionnaire								
Persona Brainstorming								
Customer Journey map								
Benchmarking								
Surveys and interviews conducted								
Second Thesis Draft submission								
Second Thesis Seminar								
Updated second draft submission								
Planned final draft submission								
Planned final thesis seminar								

Figure 1. Project Timeline

4 Research questions

The research questions below are formulated by keeping the customers' needs at the center of the overall design of the proposed service.

1. What are the common services the mobile wallet service providers provide in Bangladesh?
2. How can mobile wallet services be improved from the customers' perspective?
3. How to reduce the fees and charges of mobile wallet services?

5 Frame of reference

Frame of reference is defined as a set of ideas, conditions, or assumptions that determine how something will be approached, perceived, or understood, and anything that changes the way we perceive or make decisions can be called as framing (Social Engineer, LLC., n.d.).

A frame of reference is used in this thesis to depict the topics involved in designing a new customer centric service. As the focus of this thesis is to develop a mobile wallet or payment gateway service that can reduce the cost of transaction for the customer while making it safe and secure, the financial industry is taken into consideration involving the customer, the commercial banks, and the central bank of Bangladesh. To design and develop a service, service design thinking and service design methods and tools are used along with co-design methods.

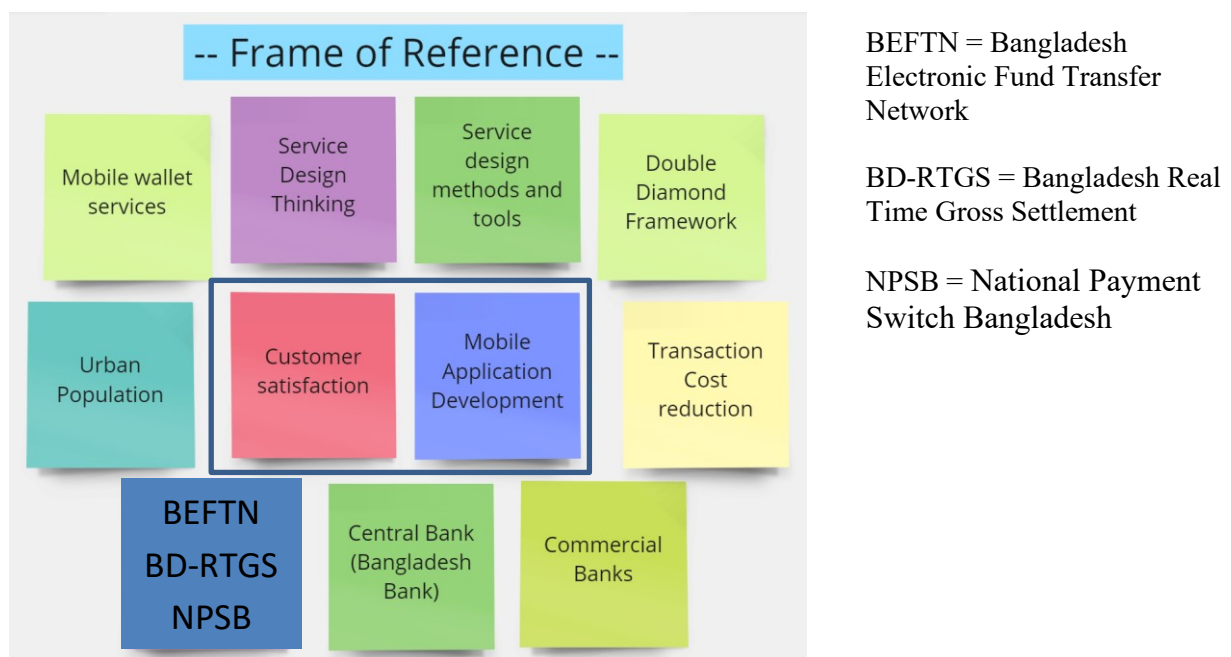


Figure 2. Frame of reference

In this thesis, a new mobile wallet or payment gateway service will be introduced with the help of design thinking and service design methods and tools. Considering the low average income in Bangladesh, a fee for transferring fund from one person to another is expensive. The need for a redesigned fund transfer and payment service seems necessary. With the purpose of reducing the cost of transactions while making the process safe and secure at the same time, designing a new service with the help of service design thinking and service design methods and tools feels effective. That makes it customer centric and takes direct feedback from the existing users/customers.

As shown in figure 2, mobile wallets services will be analyzed at the beginning, then the design thinking process will be discussed by explaining why and how a new customer centric service can be created. After that, the double diamond framework for innovation will be discussed with the used research and analysis methods.

6 Background

In this chapter demographics of Bangladesh will be introduced in a brief with its population density and distribution of population in both urban and rural areas. That will provide a better picture of the targeted customer group to serve. A brief introduction of prevalent mobile wallet services is also discussed with a fee structure from a leading wallet service provider. After that, service design thinking will be discussed to understand the development process of the new proposed service. Then, the regulations from the regulator Bangladesh Bank will be discussed. A brief description of the commercial banks and the Bangladesh Electronic Fund Transfer Network will be discussed to illustrate how the online banking and fund transfer network works in Bangladesh. Finally, customer satisfaction and a mobile app development for the new service will be discussed.

6.1 Demographics of Bangladesh

According to worldometers.info Bangladesh has a total population of more than 168 million (worldometers, 2022). This huge population lives in a total area of 147,630 square kilometers. That makes it one of the world's most densely populated countries, with 1,116 inhabitants per square kilometer. Around 62% of the population lives in the rural region. (WorldData.Info, 2022.). This means that more than 100million people of the total population live in rural places and approximately 63.46 million people live in the cities. Two of the major cities of Bangladesh are the capital Dhaka and the port city Chattogram.

Bangladesh Population (Live)

168,478,053

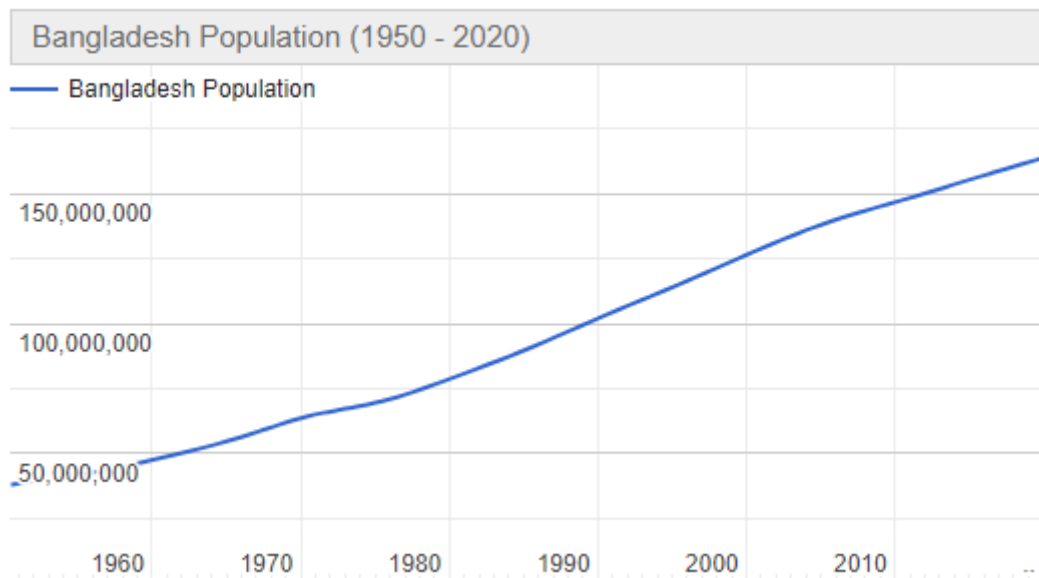


Figure 3. Bangladesh Population (worldometers, 2022)

According to worldometers.info the capital city Dhaka has a total population of more than 10 million and the second largest city Chattogram has approximately 4 million dwellers (worldometers, 2022). Bangladesh has three major cities Dhaka, Chattogram and Khulna and more than 65 medium and small sized cities and towns, where at least 45,000 people live in each of them.

According to data from statista.com, around 95% Bangladesh's population are aged below 65 (Statista, 2022). This means Bangladesh has a large workforce. Literacy rate has also increased steadily, with more than 74% of the population considered literate and can at least read and write the native Bengali language (macrotrends.net, 2022).

6.2 Mobile wallet services in Bangladesh

There are several mobile wallet or financial services offered by different service providers in Bangladesh. All these mobile wallet services provide almost identical services to their customers. For a better understanding the activities of bKash limited will be discussed below as it is the biggest service provider.

bKash limited is a subsidiary of Brac Bank Limited, one of the first mobile financial service

providers in Bangladesh started its journey on July 21, 2011. With a vision to provide financial services to the mass with the help of just a mobile Unstructured Supplementary Service Data (USSD) code menu (bKash Limited, 2011.) It opened the door to financial transactions for people who are not educated enough to open and operate a bank account but possesses a mobile phone. Within the past 10 years it became one of the revolutionary solutions to provide most of the financial services that a bank can provide to its customers including deposit and withdrawal, fund transfers, POS shopping, bill payment and now inward remittance from abroad. (bKash Limited, n.d.). Though bKash is the most popular and widely used mobile wallet, it is not the first one, another bank, Dutch Bangla Bank Limited started a similar service with the name DBBL Rocket (wallet) earlier in the same year on March 31, 2011, (Dutch-Bangla Bank Limited, n.d.). But bKash was adopted faster by the customers because of their mass marketing.

The initiative changed the financial service sector for the customers, who are living in rural places and are deprived of banking services. Small, designated shops became small cash counters for the wallet service providers. The service reached the most rural places possible, where banks cannot even plan to start operation due to lack of infrastructure. Now people can store their funds in a safe wallet that is secure and trustworthy, as it is a service from a well-known bank. People can also carry the wallet wherever needed, as it is accessible through mobile USSD codes. Can transfer funds to others, whenever necessary and can also pay for shopping and utility bills wherever the wallet is accepted. (Huawei, n.d.)

With the emergence of the mobile financial services, many other banks and private companies came up with their own wallet and started offering the same services. Despite the huge competition to grab the market share, the cost of the services remained the same for the end users. Customers still need to pay 0.05-euro equivalent for the fund transfers and need to pay close to 2% of the withdrawal amount from the customer's pocket, which is expensive for a country, where many people live under the poverty line. Below is a fee structure of bKash wallet denoted by Bangladesh Taka.

- 5 TK charge will be applicable per transaction for Send money (fund transfer) to any number except Priyo numbers, if the monthly transaction is between 100.01 TK to 25,000.00 TK.
- 10 TK charge will be applicable per transaction for Send money (fund transfer) to any number except Priyo numbers if the monthly transaction exceeds 25,000.00 TK.

- **No charges** will be applicable on bKash mobile app or USSD for sending money up to 100 TK to any number.
- According to the limit mentioned above, a 10 TK charge will be applicable for border transactions. For example: A customer already made Send Money transactions of 24,500 TK to any bKash numbers, except his Priyo numbers in a month. Now, if he/she wants to send 600 Tk (total 25,100 TK), 5 Tk will be charged for this transaction.
- Applicable for both APP and USSD (by dialing *247#) channels (bkash.com, 2021).

6.3 Service design thinking

In this chapter service design thinking is divided into two parts, service design and the design thinking process, and described accordingly.

6.3.1 Design thinking

According to Dam and Siang, service design is an iterative process. The process is used by individuals, organizations, or companies to understand the user or customer of a product or service, challenge the existing assumptions, and define problems to identify any alternative strategies that can provide solutions, which can be prototyped and tested. The main objective is to identify alternative strategies and solutions for a problem. Design thinking is more than just a process that helps to see things from a different perspective and apply a new mindset. Design thinking iterates in five phases and is a non-linear process (Dam & Siang, 2022.).

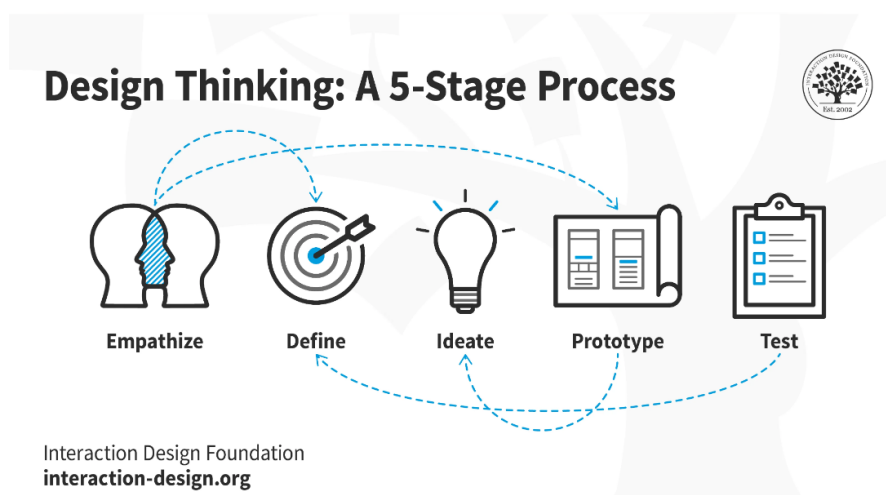


Figure 4. Design Thinking: A 5-Stage Process (Dam & Siang, 2022.)

Figure 4 shows that the design thinking process is iterative and does not require to follow a direction. It can start from any of the phases. The phases will be discussed briefly below.

- Empathize – the problem needs to be understood with empathy and through research. It is crucial to design a human-centered design process, as it helps to gain real world experience of the problem and set aside the assumptions. (Dam & Siang, 2022.). For this process the author will go through some primary and secondary research to find the core of the problem and bring a human-centric solution to the problem.
- Define – to define the problem it is needed to accumulate the information gathered during the Empathize stage. Through analyzing the observation, the core problem can be defined. Creating personas can help to understand the problem better with a human-centric approach. (Dam & Siang, 2022.). For the purpose of this study, persona brainstorming methods will be followed, to create some personas that depict the needs from different customers' point of view.
- Ideate – ideation is a result that comes from the first two phases of design thinking, a solid background of knowledge along with the ability to think outside the box, it can bring alternative ways to solve a problem. At this stage brainstorming is considered particularly helpful. (Dam & Siang, 2022.). For developing ideas co-creation methods will be used for this project.
- Prototype development – prototyping is the phase where an experiment starts. In this phase the aim remains to identify the probable best solution to an existing problem. A prototype can simply be done through prototyping. (Dam & Siang, 2022.). As this project aims to bring a solution that is software based and aims to provide service, a mobile application prototype will be developed with the help of UX design tools available.
- Test – after developing a prototype, testing is required to see how it works. But, as the design thinking process is iterative, it is always possible to go back and forth from any previous phase and restart the process from a certain phase. (Dam & Siang, 2022.). Testing can be done in a team or with a group of customers and the feedback can be used to make the prototype better or include new features that may seem necessary.

6.3.2 Service design

Service design is a holistic user centric approach for developing a service that includes the customer, business, service production and technology. It is a versatile tool for designing and developing services, business customer experience, user experience and strategies. (Solita, n.d.).

According to Stickdorn, Hormess, Lawrence and Schneider (2018, p. 26) the new principles of service design doings have six important points. Those are

1. Human centered – This keeps the human at the center of the service design process and takes the experience of all the people affected by the service into consideration.
2. Collaborative – This encourages all the stakeholders of various backgrounds to be actively engaged in the service design process.
3. Iterative – Service design is an exploratory, adaptive, and experimental approach that iterates towards implementation.
4. Sequential – The designed service should be visualized as a sequence of interrelated actions.
5. Real – The needs must be researched in reality, requires real prototyping, and intangible values need to be evidenced as physical or digital reality.
6. Holistic – The designed service should sustainably address the needs of all the involved and affected stakeholders through the entire service and across the business. (Stickdorn, Hormess, Lawrence, & Schneider, 2018)

Current mobile wallet services in Bangladesh need to have a well thought service design approach that keeps the user at the center of the design process. Through that it can ensure customer satisfaction through reducing the cost of transactions. There are new competitors entering the market almost every year to rip the benefit from the business. But in the end the customer still needs to pay the price for every transaction. To reduce the cost, a collaborative approach needs to be followed, while designing a new service.

6.4 Regulations and guidelines

The central bank came up with some regulatory guidelines for the mobile financial services (MFS) and released its revised latest version in July 2015.

The guideline mentions the tremendous growth of mobile financial sectors in Bangladesh. *“However despite impressive growth gains in capital base, income, return on equity and other areas, the financial sector remains lagging in reaching out with adequate financial services to large swathes of farm and non-farm economic activities of low income rural and urban population in Bangladesh.”* (Bangladesh Bank, 2015.).

This shows how the industry grew in the few years after launch and caused the central bank to take the growth and its services into consideration. The central bank views mobile wallet services as a tool to reach the low-income people in both rural and urban areas, as the current banking system lags to serve the large swathes of farm and non-farm activities.

According to Bangladesh Bank (2015) the mobile phone network has expanded throughout the country and Bangladesh Bank is trying to modernize the country’s Payment systems and financial sector, which is led by mobile phone based application development and IT infrastructure. (Bangladesh Bank, 2015.)

“Bangladesh Bank (BB) is issuing these regulatory guidelines for Mobile phone based Financial Service (MFS) platforms in Bangladesh with a view to providing an orderly, enabling and competitive environment for utilizing this new window of opportunity of innovatively extending the outreach of financial services.” (Bangladesh Bank, 2015.)

This above statements from Bangladesh Bank indicates how the organization sees mobile phone-based payment and financial services. It also considers that the IT infrastructure has opened opportunities for innovations that can lead to cost effective ways to provide financial services to a large population segment that has not been served with traditional financial system.

With the advancement of smartphones as we see it now, all the mobile wallet providers started providing services through mobile applications. All the service providers offer both USSD menu and mobile application at the same time, for the convenience of their customers. But still one thing has remained almost unchanged, the fee structure. At the beginning there was less fee for fund transfers and withdrawal for using the mobile app, but later the fee was

adjusted to its previous amount, which is higher. Another problem is, it is not yet possible to transfer funds from one wallet to another, which causes a single person to maintain multiple wallets for transferring money. The reason for maintaining multiple wallets can be caused by the daily and monthly transaction limit imposed by the service providers.

6.5 Commercial Bank and Bangladesh Electronic Fund Transfer Network

In this chapter a brief description of a list of commercial banks operating in Bangladesh will be presented. An introduction Bangladesh Electronic Fund Transfer Network (BEFTN), Bangladesh Real Time Gross Settlement (BD-RTGS) and National Payment Switch Bangladesh (NPSB) also be presented.

6.5.1 Commercial banks in Bangladesh

With the advancement of smartphones as we see it now, all the mobile wallet providers started according to Bangladesh Bank, there are 61 scheduled banks operating in Bangladesh, that includes three specialized banks, as well (Bangladesh Bank, n.d.). Other than these three specialized banks, there are 58 commercial banks, among these 58 banks, six are state-owned, nine are foreign commercial banks and the remaining 43 are private commercial banks. Basically, commercial banks are financial institutions, providing different banking services, that include deposits, withdrawals, maintaining different types of customer accounts, granting loans, and managing finances. (Business Inspection, 2022.) Not all the commercial banks perform the same or have the same level of trust from the customer base. Below are the top 10 commercial banks listed by Business Inspection:

1. Islami Bank Bangladesh Limited (IBBL)
2. Dutch Bangla Bank Limited (DBBL)
3. Sonali Bank Limited (SBL)
4. The City Bank Limited
5. Agrani Bank Limited
6. BRAC Bank Limited
7. Bank Asia Limited
8. United Commercial Bank Limited (UCBL)
9. International Finance Investment and Commerce Bank Limited (IFIC)
10. Mutual Trust Bank Limited (Business Inspection, 2022.)

6.5.2 Bangladesh Electronic Fund Transfer Network

Initiated in February 2011, BEFTN is the first paperless electronic fund transfer system between banks in Bangladesh (Bangladesh Bank, n.d.). BEFTN has five participants in the process. They are:

1. Originator
2. Originating Bank (OB)
3. Bangladesh Electronic Funds Transfer Network (EFT Operator)
4. Receiving Bank (RB)
5. Receiver. (Janata Bank Limited, 2020)

The first participant of the originator starts the transaction, and the instruction goes to the originating bank, originating bank sends the instructions to BEFTN and BEFTN sends the instructions to the receiving bank, then the receiving bank deposits the money to the receiver's bank. A visual representation of the process is provided below.

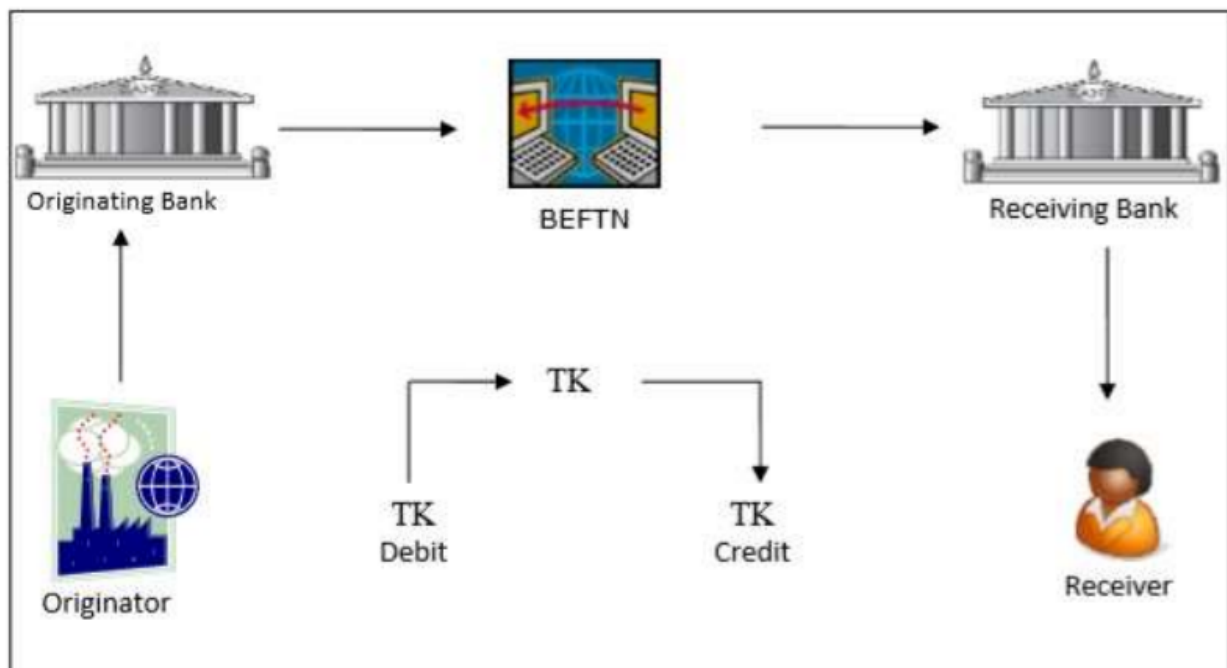


Figure 5. Eft Credit Transaction Flow (Janata Bank Limited, 2020).

Some examples of credit entries through BEFTN are:

- Inward Foreign remittances
- Domestic remittances
- Payroll private and government
- Dividends/Interest/Refunds of IPO
- Business to business payments (B2B)
- Government tax payments

- Government vendor payments
- Customer- initiated transactions. (Janata Bank Limited, 2020).

Some examples of BEFTN debit entries include:

- Inward Foreign remittances
- Domestic remittances
- Payroll private and government
- Dividends/Interest/Refunds of IPO
- Business to business payments (B2B) Government tax payments
- Government vendor payments
- Customer- initiated transactions. (Janata Bank Limited, 2020)

The main flaw of BEFTN at this moment for this project is that the transfer is not instant, and it may require a minimum of one business day for the fund to arrive at the receiver's account after approval from both the initiators and receiver's banks (epsBlog, 2022).

6.5.3 Real Time Gross Settlement (BD-RTGS)

Real Time Gross Settlement (BD-RTGS) was launched by Bangladesh Bank on 29 October 2015, with an aim to a facilitate safe, secure, and efficient interbank payment system. As the name suggests, the settlement takes place in real time without any delay between bank accounts and consequently it does not need any waiting period for the banks to approve the transaction. The only restriction it imposes, is the minimum limit of transaction to BDT 100,000.00 (One Hundred Thousand Bangladeshi Taka). BD-RTGS is currently allowed to handle different types of payments and individual bank transfers. (Bangladesh Bank, n.d.)

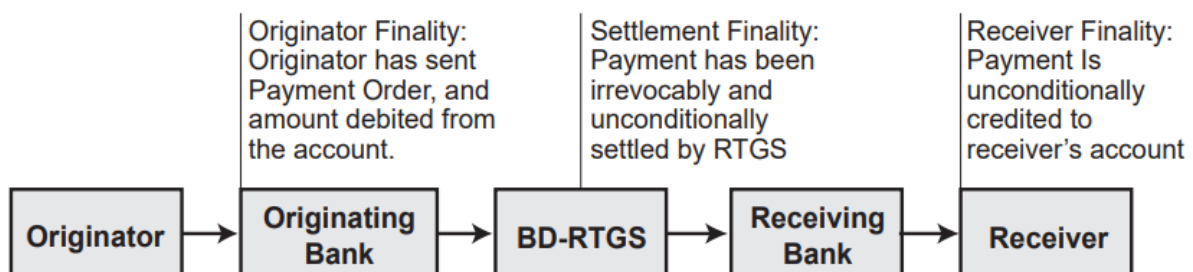


Figure 6. BD-RTGS Finality and irrevocability of payments (Bangladesh Bank, 2015)

As BD-RTGS does not offer small amounts to be transferred from one account to another, it may not be suitable for customers with the need to transfer small amounts of money. But it is

good to know that the process exists in Bangladesh and may develop further in the future that may enable banks, organizations, and users to use the service for small fund transfers.

6.5.4 National Payment Switch Bangladesh (NPSB)

According to Bangladesh Bank, NPSB is in operation in Bangladesh since 2012 and was introduced with an aim to establish interoperability among participating banks for both account and card-based (debit and credit) transactions. At this moment it is operational with Automated Teller Machine (ATM) network, Point of Sales (POS), and Internet Banking Fund Transfer (IBFT) transactions. A total of 53 (fifty-three) banks are now interconnected through NPSB, among these 53 banks, 38 banks are certified for IBFT transactions. A connected bank can use NPSB members atm network for a small fee per transaction. The central bank is also actively considering the Mobile Financial Services to be integrated into the NPSB. (Bangladesh Bank, n.d.)

The fee structure for using NPSB connected ATM network is as follows

- Cash withdrawal is 15 Taka per transaction. It is needed to mention that in Bangladesh the limit for a single ATM withdrawal is 20,000 BDT.
- Balance enquiry costs 5 Taka. It is charged each time the customer checks their account balance. For most of the banks owning ATM, customer it is free of charge.
- Mini statement costs 5 Taka for each statement and it shows 5 to 10 most recent transactions.
- POS payment is free using NPSB. (National Bank Limited, n.d.)

Considering the three payment and fund transfer systems discussed in this chapter, NPSB may be the most suitable of these three systems. But a combination of all three may also be possible for a better result. At this moment IBFT has opened the door for P2P instant fund transfers between bank accounts. The process is still new and needs some process to make it simpler for the customer, thus a new service needs to be designed to make it easier for customers.

6.6 Securities and risks

Different service providers have taken different measures to prevent scams and fraudulent activities, but scammers are still active and scamming people with new tactics every now and then. New measures are needed to prevent the increasing number of scams that are prevalent

in the country. A need for a service design that can facilitate the transaction between wallets in one single app is emerging.

7 Research and analysis methods

The chapter is divided into four sub chapters where primary data, secondary data, qualitative research methods, quantitative research methods and the double diamond framework for innovation is described with an explanation of how those methods were used for the research. Data was collected primary and secondary data collection methods, qualitative and quantitative research methods show data types that are being collected and emphasized, the double diamond framework for innovation will finally be described with the different data collection methods and ideation methods.

7.1 Primary and secondary data

Both primary and secondary data were used for defining and discovering the problem areas. It helps to find out which new services are needed and what improvements can be made to the existing services fee structure.

7.1.1 Primary data

Primary data refers to the data the researcher gathers himself through different research methods (Wagh, 2022). Some examples of data collection methods are surveys, interviews, observations etc. Some advantages of primary data include that, the collected data is less biased and gives actual and recent information, the researcher gets involved in the data collection directly, data is more focused and relevant for the research, and offers more reliability and accuracy.

For this thesis, the author will depend mostly on primary data collected from surveys and interviews. Data collected directly from the customers will give unbiased, actual and most recent information about the services, and will indicate the pain points and scope for a new service introduction.

7.1.2 Secondary data

Secondary data is the data that was already collected by someone else for their purposes. According to Formplus, secondary data are data collected already through primary sources and are readily available for others to use (Formplus Blog, 2022). Advantages of secondary

data include, it is readily available, collected in a short time, it is economical as data is already formatted. Disadvantages include, the data can be biased, accuracy can be less as it is past data, not specific to the research so not all data are useful.

For this thesis the secondary data sources will be service providers' websites, central banks' websites, online articles, business reports and financial news portals.

7.2 Qualitative research

Qualitative research deals with non-numeric data types. It is comprised of texts, audios or videos and helps to interpret open ended answers, opinions, and personal views from relative experience from a participant. Qualitative research is important to gather in depth knowledge of an existing issue, understand the root of the problem and to generate ideas from different perspectives.

According to McLeod, qualitative data is collected through observing the interview participants and that data is analyzed from the information received from the participants. It is concerned with understanding the behavior of the participant. (McLeod, 2019.)

For this thesis, data will be collected from different websites and reports available from the internet and at the same time surveys will be conducted to come up with ideas from the customer's perspective. If possible, the author will try to reach some of the responsible officials from different service providers to gain some insights about their near future to improve the services or possible future collaboration between different service providers.

Benchmarking with other similar or better services will be taken into consideration to offer a better service to the customer. For benchmarking, practical use of the services will be considered. It gives a firsthand experience of the similar services offered by other service providers and helps during the ideation process of how a new services can be designed.

7.3 Quantitative research

Quantitative research deals with the numerical form of data and involves measurements with numbers.

Jyväskylän yliopisto mentions quantitative research as "*Quantitative research focuses on various modes of classification, exploration of causality, comparison, and explanations of*

phenomena through numeric variables. Quantitative research uses several kinds of computational and statistical methods of analysis” (Jyväskylän yliopisto, 2010.)

To analyze the numeric data received from the surveys, interviews and secondary sources quantitative research method will be used. This will give a clear idea about the customers’ satisfaction, dissatisfaction, and the scope of improvements. Different data received from the sources will also provide information on the cost structures of the services and can help the author figure out how to make the service cheaper.

7.4 Research methods

To plan the methodology the double diamond design process model will be used. Launched in 2004, the Double Diamond is a clear, comprehensive, and visually descriptive design process (Design Council UK, 2019).

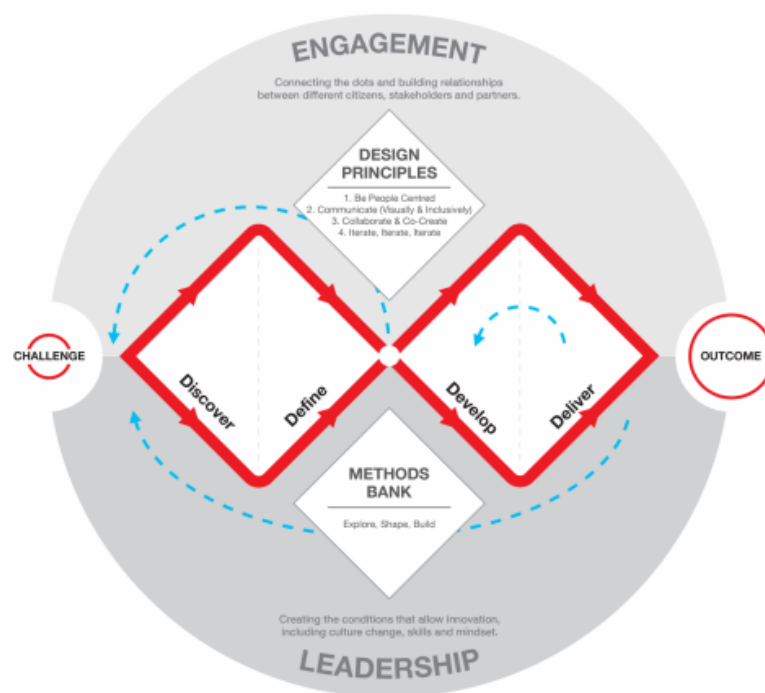


Figure 7: Double Diamond Framework for Innovation (www.designcouncil.org.uk, 2019)

© Design Council 2019

1. For problem identification (discover)

- Interviews, (customer, retailer, and merchants)

- Interview is a qualitative research method that relies on asking questions to collect data (George, 2022.),
- To identify the problem, an interview method will be used. It will help point out the key problem areas of the existing service(s) and pain points for the users.
- Surveys
 - A survey is a process, tool, or technique to gather information in research by asking questions to a predefined group of people (Formplus Blog, 2022).
 - The survey method will be used to collect data from a group of participants including end users of mobile wallet services, middle entity (retailers) and possibly employees of mobile wallet service provider companies.
- Benchmarking
 - Benchmarking is the process of measuring key business metrics and practices by comparing them with similar products or services (Harper, 2019).
 - Benchmarking between similar services in different countries will help discover the problem with the existing mobile wallet services in Bangladesh. This will also help to compare the different types of services the mobile wallets are providing and can provide in the near future.
 - Benchmarking process will be used to compare similar services from three different countries, Bangladesh, Sweden, and Finland. This will help the author to define the problem better and design a better solution by gathering ideas from existing services.

2. Define

- Group discussion
 - In a group discussion a group of participants discusses a given subject (Indeed Editorial Team, 2021).
 - A focus group discussion will be conducted to define the main challenge. The group discussion will be facilitated by the author and the participants will be selected from different stakeholders of the service process.
- Persona brainstorming
 - According to Unmade Design (2016), Personas are great tools to characterize a target audience to come up with better product decisions. The process of creating

personas develops empathy with the customer or potential customers. (Unmade Design, 2017,)

- Three possible personas will be brainstormed through the persona brainstorming method. The personas will include perspectives from a student, a small business owner and a regular private employee.
- Customer journey map
 - A customer journey map is a diagram that depicts the process a customer goes through when purchasing/using a product or service (Mixon & Horwitz, 2020).
 - A customer journey map will be produced to find out key touch points and to have better insights into the main challenge(s).

3. Develop

- Brainstorming (workshop)
 - Brainstorming is a method to generate ideas to solve a clearly defined problem (twi-global, n.d.).
 - To come up with a probable solution, a brainstorming session is planned. Participants will be chosen randomly from a group of individuals, of different age, gender, occupation, and education level.

4. Deliver

- Prototype development
 - A visual prototype of the service will be developed with Adobe XD or Figma UX design tools.
- Prototype testing
 - Finally, the prototype will be tested by a group of users of the existing mobile wallet services and the feedback will be provided.

8 Analysis and Findings

This section is organized according to the data collection methods mentioned in the methods section. Double diamond Framework for Innovation has been used to identify the problem and deliver probable solution(s). The methods, analysis and its findings are as follows.

8.1 Discover

In the discover phase a deep dive into the problem that needs to be solved is taken into account, thus it is important to have some insights into the problem. To discover the problem, interviews and surveys were used along with benchmarking to compare different but similar services offered elsewhere.

8.1.1 Summary of interviews

A total of eight individuals were interviewed for the purpose of this study. Among these eight individuals there are six users of the mobile wallet service, one merchant and the other one is a retailer (agent). As the project timeline shows, the interviews were conducted between July and August 2022. The interview questions are attached in appendix 1.

It was deemed interesting to conduct a semi-structured interview to understand the participants' perspective better. According to George (2022), a semi-structured interview is a combination of structured and unstructured interview methods, where questions are asked based on a thematic framework. In a semi-structured interview, some questions are pre-determined, and some are planned as the interview progresses. (George, 2022.)

✓ Users:

Eight users who use both bank accounts and mobile wallet accounts were chosen selectively. Where the types of accounts they use differ slightly but serve the same purpose of this study.

✓ Type of wallet used:

(Do you Use any mobile wallet/s?)

(Which mobile wallet/wallets do you actively use?)

When asked about which wallet the user uses the most, common answers were bKash and Rocket for retail users, the agent offers several mobile wallet deposit and withdrawal services to the retail users and finally the merchant has a merchant account with the wallet service provider. While the retail user has a daily and monthly deposit, withdrawal, and fund transfer limit, neither the agent nor the merchant has a transaction limit.

✓ Scope for improvement:

(Where do you think some improvements can be made?)

(What do you think about the transaction fee structure?)

The participants were asked what improvement can be made to the existing wallet services? The answer from the retail users is somewhat similar, when three of the six retail users said there should be no extra charges for transferring money from one wallet to another wallet and cash withdrawals from ATMs, the remaining three participants expects the fess to be lowered for these services. All the six participants are, however, willing to pay extra charges for utility bill payments through the wallets.

On the other hand, the agent and the merchant suggested the withdrawal fees need to be reduced. It is to be noted that both the agent and the merchant need to pay a 1.85% fee for withdrawals. The agent can avoid the fees by making transactions, but the merchant cannot. A common fee structure was discussed in the previous part of this report.

✓ Why wallets instead of banks?

(Why do you use wallets instead of bank accounts?)

(What are the main reasons?)

When the retail customers were asked why they use wallets instead of banks, considering the bank account transactions are free of cost, the participants had almost similar reasons for using mobile wallet accounts more than bank accounts. The reasons are:

- Bank branches are not available everywhere. Wallet agents are almost everywhere.
- Deposits and withdrawals require longer waiting times in banks. Deposit and withdrawals are faster for wallets accounts.
- Online fund transfers are complex and not instant. Fund transfers are instant for wallet accounts.
- Bank account transactions are only possible during banking hours. Wallet transactions are available if agents are available and can be done seven days a week.

- Comparatively, wallets are accepted more widely than bank cards.

The merchant also prefers mobile wallet payment to card payment as the fee is comparatively cheaper and not all merchants can afford to offer card payment option due to infrastructure issue and higher fees.

- ✓ Using an online bank application

(If there is a Mobile Bank App that can work similar to a mobile wallet, would you consider using it over existing mobile wallets?)

The retail users were asked, if bank offers a convenient mobile app to operate the bank account, will they consider using the bank app over the mobile wallet app? All the respondents agreed to use the bank app at the beginning, but a few conditions came up later for moving completely to online banking applications. Some of the conditions are:

- a) It depends on the services of the bank,
- b) Number of users of that service,
- c) Ease of use, transferring funds, bill payment etc.
- d) Availability of ATM network,
- e) Interbank transaction

According to the Bangladesh Bank (central bank of Bangladesh), there are 61 scheduled banks operating in Bangladesh under full control and supervision of Bangladesh Bank (Bangladesh Bank, n.d.). Interbank online fund transfer is still not common and time consuming.

8.1.2 Customer survey analysis

An online survey was conducted using google forms, the questionnaire was sent to friends and family members through social media, instant messenger, and emails. To make the sample size bigger, respondents were asked to share the questionnaire with their friends and family. The survey was open for nine days at the end of July 2022. The survey questionnaire is attached as appendix 2 in the appendix section.

- ✓ Participants:

A total of 45 participants answered the survey questions online, consisting of 32 males and 13 female participants.

- ✓ Age groups:

Age?

45 responses

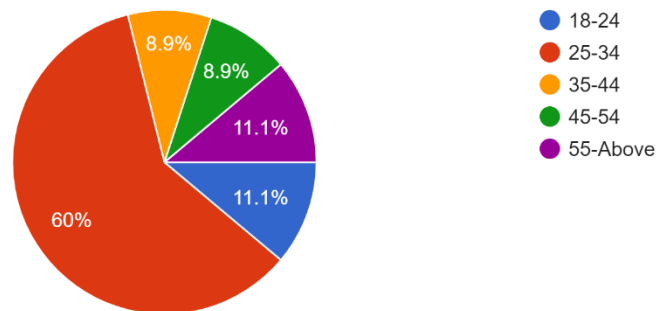


Figure 8: Pie chart of age group of survey respondents.

From the pie chart above the largest age group to participate in the survey ranges between 25-34 years. 27 out of a total of 45 respondents belong to that group which accounts for 60% of the total sample. Five of the respondents belong to age group 18-24 years and five belong to age group above 55 years. The rest of the respondents belong to the age group ranging from 35-54 years. It can be said that most of the adult age group were represented in the sample size.

✓ Mobile wallet users

From the pie chart shown below more than 91% of the total respondents are active mobile wallet users, which accounts for 41 respondents out of 45. The remaining four do not yet have a mobile wallet.

Do you use any mobile wallet service?

45 responses

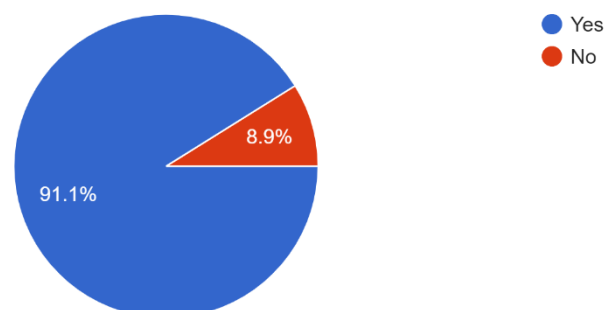


Figure 9: Mobile wallet users' percentage among survey respondents pie chart.

✓ Bank account users:

Do you have a bank account?
45 responses

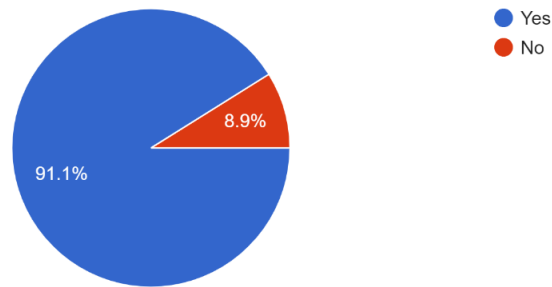


Figure 10: Pie chart showing percentage of bank account holders among survey respondents.

The above pie chart shows 91.1% or 41 out of 45 respondents have a bank account and only four of the respondents don't have a bank account. At this stage it is safe to say that at least 37 of the total 45 respondents have both a mobile wallet account(s) and a bank account.

✓ Most preferred mobile wallet service

81.1% or 36 out of 45 respondents prefer bKash wallet the most, where the next most preferred wallet is Nagad (a service of Bangladesh Postal Service) with four respondents', three of the total 45 respondents prefer Rocket wallet above other mobile wallet services, and one of the respondents has no specific mobile wallet preference. The remaining wallets like OK wallet, CellFin and iPay are not that popular yet and none of the participants use those wallets frequently. Reasons may include lack of available merchants, already having another wallet, and fewer users.

Which mobile wallet you prefer the most?
44 responses

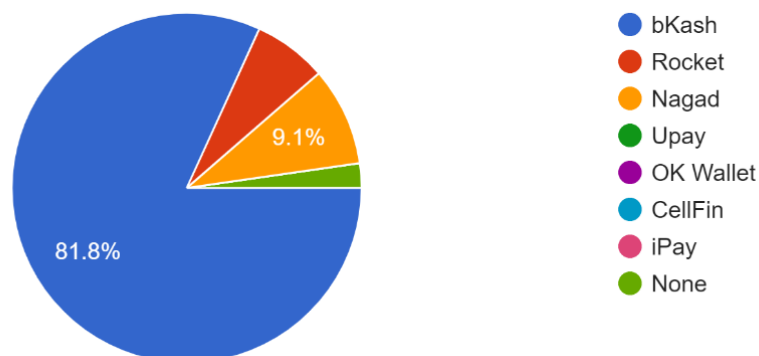


Figure 11: Pie chart of preferred mobile wallet among respondents.

✓ Reason for preference

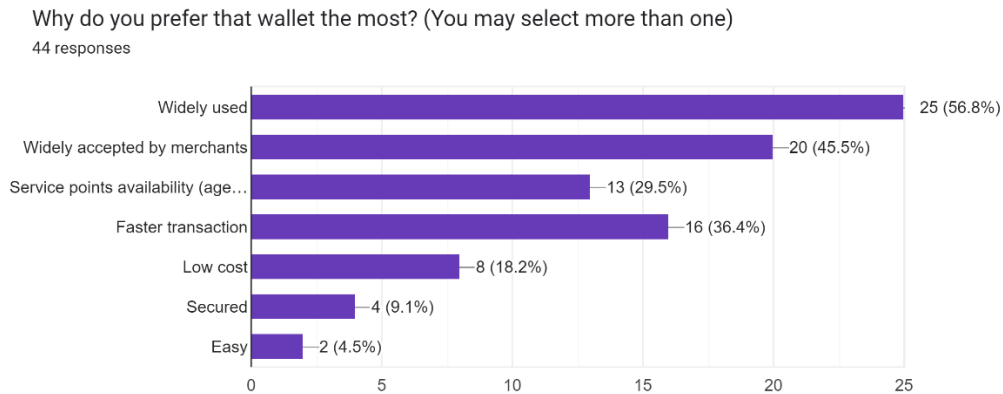


Figure 12: Bar chart showing reasons for using a mobile wallet among respondents.

This question was asked to understand the motivation of the respondents for choosing a wallet service. The top three reasons for choosing a specific mobile wallet are its user base, acceptability by merchants and transaction speed. Users of the same wallet service can only transfer funds between themselves. A higher number of users of a wallet service offers its users the chance to transfer funds in the shortest possible time. It is required to mention that, in Bangladesh transactions between different wallet is not available yet. bKash wallet users can transfer funds between themselves only and it is the same for other wallet users.

Out of 45 respondents 20 have chosen wide availability of merchants of a mobile wallet service as a reason for choosing a wallet service. This is one of the most important reasons for users to choose a specific wallet service. As a reference, it is said that bKash has more than 50,000 merchants in its network that includes different shops, hospitals, and educational institutions (Huawei, n.d.).

Out of a total of 45 respondents 16 have chosen faster transaction as a reason for choosing a mobile wallet. Almost all the wallets serving in the market offer almost instant transaction.

Service points availability is another major reason chosen by 13 respondents. The availability of service points (agents) nearby, helps the customer to make deposit and withdrawals convenient.

✓ Commonly used services

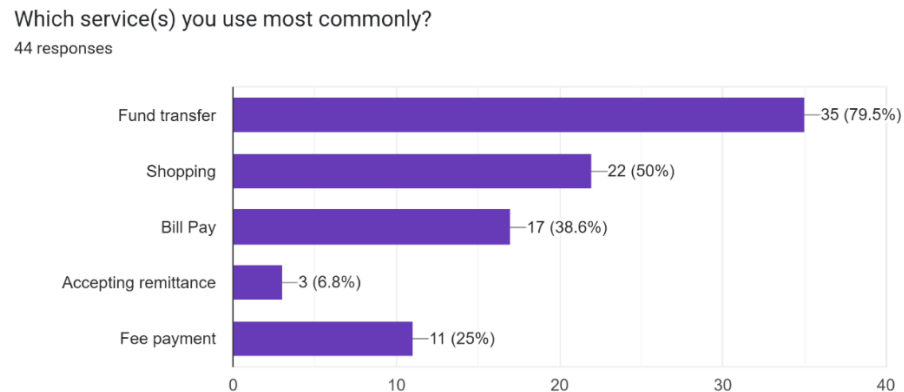


Figure 13: Most common use of mobile wallet among respondents.

Out of 45 respondents 35 have chosen fund transfer as their most used service for using mobile wallets. Using the wallet for payment in shops is the second reason, 22 respondents chose it as a commonly used service. A total of 17 respondents uses mobile wallets for paying bills including utilities, phone, and credit cards bills.

Transferring funds between wallets requires a small fee per transaction, yet we can see that most of the respondents use a wallet for transferring money. The wallet service also charges a small fee for utility bill payment from wallet. Users can pay shopping bills at different shops without any extra charges.

✓ Mobile wallet fee structure

Mobile wallet fee structures are satisfactory,
44 responses

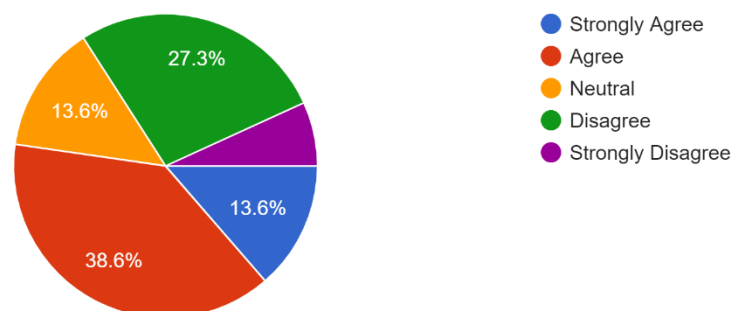


Figure 14: Customer satisfaction about wallet fee structure.

Among 44 responses received, 38.6% consider the existing fee structure as satisfactory with 17 responses. Out of the remaining 27 respondents, 12 respondents do not agree with the existing fee structure as satisfactory. Six respondents stayed neutral.

✓ Method for withdrawal from mobile wallet

Which method you commonly use for cash withdrawal?

44 responses

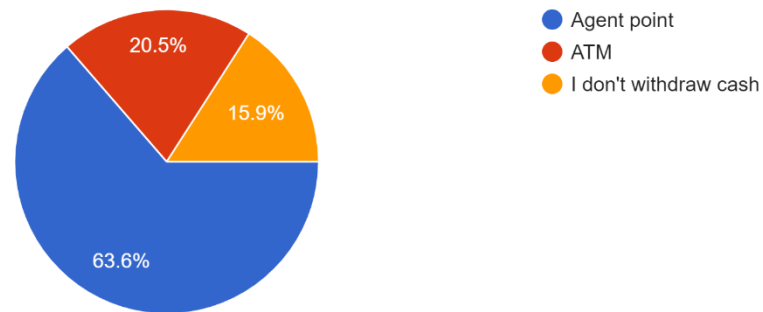


Figure 15: Cash withdrawal method from mobile wallet among respondents.

The above chart shows most of the respondents use agent points for withdrawal with 28 people out of 44 responses. Nine users use ATM network for cash withdrawals, which also require same withdrawal fees as withdrawals from agent points. The remaining seven respondents said they do not withdraw cash from the wallet.

8.1.3 Benchmarking

Three different payment system is chosen to be compared for benchmarking, with the most preferred mobile wallet in Bangladesh according to the survey data is bKash wallet. Two Major global payment systems Google Pay, and Apple Pay were not considered for benchmarking as neither of them offer services in Bangladesh and contactless payment system is not available in Bangladesh.

Three different payment systems considered for benchmarking are Swish used in Sweden, MobilePay used in Denmark and Finland and Revolut used globally. Swish and Mobile pay offer free fund transfer between users and are easy to register and use. The third service, Revolut works more like an online bank and can easily provide all the necessary services that a person may need from a bank account without the need to visit a bank branch. But depositing cash to Revolut is not yet available.

- **Swish**

Swish was launched in 2012 as a cooperation between six of the largest banks in Sweden, they are Danske Bank, Handelsbanken, Länsförsäkringar, Nordea, SEB and Swedbank and Sparbankerna. These banks together own Getswish AB. Since then other banks have also been

connected to swish and offer its customers to use Swish mobile payment services. Swish now has more than 8 million users around Sweden, with more than 300,000 companies accepting payment via swish and almost 39 billion Swedish Krona (SEK) transferred via Swish only in July 2022. (Getswish AB, n.d.).

To have a swish account a customer needs a Swedish phone number, a Swedish bank account and an authentication app (BankID) provided by the bank account. It is necessary to mention that a person needs a Swedish personal identity number (personnummer) to open a bank account. Therefore, having a personal identity number or coordination number is also a prerequisite.

Activating the wallet is easy, a bank customer needs to download the mobile application and register the mobile phone number, then connect the bank account to the application through BankIDs' second tire authentication system with a physical digital key provided by bank (similar to strong authentication in Finland). Once the bank account is connected, the mobile application is ready for use. Now the user transfers money to other Swish users with just the users' mobile phone numbers. At the final stage of transfer the sender is asked to authenticate the transfer by BankID, where details of the recipient are shown, making it safe and secure for transfer. The transfer happens in real time and the money is transferred to the recipients' bank account directly.

The registration process for using Swish mobile application is as follows, considering the user has a bank account and a BankID application installed and activated.

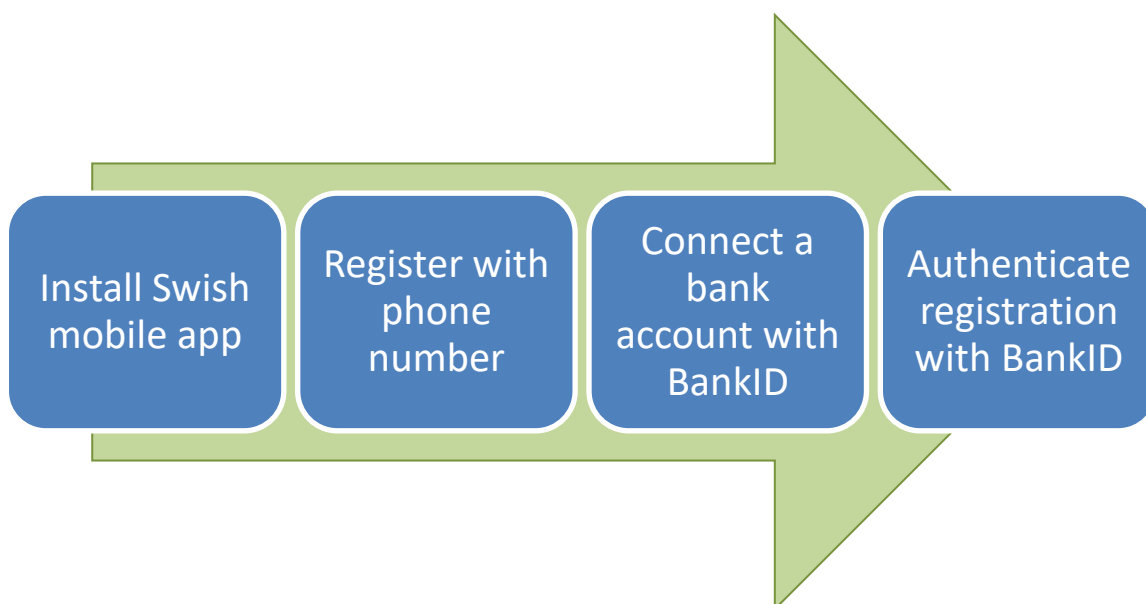


Figure 16: Registration process for Swish



Figure 17: Money transfer process for Swish

- **MobilePay**

The MobilePay app was developed and launched by Danske Bank, Denmark in 2013 to make transfer easier and users can transfer 1000 Danish Krone a day initially. The app was launched in Finland the same year in December. Today the MobilePay has more than 6 million active users in Denmark, Finland, and Greenland (MobilePay A/S, n.d.). The most popular function of Mobilepay is sending and receiving money. It is fast, easy, and simple. A user only needs a phone number of the other user to make the transaction (MobilePay A/S, n.d.).

Registering for MobilePay is relatively easy. In Finland a customer needs a Finnish phone number to register to the app, then the customer needs to verify through strong authentication through bank or any other Finnish authentication method. Once done, the customer needs to insert a debit or credit card information to be stored in the app and all transfers are made using those cards. Transfer between users is instant and the money gets deposited directly to the Bank account.

For money transfer between users, a user needs to open the app, enter the amount to be transferred, press next, select from the frequently used users' list or enter a new phone number, press next and finally swipe the send money button. Money transfer process is as easy as shown below, just in 3 steps.

MobilePay registration process is shown as a diagram below

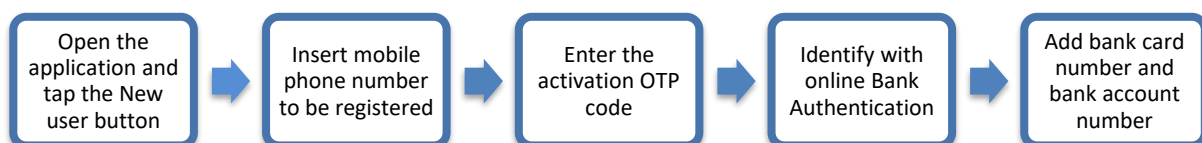


Figure 18. MobilePay registration process

MobilePay Money transfer process between wallets is as simple as this diagram

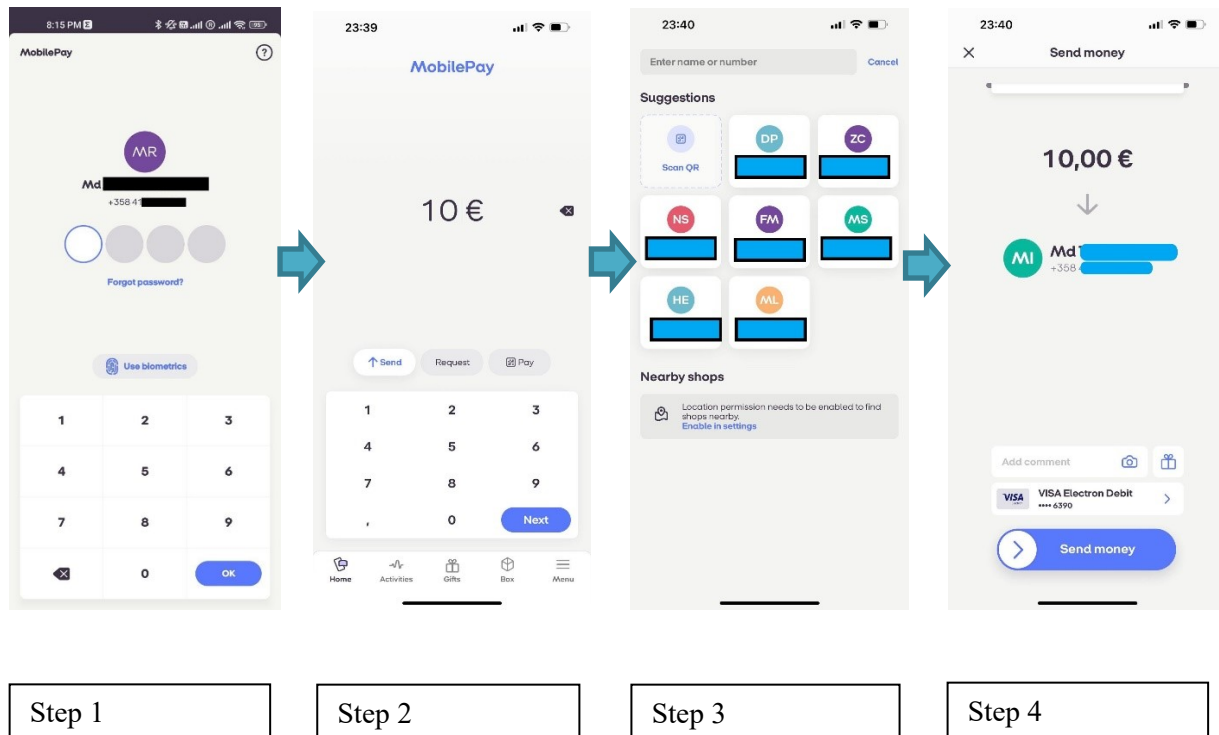


Figure 19. Mobile pay fund transfer process

- **Revolut**

Revolut was launched in 2015 and got its banking license by Bank of Lithuania in 2018. Currently it has its operations in 30 EEA countries including Finland. Non-EU countries include Australia, Singapore, Switzerland, Japan, the United Kingdom, and the United States. It has 20-million personal users worldwide, supports more than 200 countries and regions and offers more than 30 in-app currencies. It offers four different types of subscription plan and charges from 0 to Euro13.99 per month (Revolut Ltd., n.d.). For this report, the focus will be on the basic plan with no fees.

Opening an account with Revolut is simple, one just needs to download and install the mobile app from the mobile application store, register with a phone number, and after phone number verification insert a pin code for security. Once the registration is done the user needs to prove residency with an ID like passport or residence permit of the countries it is licensed to operate in. The documents can be uploaded online through its mobile app. Once the document is verified, the account is ready for use. The account can be used if the residence permit is valid.

Money can be added to a Revolut account by connecting to a bank card. Adding money is as simple as paying online, it supports adding money via cards, bank transfers and GooglePay and ApplePay.

From Revolut money can be transferred to other users' through phone number, email and unique id tag assigned to each account. It also supports bank transfers. Money transfers are free among user accounts, transfer to banks is also free in the same country. But cross currency transfer has a fee of 0.5% (Revolut Ltd, n.d.).

- **bKash wallet**

bKash has a varied fee structure for different purposes. Depositing money to an account is free. Transferring money to another bKash wallet user costs 5 Taka (euro 0.05) per transaction if the amount is more than 100 Taka (approx. 1 euro). If monthly transaction exceeds 25,000 Taka (approx. 250 euro) each transaction costs 10 Taka. Cash withdrawal costs 1.85% of the total amount. Withdrawal from Brac Bank ATM costs 1.49% of the total amount withdrawn (bKash Limited, n.d.).

Fee comparison between above wallet services, bKash wallet fees are denoted in euro, 1 euro is approximately 100 Bangladeshi Taka.

Service fee Comparison

	Swish	MobilePay	Revolut	Bkash
Deposit	Not available	Not available	Free	Free
Deposit limit	Not applicable	Not applicable	Euro 5000/day	Euro 2000 – 4500 per month
Fund Transfer charges	0	0	0	0.05 – 0.1 Euro per transaction
Utility Bill Pay charges	0	0	0	Upto Euro 0.30
Withdrawal fee from agent	Not available	Not available	Not available	1.85%
ATM Withdrawal fee	Not available	Not available	Free up to Euro 200/month	1.49%

Table 1. Fee comparison between benchmarked services

The above fee comparison shows that bKash wallet is charging higher in all the services it provides from other alternatives chosen for benchmarking.

8.1.4 Customer journey map

For customer journey maps the most common practices of opening a mobile wallet account are considered. Different wallet providers have slightly different approaches, but the most common practices will be discussed here. There are several ways to open a wallet account, depending on the service provider. Two of the most common ways are:

Registering with mobile phone: This process is easy and simple, a person needs to download the bKash mobile app, press Login/Registration button, fill in the mobile number field, choose the mobile operator, upload the National Identity Card images, verify the card details, finally confirm, and wait for around 48 hours for confirmation through SMS.

Registering at an agent point: This process needs the user to be present at the service point. The user will have to produce a national identity document along with a passport sized photo. The thesis application is filled out by the user and verified by the agent. Then the user needs to register biometric identification for security reasons, along with signing the user agreement forms. Finally, a confirmation message arrives within 48 hours.

Wallet registration process at an agent point

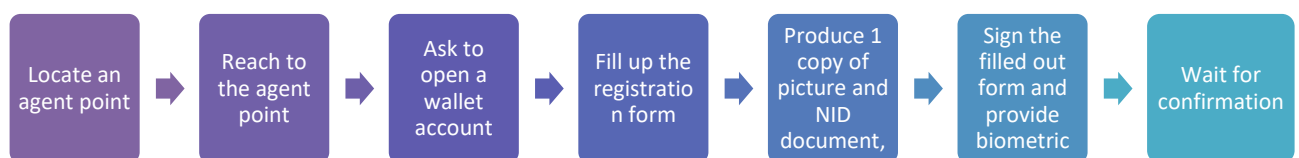


Figure 20. Mobile wallet registration process at agent point

8.2 Define

Define phase of double diamond framework for innovation emphasizes on the problem that is discovered at the discover phase. In this stage, focus is given to the identified problem so that further work can be conducted to come up with a solution. For further information a group discussion with the problem and a customer journey map will be produced in this chapter. This will help us to understand the problem better and come up with a better solution.

8.2.1 Group Discussion

A focus group discussion was conducted to define the challenges for a new service to be offered. The discussion was divided into segments to focus on one single issue at a time. The group was comprised of five Bangladeshi people of different age groups and professions. Among them two were students aged below 22 years, two were private employees and the other was a small shop owner.

- Popularity of mobile wallet services and its reasons

It was a short discussion; all participants agreed that mobile wallets are more popular with a larger number of users and more frequently used nationwide than bank accounts. The two main reasons for this popularity are the availability of agents everywhere and faster transaction speed. The small business owner takes payment through bKash wallet due to increased customer demand.

- Safety and security

Participants discussed the security issues of mobile wallet users and the increasing number of scams taking place in recent years. On the other hand, everyone agreed that if the user is cautious and doesn't share the wallet details with anyone then it is not possible to be a victim of scam as the security system is strong.

- Mobile wallet fee structure

The participants have different views on this issue. Three of the five participants use the wallet for shopping, utility bill payment and education fee payments only. The participants agreed that the charges for utility bill payment are negligible. The small business owner argued that the withdrawal charge of 1.85% is expensive and should be lowered. The other person sends money frequently to family members and feels the fee for money transfer is negligible, but withdrawal fee is expensive for the receiver.

- How can the banks be more active?

The participants argued that most of the banks do not have a mobile app that can be used to manage the bank account, but the scenario is changing, some of the leading banks have come up with their own mobile application and from that application the account can be managed, and transactions can be done in a small scale. Still, that is only possible between the same bank's customers. Transferring money to another bank's account is not yet possible. Moreover, none of those mobile applications can be used to make payments for shopping or paying utility bills. Banks can come together to make the interbank transaction possible and can also include other facilities like bill payments. The small business owner added, bank transactions are safer and more convenient for

him and cares only about the transaction fees.

- **Withdrawals**

Considering banks involved in the process, everyone thinks people can use their respective ATM network for withdrawals considering the money will be in their own bank account. But the person who sends money every month to a family living in a village, argued that there is no ATM vestibule available nearby, that makes the agent the only touchpoint for the receiver, thus he must use the mobile wallet for sending money.

8.2.2 Persona Brainstorming

Three different personas were brainstormed for the purpose of designing a customer centered potential service. These personas were brainstormed keeping the interview feedback in mind. For persona brainstorming, help was taken from two Bangladeshi persons living in Finland, and has the experience of using MobilePay and some wallet services of Bangladesh.


	22 years old	
	Student	
	Lives in Dhaka city	
	“I use mobile wallet services frequently, I prefer a new wallet to be user friendly and widely accepted”	
MD ZAHID HASAN		
<p>Zahid is a Bachelor Final year student; he lives with his family and works part time. Using a mobile wallet makes it easier for him to carry money everywhere, pay shopping bills and tuition fees.</p>		
Accounts Used		Goals
Bank account	<input checked="" type="radio"/> <input checked="" type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/>	<ul style="list-style-type: none"> • Convenience • Merchants' availability • Online payment • Mobile app availability
Mobile Wallet	<input checked="" type="radio"/> <input checked="" type="radio"/> <input checked="" type="radio"/> <input checked="" type="radio"/> <input type="radio"/>	
		Frustrations
		<ul style="list-style-type: none"> • Cash withdrawal fee

Figure 21: Persona 1 - student


	32 years old	
	Research Analyst	
	Lives in Dhaka city	
	<p>“I prefer bank transaction whenever possible; bank transaction is safe and secure. I use a mobile wallet that I can top up with my bank card”</p>	
Lubna Karim		
<p>Lubna is a 32-year-old professional, working as a news presenter since 5 years. She uses a bank account for regular transactions and uses a mobile wallet for shopping and utility bill payments only.</p>		
Accounts Used		Goals
Bank account	● ● ● ● ●	<ul style="list-style-type: none"> • Convenience • Online banking • Mobile app availability • Security
Mobile Wallet	● ● ● ● ●	
		Frustrations
		<ul style="list-style-type: none"> • ATM availability • Cash withdrawals from mobile wallet

Figure 22: Persona 2 – working professional


	32 years old	
	Small Business Owner	
Lives in Dhaka city		<p>“I generally prefer cash transaction, for wallet I prefer instant transactions and well maintained servers. I prefer low withdrawal fees”</p>
Abdul Kaium		
<p>Abdul is a small grocery shop owner in Dhaka city. He has a business account with a bank for business payments. He also has a merchant account with bKash for accepting payments from customers.</p>		
Accounts Used		Goals
Bank account	● ● ● ● ●	<ul style="list-style-type: none"> • Convenience • Minimize cost • Easy to withdraw • Security
Mobile Wallet	● ● ● ● ●	
		<p>Frustrations</p> <ul style="list-style-type: none"> • ATM availability • Cash withdrawals from mobile wallet

Figure 23: Persona 3 – retail merchant

8.3 Develop

The development phase starts at the beginning of the second diamond of the double diamond framework for innovation. In this phase the solution starts to develop with the help of co-creation. For this thesis the focus was given on arranging two different workshops to come up with a better solution from people with different views. The first workshop was online with five people from Bangladesh and the second was done in person with four people living here in Finland. The workshops will be discussed below.

8.3.1 Online Workshop

The online workshop was organized on the 21 October 2022. A total of seven people were invited but five people attended in the end. The workshop started with an introduction of the purpose of the workshop and how the workshop would be facilitated. A brief of Google Jamboard was given to familiarize the participants with the tools used. The workshop was divided into three segments, problem identification, probable solutions, and how the banks could be integrated. It is needed to mention that two of the five participants were bank employees having primary knowledge of how different online banking transactions are handled.

- The Problems

To identify the problems, participants were asked to think about the problems they think are present with the mobile wallet services in Bangladesh. During a brief discussion on which wallet to focus on, the participants agreed to focus on the most used wallet bKash. 15 minutes was given to discuss and list the problems they think exist with the wallet service. During the discussion the participants also wrote on Google Jamboard. The most common problems listed are as follows:

- High cost of fund transfer
- Cash-out / cash withdrawals are expensive
- Transaction limits.
- Fraudulent activities
- Scams are common
- No recovery system for mistaken transaction
- Poor customer service
- Small number of customer service centers

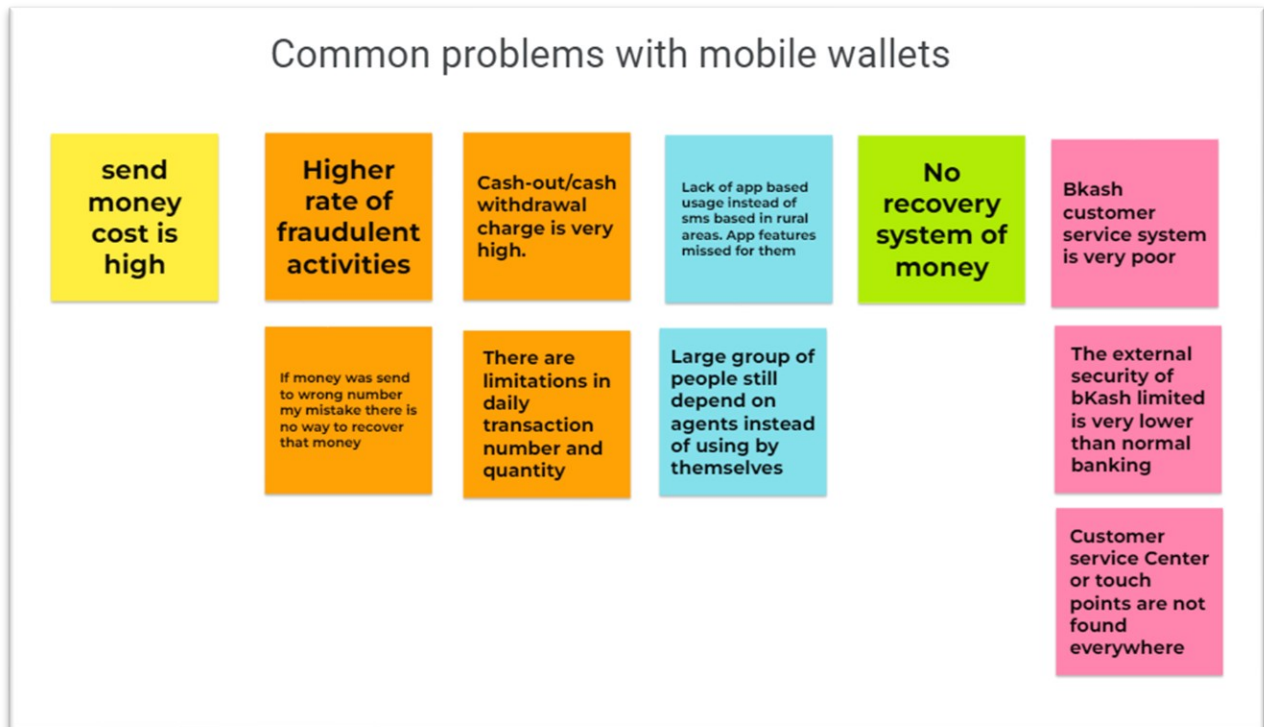


Figure 24: Common problems with mobile wallet services

- Probable solutions

The first 20 minutes of the workshop went well with many discussions leading to the identification of some problems. The second part was to find ideas to find the probable solutions to the problems. The time to come up with probable solutions was 20 minutes, including a discussion. The participants came up with the following ideas:

- Reduction of withdrawal charges
- Strict KYC (Know Your Customer) from the wallet service providers
- Charge free and easy fund transfers to and from bank accounts
- Safety against scams
- Senders and receivers can see each other's details for transactions.
- Collaboration with law enforcement agencies for preventing frauds and scams
- Raising awareness among users

Probable solution ideation board is attached below.

Probable Solutions



Figure 25: Probable solution to the existing problems of mobile wallet services

- Integrating banks

Now the problems and probable solutions are ready. The third step was to find ways to integrate banks in the process. For this step a detailed introduction to the benchmarked applications was given to the participants. Participants liked all three benchmarked services but argued that some of the services may not be suitable for Bangladesh due to lack of infrastructure. The key points are as follows:

- Banks offering easy internet banking app
- Different banks can collaborate (between them)
- Interbank online transfers can be made easy through collaboration
- Central banks offering a safe payment gateway for all the bank customers
- Contactless payment directly from the bank app for different services
- Third party apps that can link banks.

How the banks can be integrated

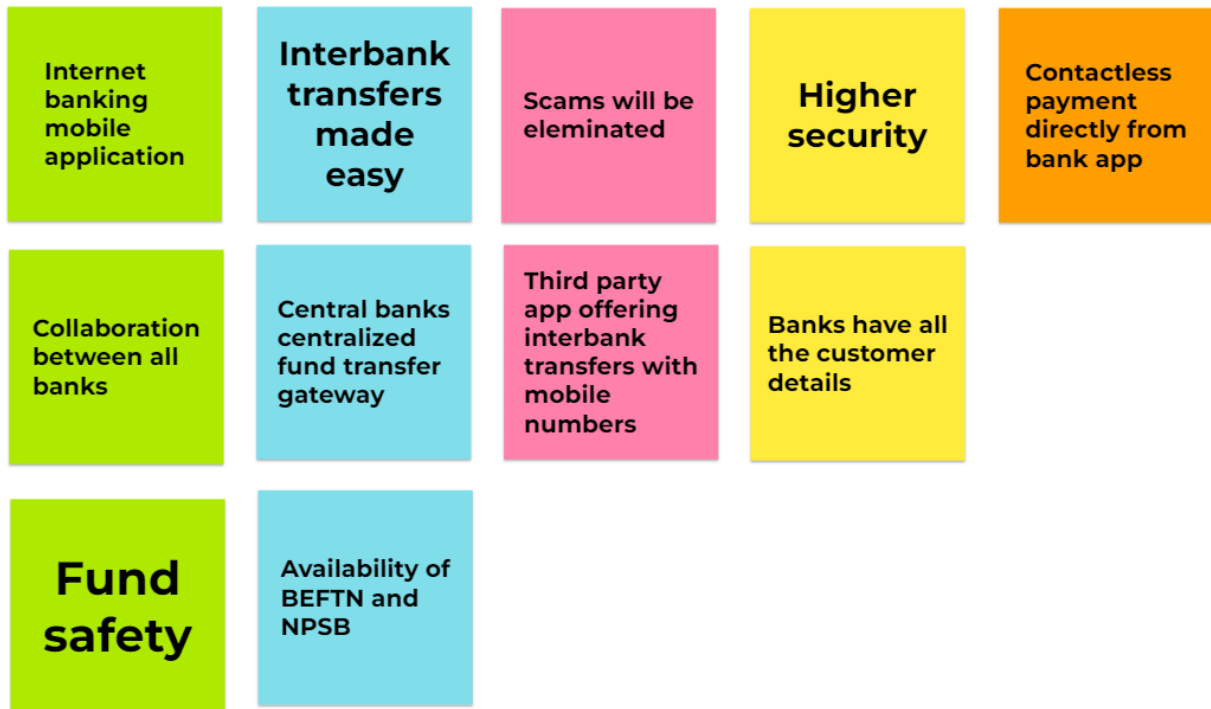


Figure 26: How the banks can be integrated into the process.

8.3.2 On site workshop

A second workshop was organized to receive ideas from a few people living in Turku, Finland. Four participants participated in the workshop organized in the Turku Student Village common room named “TYS and Chill”. All four participants moved to Finland just over a year ago and have had the firsthand user experience of online mobile banking applications and mobile payment gateway service MobilePay.

At the beginning of the workshop, a brief introduction to the purpose of the workshop was given. Then the purpose of the thesis was described in detail. A brief introduction of the first workshop was also discussed. After that we discussed mobile wallet services of Bangladesh and compared those services with the benchmarked mobile wallet applications available in Finland and Sweden. Finally, the participants were asked to discuss and come up with ideas on how to introduce a new service that can reduce or eliminate the problems of mobile wallet services. During the workshop the participants discussed how the new service can be charged by the banks.

The summary of the workshop is the following:

- Collaboration between banks
- Top commercial banks can collaborate to bring a new payment service
- Central bank can introduce a common customer friendly banking app
- A new fintech organization bringing payment services linking users' banks
- Use of NPSB (National Payment Switch Bangladesh)
- Increased security with two factor authentication through physical digital key or mobile application
- Customers can be charged a small, fixed fee for availing the service
- Revenue can also be generated from the merchants instead of charging the customers

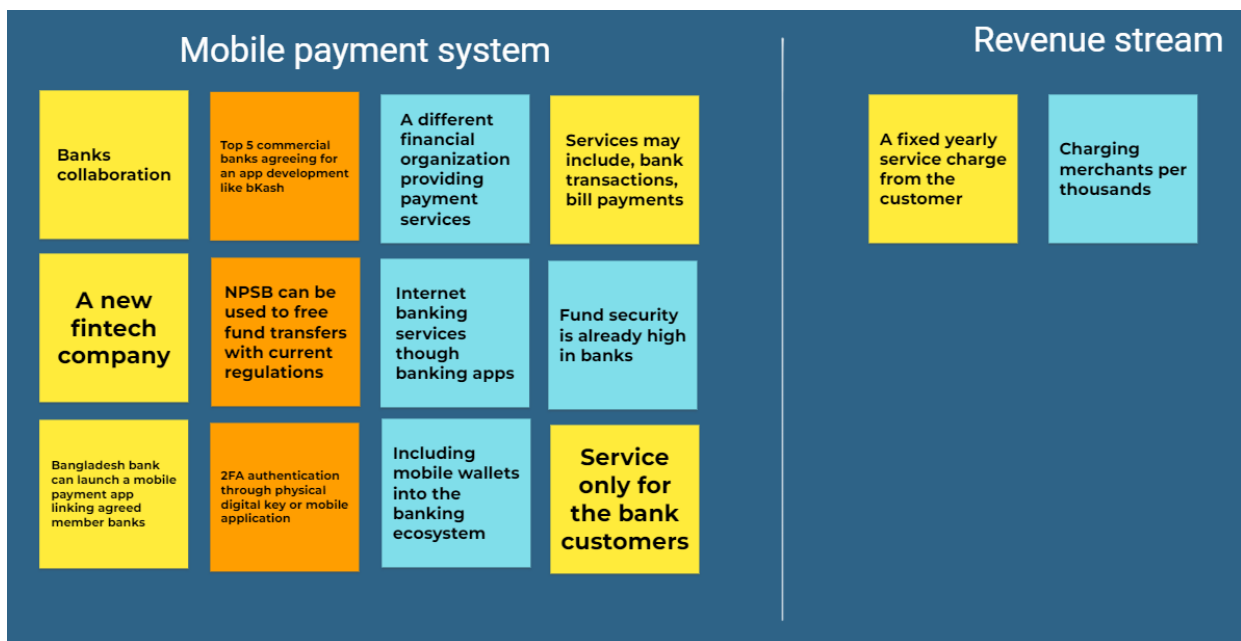


Figure 27: Internet banking and payment system with revenue stream.

8.3.3 The proposed service

Now it is time to develop a service that can provide some solutions to the existing problems of mobile wallet services. The primary goal of the proposed service is to provide a customer-friendly service that reduces the cost of transactions and will ensure security at the same time. The process of introducing the service has the following steps:

- The service

At this stage a service that can offer the primary banking services like fund transfers, fee payment, shopping, and utility bill payment will be considered for development. To provide these services, collaboration between the top banks is needed. A separate fintech company can come up with a wallet service that is independent from the competing banks. This company can approach the leading banks to offer their services. The idea is simple, the wallet will be connected directly to the bank account of the user with a phone number, and all the transactions can be seen in the bank account. Any fund transfer from one wallet account to another account is just a simple process of transferring funds from one bank account to another, but in a simple way as the mobile number will be the unique account number. Similarly, when fees or bills are paid from the wallet with contactless payment over NFC or QR codes, the payment will be done directly from the users' bank accounts to the merchants' bank account. All these processes will be done with the existing BEFTN and NPSB services provided by the central bank (Bangladesh Bank).

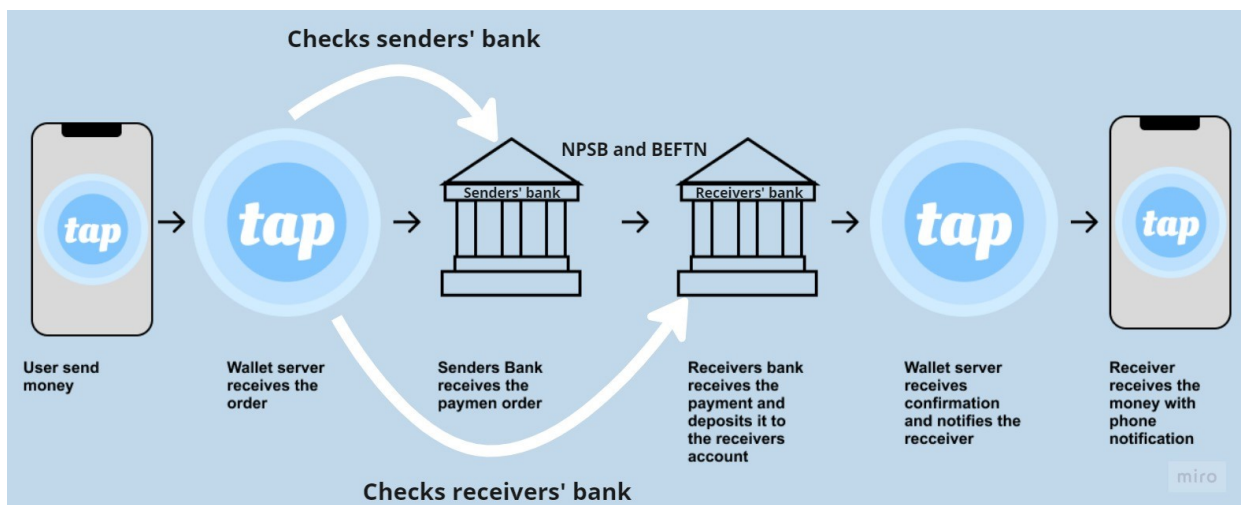


Figure 28: Tap wallet fund transfer process (Designed with Figma and Miro)

- Registration for the service

The goal is to introduce a mobile wallet like service that uses smart phone applications for payment. At this stage we assume a separate financial technology company is introducing the wallet services named “tab wallet”. A user can register with their personal data along with bank details for the service. All these details will then be stored against the mobile phone number provided by the user which will also be used as the

unique account number. After the user submits the application for registration, the user's bank will then be responsible for verifying the data with the national ID database and authenticating the registration in person. After signing the user agreement, a two-factor authentication mobile application will then be available for the user to authenticate the transactions. A visual representation of the registration process is provided below.

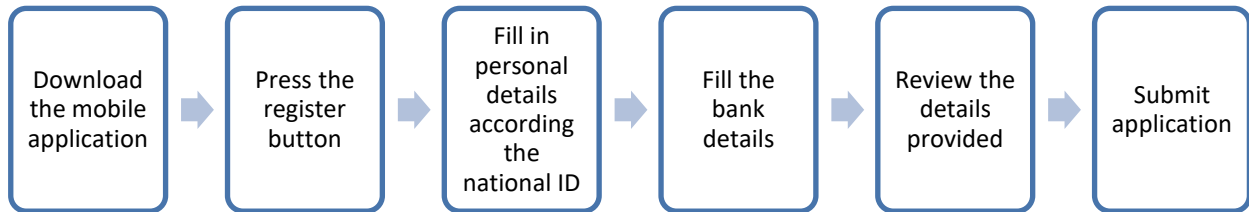


Figure 29: Tap wallet registration process users' actions.

After submitting, the bank will then authenticate the registration.

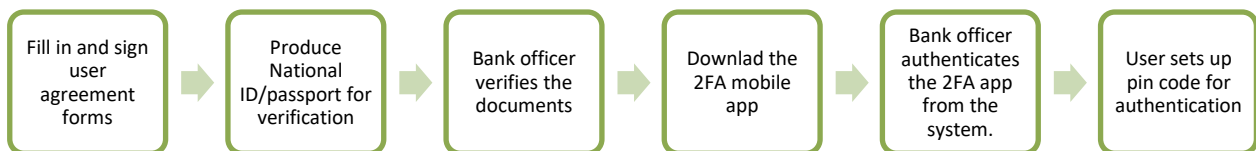


Figure 30: Tap wallet registration process banks' actions.

8.3.4 Stakeholders

Introduction to the service will need some organizations to collaborate. A few parties will be involved with the introduction process of “Tap Wallet”. That will range from the introducing organization to the central bank of Bangladesh.

- The company

A fintech company has come forward with the idea of introducing a mobile wallet that will connect the bank users' bank account with a mobile wallet. A phone number will be used as a unique account number and the bank account details will be stored against the phone number. All the monetary transactions will be reflected in the bank account to ensure safety.

- The banks

As discussed earlier, the mother company of the wallet service will approach the leading

commercial banks for collaboration. Initially top five popular banks in Bangladesh, Dutch Bangla Bank Limited (DBBL), BRAC Bank Limited, Islami Bank Bangladesh Limited (IBBL), The City Bank Limited and Eastern Bank Limited (EBL) will be approached for collaboration. All these mentioned banks have their own internet banking app available. It still uses user details like name, bank account number and branch name for online transfer from one account to another. Reaching an agreement to use the “tap wallet” service will enable its users to use the mobile wallet services like interbank fund transfers, fee payment, shopping and utility bill payments. Moreover, banks can charge their customers a small annual fee for using the wallet service that can be a source of revenue for both the wallet service provider and the banks.

- Retail users

The primary users of this service will be people with bank accounts. The wallet will work only with a bank account of the banks agreed to take the service. The user will be responsible for all the transactions to and from the wallet. This will be agreed on with user agreements signed by the user. An increase in the number of users will mean more acceptability of the wallet service.

- The merchants

To make the wallet user friendly business merchants need to be included in the ecosystem. With available merchants the retail users will be able to use the wallet for payments. The increased number of users will attract the merchants to accept the wallet service, and the increase in the number of merchants will also attract new retail users. This indirectly increases customers for banks as the wallet will only be accessible for the bank account holders.

For the wallet service the merchants will be the major source of revenue. Existing mobile wallets charge the merchants a whopping 1.85% for withdrawals. Tap wallet can offer the merchants a reduced fee of just 1%. Besides the fund will go directly to the merchants' bank account, making it always available for withdrawal for the merchants.

- The central bank

The central bank Bangladesh Bank is the regulatory organization and produces all the guidelines. The wallet service will also use the Bangladesh Bank's existing online fund

transfer services NPSB and BEFTN for transactions. As mentioned earlier in the NPSB section, the central bank is considering availing NPSB service for mobile financial services will make it easier for “Tap Wallet” to provide its service directly to the customer.

Stakeholders Map



Figure 31: Stakeholder Map (Designed with Miro)

8.4 Deliver

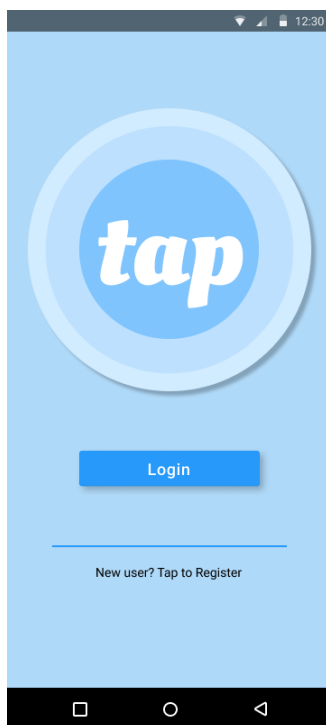
The delivery phase is the final phase of the double diamond framework for innovation. In this phase a product prototype is developed by using Figma design tool. The goal of this thesis is to deliver a customer centric product and service that will be easy to use, makes financial

transactions easier and reduces costs.

The prototype has a few steps and sections like all other mobile wallet applications. The user needs to download and install the mobile application from the application store.

8.4.1 Tap wallet registration

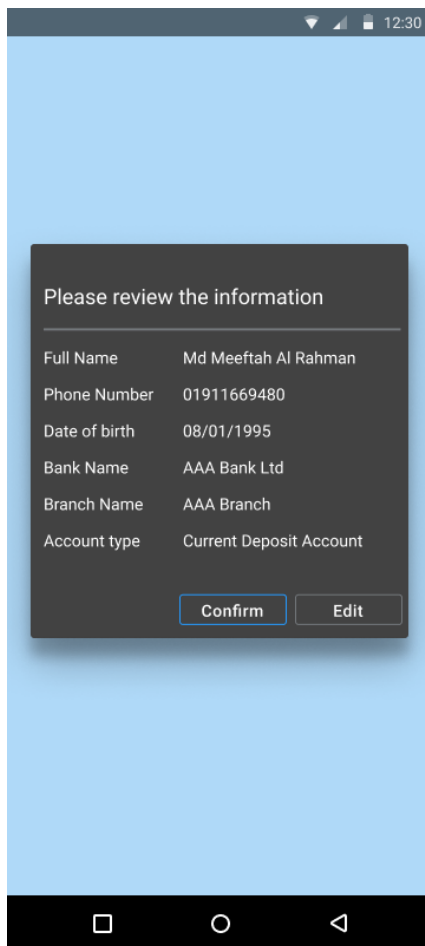
When opening the “tap wallet” application, the user will see both the login and registration button and a text. Existing users can login from the home screen, new users can apply for registration by filling in their personal and bank details on the next page. Upon submitting the registration form a review page will be displayed and upon confirmation by the user the information will be sent to the users’ bank for verification and in person authorization. A visual representation of the process is shown below



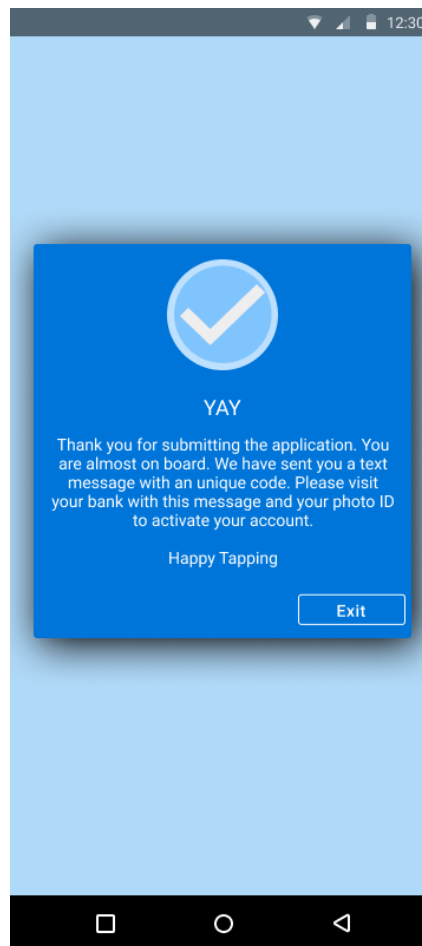
Step 1
Open the application, tap on register to apply for registration

Step 2
Fill in the registration form

Step 3
Agree end user license agreement and press Submit



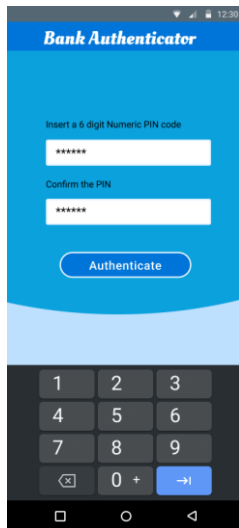
Step 4
Review the information and confirm



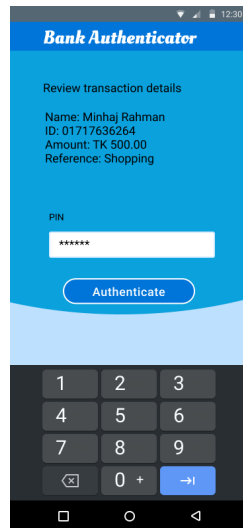
Step 5
Confirmation of application receipt with text message.

Figure 32: Tap wallet application registration layout.

After successful registration the user goes to their respective bank and produces identification documents for confirmation. The bank then provides a link with text message to activate the authenticator. The user needs to download the bank authenticator application from the mobile application store. Once downloaded the user can click the link sent by the bank to activate the authenticator app and set PIN code from mobile authentication. The application layout is as follows



Step 1
Set and confirm PIN

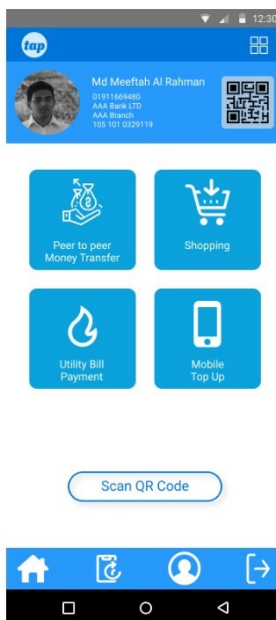


Step 2
Transaction confirmation layout

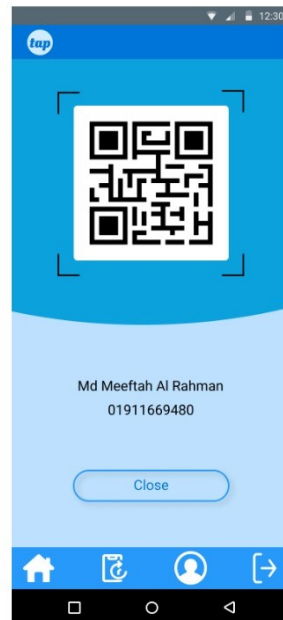
Figure 33: Tap wallet application registration layout.

8.4.2 Tap wallet home

After logging in the user will find a home screen with basic user information and tabs for available services. The user can also use QR code for sending and receiving money from the wallet.



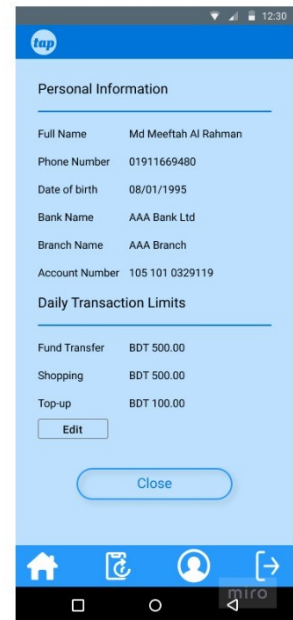
Step 1
Set and confirm PIN



Step 2
User QR code



Step 3
Scan QR code for fund transfer or bill payment



Step 4
Users' personal information

Figure 34: Tap wallet home and transfer layout.

8.4.3 Fund transfer and bill payment

The fund transfer through tap wallet is simple. The sender can just scan the QR code from the receivers' tap wallet or can enter the necessary fields manually to make the transaction. The process is the same for paying bills at a shop. The app layout for fund transfer is as follows:

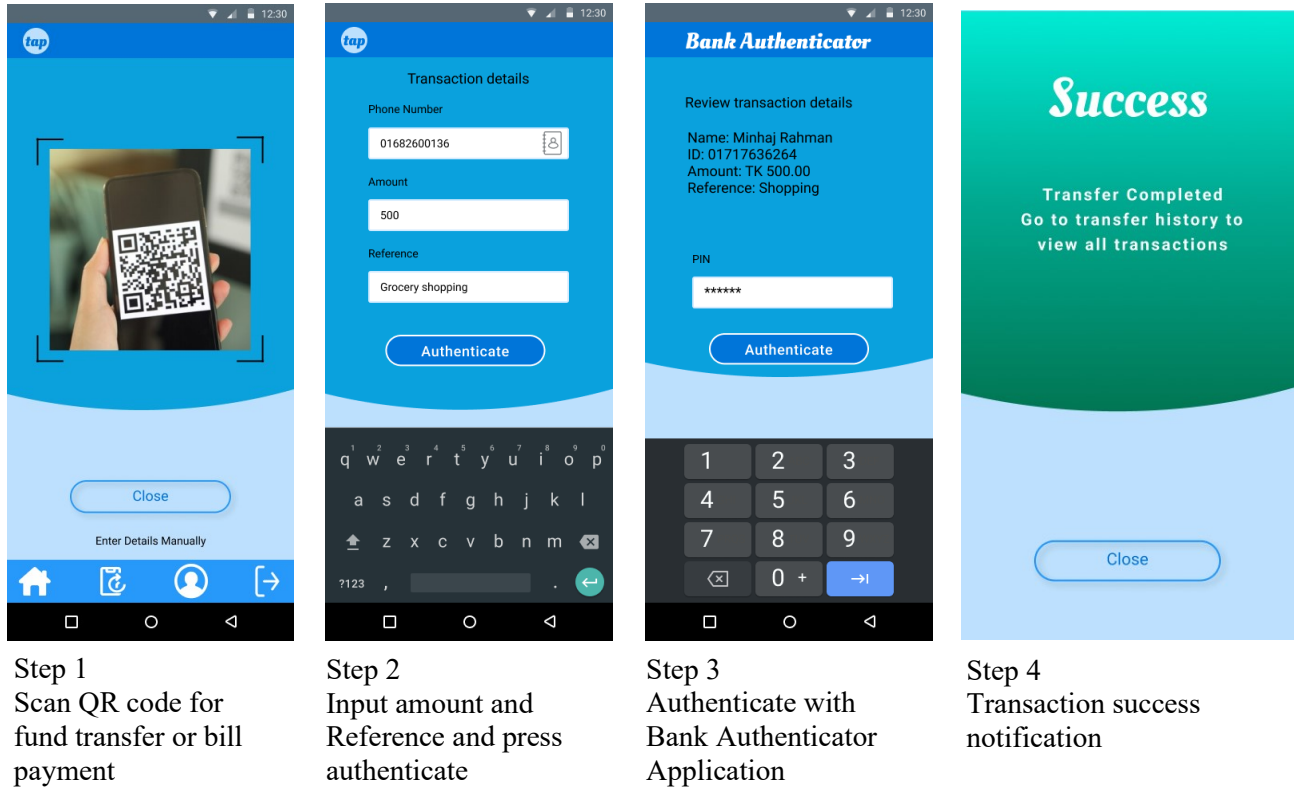


Figure 35: Tap wallet fund transfer and bill payment layout.

9 Business model canvas

A business model canvas highlights all the key factors of a business and represents the business model visually (Hersztowski, 2020). It is a powerful tool to list all the key factors and partners of the business, ranging from business customers to revenue streams for the organization. The business model canvas was designed using Miro is seen below.

The Business Model Canvas

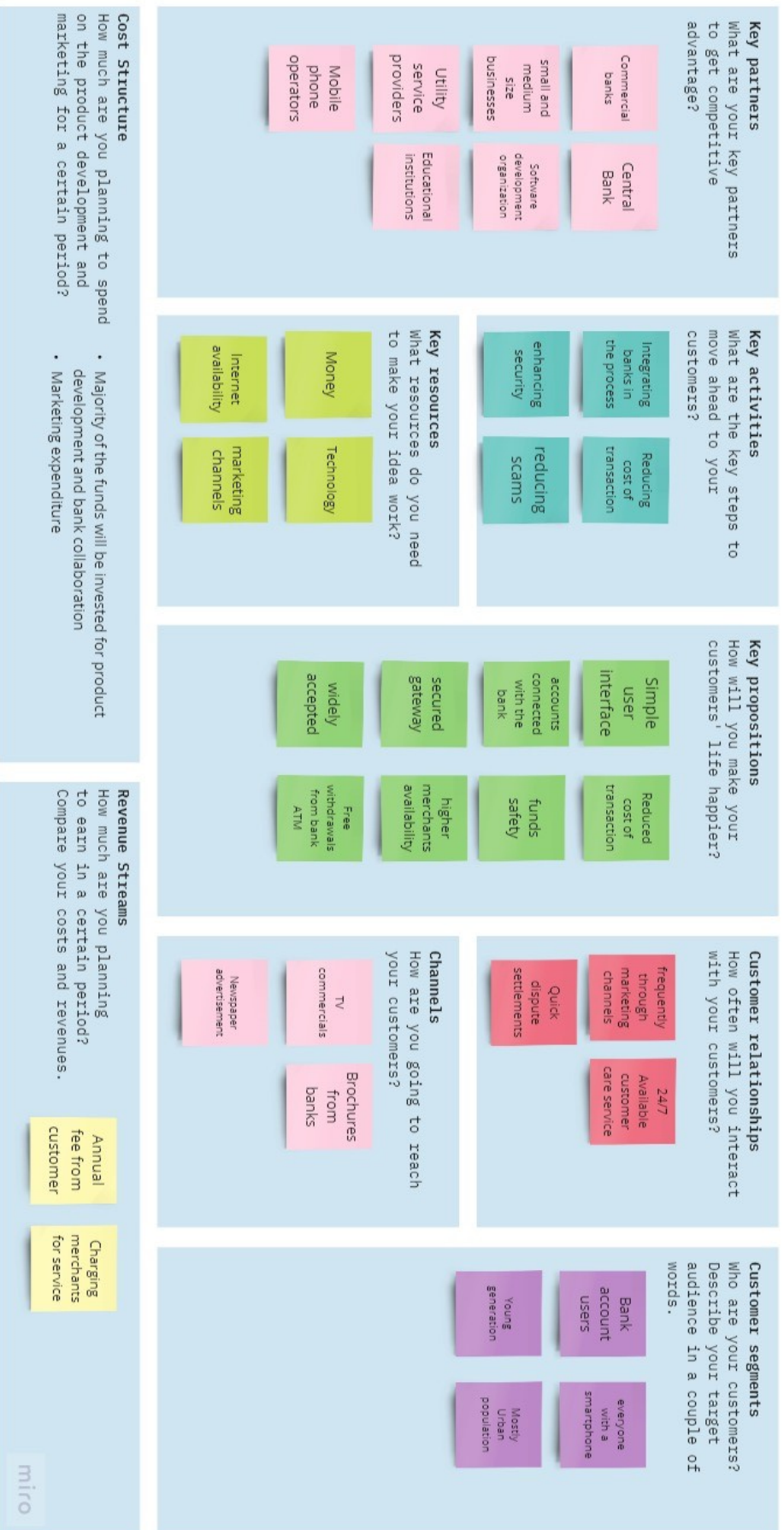


Figure 36: Tap wallet business model canvas

10 Conclusion

In conclusion it can be said that Bangladesh is a small country with a huge population of more than 168 million. It is one of the most densely populated countries in the world with more than 95% of the population aged below 65 years old. It indicates the vast number of workforce available in Bangladesh. From the demographics of Bangladesh chapter, we can see that Bangladesh has a literacy rate of 74%. Along with the increased literacy rate, technological literacy rate has also increased with the advancement of technology.

The increase of technological literacy rate has made life easier for the people of Bangladesh in several aspects. The banking sector is one of the sectors that are taking advantage of the technologies available as well. From chapter 6.2 mobile wallet services in Bangladesh, we can see that, the mobile financial services started in Bangladesh at the end of March 2011, with a bank as a financial custodian. With time bKash wallet has become one of the largest mobile wallet service providers in Bangladesh. bKash had a vision to provide financial services to the mass people deprived of banking services. Registering for a mobile wallet service is simple and takes less time. The mobile wallet can be operated with the help of just a mobile phone through USSD menu or smartphone application. Mobile wallet services provide plenty of services that banks also provide, like deposit and withdrawals, fund transfers, bill payments and fee payments. Except deposit, all the other services are subject to a fee from the customer by all the mobile wallet service providers available in Bangladesh.

Since the start of mobile wallet in 2011, the mobile wallet services industry has grown. Many new wallet services have introduced similar services, but the fee structure remained almost unchanged. Customers still need to pay 1.85% for each withdrawal and need to pay a charge for fee and bill payments. Along with these fees, low security has been an issue for a long time. Due to low security, fraud is prevalent in this sector.

The thesis started with the assumption that the services charges of mobile wallets and the security issues are needed to be revised to make the wallet services more convenient and affordable to its customers. Bringing the major banks or all the banks into a wallet ecosystem can help reduce the fee and increase the security at the same time for its users.

From the interview, we can see there are three types of customers of a mobile wallet services, the retail users, the agents and the merchants. Withdrawing funds from their respective

wallets are subject to a fee of 1.85% for each withdrawal. While retail customers have withdrawal limits the agents and merchants do not. But all these customers must pay the same fee of 1.85% for withdrawals. The survey result shows the majority of the customers using the bank accounts and the mobile wallet account at the same time. The most common use of wallets for survey respondents and interviewees were fund transfers, shopping and bill pay services. On the other hand, the most common reasons for using a mobile wallet include its user availability, merchant availability, faster transaction, and low cost. The reasons for choosing mobile wallets over bank accounts for interviewees include the nationwide agent's availability, ease of fund transferability, lack of online banking application and lack of mobile banking applications from the banks. Fund transfer between different wallet service providers is still not possible, and customers need to maintain multiple wallets to make mutual transfers according to their needs.

For benchmarking three different payment gateway service providers were chosen from Europe, those were Swish used in Sweden, MobilePay used in Finland, and Revolut used in many countries including countries of Europe. Both Swish and MobilePay has collaboration with different banks, and Revolut works as a bank itself. These three services are then compared with leading Bangladeshi mobile wallet service bKash to find the difference and similarities. While all these services offer similar services of deposit, withdrawals, bills, and fee payments, only bKash charges a fee from its customer.

Designing a new service that can minimize or eliminate the cost of transactions, increase security of the wallet, and enables the users to freely transfer funds between themselves were prioritized. For these, including the bank into the system was deemed necessary. Fund transfer between bank accounts is free, banks already have the customer's details, thus security is already ensured, and transfer between different bank accounts is also available for the bank customers. Bangladesh has fifty-eight commercial banks; these banks are connected through three online services from the national bank (Bangladesh Bank). Bangladesh Electronic Fund Transfer Network (BEFTN) offers online transfers between banks, but does not offer instant transfers, Bangladesh Real Time Gross Settlement (BD-RTGS) has a minimum limit of BDT 100,000.00 (hundred thousand Bangladeshi Taka) for each transfer, and National Payment Switch Bangladesh (NPSB) offers instant transfers to different accounts without any minimum limit. Moreover, NPSB connected bank users can use the Automated Teller Machine (ATM) network of the other banks for a small fee.

Keeping all these in mind, a wallet from a new financial organization apart from the banks can provide more customer friendly solutions to reduce transaction costs, increase wallet security, and enable its customer to easy fund transfers between themselves. The proposed service Tap wallet will be a product of a separate financial organization, which will work with different banks. The user details and the user's bank details are saved against the user's unique mobile number. That mobile number will be used as a unique identification number for logging into the wallet. After successful verification by the user's bank, the bank provides the user a two-factor authentication application. Fund transfers and bill payment will then be authorized with that two-factor authentication app by the user.

The financial organization offering Tap wallet services will approach different banks for collaboration, at the beginning the top ten most popular banks can be targeted for collaboration. After collaboration, the transaction process takes place with the help of National Payment Switch Bangladesh (NPSB) as it offers the fastest fund transfers. According to the merchants need Bangladesh Electronic Fund Transfer Network (BEFTN) can also be used, but it takes one working day to confirm the payment. Funds received and sent will happen directly from the bank account connected to user's Tap wallet.

Using Tap wallet can connect the users directly to one another and the merchants. As funds will be transferred directly form the bank account, there will be no extra charges, the services is already available for bank users for free, banks keep their users information in a safe database, that helps minimizing scams, there will always be a trace of the funds moving to different accounts, and as funds are being transferred from one tap wallet to another tap wallet the user can transfer funds with ease. Transferring funds to a different bank is no longer a problem for the sender or receiver.

Finally, it can be said that, Tap wallet can solve majority of the existing problems of the mobile wallet services of Bangladesh. With the help of Tap wallet customers can have a better service and the banks can attract more customers. All these things with the safety of a bank account.

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Table 1: Fee comparison between benchmarked services

Appendices

1. Interview Questions
2. Survey Questionnaire

Interview questions

3. Do you Use any mobile wallet/s?
4. Which mobile wallet/wallets do you actively use?
5. Where do you think some improvements can be made?
6. What do you think about the transaction fee structure?
7. Why do you use wallets instead of bank accounts?
8. What are the main reasons?
9. If there is a Mobile Bank App that can work similar to a mobile wallet, would you consider using it over existing mobile wallets?

Survey questionnaire