MOBILE BANKING: WHAT DRIVES CONSUMER ADOPTION

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The undersigned, appointed by the dean of the Graduate School, have examined the

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WHAT DRIVES CONSUMER ADOPTION

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and hereby certify that, in their opinion, it is worthy of acceptance.

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To Chris, Mom, Dad, and Steph

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MOBILE BANKING: WHAT DRIVES CONSUMER ADOPTION

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ABSTRACT

There's an app for that! Thanks to smartphone penetration, one technological revolution has spawned the creation of countless mobile innovations, including mobile banking which allows users to manage their finances from their mobile device. Knowing what drives the rate of mobile banking adoption can help financial institutions target and convert non-users and improve their overall customer experience. This thesis highlights the relevance of mobile banking through the theoretical framework of Everett Rogers' *Diffusion of Innovations* and explores potential drivers of mobile banking adoption. Results from the survey reveal the demographic and attitudinal characteristics of mobile banking users who are at least 18 years of age and reside in the United States.

Introduction

Think about all of the monotonous things you do in a typical work week[1]. You might wake up at 6 a.m. to get ready for work. Then you might commute an hour to the office to work from 8 a.m. until 5 p.m. (i.e., normal business hours). Afterward, you probably commute another hour home to make dinner, clean the house, watch TV – any number of things. Sometimes you run errands, but only if those businesses are still open to provide their services.

One of your errands might be a visit to the bank or ATM. Bank branches generally adhere to normal business hours, which may make it difficult to visit one if you work during those hours. Alternatively, ATMs are accessible 24 hours a day, although they may charge you a fee. Either of these options would allow you to check account balances, make a deposit, transfer funds, or withdraw cash. However, the time it takes you to locate a branch or ATM and travel there is time you could spend on other things. With mobile banking, you could do the same tasks wherever you are with your mobile device.

Before the Internet and smartphones, people *had* to visit a bank branch or ATM in person; they *had* to fill out a deposit or withdrawal slip; they *had* to present photo identification to make an inquiry or take any action with their funds. Today, smartphones – mobile phones with capabilities beyond talk and text – and tablets can make this experience more convenient and less of a hassle by way of mobile banking. For instance,

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[1] The "typical work week" refers to data from the Bureau of Labor Statistics' American Time Use Survey (Bureau of Labor Statistics, 2015).

people can download their bank's mobile app (if it has one) to these mobile devices,

setup a mobile account through that app (which may involve a username and password or

passcode identification to login), and view or modify their bank account(s) at any time

and from anywhere they have Wi-Fi access or 4G LTE mobile service.

In fact, Chase bank updated its mobile apps in 2014 so that customers no longer

have to visit a branch – customer service is just a call or click away (Kosner, 2015). As a

result, the bank's app, Chase Mobile, is currently the highest-rated banking app on both

the Apple App Store and Google Play (Clements, 2015). Chase also recently debuted

Finn by Chase℠ – an all-mobile bank – currently available to iOS users in St. Louis

(which does not have any Chase branches) and rolling out nationwide and to Android

users in 2018 (Business Wire, 2017). This service was designed with millennials in mind,

by observing their financial challenges and what influences their spending habits. As

such, the ways all people can bank are starting to change.

Because of its credentials and contributions to mobile banking research (Board of

Governors of the Federal Reserve System, 2016), it seems appropriate for the Federal

Reserve (or, "the Fed") – the central bank of the United States – to define mobile

banking. It describes this concept as the ability to access a bank (or credit union)

account(s) from a mobile phone via its web browser or via an app that has been

downloaded to the mobile device (Board of Governors, 2016). For the purpose of this

study, a mobile device must be handheld, wireless and portable, such as a mobile phone,

smartphone, portable media player (e.g., iPod), tablet or personal digital assistant (PDA).

A 2014 study of five Federal districts[2], headed by the Federal Reserve Bank of Boston in conjunction with the non-profit association NEACH (New England Automated Clearing House), reported that there were five basic mobile banking services offered by 75% of the financial institutions (or, "FIs") surveyed; most of the remaining 25% intended to offer them by 2016 (Marous, 2015). These services include the ability to check balances, transfer funds between accounts at the same FI, view statements and transaction history, locate an ATM or branch, and pay bills. Other services – offered by fewer than 50% of FIs surveyed – include mRDC (mobile Remote Deposit Capture), bill presentment, mobile P2P (peer-to-peer) transfer, external transfer of funds, viewing credit card balance(s), statements, and transactions, and requesting a stop payment (Marous, 2015).

Years before it became a recognized tool in the financial industry, research (Brown, Cajee, Davies, & Stroebel, 2003) foretold a high probability of success for mobile banking on the heels of its predecessor – online banking. When a customer is satisfied with one channel, like online banking, they are more likely to engage in other channels – in this case, mobile banking (Balasubramanian, Raghunathan, & Mahaj, 2005). A recent survey from Chase (2015) found there were more consumers using online banking or a mobile app to monitor their finances in 2015 than there were in 2014; meanwhile, only 16% of those surveyed are visiting branches more often. Unfortunately for these folks, SNL Financial reported that more than 1,300 bank branches in the United States closed in 2013, which might suggest a shift in how people have decided to handle their banking or how FIs want patrons to handle their banking (Tuohy, 2014). The

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[2] The five Federal districts that were surveyed included Atlanta, Boston, Dallas, Minneapolis and Richmond (Marous, 2015).

research in this thesis will examine the former suggestion in order to understand what motivates individuals to engage in mobile banking.

As more and more people have become exposed to mobile banking over the past two decades, research (Al-Jabri & Sohail, 2012; Audi, Wahbi, Abdallah, Kassem, Jaber, & Makkawi, 2016; Dineshwar & Steven, 2013; Hanafizadeh, Behboudi, Koshksaray, Jalilvand & Tabar, 2014; Illia, Ngniatedema, & Huang, 2015; Lin, 2011; Shaikh & Karjaluoto, 2015; Shankar & Kumari, 2016) has observed the reasons that contribute to its adoption or lack thereof. The Federal Reserve Board's Division of Consumer and Community Affairs first conducted its Survey of Consumers' Use of Mobile Financial Services in 2011; since then, it has reported a 21% surge in mobile banking adoption (Board of Governors, 2016). With an increasing adoption rate and the steadfast evolution of mobile technology, the Fed has opted to continue its annual survey so that it can assess consumers' usage of mobile financial services and their attitudes towards them (Board of Governors, 2016). Research like this allows FIs to forecast the adoption rates of mobile banking and understand what drives its adoption.

This study uses renowned scholar Everett Rogers' model of diffusion to analyze the influence of mobile banking characteristics on the likelihood of its adoption. These will be assessed using Rogers' five attributes of an innovation – observability, trialability, compatibility, complexity, and relative advantage. Knowing what drives mobile banking adoption can equip FIs to better serve their customers. The literature review herein will highlight the relevance of mobile banking through the theoretical framework of Rogers' *Diffusion of Innovations*, and then it will explore potential drivers of mobile banking adoption.

Theoretical Framework

In order to comprehend the vast impact and potential of mobile banking, one should first review Rogers' research. As of 2010, his literature had been cited in more than 15,000 publications, which signifies the importance of his work in a growing technological society (Bainbridge, 2012). Now in its fifth edition[3], Rogers' most popular work, *Diffusion of Innovations*, markedly outlines his research on diffusion and adoption of an innovation (Rogers, 1995). The investigator considers his work germane to the study of mobile banking adoption. The model of diffusion can serve as a lens through which the investigator can observe and interpret the motivations of consumer behavior – specifically, what drives mobile banking adoption.

In *Diffusion of Innovations*, Rogers (1995) first defines an innovation as "a new idea, practice, or object" and its diffusion as a process by which that "innovation is communicated through certain channels over time among the members of a social system" (pp. 5, 11). Despite obvious advantages, an innovation like mobile banking can take a lengthy period to reach widespread adoption; as a result, stakeholders of the innovation often seek to accelerate the rate of diffusion, which can present a problem (Rogers, 1995). When an innovation is introduced into society, its process of diffusion is also considered something new, resulting in a degree of uncertainty (Rogers, 1995). Without the necessary information to understand and appreciate the innovation, uncertainty lingers.

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[3] The first manuscript of *Diffusion of Innovations* was published in 1962. For the purpose of this thesis, the 4th edition of the book was observed (see References).

For a technological innovation like mobile banking, two types of information can help to dissipate any uncertainty – software information and innovation-evaluation information (Rogers 1995). Software information generally consists of questions that answer what it is and how it works, but the need for innovation-evaluation information motivates the consumer to ask questions like "What can it do for me?" The subsequent literature review will provide software information, but then the investigator will explore the attributes of mobile banking that may influence the decision to adopt the technology based on innovation-evaluation information.

Adoption refers to people's decision to implement an innovation into their social lives (Rogers, 1995). When a few recognize and adopt an innovation sooner than others, Rogers (1995) called this *innovativeness*. Innovators lead the way, launching the innovation into a social system, and then convert early adopters who serve as more immediate role models within their communities (Rogers, 1995). These early adopters hold the highest degree of opinion leadership within a society and thereby disseminate advice and information about the innovation among the majority (Rogers, 1995). Laggards, of a more traditional mindset, trail well behind the majority, as they tend to be suspicious of innovations (Rogers, 1995). According to Rogers (1995), most contemporary researchers who study adoption use these ideal types of adopter categories. However, for the purpose of this study, the investigator has chosen *not* to focus on the adopter categories, but these can identify how far an innovation, like mobile banking, has infiltrated a civilization.

Before mobile banking could become an innovation, one of its vessels – a mobile phone – had to first succeed at diffusion and adoption. Following Rogers' theoretical

approach, the diffusion of mobile phones and, inevitably, mobile banking are best exemplified by his Innovation-Decision Process, which is realized through five steps – knowledge, persuasion, decision, implementation, and confirmation (Rogers, 1995). When IBM debuted the Simon Personal Communicator in 1993, it exposed society to an innovation – a mobile phone with smartphone capabilities (Buck, 2013; Rogers, 1995). Even though society knew about this up-and-coming invention, for many it was not yet relevant (or financially viable) to their lifestyles, but through persuasion smartphone retailers and wireless carriers eventually convinced consumers to adopt smartphones (Rogers, 1995). As a result of their diffusion, retailers like Apple and Samsung now manufacture updated versions, or *re-inventions*, of their smartphones almost every year to maintain demand for ones that are lighter, faster, sleeker, and savvier (Rogers, 1995).

The adoption of smartphones subsequently led to other technological innovations – like mobile banking. According to the Survey of Consumers' Use of Mobile Financial Services, the rate of mobile banking adoption has steadily increased in the past two decades (Board of Governors, 2016). Rogers (1995) defined the rate of adoption as how fast a society assimilates an innovation. Most innovations follow an S-shaped rate of adoption; people slowly begin to adopt the innovation, the rate of adoption climbs until it reaches its peak, and then it drops off as fewer people remain to adopt the innovation (Rogers, 1995).

Like smartphones, mobile banking also follows the Innovation-Decision Process. First, individuals obtain *knowledge* about mobile banking, like software information. In order to attain adoption, stakeholders like FIs apply their powers of *persuasion* – which might include advertisements, demonstrations, or social media engagement – to

encourage consumers to try mobile banking and hopefully instill a favorable attitude toward this service. If consumers receive convincing innovation-evaluation information, they will likely make a *decision* to adopt mobile banking.

As previously mentioned, mobile banking's rate of adoption has slowly increased, which means a growing number of people have chosen to *implement* the innovation into their daily lives (Board of Governors, 2016). Society's gradual adoption of mobile banking suggests a *confirmation* of the innovation – less uncertainty and more confidence in the service. In order to prevent a state of dissonance (which could reduce the user's need for the innovation) or a flat-out rejection (adoption's alternative outcome), FIs need to provide a beneficial service that fulfills their customers' needs, as well as a user-friendly experience (Rogers, 1995).

To do this, FIs must understand what drives consumer adoption of mobile banking, and the most telling information can come from examining its attributes (Dash & Bhusan, 2014; Gu, Lee, & Suh, 2009; Lin, 2011). An analysis of an innovation's attributes can determine whether or not that innovation will "catch on" or be successful (Rogers, 1995). Based on his research, Rogers (1995) identified five attributes that describe innovations. He named these – observability, trialability, compatibility, complexity, and relative advantage – for their generality and succinctness, and although each is conceptually distinct they are all empirically interrelated (Rogers, 1995). In addition, all of these attributes of an innovation positively correlate toward adoption, except complexity which adversely affects it (Rogers, 1995). If an innovation is perceived to possess greater quantities of observability, trialability, compatibility, and

relative advantage, its likelihood of adoption will increase, but the greater the complexity of an innovation then the slower or less likely adoption will occur (Rogers, 1995).

According to Bauer, Reichardt, Barnes & Neumann (2005), the success of an innovation depends on its acceptance by consumers and its continuous use thereafter. The adoption and diffusion processes are dependent on two core groups – stakeholders and users. Damásio, Henriques, Teixeira-Botelho & Dias (2013) observed the adoption and diffusion of mobile Internet (m-Internet) from both the user's and the stakeholder's perspectives, discussing both groups' understanding and attitudes towards this emerging technology, similar to that of mobile banking. Their main hypothesis for technology adoption alluded to a significant impact from key adoption and use drivers. Not surprisingly, their findings indicated that social interaction increases the rate of adoption; this word-of-mouth (WOM) transmission is essential for attracting the attention of potential customers. These recent findings from Damásio et al. (2013) strengthen Rogers' research in that diffusion is a social process and WOM facilitates adoption.

According to Shaikh & Karjaluoto (2015), the majority of studies on mobile banking adoption have used the technology acceptance model (TAM) as its theoretical framework. Research (Illia et al., 2015; Luarn & Lin, 2005) from these studies, as well as research (Gu et al., 2009) from studies using other models, has been included in the following literature review to provide a thorough scope of information on mobile banking adoption. However, TAM excludes demographic factors, which might make it difficult to assess consumers' attitudes and behaviors toward mobile banking (Shaikh & Karjaluoto, 2015). Therefore, the investigator chose to apply a theoretical framework – Rogers' model of diffusion – that is sensitive to those external variables.

Second to studies using TAM, other research (Al-Jabri & Sohail, 2012; Brown et al., 2003; Dash & Bhusan, 2014; Sohail & Al-Jabri, 2014) has observed the drivers of mobile banking adoption through the lens of Rogers' diffusion of an innovation as well, specifically examining the attributes of an innovation. However, many studies have not compared the differences in opinion between users and non-users of mobile banking, which this study intends to capture. While it is important to know what features mobile banking users find useful, it is imperative for stakeholders to understand which features could convert non-users.

In addition, there do not appear to be any studies like this that have been conducted in the United States by an academic scholar. As a result, this study has the potential to provide significant insight into the American drivers of mobile banking adoption and lay the groundwork for future studies in the United States, as motivations for trying mobile banking may vary from country to country and even culture to culture.

Literature Review

Although it has existed for nearly two decades, mobile banking has revolutionized the financial industry in just the past few years. Today, people can manage their funds from anywhere using their mobile phones, making it a convenient experience. Convenience aligns with one of Rogers' five attributes of an innovation; it is a relative advantage, or benefit. This attribute along with the other four – observability, trialability, compatibility, and complexity – can impact an individual's Innovation-Decision Process in an effort to adopt or reject an innovation.

This literature review will analyze potential drivers of consumer adoption of mobile banking services based on demographics and the positive or negative correlation of Rogers' aforementioned innovation attributes. Knowing which attributes affect the rate of mobile banking adoption will help FIs develop and market the most useful features of their mobile banking technology – such as mRDC or mobile P2P transfer – so that they can better serve their customers. In order to determine what drives mobile banking adoption, subjects will participate in a survey designed to reveal the influence of these variables so that the investigator can answer the following research questions:

RQ1. Are certain demographics more inclined to adopt mobile banking?

RQ2. Which attribute of an innovation is most effective in driving mobile banking adoption?

The investigator will also introduce hypotheses on the expected outcomes of the study. These hypotheses will help to answer the aforementioned research questions.

Mobile Background

Before the dawn of mobile banking, innovators first introduced society to its vessel – a mobile device. In 1973 – almost 100 years after the invention of the telephone – Motorola publicly demonstrated the world's first portable cellular phone, thereby exposing society to an innovation and its functions (Motorola, 2016; Rogers, 1995). Eleven years later, the same company launched the first commercial handheld cell phone, weighing slightly less than two pounds with a battery life of 30 minutes (Motorola, 2016). The phone – nicknamed "the brick" for its size – sold for approximately $3,995, or roughly $8,700 by today's standards (Buck, 2013). Suddenly, cell phones became a fashionable accessory, but because of its luxurious price tag early adopters primarily consisted of male executives (Teisberg, as cited in Rogers, 1995).

As mobile phone technology evolved in the 1980s, phones lost weight, features improved, and prices began to decrease. In 1989, Motorola produced the Microtac, the first mobile flip phone, which sold for $3,000 (Buck, 2013; Motorola, 2016). It did not take long for mobile manufacturers to recognize that cell phones could offer more than just verbal conversation. In 1993, IBM debuted the Simon Personal Communicator, priced at $899, which had smartphone capabilities – or, the ability to run applications on a mobile device as if it were a computer (Buck, 2013). At this time, Teisberg determined that one in three mobile phones began to serve a nonbusiness purpose (as cited in Rogers, 1995).

By the end of the 1990s, mobile phone batteries lasted a few hours, extending the amount of time people could use these wireless devices. With the emergence of the Apple iPhone in 2007, the race for mobile domination led to a rapid evolution of smartphones.

Suddenly, mobile phones were widely affordable and coveted for short message service (SMS) – commonly referred to as text messaging – so much so that SMS users reached 2.4 billion worldwide that year (Top Marketing Schools, 2013). They had become a highly personalized and interactive communication tool – one that people keep on standby for roughly 14 hours a day (Bauer et al., 2005; Hritzuk & Jones, 2012). Not even a decade into the new millennium, roughly a third of the global population had adopted mobile phone technology.

Shortly thereafter, mobile devices achieved widespread adoption. Ian Carrington, a mobile and social advertising sales director at Google, claimed more people owned a mobile device than those who owned a toothbrush (Mclean, 2012). According to IT company Cisco (2016), the number of mobile-connected devices exceeded the world population[4] in 2015, reaching 7.9 billion mobile devices. Further research (Cisco, 2016) from this company suggested that there will be approximately 1.5 mobile devices per capita by 2020, which means the average four-person household would own six mobile devices (e.g., smartphones and tablets).

On the home front, comScore (2016) – a global media measurement and analytics company – reported that smartphone penetration is on the rise with 198.9 million people in the United States owning a smartphone, as of February 2016, an approximate 79.3% mobile market penetration. Likewise, the Fed reported a 34% increase in smartphone ownership from 2011 to 2015, with mobile phone usage remaining high and consistent across demographic and socioeconomic groups, thus affirming this innovation's influence on modern communication (Board of Governors, 2016).

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[4] The world population was observed on October 2, 2016 on the United States' Census Bureau's website.

Fortunately for FIs, research (Board of Governors, 2016; Shaikh, 2013) has found that the ongoing smartphone adoption has a direct effect on mobile banking usage. In the Fed's survey, the increase in smartphone ownership between 2011 and 2015 coincided with the increase in smartphone users who engaged in mobile banking (Board of Governors, 2016). The Fed reported that smartphone users with bank accounts, who had used mobile banking in the past 12 months, rose ten percent during that same time frame, from 43% to 53% (Board of Governors, 2016). Because research (Balasubramanian et al., 2005) has suggested that people are more likely to engage in other channels if they have a favorable experience with a similar channel – like online banking – people may be more willing to try mobile banking as they continue to adopt smartphones and evolve with mobile technology.

Mobile Banking

Unlike smartphones, mobile banking has not yet reached widespread adoption, but its diffusion throughout society has made a broader adoption possible. It is a nascent but rapidly evolving technology with minimal archives, making it more of a challenge to review its history and forecast adoption rates. Although research (Compass Plus, 2013; Shaikh & Karjaluoto, 2015) has inconsistently identified the first provider of mobile banking services, its conception naturally followed the introduction of smartphones and text messaging at the end of the 20th century.

According to a white paper from Compass Plus (2013) – an international provider of retail banking software and electronic payments systems for FIs – Merita Bank in Finland launched the first mobile banking service in 1997 via text messaging, which was the most common form of early mobile banking. However, Shaikh & Karjaluoto (2015)

claimed German company Paybox – in collaboration with Deutsche Bank – created the first service in the late 1990s. Regardless, the early success of text messaging as a means to engage users in mobile banking encouraged larger FIs with the necessary capital – like Bank of America, Chase, Citibank, and Wells Fargo – to experiment with this technology at the turn of the century (Lee, Zhang, & Chen, 2013; Pisani, 2007).

As a result of this innovativeness, the early adoption of mobile banking by these FIs led to its diffusion in the new millennium. By the mid-2000s, mobile banking became a viable platform for FIs to reach a diverse audience (Burger, 2013). It first saw success with non-value transactions like balance inquiries via text messaging (Vats & Mohan, 2008). Then, with the emergence of the iPhone, the swift evolution of smartphones meant improved Internet browsers and the creation of mobile banking apps, which would further aid mobile banking adoption (Hamblen, 2008).

Today, mobile banking features include, but are not limited to, alerts, balance checks, bill pay, internal and external funds transfer, mobile search, mRDC, P2P transfer, statement and transaction history, and stop payment requests (Marous, 2015). Many of these, like mobile alerts or push notification from mobile apps, balance checks, and the ability to view statements and transaction history, keep customers informed of their account activity and available funds (Javelin Strategy & Research, 2015b). Mobile search makes it easy to locate a branch or ATM, while mRDC allows a mobile banking user to digitally deposit a check by photographing it with their smartphone, skipping a trip to the branch. Additionally, people can transfer funds from their bank account or credit card to another person's account via P2P transfer; however, less than half of the Top 30 FIs in the United States offer this service (Javelin Strategy & Research, 2015a). For many of the

aforementioned features, mobile banking users can access them through text messaging, a mobile browser, and/or a mobile app, the latter being preferred by nearly 75% of users (Javelin Strategy & Research, 2015a).

Demographics

Although it is not the primary focus of this study, the demographics of mobile banking users may provide some useful insight into adoption, as it did with the early adopters of the mobile phone. According to Crabbe, Standing, Standing, & Karjaluoto (2009), demographics play a significant role in an individual's decision to adopt an innovation. Likewise, other research (Bhatt, 2016) has affirmed the relevance of demographics on adoption as it pertains to social and cultural factors. The findings in this study might assist FIs in marketing their mobile banking services toward the optimal demographics for adoption. Knowing the customer makes for an easier product conversion. As such, the investigator will answer the first research question:

RQ1. Are certain demographics more inclined to adopt mobile banking?

According to a survey from the Pew Research Center (2013), 32% of U.S. adults bank using their mobile phones. Javelin Strategy & Research (2015b) referred to the majority of mobile banking users (62%) as "Emergents," in that they are young and often financially inexperienced, reliant on the guidance of others. This should not be confused with Rogers' adopter categories, as not all early adopters are Emergents and not all Emergents are early adopters.

Nevertheless, young, technology-savvy individuals may be more inclined to adopt mobile banking (Brown et al., 2003; Laukkanen & Cruz, 2012). Other studies (Audi et al., 2016; Board of Governors, 2016; Gu et al., 2009; Lin, 2011; Pew Research Center,

2013; Shankar & Kumari, 2016; Sohail & Al-Jabri, 2014) have also identified a predominantly younger demographic using mobile banking, which may not come as a surprise since this generation (ages 18-29) matured with mobile technology (Bigne, Ruiz, & Sanz, 2005). However, some studies (Crabbe et al., 2009; Dash & Bhusan, 2014; Gu et al., 2009; Laukkanen & Cruz, 2012; Sohail & Al-Jabri, 2014) found a slightly older generation (ages 31-40) leading in mobile banking adoption. Based on these findings, the investigator has formulated the following hypothesis:

H1. Mobile banking users are young (i.e., millennials ages 18-34).

As for gender, many studies (Audi et al., 2016; Bhatt, 2016; Crabbe et al., 2009; Gu et al., 2009; Laukkanen & Pasanen, 2008; Lin, 2011; Prodanova, San-Martín, & Jiménez, 2015; Shankar & Kumari, 2016), mainly from Asian and Middle Eastern countries, found a higher predominance of male mobile banking users; some research (Bhatt, 2016; Prodanova et al., 2015; Sohail & Al-Jabri, 2014) described the typical mobile banking user as a young, educated, middle-class male. Laukkanen & Cruz (2012) believed that in coming years any differential in gender would balance itself out. As such, recent studies from the Board of Governors (2016) and the Pew Research Center (2013) have shown little to no difference in gender usage, suggesting that equilibrium may be occurring.

On the other hand, some research (Brown et al., 2003; Javelin Strategy & Research, 2015b) has identified a slightly higher percentage of women use mobile banking, which could suggest women may be more increasingly involved in monitoring their household finances and therefore find mobile banking technology useful. Nevertheless, the investigator feels that survey participants, who must reside in the

United States, will align with the former findings from the Board of Governors (2016) and the Pew Research Center (2013). Therefore, the investigator predicts the following hypothesis:

H2. There is no significant gender disparity among users of mobile banking.

In addition, those who have higher-education degrees and reside in a household with a total income exceeding $50,000 – Emergents net an average of $76,000 – may also be more likely to try mobile banking (Javelin Strategy & Research, 2015b; Pew Research Center, 2013). This seems like a plausible observation since these individuals may have more knowledge about this technology through their education and/or the means to purchase these not-inexpensive gadgets. One study (Prodanova et al., 2015) also suggested that employment translates to a financial necessity to afford and adopt mobile banking technology; if people have a consistent flow of money, they will need to store it somewhere, like a bank, and if they have a mobile device or smartphone, they may be inclined to monitor their account(s) via mobile banking. Other research (Laukkanen & Cruz, 2012) did not find any effects from education or income. Despite these latter findings, the investigator feels confident that higher education and income impact an individual's decision to adopt mobile banking, thus arriving at the following hypotheses:

H3. Most mobile banking users have higher-education degrees (e.g., undergraduate, graduate, and doctoral).

H4. Most mobile banking users have an annual household income exceeding $50,000.

Lastly, race and ethnicity seem to be the least polled demographics, if sampled at all. The Pew Research Center (2013) found non-white Americans more likely to engage

in mobile banking than other races. Meanwhile, some research (Bhatt, 2016; Sohail & Al-Jabri, 2014) conducted in countries less diverse than the United States may have skewed demographic results, which makes it difficult to generalize globally. Because of the lack of research, the investigator does not believe there is enough information to confidently identify the race or ethnicity that most often uses mobile banking technology. As such, the investigator proposes the following null hypothesis:

H5. There is no significant race/ethnic disparity among users of mobile banking.

Attributes of an Innovation

As more and more people have become exposed to mobile banking over the past two decades, research (Al-Jabri & Sohail, 2012; Audi et al., 2016; Dineshwar & Steven, 2013; Hanafizadeh, Behboudi, Koshksaray, Jalilvand & Tabar, 2014; Illia et al., 2015; Lin, 2011; Shaikh & Karjaluoto, 2015; Shankar & Kumari, 2016) has begun to study its adoption. Some (Al-Jabri & Sohail, 2012; Dash & Bhusan, 2014; Putzer & Park, 2010; Sohail & Al-Jabri, 2014) have even used Rogers' model of diffusion to observe the attributes of an innovation. As mentioned, all of Rogers' attributes of an innovation positively correlate toward adoption, except complexity which adversely affects it (Rogers, 1995). Again, if an innovation is perceived to possess greater quantities of observability, trialability, compatibility, and relative advantage, its likelihood of adoption will increase, but the greater the complexity of an innovation, the slower or less likely adoption will occur (Rogers, 1995). The innovation-evaluation information that follows supports the correlation of these attributes. The investigator will then test these theories in an effort to answer this final research question:

RQ2. Which attribute of an innovation is most effective in driving mobile banking adoption?

Observability. Although WOM would not be considered an attribute, the ability to observe it would be. Rogers (1995) defined observability as witnessing the effects of an innovation. If people have encountered the innovation, WOM would carry their feedback to others, thus enabling observability. When a non-user can observe the technology and a user can effectively communicate its functionality, non-users may develop a positive attitude toward the innovation, thus increasing the likelihood of its adoption (Putzer & Park, 2010; Rogers, 1995).

Like the research from Damásio et al. (2013), the Bass forecasting model presented in *Diffusion of Innovations* suggested that interpersonal WOM channels (in addition to mass media) influence the adoption of an innovation (as cited in Rogers, 1995). Before smartphones, WOM might reach a dozen people through face-to-face conversations. Today, WOM has the potential to reach thousands, or even millions, with the help of social media and the Internet. With these channels heightened by mobile communications, consumers are exposed to so much more, including new products and services. Rogers (1995) says this visibility fuels discussion, as those who know an adopter seek knowledge and feedback on the innovation. Given the rise of social media and the advent of the digital age, the investigator proposes the following hypothesis:

H6. Mobile banking users will strongly agree with observability statements.

Nevertheless, a lack of observability can hinder adoption. According to a report from BuzzCity – a venture-funded technology company with in-depth knowledge on the mobile consumer – nearly all banks offer some form of mobile banking service, but one

in ten consumers do not know they exist ("BuzzCity," 2015). BuzzCity blamed this inadequacy on FIs and their over-emphasis on TV campaigns instead of mobile advertising, which accounts for only 16% of marketing spend. By targeting customers through the appropriate channel (like m-Internet or social media) and generating awareness, FIs can encourage mobile banking adoption.

Similarly, Fiserv, Inc. – a global provider of technology solutions for FIs – also recommended targeted marketing like Smart App Banners, which promote the FI's mobile app when its name is typed into a mobile or tablet URL (Fiserv, 2014). This company also suggested properly training staff to promote mobile banking features and encourage mobile banking adoption (Fiserv, 2014). When bank patrons can easily observe this technology and bank staff can effectively communicate its use, Rogers (1995) believed patrons would be more likely to adopt the innovation.

Trialability. Likewise, if a product or service is available to consumers and there is no pressure to adopt it, they may be more inclined to try it. Trialability allows consumers to experiment with the technology before implementing it into their social lives (Agarwal & Prasad, 1998). For example, 19% of those who responded to the Fed's survey – approximately 152 individuals in a sample of 801 – accredited their FI's implementation of the service as their main reason for employing mobile banking (Board of Governors, 2016). Research (Agarwal & Prasad, 1998; Putzer & Park, 2010; Roger, 1995) found that having access to the innovation and being given a trial period encourages a more rapid adoption of the innovation. People can then choose to continue using the product or service, or they can discard it. As mobile banking continues to gain momentum, this attribute may become increasingly important to converting non-users.

To encourage adoption through trialability, Dash & Bhusan (2014) suggested that FIs create public demonstrations to educate consumers on how to use their mobile apps and, hopefully, positively affect their attitude toward the service. This recommendation has the potential to be highly influential on adoption in that it can actually address all of Rogers' attributes of an innovation. Most importantly, the ability to experiment with an innovation can increase its rate of adoption because it creates meaning for the consumer and identifies a use for the innovation (Rogers, 2015).

Compatibility. This attribute addresses the needs, values, and past experiences of a potential adopter (Rogers, 1995). If people reject an innovation, they may feel like it is not compatible with their lives. This has not been the case for smartphones, which have succeeded in widespread adoption due to compatibility (Putzer & Park, 2010). Again, the Fed found that the increase in smartphone adoption has a positive effect on mobile banking usage; in fact, 26% of respondents disclosed that owning a smartphone led them to adopt mobile banking (Board of Governors, 2016). Prior research from Laukkanen & Cruz (2012) supported that claim, finding smartphone users 2.25 times more likely than basic telephone users to engage in mobile banking. According to Rogers (1995), if an idea is more compatible with their lifestyle, people will feel less uncertain about adopting it. For those already accustomed to using a smartphone, mobile self-efficacy will ease the transition to mobile banking (Shaw, 2014). The investigator believes this study will support these findings and has formulated the following hypothesis:

H7. Mobile banking users will strongly agree with compatibility statements.

Unfortunately, compatibility can backfire. As many as 86% of consumers felt their banking needs were sufficiently met through other channels, like traditional banking

or online banking; the majority (39%) of consumers currently prefer the latter (Javelin Strategy & Research, 2015b; Marous, 2015). Because many bank patrons have still not yet recognized the value of mobile banking – potentially due to a lack of awareness or the overabundance of mobile apps – they are content with the options that are familiar to them. To prevent this type of comfortability, Dash & Bhusan (2014) – like Fiserv – also recommends the use of targeted marketing. By focusing on clients with mobile devices, who may be more inclined to explore mobile features, FIs can emphasize the compatibility of the service to customers' existing mobile habits and promote it as a viable tool for their lifestyle.

  Complexity. If people do not have mobile habits, they may not feel compatible with mobile banking and might even find it difficult to use. Rogers (1995) called this the complexity of an innovation – the opposite term being simplicity, or ease of use. This is the only attribute to adversely affect adoption; the greater the complexity of an innovation, the slower or less likely adoption will occur (Rogers, 1995).

  Unlike complexity, research (Gu et al. 2009; Luarn & Lin, 2005) has suggested that ease of use positively influences adoption, particularly with new technology. For example, Luarn & Lin (2005) found that people who had computer self-efficacy perceived a greater ease of use with mobile banking, thus encouraging adoption. On the other hand, if people felt the technology was time-consuming or frustrating to maneuver, their likelihood of adoption would decrease (Al-Jabri & Sohail, 2012).

  Research (Lin, 2011) determined that mobile banking's ease of use positively influenced experienced users, especially as they become more comfortable handling the innovation; this same research also suggested that mobile banking's "friendly interfaces"

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project an easy-to-use mentality, which invites non-users to engage with the innovation.

Meanwhile, other research (Cruz, Neto, Muñoz-Gallego, & Laukkanen, 2010) identified

a negative perception of mobile banking, particularly among older generations and those

with less education; these individuals feel the innovation is too complex to adopt.

Seemingly, non-users of mobile banking would attribute greater complexity to the

innovation because of their inexperience and/or lack of exposure. Therefore, the

investigator proposes the following directional hypothesis:

H8. Users will strongly agree with complexity statements.

Relative Advantage. Meanwhile, other research (Al-Jabri & Sohail, 2012; Kline,

2015; Prodanova et al., 2015; Yang, 2008) has suggested that benefits are perhaps the

most important drivers in mobile banking adoption. As a financial innovation, mobile

banking lowers cost, reduces risk, and provides a superior product, all of which are

considered relative advantages (Srivastava, 2013). Yang (2008) reported timeliness of

services and cost efficiency as perceived benefits of mobile banking that encourage

adoption rates. Years later, studies still echoed those sentiments. Research from Spain

(Kline, 2015; Prodanova et al., 2015) – one place where financial technology innovation

is happening fastest – found that unlimited access (71.9%), convenience and practicality

(61.1%), fast results (52.2%) and free service (50.2%) motivated consumers to utilize

mobile banking.

Rogers (1995), too, believed these relative advantages could be the best predictors

of an innovation's rate of adoption – the most important being convenience. The Fed's

survey reported convenience as the most common adopter in the United States, with 39%

of consumers listing it as the main reason for utilizing mobile banking (Board of

Governors, 2016). In 2013, the launch of the instant balance feature, via text messaging, increased mobile banking enrollment by 238% at Bank of the West, suggesting that the convenient and customized service can yield a return on an FI's technology investment through positive customer experiences.

Despite these benefits, security breaches and identity theft still remain the predominant concern for consumers in moving forward with new mobile technology (Laukkanen, 2007; Lee et al., 2013; Shin, 2009). While insistent promises of privacy and security should feel reassuring, BuzzCity reported that one in four mobile banking users still has security concerns; however, these statistics have decreased ten percent since 2013, suggesting potential reassurances despite recurring triggers have positively influenced consumers ("BuzzCity," 2015).

Nevertheless, it seems like each week the media highly publicize a new security breach, instilling fear in the consumer. Despite some willingness to acquiesce to the perceived benefits of mobile banking, consumers still feel security is one of the main impediments to their adoption of mobile financial services (Board of Governors, 2016). With greater exposure to technology comes heightened security risks (Porter, 2015). As a result, 62% of consumers with mobile phones *and* bank accounts chose not to engage in mobile banking in 2015 because of this fear. These findings suggest benefits may not be as influential an attribute as Rogers (1995) thought. As a result, the investigator proposes the following hypothesis:

H9. Relative advantage has a less significant effect on both mobile banking users than observability.

As this literature review suggests, mobile banking could be one of the most valuable mobile services in this digital age (Ha, Canedoli, Baur, & Bick, 2012; Laukkanen & Pasanen, 2008). Hritzuk & Jones (2012) believed the average consumer would start to embrace more advanced behavior as smartphone penetration continued to grow and mobile technology improved. Subsequently, Moser (2015) identified a positive trend in the discourse of mobile banking, suggesting an imminent broad adoption. As mobile banking technology seemingly outpaces the evolution of its predecessor (i.e., online banking), so, too, will mobile banking adoption (Laukkanen, 2007; Lin, 2011). If FIs want to attract and retain mobile banking users, they must understand what drives consumer adoption of mobile banking, and the best place to start is by examining its attributes (Dash & Bhusan, 2014; Gu et al., 2009; Lin, 2011).

Methods

Research Questions & Hypotheses

As covered in the literature review, knowing which attributes affect the rate of mobile banking adoption will help FIs develop and market the most useful features of their mobile banking technology so that they can better serve their customers. In order to determine what drives mobile banking adoption, subjects participated in a survey that intended to answer the following research questions:

RQ1. Are certain demographics more inclined to adopt mobile banking?

RQ2. Which attribute of an innovation is most effective in driving mobile banking adoption?

In addition, the investigator chose to hypothesize the expected outcomes of this study in an effort to answer the aforementioned research questions. The following nine hypotheses were formulated based on research findings in the literature review:

H1. Mobile banking users are young (i.e., millennials ages 18-34).

H2. There is no significant gender disparity among users of mobile banking.

H3. Most mobile banking users have higher-education degrees (e.g., undergraduate, graduate, and doctoral).

H4. Most mobile banking users have an annual household income exceeding $50,000.

H5. There is no significant race/ethnic disparity among users of mobile banking.

H6. Mobile banking users will strongly agree with observability statements.

H7. Mobile banking users will strongly agree with compatibility statements.

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H8. Users will strongly agree with complexity statements.

H9. Relative advantage has a less significant effect on both mobile banking users than observability.

Research Design

This quantitative study had a non-experimental, cross-sectional design. Its descriptive design served to collect a vast amount of data at minimal expense to the investigator. It employed a survey which provided numeric description on the preferences of the sample (Creswell, 2014). These findings have allowed the investigator to generalize the preferences and motivations of the greater population of mobile banking users.

Population & Sample

This study surveyed a sample of the population via a single-stage sampling procedure. The population consisted of individuals who were at least 18 years of age and resided in the United States at the time the study was conducted. The investigator used a sample size of 403 workers. This sample size is large enough to provide a diverse response to the questionnaire, but not so large that the investigator could not afford to adequately compensate participants for their time. A random sample allowed equal probability of participation in the study.

Data Source(s)/Instrumentation

The investigator utilized two web resources to conduct the study. First, the investigator used Qualtrics' survey software to publish the survey instrument and then the web service Amazon Mechanical Turk (or, "M-Turk") to source pre-qualified participants to respond to the survey instrument. M-Turk provides a readily available

human workforce of more than 500,000 "workers" aged 18 and older who can be segmented to complete Human Intelligence Tasks (HITs), such as the survey instrument that was specially designed for this study. This survey instrument (see Appendix B) has been adapted from similar instruments that observed attitudes toward mobile banking adoption (Al-Jabri & Sohail, 2012; Board of Governors, 2016; Dineshwar & Steven, 2013; Lin, 2011).

The investigator chose to collect data through an online questionnaire because it is both timely and generally convenient for participants and it is an expedient way for the investigator to collect a large amount of data at an inexpensive cost. In order to collect data, the investigator created an M-Turk project. Rather than emailing the survey to a prospective sample, the investigator set a specific qualification to only sample workers who are current residents of the United States aged 18 and older. If workers met these qualifications, they were able to review information pertaining to the study, such as the title, description, and compensation. Qualified workers searching for relevant HITs were able to locate the study via the following keywords: survey, mobile banking, demographics, mobile, technology, bank, financial institution, finances, and money.

Prior to accepting the assignment, workers could review the title of the study and its description, which identified the purpose of the study and the amount of compensation. Once workers accepted the assignment, they received collapsible instructions that outlined consent, directed them to the survey link, and informed them how they would receive credit for their participation. This section also reiterated the amount of compensation and advised how long it would take to complete the questionnaire. This information can be found in Appendix A.

Once workers clicked the link, they were taken to the questionnaire on the Qualtrics platform. The questionnaire consisted of 40 multiple choice and Likert scale questions, including questions pertaining to their demographic (e.g., sex, age, race/ethnicity, level of education, and household income). Some multiple-choice questions allowed workers to select more than one option, while the five-point Likert scale questions ranged in opinion from strongly agree to strongly disagree. Table 1 shows how Likert scale questions were grouped according to their respective attitudinal construct.

Table 1. Questions pertaining to attitudinal constructs.

Construct	Questions
Compatibility	13, 14, 15, 16, 17, 18
Trialability	19, 20
Observability	21, 22, 23
Complexity	24, 25, 26, 27, 28, 29
Relative Advantage	30, 31, 32, 33, 34, 35

Validity & Reliability

Because the survey was specially designed for this study, no validity or reliability was known. As a result, a panel of experts (n = 4) consisting of professors at the University of Missouri-Columbia reviewed the instrument for clarity and validity prior to its distribution. However, despite this review, the investigator determined – posttest – some questions were not written effectively, were not entirely relevant to the respective attribute, or were not to scale. As a result, questions 20, 31, 34, and 35 were omitted from scoring.

To measure internal consistency, the investigator calculated Cronbach's alpha on each of the attitudinal constructs (see Table 2). Since one of the two questions for the attitudinal construct trialability was omitted due to its lack of clarity, the investigator was unable to calculate its Cronbach's alpha. As seen in Table 2, all coefficients for the 4 remaining constructs represent acceptable internal consistencies.

Table 2. Cronbach's alpha.

Construct	No. of Items	Alpha
Compatibility	6	0.773
Observability	3	0.747
Complexity	6	0.778
Relative Advantage	3	0.733

Data Collection

As stated, the data collection process occurred in a cross-sectional manner. The investigator had no interaction with workers. The design of the web services prohibited the investigator from contacting participants directly and vice versa.

After the appropriate pilot testing was completed, the investigator launched the questionnaire on M-Turk on March 2, 2017. Qualified workers were able to complete the one-time questionnaire at their convenience. The investigator estimated the duration of the questionnaire between five and seven minutes, with the expectation of receiving all completed HITs within two weeks of publishing the batch. In actuality, the average participant completed the questionnaire in three minutes and 43 seconds, with test times ranging from 37 seconds to 18 minutes and 14 seconds. Meanwhile, the duration for receiving completed questionnaires took longer than expected; the study reached its goal of 400-plus recipients on April 20, 2017, seven weeks after the study's launch.

With regard to confidentiality, M-Turk did not permit the collection of personally identifiable information; as noted, participants were asked to identify demographic information only. M-Turk and Qualtrics are both secure networks, which require the investigator to input a password for access. Survey results were accessible through the Qualtrics platform. The investigator did not create hard copies or permit data sharing outside the research team.

To encourage participation in the study, the investigator awarded workers with a nominal amount of 15 cents for their time commitment. Once all workers in the allotted sample completed the questionnaire, the investigator began data analysis.

Data Analysis

For this study, a quantitative method with a survey instrument was the least exhaustive method for the investigator to observe participants. More importantly, it allowed the investigator to formulate specific questions that correlate to Rogers' attributes of an innovation and then present those questions to the sample in a uniform way. As such, responses were analyzed to determine which attributes affect the likelihood of mobile banking adoption and if certain demographics are more inclined to engage in mobile banking.

Once the investigator exceeded 400 questionnaire submissions, the survey was closed, and Qualtrics tabulated the questionnaires for data analysis. The data were exported to Excel and saved on the investigator's personal laptop, which requires a PIN to access materials and retains antivirus software. Subsequently, the investigator uploaded the Excel file into SPSS Statistics for descriptive and statistical analyses.

First, the investigator ran a frequency test on all 40 questions for counts and percentages and then calculated means, medians, and standard deviations for Likert scale questions. To test statistical significance, a chi-square comparison showed how participants differed across five demographic characteristics (e.g., sex, age, race/ethnicity, level of education, and household income) (see Table 7). For Likert scale questions, the investigator used the Wilcoxon Rank Sum test – a nonparametric test – to

calculate significance and Z-scores since there was a skewed distribution for the attributes (see Table 5).

After completing these analyses and consulting with the panel of experts, the investigator will only provide results and discussion pertaining to the user population in this study. Though it was the investigator's intent to compare users and non-users of mobile banking, miscommunications with the web resource M-Turk prevented the proper collection of segregated user and non-user data. As a result, non-users (shown in Table 3) represent less than 10% of the surveyed population – a sample size that is not large enough to draw generalizable conclusions about mobile banking usage.

Table 3. Mobile banking users versus non-users.	
Respondents	**Total**
Users	364
Non-users	39
Total:	403

Results

All 403 workers willingly participated in the study, but it is worth noting that not all of these participants completed the entirety of the survey. Table 4 indicates the number of participants who failed to respond to each survey question. If the survey question is not listed, all participants provided an answer.

Table 4. Unanswered questions.

Survey Question	Number of Participants Who Did Not Provide an Answer
3	1
4	2
5	3
6	12
7	3
8	1
9	1
10	1
11	13
13	1
17	1
18	3
19	2
20	1
22	2
23	2
28	2
30	1
31	1
32	2
33	3
36	3
38	2
40	1

For those that did respond to questions, nearly all participants (99.3%) had regular access to a mobile device. Of these individuals, most (97.0%) had access to a smartphone, and more than half (60.4%) had access to a tablet.

Almost all respondents (97.8%) used a bank or credit union to manage their money. Most of them (97.8%) were aware their FI offered some form of mobile banking (e.g., a mobile app, text alerts), and many (90.3%) used or subscribed to a mobile banking service (see Table 3). When asked which mobile devices they used for their mobile banking service(s), more than two-thirds of respondents (68.8%) only used one device, and that device was most likely a smartphone (92.1%) followed by a tablet (31.7%).

A majority of respondents (79.2%) first heard about mobile banking because their FI implemented mobile banking and notified them directly (e.g., via email or postal service), while fewer than 20.0% heard about it from the following: a friend or relative (9.0%), a print, radio, TV or digital advertisement (7.3%), and social media (2.0%). Only one respondent had never heard about mobile banking until this survey, and 6.2% of participants said they had never tried it.

The main reason mobile banking users decided to try the service varies: 32.1% said their FI notified them to enroll in the service or download its app, 26.5% said their FI's implementation of a mobile banking service led them to try it, and 17.5% said their purchase of a smartphone led them to try it. Most said they used it daily (42.5%), while roughly a third of them said they used it once a week (32.6%), and their main reason for using it was convenience (52.6%), followed by accessibility (31.0%). Meanwhile, the main reasons for *not* using mobile banking[5] included their FI not offering the service (19.1%), preferring traditional banking at a branch location or online banking (18.1%),

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[5] In question five, 361 (out of 400) respondents said they *do* use mobile banking, but for this question (11), 94 respondents volunteered reasons for not using it. This means 55 respondents – who should have selected the answer "I already use mobile banking" – contributed feedback that contradicted their previous response in question five.

the risk of a security breach (16.0%), and not being aware of the service (12.8%). Nevertheless, a majority of participants (89.3%) said they planned to continue or start using mobile banking within the next 12 months.

The next portion of the questionnaire revealed respondents' opinions toward each of the attitudinal constructs. These statements were recorded on a five-point Likert scale, where "1" meant "strongly agree" and "5" meant "strongly disagree." Table 5 shows user responses, as well as all responses, via a Wilcoxon Rank Sum test; it captures the number of responses, the median of responses, the Wilcoxon test value ("Z"), and the level of statistical significance. The investigator used this test because the distribution for most statements was found to be skewed.

Table 5. Likert scale responses.

	Users				All Respondents	
	N	Median	Z	Significance	N	Median
Compatibility						
13. Mobile banking technology best suits my banking needs	360	1.00	-7.56	***	399	1.00
14. I think mobile banking is similar to online banking	361	2.00	-3.68	***	400	2.00
15. I prefer mobile banking to traditional banking (i.e., visiting a branch location) or online banking	361	2.00	-6.05	***	400	2.00
16. I would consider myself tech-savvy and/or computer literate	361	1.00	-1.35		400	1.00
17. I am confident in my ability to navigate the features of a mobile device	360	1.00	-2.93	**	399	1.00
18. I enjoy learning to use new technology	359	2.00	-2.40	*	397	2.00
Trialability						
19. A trial period or tutorial would help/would have helped me to better understand how to use mobile banking	359	3.00	-2.21	*	398	3.00
Observability						
21. I would try a new technology if a close friend or relative told me to try it	361	2.00	-4.45	***	400	2.00
22. I like that I can access mobile banking anytime/anywhere	359	1.00	-6.94	***	398	1.00
23. I would recommend mobile banking to others	359	1.00	-8.46	***	398	1.00
Complexity						
24. I know how mobile banking works	361	1.00	-5.42	***	400	1.00
25. If I don't/didn't know how to use mobile banking, I would ask someone who knows how to use it in order to understand how it works	361	2.00	-2.68	**	400	2.00
26R. Mobile banking requires a lot of effort	361	2.00	-2.95	**	400	2.00
27. Mobile banking is easy to use	361	1.00	-6.36	***	400	1.00
28R. Mobile banking is frustrating	359	2.00	-4.66	***	398	2.00
29R. Mobile banking is time-consuming	361	2.00	-4.66	***	400	2.00
Relative Advantage						
30. Mobile banking is faster than visiting a bank branch	360	1.00	-3.10	**	399	1.00
32. Mobile banking is convenient for managing my financial account(s)	359	1.00	-7.16	***	398	1.00
33. Mobile banking is cost-efficient for me	359	1.00	-5.43	***	397	1.00

Mean scores are based on a five-point scale, where 1 = strongly agree, 2 = agree, 3 = no opinion, 4 = disagree and 5 = strongly disagree

Z = Wilcoxon test value

*Significance level at < 0.05

**Significance level at < 0.01

***Significance level at < 0.001

The majority of statements were found to have a significantly different distribution. For compatibility, five of the six statements were shown to be significant, with three of them at $p < 0.001$. Meanwhile, users felt highly tech-savvy and/or computer literate; the median response for all participants was "strongly agree."

Although reliability could not be tested on the construct of trialability, question 19 resulted in a significance level of $p < 0.05$. Users generally had no opinion toward the benefit of a trial period or tutorial.

All statements for the construct observability were found to have a significantly different distribution at $p < 0.001$. Users generally agreed with the statements. Naturally, they felt they could recommend mobile banking to others. Similarly, the statements for complexity also demonstrated a high level of significance, with four of the six statements at $p < 0.001$. Users felt most strongly about the ease of mobile banking use and how the service works, with medians of 1.00 for both questions 27 and 24.

As for relative advantage, all three statements were statistically significant, with two of them at $p < 0.001$. The median responses for these three statements suggest users are strongly affected by how fast, convenient and cost-efficient mobile banking is.

The final five questions captured the demographic characteristics of participants, as shown in Table 6. The majority of participants were female (60.1%), White or Caucasian (70.9%), and between the ages of 25-44 (61.0%). More than two-thirds of participants (67.5%) had completed higher education (e.g., 2- or 4-year degrees, professional degrees, and doctorate degrees). Incomes varied, but three-quarters of all participants (75.2%) earned up to $75,000 annually.

Table 5. Overall demographics of all 403 participants.

Sex	Total
Female	242
Male	156
No Answer	3
Transgender	2

Age	Total
18 - 24	62
25 - 34	158
35 - 44	88
45 - 54	55
55 - 64	26
65 - 74	13
75 or older	1

Race/Ethnicity	Total
Asian or Pacific Islander Only	30
Biracial	12
Black or African American Only	45
Hispanic or Latino Only	26
Native American or American Indian Only	0
No Answer	2
Other	2
White or Caucasian Only	286

Education	Total
Less than high school	5
High school graduate	34
Some college	92
2 year degree	57
4 year degree	167
Professional degree	40
Doctorate	8

Salary	Total
Less than $25,000	83
$25,000 - $49,999	128
$50,000 - $74,999	92
$75,000 - $99,999	51
$100,000 - $124,999	25
$125,000 - $149,999	8
$150,000 or more	15
No answer	1

In order to interpret the hypotheses, the investigator ran chi-square comparisons of the demographic characteristics, shown in Table 7. Of the five demographic characteristics observed, only age was found to be statistically significant with a *p* value of 0.034. Its odds ratio revealed a resulting output less than one, meaning millennials, ages 18-34, have a significantly higher chance of adopting mobile banking. As a result of these tests, the investigator determined a person's age may impact his or her decision to use mobile banking, but gender, race/ethnicity, education, and income may not.

Table 7. Demographics of mobile banking users.

		Users	
	Total	**N**	**%**
Sex			
Female	240	218	90.8%
Male	156	139	89.1%
χ^2=.319			
Age			
18-34	218	203	93.1%
35 and older	182	158	86.8%
χ^2=4.483*			
Race/Ethnicity			
Asian or Pacific Islander	30	26	86.7%
Black or African American	42	34	81.0%
Hispanic or Latino	26	22	84.6%
White or Caucasian	286	264	92.3%
χ^2=6.779			
Higher Education			
Completed	268	241	89.9%
Not completed	132	120	90.9%
χ^2=0.097			
Annual Household Income (before taxes)			
Less than $50,000	209	184	88.0%
$50,000 or more	190	176	92.6%
χ^2=2.381			

*Significance level at < 0.05

Discussion

Prior to interpreting the findings, the investigator first observed the lack of responses to determine if response bias existed (refer to Table 4). For most survey questions where no answer was captured, only a few participants failed to respond to the question. Because the majority of questions had few nonresponses, the investigator feels confident that response bias did not impact this study. Fortunately, the 56 participants who failed to respond to one or more questions have not been excluded from analysis as this would have eliminated other valuable feedback from 14% of the sample population.

Due to the anonymity of the study, the investigator was unable to contact non-respondents to understand their lack of response(s), although the investigator suspects a number of reasons could have impacted these nonresponses, including, but not limited to, the following conjectures: participants did not understand the question(s), participants unintentionally missed the question(s), or participants did not want to answer the question(s) for personal reasons.

Interestingly, two questions – numbers six and 11 – have a larger sampling of nonresponses, 12 and 13 respectively. While question six allowed participants to select multiple options, question 11 only permitted one answer. Text responses to those selecting "Other" on these questions suggest some confusion or a lack of answer options, which could explain why so many chose not to respond. Since these questions did not impact the statistical analysis, their responses have been reviewed for this study.

As for the data that were collected, it should not surprise anyone that smartphone penetration continues to rise. With widespread use of smartphones, it seems people are

receptive to mobile technology, as the literature suggested. What is surprising, though, is how many are already using mobile banking – at least nine out of 10 individuals, according to this study. This shows how rapidly the diffusion of mobile banking technology has occurred in the course of three years researching this topic and conducting this study.

Fortunately for FIs, their marketing is reaching a vast majority of their patrons, and for those utilizing mobile banking more than 75% of them use it at least once a week. These results will be reassuring for FIs; knowing who is using mobile banking and what drives them to adopt the service will allow them to convert non-users and encourage ongoing usage for early adopters.

In order to answer the first research question – *Are certain demographics more inclined to adopt mobile banking?* – the investigator created five hypotheses, one for each of the demographic characteristics recorded.

H1. Mobile banking users are young (i.e., millennials ages 18-34).

Per the statistical analysis, age is the only demographic characteristic shown to be statistically significant. Since its odds ratio is less than one, millennials – ages 18-34 – have a significantly higher chance of adopting mobile banking, thus supporting this hypothesis. This finding supports research (Audi et al., 2016; Board of Governors, 2016; Gu et al., 2009; Lin, 2011; Pew Research Center, 2013; Shankar & Kumari, 2016; Sohail & Al-Jabri, 2014) in which a predominantly younger demographic uses mobile banking, perhaps because they have grown up using mobile technology and may require less persuasion to adopt mobile banking. As a result, it is important for FIs to target these

younger generations as they begin to build their finances. Technology like mobile

banking has the ability to make managing their funds a simpler process.

  H2. There is no significant gender disparity among users of mobile banking.

  Unlike research (Audi et al., 2016; Bhatt, 2016; Crabbe et al., 2009; Gu et al.,

2009; Laukkanen & Pasanen, 2008; Lin, 2011; Prodanova, San-Martín, & Jiménez, 2015;

Shankar & Kumari, 2016) that found a higher predominance of male mobile banking

users, this study anticipated no gender disparity among mobile banking users, and data

support that null hypothesis. Of those surveyed, 90.8% of females and 89.1% of men are

users. While many of those previous studies hail from Asia and the Middle East, the

investigator believes cultural disparities in which women lag behind men in areas of

education, employment, and equal rights may explain the different findings based on

where people are surveyed. Meanwhile, this study aligns with others conducted in the

United States (Board of Governors, 2016; Pew Research Center, 2013), suggesting that

neither sex is more technologically or financially motivated to use mobile banking.

  H3. Most mobile banking users have higher-education degrees (e.g.,

undergraduate, graduate, and doctoral).

  H4. Most mobile banking users have an annual household income exceeding

$50,000.

  Similarly, further research (Javelin Strategy & Research, 2015b; Pew Research

Center, 2013) from organizations based in the United States identified higher education

and annual household incomes as indicators of mobile banking usage. However, neither

level of education or annual household income demonstrate statistical significance in this

study. As a result, data fail to support these alternative hypotheses.

These findings coincide with those from Laukkanen & Cruz (2012), which also failed to identify a statistical significance with these two demographic characteristics. The reason for this may have more to do with smartphone penetration than a person's level of education or annual household income. Smartphones are becoming more and more user-friendly with each re-invention and so are their apps, which regularly update to resolve software issues. Therefore, access to a smartphone and mobile efficacy – as well as banking with a FI that has mobile banking services – may be more influential criteria on someone's decision to adopt mobile banking than the aforementioned demographic characteristics.

H5. There is no significant race/ethnic disparity among users of mobile banking.

With little research on the race and ethnicity of mobile banking users, the investigator felt comfortable proposing a null hypothesis, and that instinct proved correct. The statistical analysis does not reveal a significance between a person's race/ethnicity and his or her mobile banking preference, thus supporting this hypothesis.

Although responders could select multiple races/ethnicities, including an option for "other," these were not included in the statistical analysis. Interestingly, 12 responders selected two races/ethnicities, and all of them identified as mobile banking users. As racial and ethnic lines blur, it may become more difficult to categorize survey participants by one specific race/ethnicity. In addition, this demographic, like the two prior, seems to have less influence on a person's mobile habits than their access to a smartphone and mobile banking technology.

Based on these findings, age appears to be the only demographic characteristic to impact a person's decision to adopt mobile banking. As previously stated, this may be the

result of tech-savvy generations who began using mobile technology at a young age, making it second nature to them. Beyond demographics, though, a person's knowledge of, attitude toward, and interaction with an innovation can affect his or her decision to adopt it. The four remaining hypotheses will answer the final research question – *Which attribute of an innovation is most effective in driving mobile banking adoption?*

H6. Mobile banking users will strongly agree with observability statements.

Using the Wilcoxon Rank Sum test, all three statements pertaining to observability show significance levels of $p > 0.001$ (see Table 5). Users are likely to agree with these statements. As a result, data support this hypothesis.

According to this study, users like that they can use mobile banking anytime/anywhere. This statement may be more agreeable to them because they can attest to using the service whenever they want. While non-users may be aware of this perk and react favorably to it, they may not be able to personally relate to this banking privilege.

Responses to the other two statements are a direct result of WOM. Users are inclined to try a new technology if a close friend or relative told them to try it and even more likely to recommend mobile banking to others, naturally since they have firsthand experience with it. It is possible users learned about mobile banking from someone else who had tried it, and now they are willing to share their positive experience, thus enabling observability.

H7. Mobile banking users will strongly agree with compatibility statements.

Five of the six statements for compatibility show statistical significance, suggesting users *do* feel strongly about their mobile self-efficacy. In particular, the median score for users who feel confident in their ability to navigate the features of a

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mobile device is 1.00, or strongly agree. This affirms their compatibility with a mobile device; and as the literature revealed, it translates to a positive effect on mobile banking usage. People can do just about anything on their smartphone. Unlike the traditional mode of running errands and paying bills, mobile banking suits their mobile lifestyle. For these reasons, the hypothesis testing compatibility can be supported.

H8. Users will strongly agree with complexity statements.

According to Rogers, the greater the complexity of an innovation, the less likely adoption will occur. For this study, questions were scored to reflect agreement with ease of use – the opposite of complexity – which would encourage adoption. All six statements pertaining to ease of use show significance, with four of the six statements at $p > 0.001$ and the other two at $p > 0.01$ (see Table 5). Users respond favorably to mobile banking's ease of use. As such, users may not be significantly affected by the attribute of complexity – or the difficulty of using an innovation – thus supporting this hypothesis.

Although mobile banking users could have reacted negatively to potentially complex components of the service (e.g., it requires a lot of effort, it is time-consuming), the fact remains that their opinions are not so severe that they would give up its usage entirely.

H9. Relative advantage has a less significant effect on both mobile banking users than observability.

Like observability, all three statements pertaining to relative advantage show statistical significance, though only two match observability's consistency at $p > 0.001$ (see Table 5). When analyzing the means of these two attributes, users respond more

agreeably to relative advantage than observability (see Table 8). As a result, data fails to support this hypothesis.

Table 8. Means for attributes.		
Attributes	**Users**	**All**
Compatibility	1.63	1.69
Trialability	3.16	3.13
Observability	1.66	1.75
Complexity	1.74	1.80
Relative Advantage	1.53	1.61

Users strongly agree with all three relative advantage statements. When it comes to timeliness, users indicated mobile banking is faster compared to visiting a bank branch. The literature cites instances where visiting a branch is no longer necessary. As branches continue closing or replacing staff with automated options, finding a branch, getting there, and waiting to be helped by a teller could become an exhausting process, one that could be avoided by utilizing mobile banking.

Upon assessing the final five hypotheses pertaining to attributes of an innovation, the investigator is able to answer the second research question – *Which attribute of an innovation is most effective in driving mobile banking adoption?*

According to the mean response of each attribute's questions, relative advantage is the most effective attribute in driving mobile banking adoption (see Table 8). This supports many of the findings cited in the literature. Rogers believed relative advantage is the best predictor of an innovation's rate of adoption, and it holds considerable weight in his Innovation-Decision Process. In this survey, question 10 specifically asks about the main reason for using mobile banking, and convenience dominates that poll with more than half of the responses. If an innovation is not convenient, why should people care to

use it? Nevertheless, influence from all five attributes reinforces the collective power of impacting the adoption of an innovation.

Conclusion

According to Rogers (1995), the attributes of an innovation will determine its success. Similarly, user demographics can also influence an individual's decision to adopt an innovation (Crabbe et al., 2009). This study chose to evaluate both of these characteristics in an attempt to understand what drives mobile banking. For an FI – particularly one in the United States – this information could prove invaluable as it seeks to attract new patrons, enhance its customer experience, establish itself as a serious competitor, and stay relevant in a digital economy (Goyal, Chawla, & Bhatia, 2016).

Limitations

This study is not without limitations. Research (Goyal et al., 2016; Srivastava, 2013) has referred to mobile banking as a financial innovation because it has the potential to reduce costs, lower risks, and provide an improved product. However, it may not necessarily fulfill these anticipations. Some research (Moser, 2015) has suggested that the hype of mobile banking has led to inflated expectations about its functionality and adoption, thereby weakening the findings in prior research. If expectations remain inflated, the findings in this study may also fail to identify accurate motivations for mobile banking adoption.

As for the data source, the investigator would have preferred to first identify participants as users or non-users of mobile banking and then provide them with the applicable test to assess their opinions of the service. This would have been particularly useful in conclusively assessing the attitudes of non-users of mobile banking. Unfortunately, M-Turk's process for customizing qualifications made it difficult to

execute. As a result, the sample was not stratified, and responses from mobile banking users trended higher.

Since research (Balasubramanian et al., 2005) herein suggested satisfied customers may be more willing to engage in other similar channels (e.g., online banking users converting to mobile banking users), it is possible that those surveyed on an online platform may have already had a predisposition to adopt mobile banking. Mailing or distributing paper surveys to participants may have prevented any technology bias but would have been a more exhaustive process.

In addition, the investigator's decision to use a web-based workforce may not accurately depict the population of mobile banking users and non-users because all survey participants needed access to the Internet in order to complete the questionnaire. This makes it more difficult to generalize conclusions on a global scale or even within the United States. Likewise, participants' geographic location is subjective to the country that is sampled – in this case, the United States. Banking regulations, as well as mobile technology and diffusion, vary from country to country as do social norms, both of which could skew findings.

Future Research

Because mobile banking technology is evolving quickly, additional research could reevaluate the methods from previous studies. For one, a larger sample study would increase generalizability. Like this study, most studies before it used a cross-sectional design. According to Mathieson et al. and Venkatesh & Davis, experience influences perception which changes over time; therefore, a longitudinal study would capture this evolution and the variations in opinion and behavior (as cited in Luarn & Lin, 2005).

Furthermore, future studies should explore other mobile banking topics that would be of potential interest. These include how mobile banking adoption differs from smaller to larger FIs; how mobile banking adoption differs from country to country or culture to culture; and how the user experience among mobile banking apps influences the rate of adoption. FIs need more studies like these in order to enhance the overall banking experience.

Managerial Recommendations

Based on the findings in this study, the investigator can provide marketers at FIs with useful recommendations to strengthen mobile banking usage. These findings suggest many people are aware and already using mobile banking, thanks to their FI which notified them directly of the service. Research herein from BuzzCity encouraged FIs to message customers directly through their preferred channel rather than waste money on media advertisements. Knowing how patrons prefer to be contacted (e.g., mail, email, text message) is the first step to build trust and establish boundaries – things which are necessary when dealing with finances and lend credibility to the source. Continuing to inform new patrons of their mobile banking presence and providing updates to the service's current users may prove most effective for FIs to increase mobile banking adoption.

As for targeting new patrons to adopt mobile banking, FIs should focus on converting younger generations. With age being the only characteristic shown to be statistically significant in this study, FIs could be exerting unnecessary effort on other demographics. Currently, millennials have a significantly higher chance of adopting mobile banking; they have matured with mobile technology (as will generations to

come), and like most young adults they are financially inexperienced and require

guidance. By establishing credibility early in their lives as they build their finances, FIs

can shepherd them to mobile banking adoption and, more importantly, create a lasting

relationship with their business.

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Appendix A: Consent

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Title: Mobile Banking: What Drives Consumer Adoption

We are conducting an academic survey about mobile banking. The purpose of this study is to observe the habits and opinions of mobile banking users and non-users within the United States.

We are asking approximately 400 subjects to participate in this study. Participation is voluntary, and your decision not to participate will not involve any penalty or loss of benefits.

To participate, you must be a resident of the United States. Please select the link below and complete the questionnaire to the best of your ability. At the end of the questionnaire, you will receive a code to paste into the box below to receive credit for taking our questionnaire. Workers will receive 15 cents in compensation for participating in this study. The questionnaire should take approximately five to seven minutes to complete.

If you choose to participate in this questionnaire, you are consenting to the use of your responses. There are no risks associated with this study. You may expect to benefit from taking part in this research to the extent that you are contributing to academic knowledge.

If you have any questions regarding your rights as a participant in this research and/or concerns about the study, or if you feel under any pressure to enroll or to continue to participate in this study, you may contact the University of Missouri Health Sciences

Institutional Review Board (which is a group of people who review the research studies to protect participants' rights) at (573) 882-3181.

Appendix B: Questionnaire

1. Do you own or have regular access to a mobile device (mobile phone, smartphone, tablet, etc.)?

- ❑ Yes
- ❑ No

2. If you own or have regular access to a mobile device, what type of mobile device(s) do you have access to? (Choose all that apply)

- ❑ Smartphone
- ❑ Tablet or iPad
- ❑ Personal Digital Assistants (PDAs)
- ❑ Smartwatch (e.g., Apple Watch, Sony Smartwatch, Garmin Vivoactive)
- ❑ Portable Media Player (e.g., iPod Touch)
- ❑ Other:_____
- ❑ I do not own or have regular access to a mobile device

3. Do you use a bank or credit union to manage your money?

- ❑ Yes
- ❑ No
- ❑ Not sure / Someone else manages my money

4. Do you know if your financial institution (e.g., bank or credit union) offers some form of mobile banking (a mobile app, text alerts, etc.)?

- ❑ Yes
- ❑ No
- ❑ Not sure

5. Do you use/subscribe to a mobile banking service (a mobile banking app, text alerts, etc.)?

- ❑ Yes
- ❑ No
- ❑ I do not own or have regular access to a mobile device

6. If you own or have regular access to a mobile device AND you use/subscribe to a mobile banking service (a mobile banking app, text alerts, etc.), what type of mobile device(s) do you use for mobile banking? (Choose all that apply)

- ❑ Smartphone
- ❑ Tablet or iPad
- ❑ Personal Digital Assistants (PDAs)
- ❑ Smartwatch (e.g., Apple Watch, Sony Smartwatch, Garmin Vivoactive)
- ❑ Portable Media Player (e.g., iPod Touch)
- ❑ Other:_____
- ❑ I do not own or have regular access to a mobile device and, therefore, do not use mobile banking

7. How did you first hear about mobile banking?

- ❑ A friend or relative
- ❑ My financial institution implemented mobile banking and notified me directly (e.g., via email or postal service)
- ❑ A print/radio/TV/digital advertisement
- ❑ Social media (e.g., Facebook, Twitter)
- ❑ Other:_____
- ❑ I have not heard about mobile banking until now

8. What was the primary reason you decided to try mobile banking?

- ❑ I purchased/received a smartphone
- ❑ My financial institution finally implemented mobile banking
- ❑ My financial institution notified me to enroll in the service or download its app
- ❑ A friend or relative encouraged me to try it
- ❑ An employee of the financial institution showed me how to use the service
- ❑ I saw an advertisement promoting the service
- ❑ Other:_____
- ❑ I have not tried mobile banking

9. How often do you use mobile banking?

- ❑ Everyday
- ❑ Once a week
- ❑ Once a month
- ❑ Multiple times per month
- ❑ Never

10. If I use mobile banking, my main reason for using it is because:

- ❑ It is always accessible
- ❑ It is convenient
- ❑ It is easy to use
- ❑ It is free
- ❑ It is a safe and secure way to review my finances
- ❑ Other:_____
- ❑ I do not use mobile banking

11. If I do not use mobile banking, my main reason for **<u>not</u>** using it is because:

- ❑ I was not aware of this service
- ❑ I heard negative things about this service
- ❑ My financial institution does not offer this service
- ❑ I do not know how to use this service
- ❑ I do not own or have regular access to a mobile device
- ❑ I prefer traditional banking at a branch location or online banking
- ❑ It is difficult to use
- ❑ It is time-consuming
- ❑ It may be susceptible to a security breach
- ❑ Other:_____
- ❑ I already use mobile banking

12. Do you plan to continue or start using mobile banking within the next 12 months?

- ❑ Yes
- ❑ No
- ❑ Not sure

13. Mobile banking technology best suits my banking needs.

- ❑ Strongly Agree
- ❑ Agree
- ❑ No Opinion
- ❑ Disagree
- ❑ Strongly Disagree

14. I think mobile banking is similar to online banking.

- ❑ Strongly Agree
- ❑ Agree
- ❑ No Opinion
- ❑ Disagree
- ❑ Strongly Disagree

15. I prefer mobile banking to traditional banking (i.e., visiting a branch location) or online banking.

- ❑ Strongly Agree
- ❑ Agree
- ❑ No Opinion
- ❑ Disagree
- ❑ Strongly Disagree

16. I would consider myself tech-savvy and/or computer literate.

- ❑ Strongly Agree
- ❑ Agree
- ❑ No Opinion
- ❑ Disagree
- ❑ Strongly Disagree

17. I am confident in my ability to navigate the features of a mobile device.

- ❑ Strongly Agree
- ❑ Agree
- ❑ No Opinion
- ❑ Disagree
- ❑ Strongly Disagree

18. I enjoy learning to use new technology.

- ❑ Strongly Agree
- ❑ Agree
- ❑ No Opinion
- ❑ Disagree
- ❑ Strongly Disagree

19. A trial period or tutorial would help/would have helped me to better understand how to use mobile banking.

- ❑ Strongly Agree
- ❑ Agree
- ❑ No Opinion
- ❑ Disagree
- ❑ Strongly Disagree

20. I do not/did not feel pressured to adopt mobile banking.

- ❑ Strongly Agree
- ❑ Agree
- ❑ No Opinion
- ❑ Disagree
- ❑ Strongly Disagree

21. I would try a new technology if a close friend or relative told me to try it.

- ❑ Strongly Agree
- ❑ Agree
- ❑ No Opinion
- ❑ Disagree
- ❑ Strongly Disagree

22. I like that I can access mobile banking anytime/anywhere.

- ❑ Strongly Agree
- ❑ Agree
- ❑ No Opinion
- ❑ Disagree
- ❑ Strongly Disagree

23. I would recommend mobile banking to others.

- ❑ Strongly Agree
- ❑ Agree
- ❑ No Opinion
- ❑ Disagree
- ❑ Strongly Disagree

24. I know how mobile banking works.

- ❑ Strongly Agree
- ❑ Agree
- ❑ No Opinion
- ❑ Disagree
- ❑ Strongly Disagree

25. If I don't/didn't know how to use mobile banking, I would ask someone who knows how to use it in order to understand how it works.

- ❑ Strongly Agree
- ❑ Agree
- ❑ No Opinion
- ❑ Disagree
- ❑ Strongly Disagree

26. Mobile banking requires a lot of effort.

- ❑ Strongly Agree
- ❑ Agree
- ❑ No Opinion
- ❑ Disagree
- ❑ Strongly Disagree

27. Mobile banking is easy to use.

- ❑ Strongly Agree
- ❑ Agree
- ❑ No Opinion
- ❑ Disagree
- ❑ Strongly Disagree

28. Mobile banking is frustrating.

- ❑ Strongly Agree
- ❑ Agree
- ❑ No Opinion
- ❑ Disagree
- ❑ Strongly Disagree

29. Mobile banking is time-consuming.

- ❑ Strongly Agree
- ❑ Agree
- ❑ No Opinion
- ❑ Disagree
- ❑ Strongly Disagree

30. Mobile banking is faster than visiting a bank branch.

- ❑ Strongly Agree
- ❑ Agree
- ❑ No Opinion
- ❑ Disagree
- ❑ Strongly Disagree

31. I prefer to manage my finances before or after normal banking hours, which are typically from 8 a.m. – 5 p.m.

- ❑ Strongly Agree
- ❑ Agree
- ❑ No Opinion
- ❑ Disagree
- ❑ Strongly Disagree

32. Mobile banking is convenient for managing my financial account(s).

- ❑ Strongly Agree
- ❑ Agree
- ❑ No Opinion
- ❑ Disagree
- ❑ Strongly Disagree

33. Mobile banking is cost-efficient for me.

- ❑ Strongly Agree
- ❑ Agree
- ❑ No Opinion
- ❑ Disagree
- ❑ Strongly Disagree

34. Mobile banking is more susceptible to a security breach than traditional banking.

- ❑ Strongly Agree
- ❑ Agree
- ❑ No Opinion
- ❑ Disagree
- ❑ Strongly Disagree

35. Fingerprint authentication technology, passcode identification, and/or an additional security measure would give me more confidence in mobile banking.

- ❑ Strongly Agree
- ❑ Agree
- ❑ No Opinion
- ❑ Disagree
- ❑ Strongly Disagree

36. Sex:

- ❑ Female
- ❑ Male
- ❑ Transgender

37. Age:

- ❑ 18-24
- ❑ 25-34
- ❑ 35-44
- ❑ 45-54
- ❑ 55-64
- ❑ 65-74
- ❑ 75 or older

38. Race/Ethnicity (Choose all that apply):

- ❑ White or Caucasian
- ❑ Hispanic or Latino
- ❑ Black or African American
- ❑ Native American or American Indian
- ❑ Asian or Pacific Islander
- ❑ Other

39. Highest level of education completed:

- ❑ Less than high school
- ❑ High school graduate
- ❑ Some college
- ❑ 2-year degree
- ❑ 4-year degree
- ❑ Professional degree
- ❑ Doctorate

40. Annual Household Income (before taxes):

- ❑ Less than $25,000
- ❑ $25,000 to $49,999
- ❑ $50,000 to $74,999
- ❑ $75,000 to $99,999
- ❑ $100,000 to $124,999
- ❑ $125,000 to $149,999
- ❑ $150,000 or more

Appendix C: Questionnaire Results

1. Do you own or have regular access to a mobile device (mobile phone, smartphone, tablet, etc.)?	
Answers	**# of Responses**
No	3
Yes	400
Grand Total	**403**

2. If you own or have regular access to a mobile device, what type of mobile device(s) do you have access to? (Choose all that apply)	
Answers	**# of Responses**
I do not own or have regular access to a mobile device	2
Other	1
Personal Digital Assistants (PDAs)	2
Portable Media Player (e.g. iPod Touch); Other	1
Smartphone	143
Smartphone; Other	3
Smartphone; Portable Media Player (e.g. iPod Touch)	5
Smartphone; Smartwatch (e.g. Apple Watch, Sony Smartwatch, Garmin Vivoactive)	2
Smartphone: Smartwatch (e.g. Apple Watch, Sony Smartwatch, Garmin Vivoactive); Portable Media Player (e.g. iPod Touch)	1
Smartphone; Tablet or iPad	191
Smartphone; Tablet or iPad; Personal Digital Assistants (PDAs); Smartwatch (e.g. Apple Watch, Sony Smartwatch, Garmin Vivoactive)	1
Smartphone; Tablet or iPad; Personal Digital Assistants (PDAs); Smartwatch (e.g. Apple Watch, Sony Smartwatch, Garmin Vivoactive); Portable Media Player (e.g. iPod Touch)	2
Smartphone; Tablet or iPad; Portable Media Player (e.g. iPod Touch)	27
Smartphone; Tablet or iPad; Smartwatch (e.g. Apple Watch, Sony Smartwatch, Garmin Vivoactive)	12
Smartphone; Tablet or iPad; Smartwatch (e.g. Apple Watch, Sony Smartwatch, Garmin Vivoactive); Portable Media Player (e.g. iPod Touch)	3
Tablet or iPad	7
Grand Total	**403**

3. Do you use a bank or credit union to manage your money?	
Answers	**# of Responses**
No	9
No answer	1
Yes	393
Grand Total	**403**

4. Do you know if your financial institution (e.g., bank or credit union) offers some form of mobile banking (a mobile app, text alerts, etc.)?	
Answers	**# of Responses**
No	2
No answer	2
Not sure	7
Yes	392
Grand Total	**403**

5. Do you use/subscribe to a mobile banking service (a mobile banking app, text alerts, etc.)?	
Answers	**# of Responses**
I do not own or have regular access to a mobile device	1
No	38
No answer	3
Yes	361
Grand Total	**403**

6. If you own or have regular access to a mobile device AND you use/subscribe to a mobile banking service (a mobile banking app, text alerts, etc.), what type of mobile device(s) do you use for mobile banking? (Choose all that apply)	
Answers	**# of Responses**
I do not own or have regular access to a mobile device and, therefore, do not use mobile banking	7
No answer	12
Other	6
Personal Digital Assistants (PDAs)	2
Smartphone	247
Smartphone; Other	2
Smartphone; Personal Digital Assistants (PDAs)	1
Smartphone; Portable Media Player (e.g. iPod Touch)	2
Smartphone; Tablet or iPad	101
Smartphone; Tablet or iPad; Personal Digital Assistants (PDAs)	1
Smartphone; Tablet or iPad; Portable Media Player (e.g. iPod Touch)	4
Smartphone; Tablet or iPad; Smartwatch (e.g. Apple Watch, Sony Smartwatch, Garmin Vivoactive)	2
Tablet or iPad	14
Tablet or iPad; Personal Digital Assistants (PDAs)	1
Tablet or iPad; Personal Digital Assistants (PDAs); Smartwatch (e.g. Apple Watch, Sony Smartwatch, Garmin Vivoactive)	1
Grand Total	**403**

7. How did you first hear about mobile banking?	
Answers	**# of Responses**
A friend or relative	36
A print/radio/TV/digital advertisement	28
I have not heard about mobile banking until now	1
My financial institution implemented mobile banking and notified me directly (e.g., via email or postal service)	316
No answer	3
Other	11
Social media (e.g. Facebook, Twitter)	8
Grand Total	**403**

8. What was the primary reason you decided to try mobile banking?	
Answers	**# of Responses**
A friend or relative encouraged me to try it	24
An employee of the financial institution showed me how to use the service	16
I have not tried mobile banking	25
I purchased/received a smartphone	66
I saw an advertisement promoting the service	20
My financial institution finally implemented mobile banking	100
My financial institution notified me to enroll in the service or download its app	121
No answer	1
Other	30
Grand Total	**403**

9. How often do you use mobile banking?	
Answers	**# of Responses**
Daily	171
Multiple times per month	31
Never	25
No answer	1
Once a month	44
Once a week	131
Grand Total	**403**

10. If I use mobile banking, my main reason for using it is because:	
Answers	**# of Responses**
I do not use mobile banking	24
It is a safe and secure way to review my finances	17
It is always accessible	117
It is convenient	199
It is easy to use	32
It is free	6
No answer	1
Other	7
Grand Total	**403**

11. If I do not use mobile banking, my main reason for not using it is because:	
Answers	**# of Responses**
I already use mobile banking	296
I do not know how to use this service	4
I do not own or have regular access to a mobile device	7
I heard negative things about this service	7
I prefer traditional banking at a branch location or online banking	17
I was not aware of this service	12
It is difficult to use	4
It is time-consuming	3
It may be susceptible to a security breach	15
My financial institution does not offer this service	18
No answer	13
Other	7
Grand Total	**403**

12. Do you plan to continue or start using mobile banking within the next 12 months?	
Answers	**# of Responses**
No	23
Not sure	20
Yes	360
Grand Total	**403**

13. Mobile banking technology best suits my banking needs.	
Answers	**# of Responses**
Strongly agree	221
Agree	136
No opinion	22
Disagree	17
Strongly disagree	6
No answer	1
Grand Total	**403**

14. I think mobile banking is similar to online banking.	
Answers	**# of Responses**
Strongly agree	170
Agree	187
No opinion	25
Disagree	19
Strongly disagree	2
Grand Total	**403**

15. I prefer mobile banking to traditional banking (i.e., visiting a branch location) or online banking.	
Answers	**# of Responses**
Strongly agree	181
Agree	104
No opinion	58
Disagree	47
Strongly disagree	13
Grand Total	**403**

16. I would consider myself tech-savvy and/or computer literate.	
Answers	**# of Responses**
Strongly agree	203
Agree	165
No opinion	22
Disagree	12
Strongly disagree	1
Grand Total	**403**

17. I am confident in my ability to navigate the features of a mobile device.	
Answers	**# of Responses**
Strongly agree	252
Agree	131
No opinion	13
Disagree	5
Strongly disagree	1
No answer	1
Grand Total	**403**

18. I enjoy learning to use new technology.	
Answers	**# of Responses**
Strongly agree	183
Agree	170
No opinion	32
Disagree	14
Strongly disagree	1
No answer	3
Grand Total	**403**

19. A trial period or tutorial would help/would have helped me to better understand how to use mobile banking.	
Answers	**# of Responses**
Strongly agree	31
Agree	86
No opinion	129
Disagree	114
Strongly disagree	41
No answer	2
Grand Total	**403**

20. I do not/did not feel pressured to adopt mobile banking.	
Answers	**# of Responses**
Strongly agree	160
Agree	183
No opinion	34
Disagree	16
Strongly disagree	9
No answer	1
Grand Total	**403**

21. I would try a new technology if a close friend or relative told me to try it.	
Answers	**# of Responses**
Strongly agree	72
Agree	222
No opinion	84
Disagree	22
Strongly disagree	3
Grand Total	**403**

22. I like that I can access mobile banking anytime/anywhere.	
Answers	**# of Responses**
Strongly agree	263
Agree	106
No opinion	27
Disagree	3
Strongly disagree	2
No answer	2
Grand Total	**403**

23. I would recommend mobile banking to others.	
Answers	**# of Responses**
Strongly agree	215
Agree	130
No opinion	40
Disagree	13
Strongly disagree	3
No answer	2
Grand Total	**403**

24. I know how mobile banking works.	
Answers	**# of Responses**
Strongly agree	221
Agree	150
No opinion	13
Disagree	16
Strongly disagree	3
Grand Total	**403**

25. If I don't/didn't know how to use mobile banking, I would ask someone who knows how to use it in order to understand how it works.	
Answers	**# of Responses**
Strongly agree	103
Agree	201
No opinion	62
Disagree	29
Strongly disagree	8
Grand Total	**403**

26. Mobile banking requires a lot of effort.	
Answers	**# of Responses**
Strongly agree	11
Agree	24
No opinion	32
Disagree	189
Strongly disagree	147
Grand Total	**403**

27. Mobile banking is easy to use.	
Answers	**# of Responses**
Strongly agree	220
Agree	150
No opinion	26
Disagree	6
Strongly disagree	1
Grand Total	**403**

28. Mobile banking is frustrating.	
Answers	**# of Responses**
Strongly agree	6
Agree	20
No opinion	36
Disagree	169
Strongly disagree	170
No answer	2
Grand Total	**403**

29. Mobile banking is time-consuming.	
Answers	**# of Responses**
Strongly agree	8
Agree	22
No opinion	35
Disagree	179
Strongly disagree	159
Grand Total	**403**

30. Mobile banking is faster than visiting a bank branch.	
Answers	**# of Responses**
Strongly agree	265
Agree	105
No opinion	20
Disagree	7
Strongly disagree	5
No answer	1
Grand Total	**403**

31. I prefer to manage my finances before or after normal banking hours, which are typically from 8 a.m. – 5 p.m.	
Answers	**# of Responses**
Strongly agree	142
Agree	125
No opinion	82
Disagree	41
Strongly disagree	12
No answer	1
Grand Total	**403**

32. Mobile banking is convenient for managing my financial account(s).	
Answers	**# of Responses**
Strongly agree	215
Agree	141
No opinion	25
Disagree	18
Strongly disagree	2
No answer	2
Grand Total	**403**

33. Mobile banking is cost-efficient for me.	
Answers	**# of Responses**
Strongly agree	202
Agree	125
No opinion	58
Disagree	9
Strongly disagree	6
No answer	3
Grand Total	**403**

34. Mobile banking is more susceptible to a security breach than traditional banking.	
Answers	**# of Responses**
Strongly agree	48
Agree	134
No opinion	127
Disagree	77
Strongly disagree	17
Grand Total	**403**

35. Fingerprint authentication technology, passcode identification, and/or an additional security measure would give me more confidence in mobile banking.	
Answers	**# of Responses**
Strongly agree	124
Agree	165
No opinion	60
Disagree	45
Strongly disagree	9
Grand Total	**403**

36. Sex:	
Answers	**# of Responses**
Female	242
Male	156
No answer	3
Transgender	2
Grand Total	**403**

37. Age:	
Answers	**# of Responses**
18 – 24	62
25 – 34	158
35 – 44	88
45 – 54	55
55 – 64	26
65 – 74	13
75 or older	1
Grand Total	**403**

38. Race/Ethnicity (Choose all that apply):	
Answers	**# of Responses**
Asian or Pacific Islander	30
Black or African American	45
Black or African American; Asian or Pacific Islander	1
Hispanic or Latino	26
Hispanic or Latino; Black or African American	1
No answer	2
Other	2
White or Caucasian	286
White or Caucasian; Asian or Pacific Islander	2
White or Caucasian; Hispanic or Latino	6
White or Caucasian; Native American or American Indian	1
White or Caucasian; Other	1
Grand Total	**403**

39. Highest level of education completed:	
Answers	**# of Responses**
2-year degree	57
4-year degree	167
Doctorate	8
High school graduate	34
Less than high school	5
Professional degree	40
Some college	92
Grand Total	**403**

40. Annual Household Income (before taxes):	
Answers	**# of Responses**
Less than $25,000	83
$25,000 - $49,999	128
$50,000 - $74,999	92
$75,000 - $99,999	51
$100,000 - $124,999	25
$125,000 - $149,999	8
$150,000 or more	15
No answer	1
Grand Total	**403**