Title:

Adoption and Use of Mobile Banking

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Author(s):

Sadaf Salek Naeini,

T. Gordon Chen

Asrar Ahmed Syed

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Abstract:

This paper explores the use of mobile banking applications. User behaviors and frustrations were defined through literature reviews and interviews and used to provide recommendations to improve the banking application experience with the goal of increasing the use of the application. With improvements in technology, it allowed banks to increase services offered to their customers. The mobile banking application was developed to provide users the convenience of making financial transactions with their account without having to go to the bank. The five-stage design thinking process was utilized to develop recommendations on how to improve the mobile banking application experience. Understanding how users feel about using the mobile banking application through ease of use, security, and readability suggests that mobile application is no longer just convenience alone but also to provide users with a comprehensive platform that integrates multiple financial services into a single package, service, simplicity, and security will enhance the user's experience with the application.

Point of View Problem Statements:

Persona One: Steven needs a way to feel comfortable using the bank application in public because he thinks people around him can see his password and account information.

Persona Two: Josh needs a way to make to learn about all the features available with his account because he wants an easy way to manage all his accounts without having to worry about anyone access it.

Persona Three: Steve Jobs is resourceful and is able to easily find everything he needs online.

Designer Comments: Customers need a way to ensure their account is not accessible by others.

Introduction

A bank is a financial institution that focuses primarily on borrowing and lending money. A bank is built up on the promise of keeping their customer’s money safe and their financial information private. With improvements on communication and technology, banks are able to provide customers with more services including anytime banking and the ability to maintain multiple accounts simultaneously. The purpose of this paper is to analyze the emergence of mobile services and its effect on customer interaction with financial services. Interviews, and literature review will be analyzed to evaluate the adoption of use mobile banking. A 5-stage design thinking approach was used to provide recommendations on opportunities to promote the use of mobile banking applications, a way to improve communication and continual building of trust and security between banks and their customers.

With changes in technology and increases in competition, customers are expecting more from their banks. They are expecting the be able to access services at will. Customers are demanding greater convenience and accessibility to their bank account requiring longer branch operational hours and an increase in the choice of delivery mechanisms. In recent years, there has been a drastic change in lifestyles where customers are more affluent and spend more time and money on leisurely activities. This has led to decreases in disposable time. Customers are requesting for more accessibility to their banks when performing other tasks such as shopping or at work. This can be observed by branch location placements at local food markets and ATM machines at convenience stores. Customers working hours may also restrict their time for going to the bank during their operational hours. Overall customers have demanded for greater convenience and accessibility to their financial institution not only restricted to the branch location.

Currently, customers are offered accessibility to their bank accounts through in-person banking and online banking. The services offered by banks are the ability to maintain accounts, investments,

deposits, withdrawals, transfers, loans, and payment systems to their customers and other businesses. In-person banking with limitations of operational hours, distance a customer is to a local branch, and customer lines, is able to provide customers face-to-face transactions to build the customer-bank relationships as well as receive in-person assistance and advice on managing accounts, banks offer the ability to change or purchase various forms of money, such as converting coins to paper bills, ordering checks or money orders. Another service provided to bank customers is the option of using mobile banking. Mobile banking is typically used on bank developed applications on smartphone platforms. This service offers customers the flexibility to access and maintain their bank account any day or hour without any restrictions to limited operation hours. There are many options that can be set on the mobile app, such as secure messaging of personal information on the account, account fraudulent transactions and alerts, and the ability to see all transactions and accounts at the same time. However, with these additional services, it is restricted to daily/weekly caps on withdrawals and the inability to deposit physical money into accounts with the use of the mobile application.

Methodology:

In order to discover users' needs, a marketing approach was adopted to observe varying age groups and their use in mobile banking applications. Current market for mobile banking is targeted towards users with a bank account and familiarity with smart phones. Mobile banking was initially developed to provide convenience to customers for managing and conducting financial transactions at any time and location. A five-stage design thinking approach was applied to gain empathy with users and their concerns or frustrations with mobile banking in order to provide recommendations to promote the use of mobile banking. The five-stage design thinking are Empathy, Define, Ideate, Prototype, and Test.

5-Stage Design Thinking Process

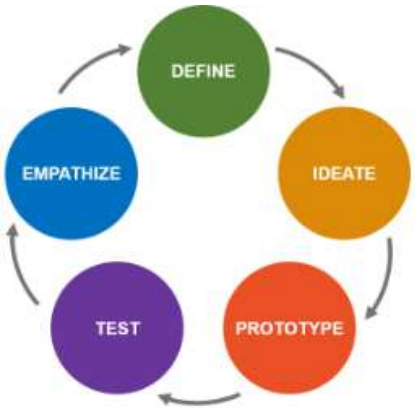

Figure 1. Design Thinking Process

The innovation approached analyzed consisted of five distinct design thinking stages that are intertwined with one another, the five stages consisted of empathizing with the customer, defining the customer's problems, developing and evaluating potential solutions in the ideate stage, building of developing a prototype, and testing of the idea or prototype. Described by Tom & David Kelley in Creative Confidence, the most significant type of innovation is the innovation that resolves what the end user actually needs. The understanding of the end user can be defined within the empathizing stage consisting of trying to gain experience through another person's point of view, and try to understand why people do what they do. Direct interviews were used in the field to better extract information from the end users. Interviews were initiated with introductory questions for background information that gradually escalated to more open ended questions about how the end user uses the mobile bank application, their feelings, needs, and emotions were recorded after each question. Within this stage of design thinking will require qualitative traveling into the field and observing, listening, interacting, and participating in the end user's

activity, during this stage may also require further literature research to gain insight, alignment and the emotions of the end user.

After gaining insight from field work and research, define is the next stage, this is where observations and interactions are synthesized together to define a target customer, a point of view, and a problem statement. A point of view problem statement is a statement that will allow for ideation in a goal oriented manner as defined in lecture. It looks specifically at combining the following elements user, need, and insight in the form user needs an action because user insight. A problem statement is defined within the empathy stage to focus towards a specific user, their needs, and insights gained. A problem statement developed during this stage is important to help guide design thinking to focus on specific needs rather than specific problems.

The ideate stage requires idea generations for potential ways to improve an end user's experience with the problem statement. This stage focuses on idea generation instead of idea evaluation. Tools like brainstorming and mind mapping are typically used during this stage. This stage promotes for idea generation that can be built from or to already generated ideas increasing the likelihood of arriving at the most creative and appropriate solutions for the problem. After all ideas have been generated, idea categorization and evaluation can be used to narrow down the ideas and move the idea forward to the next stage.

During the prototyping phase, a representation of one or more the ideas generated in the previous stage are built to share with others. A prototype can be a role-playing activity, a physical object, or a story. During this stage, the prototype can be used to allow others for further evaluation as well as gain a deeper sense of empathy from other users. From feedback and evaluations, prototypes can be modified for a better understanding of how the potential solution can be used to resolve the end user's problem.

The last design thinking phase mentioned was the testing phase. During this phase, the prototype will be evaluated by end users. This phase is not necessarily the last phase of the design thinking phase, it may lead to further iterations and development of a different prototype and a further development of empathy with the end user.

Stage 1: Empathy

To build empathy with mobile banking application users, literature research and interviews were completed to gain insight on end users concerns and frustrations with the mobile bank application experience. User research studies of local banks were conducted to understand user’s current relations with their bank, their perception of offline and online bank services, and to offer recommendations for more customer-focused services. Interview questions were aligned with users online and offline expectations of the bank, their current bank application interface, and current frustrations to learn more about the user experience.

Figure 2: User Experience with Mobile Applications [5]

Literature Review

Electronic commerce (e-commerce) continues to have a profound impact on the global business environment, but technologies and applications also have begun to focus more on mobile computing, the wireless Web, and mobile commerce. Against this backdrop, mobile banking (m-banking) has emerged as an important distribution channel, with considerable research devoted to its adoption. However, some researches stream have lacked a clear roadmap or agenda. Therefore, one of the article analyzed and synthesized existing studies of mobile banking adoption and maps the major theories that researchers have used to predict consumer intentions to adopt it. The findings indicate that the mobile banking adoption literature is fragmented, though it commonly relies on the technology acceptance model and its modifications, revealing that compatibility (with lifestyle and device), perceived usefulness, and attitude are the most significant drivers of intentions to adopt mobile banking services in developed and developing countries. Moreover, the extant literature appears limited by its narrow focus on SMS banking in developing countries; virtually no studies address the use of mobile banking applications via smartphones or tablets or consider the consequences of such usage. The study makes several recommendations for continued research in the area of mobile banking.

One of the articles, included in this review investigated and identified several influences on consumer adoption behavior toward mobile banking. In general, they provided interesting insights into the diffusion pattern of mobile banking. For most studies, the underlying objective was to discover deeper motivations and associations that significantly influenced potential adopters' attitudes and intentions across various social systems so that they could articulate behavioral intentions toward mobile banking adoption.

The use of mobile devices for conducting banking transactions and accessing other financial information is an emerging service that has yet to be widely adopted by mobile users; Analyzing the conceptual models explicitly mentioned in some research reveals a large and heterogeneous picture. A few of the lit reviews analyzed the security issues affecting mobile banking; some of the others studies relied on students for their data. Only one study was found that surveyed small business owners and two addressed the population of rural areas without access to banking facilities. Most of the lit reviews were found to be cross- sectional in nature and measured perceptions and intentions of subjects at a single point in time.

Poon (2008) revealed about the user's adoption of e-banking services in Malaysia in which privacy, security and convenience factors play an important role in determining the users' acceptance of e-banking services with respect to different segmentation of age group, education level and income level. E-banking provides higher degree of convenience that enables customers to access internet bank at all times and places. Apart from that, the accessibility of computers is perceived as a measure of relative advantage.

The customers feel unrestricted while using Internet banking. Liao and Cheung et.al. (2002) stated that willingness to use Internet banking depends on the expectations of accuracy, security, network speed, user-friendliness, user involvement, and convenience. User involvement usually means the control the individual can exercise over a process.

The results of Laukkanen (2007) described customer perceived positive and negative value perceptions to fund transfer via internet and mobile phone. The most noteworthy differences between these two channels are related to the location free access to the service and the display of the device. The most important contributor to mobile banking seems to be the ability use the service wherever wanted, which is related to the capability for immediate actions and time savings in service consumption. The keyboard and the display of the device seem to be the clearest inhibitors to the use of mobile bill paying service whereas in the use of the PC the case seems to be the opposite.

In the literature review, it identified that perceived benefits; security, human touch, physical reach

and price premium have emerged as important factors in declining the technological inclination. Uppal and Kaur (2006) found that the overall efficiency of e- banks is better as compared to that of traditional banks and there has been a fast shifting of bank customers from traditional to e-banks. This conveys the advantages of e-channels in terms of cost and quickness. There is no complaint from the customers for delay in e- banking functions. E-banks have complaints against service charges and A TM problems. Nonetheless, bank employees feel that the customer service in terms of timely services, behavior of employees etc., is better in e-channel banks.

One of the literature reviews explored the various levels of internet banking services provided by banks using the secondary data. It also compares the traditional banking systems with net banking. It lists out the various advantages of internet banking and the successful security measures adopted by different banks for secured banking transactions. It also analyzes how E-banking can be useful for banking industry during this global financial meltdown.

Figure 3: Customer Expectation from Banks [7]

Fieldwork

Interviews were conducted with a research objective of understanding people's experience with their bank, other banks, the mobile banking application, and possible concerns they had with any of the banks and its mobile applications. Bank users with smartphones located near the Portland State University Campus were interviewed ranging from full time students to retired community members. Questions towards the interviewees were left open ended to allow for more room for experience building and empathy development with the end user. Questions were aligned as follows:

1. General background information
2. Smartphone ownership
3. Overall experience with banking
4. Experience with mobile banking applications
5. Bank preference
6. Frustrations or concerns with banking
7. Frustrations or concerns with mobile banking
8. Duration of banking with preferred bank
9. Security concerns
10. Why they do or don't use mobile banking applications

Number Interviewed		
Bank App Users	No	Yes
Adult	0	6
Elder	3	1
Traditional Student	0	8
Grand Total	3	15

Table 1: Interviewed response on the use of Bank Applications

Interview Feedback

Interviews were limited to users with smartphones and local bank accounts. This limitation was necessary to gain the most feedback from users who are able to access both local banks and the mobile bank application. Both group and individual interviews were conducted to allow for both easier note taking on frustrations and body language. Interviews began with a casual conversation about banking leading into the “Five Whys” to uncover a person's reasoning on why the interviewee would or would not use mobile banking. During this interview process, many groups were approached provided some frustrations when using the bank application. The interviews provided many similar frustrations of the ease of use of the application, and difficulty in reading or navigating through all the features available in the mobile application. Other concerns consisted of trust or security with their account linked to their smartphone, some of the technical problems were also mentioned by the people who were interviewed like app gets crashed many times, transfer of money takes up to 3 days and puts the money in the holding zone which is more frustrating when the money is neither in the account of sender nor receiver. For users who did not use the mobile application preferred the use of traditional banking because it was more familiar to use when compared to mobile banking. A few bank users also shared having more than one account with other banks. For instance, one interviewee said he had accounts in Wells Fargo and Chase. When a person has to send him money, they would send it using his email. Since he has two different bank accounts with same email id linked, he does not know which bank account he would receive money. Some users also complained about the internet issues which is an obstacle for using mobile internet banking. Somewhere not sure of benefits of internet banking. Many people in almost all the age groups still do not use mobile banking even while using smartphones. From the interviews, major banks such as Wells Fargo and Chase were the most commonly used bank. When users were asked why they selected that bank, responses were tailored towards the convenience of many locations for the branches, referred by friends and family and growing up with the bank.

Literature Review and Interview Feedback

Interviews with different range of ages were conducted to obtain more information/data about customer needs for the mobile banking application, and other insight on a personal level that could be significant to the interviewers. The literature review helped the team define the scope of the project. Factors defined from both interviews and literature review were put into consideration when coming up with recommendations and improvements to the bank application experience.

Stage 2: Define

After collecting feedback from shared experiences, interviews and literature review, data was

compiled into an affinity diagram. An affinity diagram is a tool used to organize many ideas into common categories. The affinity diagram helped clearly organize all issues and frustrations that share similar themes are categorized together. The affinity diagram helped synthesize findings from the shared experiences, interviews, and literature reviews to look for patterns. A formulation of a voice, identity, and a set of design principles were used for the project. Target personas were developed to better structure potential solutions that align with a specific market. Three personas were reviewed for targeting mobile bank applications modifications and recommendations based on interview feedback. These personas consisted of a older person, who frequently stays connected with social media, the persona's primary complaint was not being comfortable accessing a bank account information in public with the fear of others being able to see login and account information. The secondary persona was created for a person who will also be affected with modifications or recommendations to the mobile bank application service. The secondary persona is a student who recently started working wanting a way to learn more about available features on his account and a way to ensure no one else has access to it. Lastly, the third persona reviewed will least likely be affected, is a person who worked in the technology industry and prefers using mobile bank applications. These personas will be affected with any changes or services to alter the bank application experience and will all have different types of responses to the change.

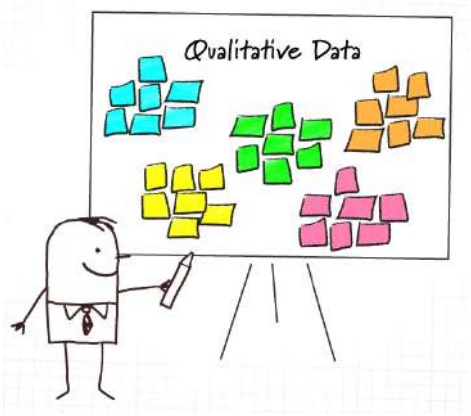

Figure 4: Categorizing with Affinity Diagrams

The first persona named was Steven, he is a 75-year-old retired war veteran who enjoyed staying connected with friends on Facebook. His primary complaint was that he did not feel comfortable using the mobile bank application in public because he was afraid users would be able to see his password and account information.

Figure 5: Primary Persona

The second persona was named Josh, who is a college student who recently started his first job at a local restaurant. As a busy student and employee, he stays connected with his friends on social media platforms and at college parties. Josh's primary complaint was that he was not familiar with all the features available with his bank account.

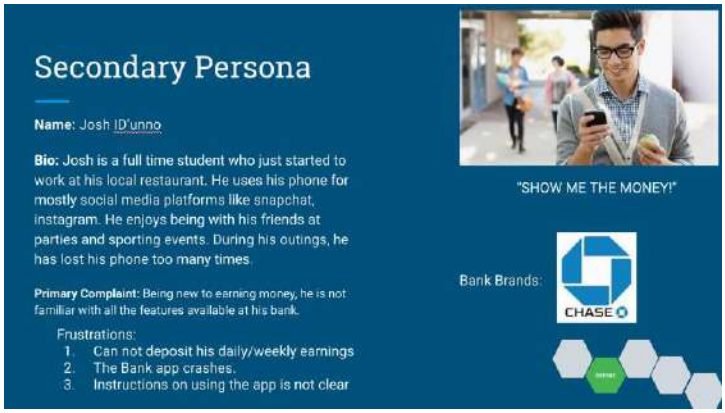

Figure 6: Secondary Persona

The last persona was named Steve Jobs, who very accomplished and has a lot of experience with technology and has had a lot of experience with mobile banking. He was very familiar with all banking features and applications and utilized banking apps frequently.

Stage 3: Ideate

After data collection between current literature studies and feedback from the interviews, many customer frustrations were identified to be solved. Frustrations like security, trust, ease of use, and age were categorized. From the interviews, more people over the age of 60 did not choose to use the mobile banking application. The interviews from the older group shared frustration with the ease of use of the application, and had trust and security concerns with account breaching. Older users were selected as a target for user centered innovation design project. From the interviews, older users shared common frustrations about banking. These frustrations include not having enough time to go to a bank during regular hours, the font size of the bank application was too small to read, and a fear that others would be able to access their account. These frustrations were used to narrow the design focus on how to increase the use of mobile banking for older users. Brainstorming was used to identify possible solutions to reduce frustration in using the banking application. Point of view problem statements were created to help narrow down solution themes. Potential solutions were narrowed down to redesign the bank application to ease navigation and accessibility, for banks to provide information sessions to align with these bank application frustrations presented in stage 2.

Stage 4: Prototype

Within the prototyping phase, a project evaluation was used with the consideration of the current target market of mobile bankers, literature review, fieldwork, the creation of personas, and point of views to narrow brainstormed ideas. The goal of this project was to evaluate the adoption and the use of mobile banking, and analyze how the emergence of mobile services can affect customer interactions with financial services. The banking services that people usually consider are to access their account information, manage their transactions, investments, and find support on banking features.

The target market for mobile banking is defined as all users of banking in combination of smart phones. The overall goal is to provide all customers a service by which they can manage their banking accounts at their convenience. During this evaluation, it was noticed that elders with smartphones are not

using the bank application as frequent as the interviewed students and adults. Elders were selected as the primary target market for this project to help encourage the use of the banking application.

Literature review provided some primary concerns for the use of the bank application. It indicated concerns for security in online fraud and ease of use that also aligned with the interviews, these concerns were incorporated into the creation of the personas. The personas created shared some trust and security concerns in other people being able to see account information, personas also were not aware of all the available features in the mobile banking app and how to access the available features within the application.

When coming up with potential solutions, a brainstorming session focused on possible solutions that align with resolving the primary personas complaints was used. To resolve the frustrations of the user not having enough time to go to the bank, the potential of allowing the user setup appoints on the bank application with bank employees would allocate a time slot for the user to be more informed about the application and the features and services offered. When considering the incorporation of this within the banking app, it may clutter the existing application. When looking at other available platforms, social media provides both personas a way to interact with other users and companies to stay connected and informed. A potential solution would be to inform users of security, features, and how to videos by making it public on social media platforms. For example, a video can show users how to transfer money on the application or how to navigate through the application. The other concern for using the application was security breaches, banks can also reiterate their security process and the similarities it has with their traditional banking procedures to try and reduce security concerns with banking application. These informative videos could be used to build trust by guiding them to all aspects of security and also with types of frauds to more secure. Another frustration noticed with the mobile banking application was the font size, the font size was noted to be difficult for older users because it was too small. A possible solution that could resolve this frustration is to incorporate an ability to change the font size to desired level within the application. This would allow users more customizability with the bank application. Another frustration indicated was the fear of someone else being able to access the account. A possible solution would be to incorporate another security level to access the account, such as incorporating a pin, a pattern, or have fingerprint log-in to be more secure, the levels of security on the user's phone can be customizable to have either option or combination of the options to ensure that the user is able to control who has the ability to access the account.

Overall solution scope of this project was to provide banks recommendations on incorporating information sessions and some ideas for redesign to overall increase usability, customizability, and decrease security concerns.

Stage 5: Test: Evaluation of the proposed solution.

Taking the proposed solution and applying it on the bank app like reiterating that the security of the banks is similar to that of the mobile banking application. Updating the bank application with the new security systems such as fingerprint login, redesigning the app by adding additional features and adjusting font size and using social media to be more educated and then taking the feedback of the persona’s regularly to see what they feel about added features, these changes in features will encourage the elders to begin using the mobile bank application. Users that were not targeted may also be affected by the modifications to the application or additional services such as information sessions. They will be provided the ability to customize which options they would like to appear on the mobile application or select which sessions to attend either in person or online.

Conclusions

User Centered Design Thinking in products and services improves user experiences. Understanding End users’ needs is important in improving their experience in mobile banking applications. User experience on banking applications was studied from User centered design thinking

perspective. User frustrations were analyzed in order to provide recommendations that may help resolve these issues. Some recommended features listed below would help improve this user experience and reduce frustration.

1. Restating the security of the mobile banking app to be precisely similar to that of the traditional bank will can help bank build trust among the people.
2. Designing the bank app with the needs of the customer could lead people being more involved in the bank app and solve future issues as banks solve their problems.
3. Adding more modern security systems in the mobile banking application and informing people on social media gets the people more educated about how they can use new features and apply new security systems in the banking app.
4. Reaching out to users through social media or in-person informative sessions to improve customer experience and faith in the bank.

Lessons learned from the field work and literature is that, if giving new service then it should be designed from purely on customer needs and keep developing based on them as people are end users of the service or product. During the fieldwork, we learned more features of the banking app which we were not informed off. Lack of structured questions during the interviews made it difficult to understand problems and people who are not residents and for whom language is barrier had difficulty in articulating their problems.

In future research, due to short duration of the project the sample size for the interviews was very small, with more time, different areas would be recommended to interview for generalizability. A more structured questionnaire would provide similar questions presented to the interviewees and more insight for each experience on the mobile banking application. Also, another limitation would be to be better informed about the banking process, its features and services offered in both in-person and mobile bank application interaction. Understanding how a bank operates could lead to a better understanding of how things are currently designed. Understanding the technical application can also provide improve the recommendations on bettering the bank application experience.

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Appendix: Categorized Interview Responses

Age Group	Smartphone	Do they use banking app	Type of the bank	Immigrants?	Trust Issue	Holding Zone
Elder	Yes	No	Chase	No	Yes	Yes
Adult	Yes	Yes	Bank of America	No	Yes	No
Adult	Yes	Yes	Bank of America	No	No	No
Student	Yes	Yes	Bank of America	Yes	Yes	Yes
Student	yes	yes	chase	yes	No	yes
Student	yes	yes	chase	yes	No	yes
Stundet	yes	yes	chase	yes	No	yes
Student	yes	yes	chase	yes	No	No
Adult	Yes	Yes	Wells Fargo, Citi, chase	Yes	No	No
Adult	Yes	Yes	Us bank	No	No	No
Elder	Yes	No	Wells Fargo	No	Yes	No
Elder	No	No	First Tech	Yes	Yes	No
Student	Yes	Yes	Wells Fargo	No	No	No
Adult	Yes	yes	WaMu	No	No	no
Elder	Yes	yes	chase	yes	Yes	No
Student	Yes	Yes	Wells Fargo	No	Yes	Yes
Adult	Yes	Yes	wells fargo	No	No	No
Student	Yes	Yes	Credit Union	No	No	No