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# Overcoming the Grey Digital Divide in the Banking Sector

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**University of Stavanger Business School**

**Specializations: Leadership in a digital economy  
& Strategic Marketing and Analytics**



# Preface

Dear reader,

The following Master's thesis is written by two students at UiS Business School during the spring of 2023. While both of our degrees are in Business Administration, we are writing across different specializations: Leadership in a digital economy and Strategic Marketing. However, we find that our specializations go naturally together and provide interesting insights into different areas.

The motivation for writing this thesis was because we saw the effects of the grey digital divide in our own lives – grandparents and parents required help navigating all the digital solutions. Because digital technologies have rapidly advanced, one must ensure that all individuals, including seniors, have equal access and opportunities to embrace digital banking services.

The chosen subject was challenging and proved to be more comprehensive than first anticipated. However, it proved to be an exciting study that intrigued us both. Seeing that there are such a high number of non-digital Norwegians, this subject matter needs to be shed light on.

We would especially like to thank our supervisor Avishek Lahiri for his outstanding support and guidance. In addition, we would like to immensely thank all the participants who made themselves available for an interview and those who took time out of their day to answer our survey, especially the Facebook group Pensjonister i Aksjon. Lastly, a huge thank you to our friends and family for inspiration, encouragement, and help with insights.

Hopefully, you will find this read as interesting as we do!

Lene Katrin Salte and Kristine Simonsen

15.06.2023, Stavanger.

# Abstract

The thesis highlights the high degree of non-digital seniors in Norway and the different customer touchpoints they might be excluded from because the provider only distributes digital solutions. The research shows the necessity of being digital today and that seniors tend to be less likely to utilize digital solutions, e.g., those distributed by the bank. Non-digital seniors face exclusion and economic disadvantages from both the banking sector, but also various other services. The problem statement for this thesis is “*How can the banking industry take measures to overcome the grey digital divide that is occurring due to digital transformation?*”.

The research questions which will be used to guide the thesis are:

1. Are seniors (65+ years of age) being excluded from banks digital transformation?
2. What are the variables influencing seniors' adoption of the mobile banking application?
3. What measures can banks take to include older customers more and get them to adopt the mobile banking application?

The data were collected in Norway. Inspired by the Unified Theory of Acceptance and Use of Technology (UTAUT), it was discovered which variables influence behavioral intention and actual usage related to mobile banking applications. The scales were adapted, and social influence was divided into two, one from friends and one from family. Performance expectancy was also adapted and divided into two items, ‘useful’ and ‘efficient’. It was discovered that when age is used as a moderator, performance expectancy, facilitating conditions, and social influence from family have a significant positive effect on behavioral intention.

The number of seniors over 70 in Norway is expected to double by 2060, further emphasizing the need to prioritize seniors. This means that even though the bank has a lot of younger customers, they should not disregard seniors' purchasing power and unique needs. To include seniors, the banks should offer various learning options tailored to seniors and their preferred way of learning. The recommendations include providing a step-by-step instruction sheet available for download, online how-to videos, and individual training sessions with a tutor. This ensures that seniors can access the necessary support and resources to understand and adopt the mobile banking application.

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# 1.0 Introduction and motivation

## 1.1 Background for choosing the assignment

In recent years, digital technologies have become increasingly common in people's daily life, and smartphones have reached approximately 96% of the Norwegian population (SSB, 2021). With the increase of technology throughout society, businesses are adapting and providing digital solutions to their customers to meet their expectations. Businesses are also shifting away from traditional services and incorporating technology wherever possible. However, not everyone in society are using digital solutions; therefore experiences exclusion from these services.

One group at a higher risk of getting digitally excluded is seniors because they are more likely than others to be non-digital (Bunyan & Collins, 2013). This digital exclusion is often referred to as the grey digital divide. Moreover, a high number of senior citizens in Norway are considered non-digital - approximately 480.000 seniors (Bjønness et al., 2021). What non-digital means is that they have limited to no knowledge about digital solutions and do not use computers, tablets, or smartphones (Eldreombudet, 2022). There are also many seniors in Norway, measuring 18.1% of the population aged 65 and above in 2021 (OECD, 2023b). The total Norwegian population was measured to be 5,408,000 in 2021 (OECD, 2023a), with 18.1% of them being seniors and 480 000 of them non-digital, estimating 49% of all seniors as non-digital. Further, the population is aging, and by 2060, it is expected that the number of people over 70 is doubled (Christiansen, 2022). The non-digital seniors in Norway are not only vulnerable to digital exclusion, but when businesses remove traditional non-digital touchpoints, they may be excluded from various services.

The banking sector also utilizes digital technologies in its services and distributes self-services like mobile banking applications. The mobile banking application, in particular, aims to bring customers closer to the bank (Berraies et al., 2017) while meeting customers' demand for digital technologies (Pramanik et al., 2019). Moreover, the banks' expenses have significantly lowered using mobile banking applications instead of physical or online banking. For example, as mentioned by Ghobakhloo and Fathi in 2019, "expenses associated with processing a transaction via mobile banking can be up to two times lower than online banking, ten times lower than via ATM, and up to 50 times lower than by branch" (p.1). From a customer's



perspective, accessing the bank anytime and anywhere is convenient – allowing a customer to pay their bills, check their balance, and manage their account whenever needed.

Considering the digital transformation happening in the banking sector, an industry standard was introduced in November 2022 to meet non-digital customers. It states that banks are required to provide analog solutions to their customers and offer guidance for customers who want to learn to use their digital services (Finans Norge, 2022). However, the digital transformation has enabled banks to reduce the number of service branches, and the ones still operating are typically located near cities and not in proximity. This means that the industry standard might not benefit non-digital seniors living far away from the bank's physical location.

As previously stated, using digital touchpoints for customers reduces banks' expenses significantly. However, not everyone is digitally resourceful, particularly not seniors. Ensuring the inclusion of seniors in this transformation will limit the exclusion of seniors and reduce the costs for banks. Even though Norway has adopted an industry standard, we feel that the problem should be further studied, as there are benefits for both the banking sector and non-user seniors.

## 1.2 The thesis' purpose

The purpose of this master thesis is to gain insight into how the banking industry can prevent the trend of seniors being excluded from the digital transformation. The banking industry was chosen because it is an industry that everyone has some sort of relationship with, and therefore, a perfect starting point to start reducing the grey digital divide. A study conducted in 2019 shows that seniors are eager to elevate their knowledge regarding digital technology, as well as a perception that the use of digital technology is a requirement to fully participate in society today (Betts et al., 2019). However, not all aspects of society have been integrated into the digital society we are now experiencing. Due to different industries transforming digitally and moving towards a higher level of utilizing digital technologies, we emphasize the importance of understanding and using these digital technologies to not be excluded.

There has been an increase in smartphone usage in Norway – going from 89% in 2016 to 96% in 2021 (SSB, 2021). This shows that smartphones have become a regular household item; therefore, one can assume that the probability of one adopting the mobile banking application is higher. Menéndez Álvarez-Dardet et al. also mentioned in 2020 that a higher percentage of seniors frequently use smartphones and regard them as more useful than PCs and tablets. As many seniors use smartphones, it would be beneficial for banks and seniors to adopt the mobile

banking application because it reduces costs associated with banking, transfers, and payments for both the bank and the customer. Various Norwegian banks charge their customers when they require assistance from the bank when using services. Transferring money to another bank, transferring from one of your bank accounts to another that you also manage, or simply paying a bill are all examples (DNB, n.d.; Jæren Sparebank, n.d.-a; SpareBank1, n.d.-b). In addition, it also creates an element of convenience for seniors as it eliminates the need for them to visit the bank branch in person.

Lastly, the effects exclusion has on seniors' health is also one important factor of this thesis' purpose. A study by Delello and McWhorter (2017) showed a larger incidence of social isolation now that seniors tend to live longer. This could potentially lead to loneliness and depression, in addition to a general decline in health. They also found that using technology could lead to increased knowledge, closer family ties, and a greater connection to society. Seniors can also have physical limitations, such as eyesight issues or weak limbs, that might require them to hire someone to take them to the physical bank location. All these limitations and health issues are major factors as to why there is a need for seniors to be adopting technology.

### 1.3 Problem statement

The thesis will assess to which extent seniors use the various digital tools distributed by banks. It will also employ the Unified Theory of Acceptance and Use of Technology model to identify the important variables for seniors when using technology related to their bank.

The overall aim is to study the following problem statement:

***How can the banking industry take measures to overcome the grey digital divide that is occurring due to digital transformation?***

To be able to answer the problem statement, the following research questions have been created:

1. Are seniors (65+) excluded in the bank's digital transformation?
2. What are the variables influencing seniors' adoption of the mobile banking application?
3. What measures can banks take to include older customers more and get them to adopt the mobile banking application?

The thesis scope has been limited to the following:

1. We used interviews to get qualitative insight and non-numerical data before forming a questionnaire to gather data to test our hypotheses.

2. Given the challenges of collecting primary data due to the segment mostly being non-digital, we used convenience sampling and snowballing techniques.
3. To better understand mobile banking application usage habits, we collected data across the age distribution.
4. The problem statement will focus on what the banks can do, meaning it has a business perspective.
5. Due to the survey being distributed in Norwegian, it is limited to the Norwegian population.

#### 1.4 The structure of the thesis

Firstly, this thesis will review the theory related to the problem statement to create a foundation for the conceptual framework. A separate section will include relevant and existing literature on the subject matter, which will be used in relation to hypothesis development and findings. Following the literature, the hypothesis development and conceptual framework will be presented.

Furthermore, a methodological chapter will follow, explaining the different research designs, methods for data collection, and the steps taken to ensure the data's validity and reliability. Next, a thorough analysis of the data where the results are presented will be provided. Moreover, a discussion will follow using relevant literature and our findings to answer the hypotheses. The implications that can be drawn from the thesis' findings will then be presented, including the thesis' limitations. Lastly, a conclusion will conclude the thesis.

## 2.0 Theoretical chapter

In order to answer our problem statement, several theories have been studied to gather information on behavior and user acceptance. However, the main theoretical framework for this thesis is the Unified Theory of Acceptance and Use of Technology, which is presented in the following subchapter.

### 2.1 Unified Theory of Acceptance and Use of Technology

User acceptance, or lack thereof, has been quite relevant regarding whether a new information system would be successful. As stated by Davis in 1993, “user acceptance is often the pivotal factor determining the success or failure of an information system project” (p. 475). Several models have been developed, proposed, and tested to explain and predict user acceptance and intentions to adopt new products or services related to information technology (Brown & Venkatesh, 2005). One model outperforms the previous models: the Unified Theory of Acceptance and Use of Technology (UTAUT). UTAUT has been tested while using the original data and was found to outperform the eight individual models – an adjusted  $R^2$  of .69, meaning it explains 69% of the variance in usage intention (Venkatesh et al., 2003). Table 1 illustrates the eight models UTAUT outperforms (see Appendix A for more in depth explanations of the models).

**Table 1**

*The eight models that UTAUT is based on.*

<b>Model</b>	<b>Definition</b>
Theory of Reasoned Action (TRA)	“a behavioral intention measure will predict the performance of any voluntary act, unless intent changes prior to performance or unless the intention measure does not correspond to the behavioral criterion in terms of action, target, context, time-frame and/or specificity” (Sheppard et al., 1988, p. 325). The core constructs is attitude toward behavior and subjective norm.
Technology Acceptance Model (TAM/TAM2)	The model addresses why some users accept or reject new technology and how specific system characteristics have influenced user acceptance. The core constructs are perceived usefulness and perceived ease of use (Davis, 1993).

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Motivational Model (MM)	The main drivers of the MM are extrinsic and intrinsic motivation. It focuses on an individual's intention to perform a given behavior – where the intention to perform a behavior is closely related to the actual behavior (Venkatesh & Speier, 1999).
Theory of Planned Behavior (TPB)	The Theory of Planned Behavior uses attitude toward behavior, subjective norm, and perceived behavioral control as the core constructs – and it is an extended version of TRA (Ajzen, 1991).
Combined TAM and TPB (C-TAM-TPB)	This model decomposes the factors attitude, subjective norm, and perceived behavioral control into the underlying belief structure concerning technology adoption contexts (Venkatesh et al., 2003). The model includes two belief structures: normative belief (peer influence and superior influence) and control belief (self-efficacy, resource facilitating conditions, and technology facilitating conditions) (Taylor & Todd, 1995).
Model of PC Utilization (MPCU)	The model of PC Utilization is derived mainly from Triandis' theory of human behavior from 1977, which presents a competing perspective to the ones proposed by TRA and TPB. MPCU's core constructs is: job-fit, complexity, long-term consequences, affect towards use, social factors, and facilitating conditions (Thompson et al., 1991, p. 126-129).
Innovation Theory (IDT)	Diffusion E.M Rogers created the Innovation Diffusion Theory (IDT) which was used to study various types of innovations. Rogers (1962) presented five different attributes that had been shown to influence adoption: relative advantage, compatibility, complexity, observability, and trialability (Moore & Benbasat, 1991). However, it was Moore and Benbasat (1991) that adapted the characteristics which Rogers had presented so that they could be used to study individual technology acceptance.
Social Cognitive Theory (SCT)	The SCT is “based on the premise that environmental influences such as social pressures or unique situational characteristics, cognitive and other personal factors including

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personality as well as demographic characteristics, and behavior are reciprocally determined” (Compeau & Higgins, 1995, p. 190).

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All these models provide insight and a deeper understanding of the variables found in UTAUT. The ‘social influence’ variable from UTAUT is based on previous models, such as the subjective norm in TAM2, TRA, and TPB, the intrinsic motivation from MM, normative beliefs from C-TAM-TPB, and social factors from MPCU (Venkatesh et al., 2003). One of the main objectives of this thesis is to find whether higher age has a positive or negative effect on social influence.

In addition, the models, such as C-TAM-TPB and MPCU, look at the ‘facilitating conditions’ variable, which is especially essential in our thesis. Several established conditions must be met to use mobile banking applications. Therefore, it is necessary to broaden the understanding of the variable to see what it needs to include in order to change behavior. We also see that perceived usefulness and perceived ease of use are used in several of the models, and these constructs can be directly related to ‘performance expectancy’ and ‘effort expectancy’ of the UTAUT model. It can further help comprehend the variables that must be present when a senior accept new technology. TPB also looks more closely at a person's behavioral intention and could elevate our understanding of the variable and find a link between the intention to use mobile banking applications and actual usage.

In the following subchapter, we will go through the variables found in UTAUT and illustrate why the theoretical model is valuable for our research and this thesis.

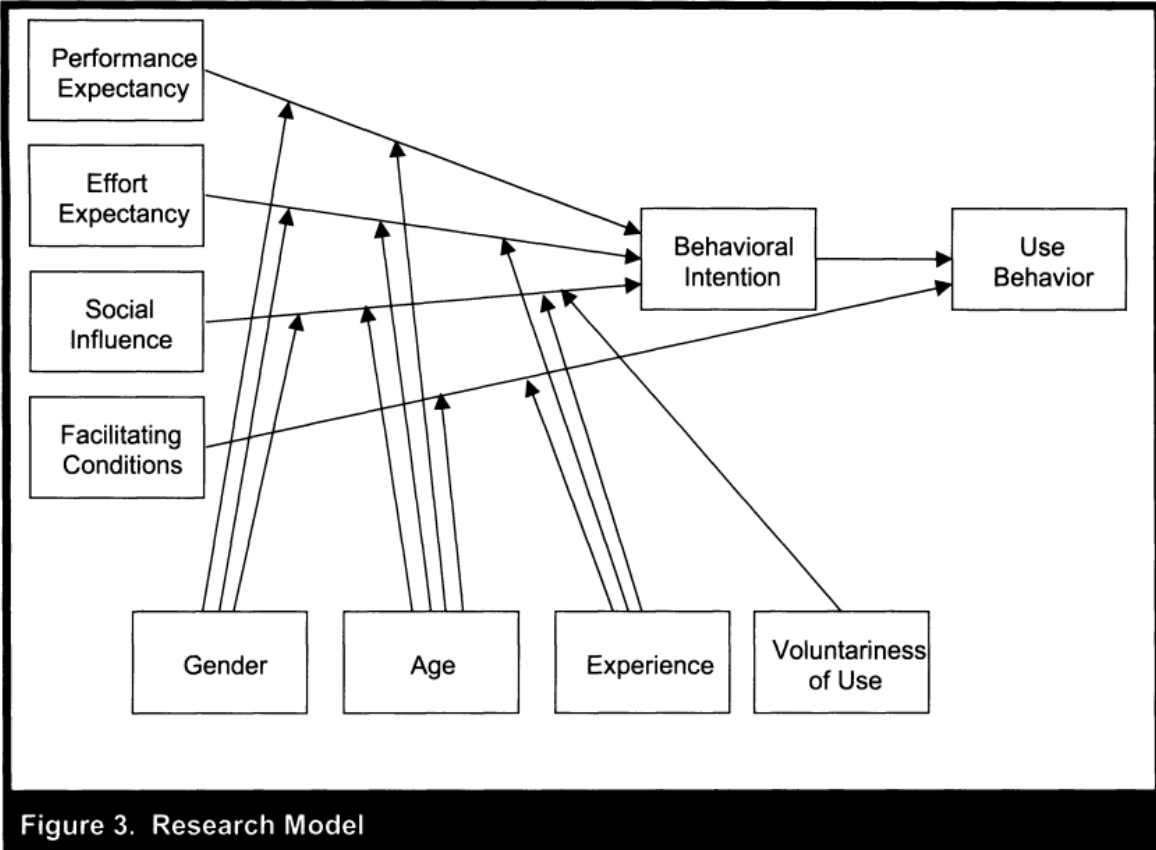
### *2.1.1 UTAUT key variables*

UTAUT looks at how the determinants of intention and behavior are evolving, and it is mentioned that the model is a valuable tool for managers when they need to assess the likelihood of success for new technology introduced at the office. In addition, it helps the managers understand the drivers of acceptance – which in turn helps design interventions such as marketing and training to become more targeted at the users who may not want to adopt and use new systems and innovations (Venkatesh et al., 2003).

The UTAUT model identified four key variables: ‘performance expectancy’, ‘effort expectancy’, ‘social influence’, and ‘facilitating conditions’. In addition, it includes four

moderators: age, gender, experience, and voluntariness. Figure 1 show the illustration of the UTAUT model:

**Figure 1**  
*The UTAUT model*



*Note.* From User Acceptance of Information Technology: Toward a Unified View by Venkatesh et al., 2003, *MIS Quarterly* 27(3), p. 447. Copyright 2003 by Mangament Information Systems Research Center

All these variables are used to predict ‘behavioral intention’ related to technology, primarily in organizational contexts (Venkatesh et al., 2003). However, for our thesis, we wanted to apply it to personal use for seniors in relation to mobile banking applications. Based on how the model outperforms its predecessor, we argue that UTAUT will be best suited to find the variables contributing to the adoption of technology for seniors. For our model, we have used the four key variables included in the UTAUT. We chose to eliminate voluntariness of use as a moderator. We excluded this moderator because it relates to a work setting where managers either made it mandatory or voluntary to use the system. Additionally, the mobile banking

application distributed by the banks are already voluntary for people to use and therefore does not need to be a moderator.

Firstly, ‘performance expectancy’ is compared to the perceived usefulness variable that we find in TAM and the relative advantage of IDT. The variable reflects upon the users’ perception of how to improve performance by using the technology. Combined with mobile technology in the banking sector, examples of performance improvement would be convenient payment, faster response time, and more effective service. Moreover, there is a similarity between ‘effort expectancy’ (UTAUT) and perceived ease-of-use (TAM), as well as complexity (IDT). For mobile banking, ‘effort expectancy’ looks at the users’ perception of how easy or difficult it is to use (Zhou et al., 2010). Both ‘performance expectancy’ and ‘effort expectancy’ looks at the technology and the perception that the user has about the usefulness and ease of use – variables that could be important for the adoption process for seniors. If the technology, in this case mobile banking applications, is viewed as challenging to use, the seniors might disregard it for the analog option they are familiar with. Therefore, the technology must be viewed as easier to use than what they use now and more useful in their daily lives.

Furthermore, ‘social influence’ as a variable can be compared to the subjective norm of TRA. The variable looks at the environmental effects; opinions of friends, family, and others close to the user, and how this can influence user behavior. Opinions of those close to the user can influence whether or not a user will adopt and start using the technology. Concerning social influence, we wanted to see if the influence from family and friends impacts the senior’s adoption of the mobile banking application – whether positively or negatively. Research has shown that family tends to use the technology for them instead of guiding them so that they can learn how to use the technology themselves (Zhao et al., 2022). In addition, we saw in our interviews that seniors value guidance and recommendations from their friends because it occur more naturally. During conversations in social settings, it became a natural part of the conversation, and they could help each other when they encountered difficulties with technology applications – instead of feeling like they were bothering their family members.

Lastly, ‘facilitating condition’ as a variable relates to perceived behavioral control found as a core construct in TPB. The variable looks at how the user’s knowledge, ability, as well as specific resources cause an effect on usage or adoption. For instance, with the technology related to mobile banking applications, the user must have specific resources such as internet access, a smartphone or table, or just skills to operate such devices (Zhou et al., 2010).



## 3.0 Relevant literature

Several studies have been conducted on the topic of digital transformation, digital divide and adoption of technology. In this chapter, we will go over existing literature which is of interest to the scope of this master thesis.

### 3.1 Trust and the Norwegian banking system

Despite the numerous advantages of using the bank's mobile application, research has shown that some users are concerned about security (Orehovački et al., 2022). Trust combined with security are highlighted as important components in various types of mobile banking (Arcand et al., 2017; Owusu Kwateng et al., 2019), including mobile wallets (Komulainen & Saraniemi, 2019) and mobile banking applications (Berraies et al., 2017; Orehovački et al., 2022). Moreover, trust has also been discovered to affect customer satisfaction (Arcand et al., 2017; Berraies et al., 2017). For seniors in particular, it was found that they lack trust in online activities (Betts et al., 2019) and anticipate the occurrence of technical problems and security threats (Friemel, 2016), such as those involving personal data (Betts et al., 2019).

A study done in 2020 found trust to be a mediating variable that was influenced by several factors, as well as influencing the attitude toward actual usage (Lonkani et al., 2020). It further stated that for banks to elevate the usage rates and get a higher retention rate of customers, they should examine how to increase trust or at least their customers' perception of trust. Having decided to use the UTAUT model's four key variables, we wanted to see if trust was needed as a moderator in our model. To better understand Norwegians' trust related to the banking sector, we looked at how the Norwegian central bank operates and how it secures customers in Norwegian banks.

Norway's central bank, owned by the Norwegian government (Norges Bank, 2023c), oversees maintaining monetary stability, financial stability, and asset management on behalf of the Norwegian financial department (Norges Bank, 2023b). Crisis management is one of Norges Bank's responsibilities to ensure financial stability. Further, the payment system must always be operational, and the central bank must distribute liquidity in the form of a loan to various banks as a last resort if banks cannot add liquidity on their own. However, it is stated that this could potentially lead to banks taking higher risks than they would usually take, and the central bank is therefore establishing the condition for financial stability to be jeopardized to receive this type of financial support (Norges Bank, 2023a). Norges Bank is also responsible for customer security. If a bank is forced to close, up to 2 million of the customers' deposits are

secured through the fund “Bankenes sikringsfond” (Norges Bank, 2023a). Based on this, it limits the influence that security has on the adoption process for a Norwegian – seeing as the banking system can be regarded as secure.

In banking there are financial risks, however, as mentioned previously, customers in Norwegian banks are financially secured by the government through Norway’s central bank. Furthermore, according to OECD (2021) Norwegians have very high trust in their government. In fact, it was 77% compared to 47% in OECD countries. Public institutions in Norway are generally considered trustworthy, and the high institutional trust has been this way since the 1960s (OECD, 2021).

Based on this, we assume that Norway is a high-trust society. Thus, we chose to exclude trust as a moderating variable because it seems to be a neutral variable that does not influence adoption – negatively or positively.

### 3.2 Digital transformation

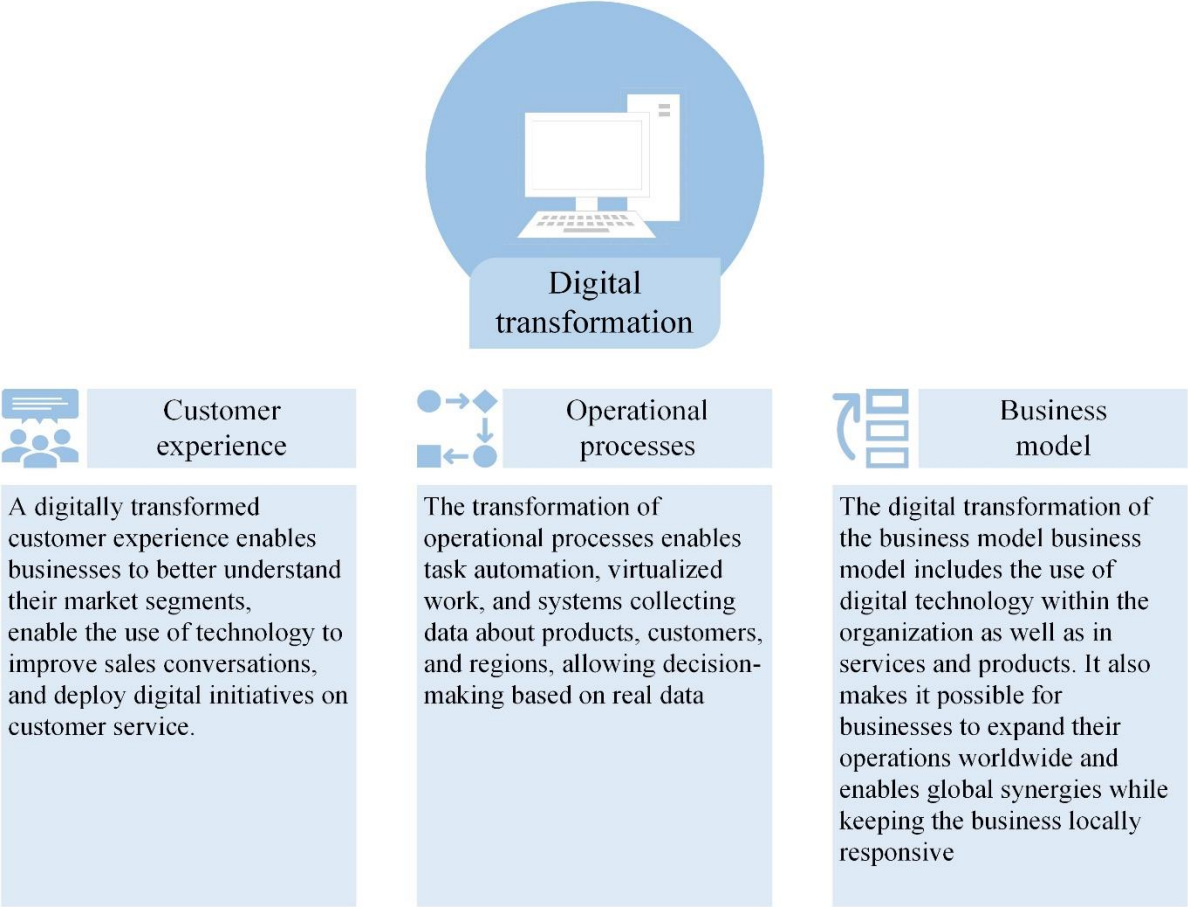
The distribution of digital technologies is facilitating the digital transformation of businesses and organizations worldwide. To better understand the term digital transformation, we wanted to inspect the process in general and within banks and see if there is a relation to the digital exclusion of seniors. Gong and Ribiere (2021, p.12) emphasized the need for a unified definition and developed the following based on previous literature:

““A fundamental change process, enabled by the innovative use of digital technologies accompanied by the strategic leverage of key resources and capabilities, aiming to radically improve an entity\* and redefine its value proposition for its stakeholders.” (\*An entity could be: an organization, a business network, an industry, or society.)”

With the innovative use of digital technologies, three key areas of businesses are digitally transforming: the customer experience, operational processes, and the business model. Based on the literature by Westerman et al. (2014), Figure 2 shows how digital transformation can affect businesses.

**Figure 2**

*Visualization of the effects digital transformation has on businesses.*



*Note.* Adapted from *The Nine Elements of Digital Transformation* by Westerman et al., 2014. MIT Sloan Management Review 55(3).

Due to the digital transformation, an increasing portion of industries are embracing digital solutions in customer touchpoints requiring customers to have internet access and smartphones or tablets. This can be seen in the health sector, public transportation, customer reward programs (e.g., such as in rema1000), restaurants, and toll companies. It also includes the banking sector, which we will closely examine from an organizational and customer point of view. For instance, in the health sector, following a doctor’s appointment, the patient will receive an SMS with a link to pay within 48 hours using Vipps to avoid additional fees that come with a physical invoice. If a patient lacks access to a smartphone or a device that could open the link, they must pay to have a physical invoice sent to them in the mail. Some hospitals send an SMS to their patients before an appointment asking them to register, which follows with an additional SMS containing information about their waiting zone (see Appendix B).

Kolumbus, a public transportation company in Rogaland, provides another example. If the user does not have a transit card, there are four additional options for purchasing a ticket. It can be purchased through the Kolumbus application, at a ticket machine, on the bus, or at the Kolumbus customer center. However, only a few ticket machines are available, and the customer service center is not within walking distance for all users residing outside Stavanger city center. Also, only cash is accepted when purchasing a ticket on the bus, and the price per ticket is significantly higher than the prices on the application (Kolumbus, n.d.). This means that a passenger residing outside the city center must carry cash if they do not have access to a smartphone or a transit card.

The Covid-19 pandemic also sped up the process of digital transformation. Restaurants and bars incorporated technology into their customer touchpoints to limit the risk of infection. Customers were required to order while seated at their table using their smartphone and a QR-code. In addition, guests had to sign an online form to indicate where they were seated and at what time to track infection. Even though Covid-19 is not considered a crucial threat to humanity anymore, many bars and restaurants kept the option to order using a smartphone.

These are just a few examples of businesses that are embracing digital solutions, where internet access and smartphones are almost a requirement to use their services. With all these industries moving towards implementing digital solutions and removing non-digital solutions from their customer touchpoints, it has become critical to ensure that everyone in society is considered and included. As mentioned in the introduction, 480.000 seniors in Norway are non-digital (Bjønness et al., 2021) and, therefore, at risk of being unable to use these services.

### *3.2.1 Digital transformation in the banking sector*

As previously stated, businesses worldwide, including the banking industry, are experiencing a digital transformation. In fact, the digital transformation is broadly impacting the industry. The business model is changing with digital services increasingly replacing traditional services, opening new market opportunities (Naimi-Sadigh et al., 2022). The value chain is also changing because of the provision of digital services, leading to the development of new communication channels (Naimi-Sadigh et al., 2022), such as communication via online platforms (Theiri & Alareeni, 2021).

The digital transformation of banks can have several advantages for both the business and the operation (Pramanik et al., 2019). It can potentially improve performance (Do et al., 2022), customer acquisition, and customer satisfaction (Pramanik et al., 2019). Nevertheless, it can also provide a tremendous competitive advantage and a more extensive customer base (Firdaus

& Tobing, 2022; Kolodiziev et al., 2021). Additionally, it can lead to increased profitability (Naimi-Sadigh et al., 2022), faster processes, and lower error rates, such as trading errors (Pramanik et al., 2019). Theiri and Alareeni (2021) also mention that digital transformation can lead to lower transaction costs, improved reliability, and speed.

We found some examples to understand better how digital technologies provide these benefits. When it comes to speed, using digital technology can not only accelerate the sales and in-branch servicing processes but also has the potential to increase the speed to market. Other processes accelerated by digital technology include transaction execution and client onboarding. Further, an example of a cost that is reduced by using digital technology is the cost related to customers. Serving a digital customer cost less than serving a non-digital customer. Another example is the cost of deposits, where deposits via smartphone cost less for the bank than via ATMs (Pramanik et al., 2019).

Concerning mobile banking, Del Gaudio et al. (2021) investigated the impact of mobile, internet, and information communication technology (ICT) on the banking industry. They discovered that it affected multiple parts of the bank. There is a positive relationship between the diffusion of these digital technologies and profitability, indicating that using various tools may increase the bank's profitability.

### 3.3 Digital banking

Due to the penetration and innovation of technology, there has been a demand for digital technologies from customers, forcing banks to utilize technology in their banking services. This includes the use of self-service such as mobile banking applications, but also video banking, chat support, and chat bots. Mbama and Ezepeue (2018) discovered a shift in the banking trend, indicating that customer use of mobile banking has increased, and that customer behavior has changed over the last ten years. Further, the survey distributed in 2016 considered the three main service channels for digital banking and discovered that most people used the internet, followed by mobile, and lastly, telephone. However, in a more recent study, mobile technology was identified as one of the most important considerations for banks (Pramanik et al., 2019).

Customers use digital banking services for a variety of reasons, including convenience (Komulainen et al., 2018), timesaving (Berraies et al., 2017; Orehovački et al., 2022), and for its functionality (Orehovački et al., 2022). The reasons for using mobile banking applications specifically were found to be ease of use, efficiency, and usefulness, where the user will perceive the mobile banking application as useful if it allows for effortless execution of services

(Orehovački et al., 2022). This is related to both performance expectancy and effort expectancy in the UTAUT model, where ease of use falls under effort expectancy, and usefulness is related to performance expectancy – in turn, factors that are seen to be leading to acceptance of new technology (Venkatesh et al., 2003). Having digital banking services that are perceived as easy and convenient can also increase customer satisfaction (Komulainen et al., 2018). Moreover, suppose the mobile banking application meets the customers' expectations. In that case, they are likely to continue using it and recommend the mobile banking application to those relevant to them (Orehovački et al., 2022).

All the advantages of using mobile banking itself should be an incentive for seniors to adopt the technology. However, as there are multiple non-digital seniors, measures must be taken to include them – which we will try to establish in this study. The divide that has occurred between those digital and non-digital, we will examine the existing literature found on the topic in the following section.

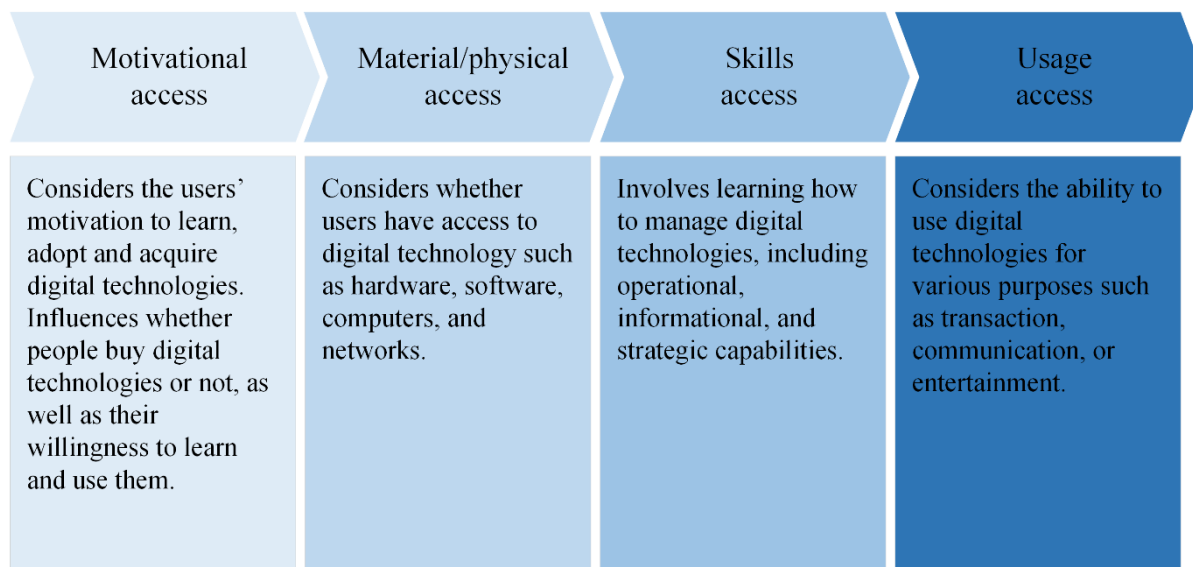
### 3.4 Digital divide

Although ICT have become increasingly common, not everyone is connected. The existing gap is referred to as the digital divide and is defined as “the gap between individuals, households, businesses and geographic areas at different socio-economic levels regarding their opportunities to access information and communication technologies (ICTs)” (OECD, 2001). Further, when investigating the digital divide in society, it is discovered that higher age, lower income, and level of education are all significantly related to this exclusion (Bunyan and Collins, 2013).

The digital divide can be divided into four access stages, each serving as a prerequisite for the next: 1) motivational, 2) material or physical, 3) skills, and 4) usage. This means that when a user is motivated and has material access, the level of skills and usage are potential issues (van Dijk, 2005, p.21). A direct link to UTAUT can be drawn to the variable ‘facilitating conditions’, where a potential user needs access to the internet and a certain skill level to become an actual user of mobile banking applications. Figure 3 shows the access stages and what they include:

**Figure 3**

*Access stages and explanation*



*Note.* Adapted from *The Deepening Divide: Inequality in the Information Society*, by van Dijk, 2005, p. 21-48. SAGE publications, Incorporated

Concerning the motivational access stage, motivation is much lower among seniors than the younger generation (van Dijk, 2005, p.40). However, more recent studies indicate that physical and material access has increased throughout society, and the current digital divide is based on the two last stages, namely skills and usage (Scheerder et al., 2017). This is also emphasized by van Deursen and van Dijk (2014), who identified a shift in research moving toward skills and use, and away from material access. Moreover, a study conducted in Chile discovered that smartphones could be used to connect people who are lacking digitally, thus connecting them via smartphones and the internet. They mention that younger people are more likely to get exclusive internet access through smartphones than seniors (Correa et al., 2020). Thus, leading us to the topic of the grey digital divide, where the divide is happening because of age-related differences in use and access to technology.

### *3.4.1 Grey digital divide*

The digital divide concerning seniors has occasionally been referred to as the grey digital divide by researchers (Alexopoulou et al., 2022; Mubarak & Nycyk, 2017; Mubarak & Suomi, 2022; Sala et al., 2022). As previously stated, seniors belong to a group in society that is more likely to be digitally excluded. Considering this, interviews conducted in 2009 discovered that internet usage among seniors aged 65 and above consisted of either non-users or heavy users (Friemel,

2016). A more recent study, however, showed that 87% of seniors over 60 used their smartphones daily or weekly. Additionally, the participants deemed smartphones the most useful ICT device (Menéndez Álvarez-Dardet et al., 2020). This is consistent with previous research, which indicates that access to digital technology has increased throughout society (Scheerder et al., 2017; van Deursen & van Dijk, 2014). However, for non-digital seniors, it can lead to disadvantages when using different services and potentially lead to exclusion. So, despite all the advantages of digital solutions, why are some seniors not using them?

#### *3.4.2 Why are seniors not using digital technologies?*

Learning, entertainment, communication, hobbies, daily activities, and health are benefits seniors can gain from using digital technologies (Barrantes Cáceres & Cozzubo Chaparro, 2019). Even though digital technologies provide numerous benefits, seniors face various barriers that may prevent them from utilizing the technology. Barriers might be age-related issues, inability to use technology, barriers related to attitudes, and a lack of support and training (Barrantes Cáceres & Cozzubo Chaparro, 2019). Age-related health issues, such as poor vision or hearing, were discovered to be a major issue for seniors over the age of 85, and every second person stated vision and hearing to be problems preventing them from using the internet. Dexterity issues were also mentioned as a barrier among one-quarter of the seniors in this age group (Friemel, 2016).

Another barrier to internet usage among seniors is the fear of negative outcomes and the perception that the internet is too complicated and difficult to use and understand (Friemel, 2016). Lack of interest and the perception that information and communication technology is ineffective were also identified as reasons why seniors are not using these technologies (Menéndez Álvarez-Dardet et al., 2020). Even though this thesis cannot change the health-related issue, some measures can be taken to reduce the barriers related to fear of negative outcomes and the perception that the internet is too complicated to use.

Through this thesis we want to find out how the banking industry can contribute to reduce the grey digital divide and get seniors to feel more included in the digital society. Therefore, trying to reduce the barriers that seniors experience will be an important step in the process.



## 4.0 Hypothesis development

To be able to research and figure out what measures could be taken by the banks to close the grey digital divide and include the seniors in the digital transformation, we developed several hypotheses. Research shows that mobile banking applications are viewed as a suitable replacement for internet banking. However, achieving this point requires the mobile banking application to be capable of executing financial transactions quickly (Orehovački et al., 2022). Using the variables from UTAUT, we wanted to see which factors are essential for seniors in order to adopt the mobile banking application.

### 4.1 UTAUT factors' relationship with behavior intention

As mentioned, age is a moderating variable in the acceptance of new technology. According to the UTAUT model, age is a factor that influences the relationship between all four variables and behavior intention: performance expectancy, effort expectancy, social influence, and facilitating conditions (Venkatesh et al., 2003). Age also influences whether one experiences digital inclusion, whereas seniors are more likely to be digitally excluded (Bunyan & Collins, 2013). For this reason, we wanted to see if higher age impacted the relationship between all the factors in UTAUT and behavioral intention.

Firstly, considering the relationship between performance expectancy and behavioral intention, one can assume that age weakens the relationship because of habits. Humans are creatures of habit and like doing things in a certain way – which might make them not want to change their behavior. A study found that habits affect behavioral intention (Arenas-Gaitán & Ramón-Jerónimo, 2015). Natarajan et al. (2017) also said that for older people, they find mobile shopping application useful, which can then be assumed to mean that smartphones is considered useful for the older population. Therefore, we hypothesize the following:

*H<sub>1</sub>: The relationship between performance expectancy and behavioral intention is weakened by higher age.*

Secondly, Venkatesh et al. (2003) discovered a significant positive relationship between effort expectancy and behavioral intention. Considering this relationship with mobile banking, both Bhatiasevi (2016), and Bankole and Bankole (2017) discovered a positive influence on behavioral intention to use mobile banking technology. Orehovački et al. (2022) also highlights that a reason for using the mobile banking application is its ease of use. However, higher age

might weaken the relationship between effort expectancy and behavioral intention. This is because age is often associated with declining physical health and increased susceptibility to various health conditions (Barrantes Cáceres & Cozzubo Chaparro, 2019). Hence, limitations or challenges may affect their ability to adopt a certain behavior. As mentioned, seniors may experience reduced eyesight and weaker joints (Friemel, 2016).

On the contrary, a study conducted on seniors regarding mobile health services found that effort expectancy positively affects behavioral intention (Hoque & Sorwar, 2017). However, Plude and Hoyer (1986) found that increased age could be associated with difficulty processing complex stimuli. Thus, this hypothesis was developed:

*H<sub>2</sub>: The relationship between effort expectancy and behavioral intention is weakened by higher age.*

Further, we highlight facilitating conditions and behavioral intention. Facilitating condition considers whether the user has access to the technologies in question. This includes the users' motivation to gain access and their physical access. van Dijk stated in 2005 (p. 40) that seniors are less motivated than younger people to learn, adopt, and acquire digital technologies. Therefore, we hypothesize the following:

*H<sub>3</sub>: The relationship between facilitating conditions and behavioral intention is weakened by higher age.*

However, when it comes to the relationship between social influence and behavioral intention, it has been shown to differ whether the influence comes from friends or family of the user. From our findings in the interviews, the respondents were more likely to get influenced by their friends than their family members. They felt it was easier to get help without bothering anyone when directly conversing with their friends.

Furthermore, a study conducted in 2022 discovered some findings focusing on healthcare information technologies. In some cases, children and grandchildren discouraged seniors from using healthcare information technologies. On the other hand, families were frequently the starting point for senior patients learning the basic skills to use this technology. The study also discovered that some seniors rely too heavily on family, making it difficult to learn more than the basics (Zhao et al., 2022). Hoque and Sorwar (2017) also examined seniors and if social

influence from those perceived as important is influencing their behavioral intentions in mobile health services and found a positive relationship. Therefore, we wanted to see if social influence by friends strengthened the relationship with behavioral intention and whether it was weakened by social influence from family. Hence, the following are the hypotheses:

*H<sub>4a</sub>: The relationship between social influence by friends and behavioral intention is strengthened by higher age.*

*H<sub>4b</sub>: The relationship between social influence by family and behavioral intention is weakened by higher age.*

## 4.2 Behavioral intention v. actual usage

In addition to the relationship between the variables and behavioral intention, we wanted to see if age was a moderating variable in relation to behavioral intention and actual usage. During our interviews, most respondents did not feel the need for a mobile banking application, while some were positive about learning to use it. In comparison, all the younger adults we interviewed for reference were familiar with their mobile banking application, used it frequently, and it was their preferred choice for doing financial tasks. Further, Hoque and Sorwar (2017) found that there was a positive relationship between seniors' behavioral intention and actual usage. Therefore, we developed these hypotheses:

*H<sub>5a</sub>: There is a significant relationship between behavioral intention and actual usage.*

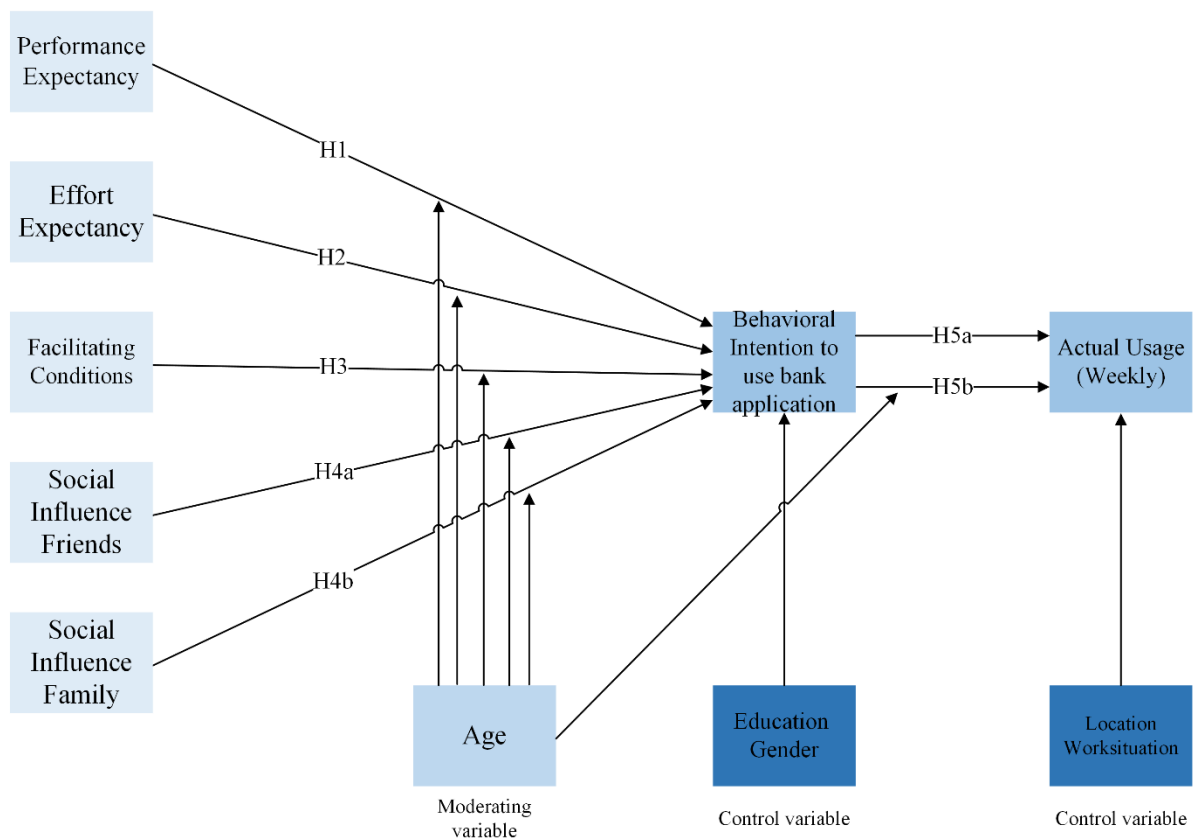
*H<sub>5b</sub>: The relationship between behavioral intention and actual usage is weakened by higher age.*

### 4.3 Conceptual framework

Illustrated in Figure 4 is our conceptual framework. It illustrates the relationship between the variables influencing behavioral intention to use the banking application with the corresponding hypotheses. Age is also included as a moderating variable. In addition, the relationship between behavioral intention and actual usage is shown, with the hypotheses and age as the moderating variable. The control variables are highlighted below the dependent variables: behavioral intention and actual usage. It should be mentioned that our research has taken place in Norway and should be of consideration when looking at our findings.

**Figure 4**

*Our conceptual framework.*



*Note.* Adapted from User Acceptance of Information Technology: Toward a Unified View by Venkatesh et al., 2003, *MIS Quarterly* 27(3), p. 447.

## 5.0 Research method

This chapter presents clearly and in detail what we have done to be able to answer our research question. We will begin by addressing the thesis' research design. Following, we will provide a detailed orientation to our research method, data collection, and the measures we have taken to ensure data quality.

### 5.1 Research design

The sources of information and the research design are quite related, as they both depend on how much is known about the problem that's faced. The research design is used as a guide to easier collect and analyze the data and as a framework or plan for a study. It ensures that the study will be relevant to the problem being researched and that the study uses economic procedures. There are three types of research design: exploratory, descriptive, and causal. A casual design focuses on cause-and-effect relationships and is studied by performing experiments (Iacobucci & Churchill, 2010, pp. 30, 58-59). Therefore, this is not necessary or suitable for our study and was discarded as a research design for this thesis.

As our problem statement requires a lot of insight into thoughts about and the usage of mobile devices, the research design that best fits our thesis is exploratory design. The exploratory design focuses on discovering ideas and insights to get possible explanations and assess consumers' reactions. However, we did see the need for a cross design, including some factors from the descriptive research design. Descriptive research is usually concerned with the frequency some things occur or the relationship between variables – such as usage compared with age, gender, or location (Iacobucci & Churchill, 2010, p. 58-59). Due to age being the variable focused on and usage among seniors, a descriptive study would be appropriate. Following this, we will elaborate on the research method and data collection process.

### 5.2 Research Method and data collection

#### *5.2.1 Target segment*

Several researchers have considered the digital divide among seniors in their research. However, there are differences in the ages they investigated. Some included seniors aged 60 and above (Barrantes Cáceres & Cozzubo Chaparro, 2019), those over 60 years of age (Lüders & Gjevjon, 2017; Song et al., 2021), and some chose to focus on seniors over the age of 65 (Alexopoulou et al., 2022; Mannheim et al., 2019; van Deursen & Helsper, 2015). When deciding which age group to include, we also considered when Norwegians retired. The average

age for first-time pension payments in 2022 was 65,6 (Halse, 2023). Therefore, we chose to target people over the age of 65.

### *5.2.2 Mixed methods*

Quantitative and qualitative research methods are the two most common methods when collecting data. Even though we separate qualitative and quantitative research methods, it is possible to combine them. Combining these methods is referred to as mixed methods. Using a mixed method for data collection yields benefits such as contrasting, confirming, and complementary data sources and more accurate and comprehensive reporting (Hammond & Wellington, 2020, p. 129-130).

This thesis employs a mixed method, combining qualitative and quantitative research methods concurrently. This means the methods are applied at different periods (Hammond & Wellington, 2020, p. 130). Using semi-structured interviews as the qualitative method, we could identify themes to include in the quantitative research. The process of analyzing qualitative data using themes includes finding patterns, coding the findings, and interpreting them (Boyatzis, 1998, p. 4-11).

We chose to collect our primary data through a survey for quantitative analysis, which is known to be time efficient, enables the collection of a large amount of data, and allows for a wide range of compatibility of the answers (O’Gorman & MacIntosh, 2015, p. 156). Furthermore, when using a survey, the same questions are asked to a number of people, allowing information about attitudes and characteristics to be collected (Walle, 2015, p. 50-51).

The next sub-chapters will go through each chosen method and explain the data collection process.

### *5.2.3 Qualitative research method*

The qualitative research method employs non-numerical data (Hammond & Wellington, 2020, p. 155), and the relationship between theory and research is inductive (Bell et al., 2019, p. 356). Moreover, inductive research employs a bottom-up approach, where the general conclusion is derived from observations or instances (Hammond & Wellington, 2020, p. 101). Examples of qualitative research include interviews and observations (Hammond & Wellington, 2020, p. 155).

#### *5.2.4 Qualitative data collection*

As mentioned, one form of qualitative data collection is through conducting interviews. This method is generally used to understand or gain insights into attitudes, behaviors, opinions, and experiences. Conducting semi-structured interviews enabled us to create more specific hypotheses and a more targeted survey. The benefits of using semi-structured interviews are that it allows for adaption and gives flexibility (Rowley, 2012). In total, we conducted 11 interviews; ten were with potential and current users and one with a bank employee.

The interviews were conducted with people residing in different areas of Norway, with different age groups and gender, to get a representative sample. It should be mentioned that half of those interviewed were over 60, and the oldest participant was 83. We began by reaching out to friends and family, who further forwarded us to people they thought might be interested in participating, which is a sampling method called snowball sampling. The snowballing technique is frequently used when the studied population is challenging to collect data on and reach out to. In such cases, the researcher relies on participants to provide information about where to find additional participants (Bairagi & Munot, 2019, p. 97).

The participants were briefed on the thesis topic and assured that their participation would be anonymous, and we clearly stated that they could withdraw from participation whenever they wanted. The interviews, however, were not recorded, but both authors were present during the interviews, allowing us to take notes. The interviews, which lasted about 30 minutes each, were conducted in person and over the phone, depending on the participants' location.

Moreover, the interviews primarily focused on smartphone and tablet usage, how participants use these technologies, what they consider important, and how they use the services provided by the bank (see Appendix C for the complete interview guide). We also conducted an interview with a customer service representative from a local bank to get his perspective regarding seniors' difficulties when using digital banking services. Our interview guide for potential and current users consisted of seven predetermined questions and follow-up questions based on the participants' knowledge and thoughts. The interview guide for the bank employee consisted of six predetermined questions that were also adapted based on the response we received.

We also approached people in cafes and shopping malls to not only rely on snowball sampling. This proved tougher than anticipated, and the response rate was low. The potential participants who said yes to participating said no after hearing about the specific subject, with one saying, "I don't have knowledge about technology". We believe it is due to the sensitive nature of banks

and finance information. However, we were able to assure the respondents of confidentiality while interviewing them and that we were not interested in their transaction – rather the choices behind which banking service they used.

*5.2.5 Themes*

By reviewing the notes from our interviews, we identified some themes that multiple participants highlighted. The first theme is ‘awareness’ and is based on responses from senior participants. Many were unaware of the mobile banking application and its benefits. One of the interview questions considered whether the participant was aware of the mobile banking application and one of them specifically responded, “Not until you just said it”. The second theme that we discovered was ‘effort’. The participants were satisfied with their current digital banking tools. They did not see value in learning something new, and one respondent said, “I am pleased with what I am currently using and do not see the reason for learning something new”. Further, they also perceived the mobile banking application as difficult to use and thus did not use it.

However, across all age groups, Vipps were cited as useful, with simple login and transfers using a phone number and their contact lists, eliminating the possibility of a mistaken transfer. It was also highlighted that Vipps allows to add multiple bank accounts in the application. The last theme that was discovered is ‘habit’. Participants had always used the bank’s website for their banking, and therefore also a part of their habit. One participant said, " My husband and I have always used the computer for paying bills and everything”. Since this was something that they knew already, they did not want to break their habit and learn something else.

**Table 2**

*Themes extracted from the interviews/observations.*

THEMES	EXCERPTS
Awareness	Not aware of the mobile banking application
	Not aware of the advantages of mobile banking application
Effort	Perception that the mobile banking application is difficult to use
	Vipps is easier and more adaptable



Habit	Always used the website for banking
	Not interested in learning new digital tools

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Based on these themes, we determined that we needed to include web-based banking and Vipps in our survey. Everyone in the interviews was aware of and using Vipps, but internet banking was the preferred choice among seniors.

### *5.2.6 Quantitative research method*

Moving on to our next research method, quantitative research, which can be defined as “quantifying the problem or research question and establishing the mechanisms through which one or more (quantitative) variable(s) may affect another variable” (O’Gorman & MacIntosh, 2015, p. 155). Further, in Bell et al. (2019, p. 163), quantitative research is described as “(...) covers approaches which attempt to measure and/or count social phenomena and the relationships between them”. The quantitative research method collects numerical data and typically illustrates the relationship between theory and research in a deductive manner (Bell et al., 2019, p. 164). Deductive methods employ logic and a top-down approach, intending to draw valid conclusions from initial assumptions (Hammond & Wellington, 2020, p. 53-101). This includes methods such as surveys, meta-analyses, and systematic reviews (Hammond & Wellington, 2020, p. 157). The thesis will take a deductive approach to data analysis and hypothesis testing.

### *5.2.7 The questionnaire*

The primary data for this thesis was gathered in Norway using an online survey created in Qualtrics. Surveys are a structured data collection method that allows for the creation of a database for use in analysis. The survey was distributed in such a way that it is self-administered, meaning that respondents completed the survey independently rather than while being observed by the researcher. This is regarded as a time and cost-effective data collection method, and it eliminates the possibility of researchers influencing respondents (O’Gorman & MacIntosh, 2015, p. 165-166).

The questionnaire is structured using demographic variables first, then moving on to constructs related to UTAUT. The demographic variables included in the survey consider age, gender, place of residence, educational level, and job situation. Further, the survey contained 44 questions, with 11 related to the five constructs contributing to behavioral intention. The

constructs were Performance Expectancy (e.g., To what degree do you find the mobile banking application useful in your daily life?), Effort Expectancy (e.g., To what degree do you find the banking application easy to use?), Social influence Friends (e.g., How likely are you to adopt technology recommended by friends?), Social influence Family (How likely are you to adopt technology recommended by family?), and facilitating conditions (e.g., Do you have knowledge about the application distributed by your bank?).

To include Vipps and internet banking, we added a section for each technology and related them to the different constructs, except social influence. In addition to the five constructs, the survey contained questions related to behavioral intention (e.g., I want to use the mobile banking application in the next few months) and options for training methods delivered by the bank (e.g., Which of these options could you have attended or used for training regarding the use of the mobile banking application?) (See Appendix D for the full survey).

#### *5.2.8 Quantitative data collection*

Prior to distribution, the survey was pretested by participants of various age groups and adapted based on their feedback. By doing the pretest of the survey, we were able to go through the questions to make sure that they were understood in the way it was meant to by a few selected participants. Further, we contacted several Facebook groups containing members in our targeted age group to elevate the response rate. We also got friends and family members to forward it to people they knew. To avoid missing data, we added a feature that deleted incomplete submissions. We also activated bot detection and prevented duplicated responses by the same participants to ensure reliable data. If the respondent had not used the technology yet, the survey skipped the various question blocks related to the various digital banking technologies. This was done to ensure that responses to the various technologies were valid.

When collecting the data, we primarily distributed the survey through social media and asked friends and family to forward it to people over 65 years of age. However, after having the survey online for about two weeks and only receiving 11 responses from our targeted group, we began sharing the survey again, explicitly asking for people over 55. We were also given access to a Facebook group called Pensjonister i Aksjon (Pensioners in action). This elevated the response rate tremendously. We also approached local shopping malls, which were positive about having data collection stands at their establishments. One of the center managers specifically responded, “Very important topic you take on, well done! Hopefully there will be a lot of feedback, and the banks will change something”.

When we were at the site to get responses, we changed the settings to allow multiple entries on the same device since we used our personal computers and tablets. There was some interest in contributing, but as expected, many did not have the time. When the participants were taking the survey, we stated they could ask us questions if anything was unclear, but we moved further away so that the participants were confident that we could not see the screen or their responses. This was done to ensure we did not influence their responses and received as many trustworthy responses as possible. Distributing the survey using social media and while standing in a shopping mall can be referred to as convenience sampling. Convenience sampling can be described as obtaining responses from samples that are deemed convenient (Bairagi & Munot, 2019, p. 97; Vogt, 2005, p. 62).

#### *5.2.9 Data collection problems*

During the data collection using the survey, we ran into some problems. Many people said they would complete the survey, but it appeared that if they did not receive it at a convenient time, they forgot to do it. Further, even though we had pretested it, we still received comments from people of higher age that it was challenging to complete. Given that we were aware that seniors might not be as technologically savvy, this was, to some extent, expected. We were also having trouble getting many responses from people over the age of 65.

The survey, which asked the same questions about internet banking, Vipps, and mobile banking applications, also distinguished between the social influence of friends and family. Because of this, there were many questions and a high degree of repetition throughout the survey. Concerning this, we discovered that many of the respondents who abandoned the survey stopped on question 41.

### **5.3 Quality of research**

#### *5.3.1 Validity*

Both validity and reliability influence how a researcher views their work (O’Gorman & MacIntosh, 2015, p. 171). Validity relates to the suitability of the measure, meaning that the measure measures what it is intended to (Hammond & Wellington, 2020, p. 192). The internal validity in a study is concerned with whether the independent variable or the treatment causes the association or change/lack of change. External validity, on the other hand, considers whether the results are generalizable to other samples. However, even if a survey is well-sampled and qualitatively executed, there is still a chance of high internal and external validity (O’Gorman

& MacIntosh, 2015, p. 171). To ensure validity, we took inspiration from surveys distributed by other researchers using the UTAUT model and adapted it to fit our research question.

### *5.3.2 Reliability*

Reliability concerns the extent to which the study is consistent, meaning that it can be repeated and the same results obtained (Hammond & Wellington, 2020, p. 163; O’Gorman & MacIntosh, 2015, p. 171). To ensure high reliability in our survey, we tried to get as many responses as possible by keeping the survey online for five weeks and promoting it during this period. Furthermore, we attempted to reach out to different parts of Norway so that the survey results could be considered representative across the Norwegian population. However, it is important to note that technology is constantly changing and evolving, implying that the results may be reliable now but perhaps not in a few years.

## 5.4 Preliminary analysis

### *5.4.1 Validity analysis*

We conducted a factor analysis to ensure the scales measured what they should. Factor analysis uses the original variables and attempts to create fewer linear combinations that include variability in the pattern of correlations (Pallant, 2020, p. 188-189). Potential issues were inspected to ensure we could conduct a principal component analysis. We conducted factor analysis on our two latent variables: Social Influence Friends and Social Influence Family.

The first analysis showed a low value in the component matrix for the last item regarding nuisance for both family (.45) and friends (.47). This value was low compared to the other items, which were between .7 and .8. Due to this, we decided to rerun the factor analysis without this item and got a component value for all the remaining items over .7 (see Table E1 and E2). As illustrated in the table below, we see that the Bartlett’s test was significant,  $p < .05$ , and that the Kaiser-Meyer-Olkin (KMO) was over .6 (Kaiser, 1974) and therefore suitable for factor analysis (Pallant, 2020, p. 188-190).

**Table 3***Validity analysis for the scales*

<b>Variable</b>	<b>Items</b>	<b>KMO</b>	<b>Bartlett's Test</b>	<b>Component Eigenvalue Total</b>
SI_Friends	4	.79	<.001	2.57
SI_Family	4	.84	<.001	2.98

*Note.* SI\_Friends = Social Influence Friends, SI\_Family = Social Influence Family

In addition, according to Kaiser's criterion, the component eigenvalue needs to be above 1 (Pallant, 2020, p. 191), which is the case for these components. Therefore, these factors were extracted for Social Influence Friends and Social Influence Family.

As shown in Table 4, the component for Social Influence Friends explained a total of 64.20% of the variance, and the factor loadings ranging between .75 and .86. Further, the Social Influence Family component explained a total of 74.52% of the variance, and the factor loadings had a range between .84 and .89.

**Table 4***Factor extractions*

<b>Extracted component</b>	<b>Eigenvalue</b>	<b>% of variance</b>	<b>Component, min</b>	<b>Component, max</b>
Factor_SI_Fri	2.57	64.20%	.75	.86
Factor_SI_Fam	2.98	74.52%	.84	.89

*Note.* Factor\_SI\_Fri = Factor Social Influence Friends, Factor\_SI\_Fam = Factor Social Influence Family

#### 5.4.2 Reliability analysis

When testing the reliability, Cronbach's Alpha is the most used measure, and when performed on scales, it is commonly referred to as a measure of internal consistency (Bonett & Wright, 2015). By checking for internal consistency, the analysis will indicate whether the scale is consistent and measuring the same construct (Pallant, 2020, p. 102). The measure ranges from

0 to 1, where 0 states that the measure is unreliable and 1 is perfectly reliable. If the value is over .7, the measure (e.g., test, scale) is considered reliable and accepted (Vogt, 2005, pp. 71, 274; Pallant, p. 105). Even though .7 is accepted, values over .8 are preferred (Pallant, 2020, p. 105).

Testing for reliability can only be done on scales that consist of more than two items. Two of our scales fit the criterium, Social Influence Friends and Social Influence Family, which was then used in the reliability test. These were both within the acceptable score for Cronbach's Alpha, as illustrated in Table 5:

**Table 5**

*Cronbach's Alpha values for the extracted factors*

<b>Variable</b>	<b>Items</b>	<b>Cronbach's Alpha</b>
Social Influence friends	4	.81
Social Influence family	4	.89

## 5.5 Descriptive statistics

### 5.5.1 Demographics

During the period the survey was open, we got 322 responses. However, one of the respondents did not have internet access and was removed when cleaning the data. A total of 67% were female, while 33% were male. Furthermore, the mean for age was measured to 5.82, indicating that the mean age consists of respondents between 46-55 (5) and respondents between 56-66 (6).

**Table 6**

*Descriptive statistics for the demographic variables.*

<b>Variable</b>	<b>Description</b>	<b>Frequency</b>	<b>Percentage</b>
Gender	Male	106	33%
	Female	215	67%
Age	16-25	17	5.3%
	26-35	29	9%

	36-45	9	2.8%
	46-55	38	11.8%
	56-65	107	33.3%
	66-75	93	29%
	75-85	25	7.8%
	85 and older	3	0.9%
Location	Big city	22	6.9%
	City	168	52.3%
	Suburban area	99	30.8%
	Countryside	23	7.2%
	Abroad	8	2.5%
Education Level	University	162	50.5%
	Highschool	133	41.4%
	Primary school	26	8.1%
Work Situation	Student	2	1.6%
	Student with job	12	3.7%
	Unemployed	2	0.6%
	Full-time employee	135	42.1%
	Part-time employee	11	3.4%
	Retired	142	44.2%
	None of the above	14	4.4%

The Location variable was divided into five categories. Big City considers those who live in the city centers of cities such as Stavanger and Oslo. City includes residents of Bryne and those living just outside of Stavanger City, such as Hundvåg and Hillevåg. Suburban areas include less populated locations such as Nærbø. Countryside includes Orre and other smaller locations. We also received responses from Norwegians living in other countries, such as Denmark and Thailand, which fall under the Abroad category.

### 5.5.2 Descriptive statistics from the survey

From the survey, we also found that it differs which banking solution is the preferred choice based on the age groups. When including the whole sample, we see that the mobile banking application is the most preferred one. Table 7 illustrates the ranking for the entire sample:

**Table 7***Ranking options for the entire sample.*

<b>Rank</b>	<b>Banking option</b>	<b>Percentage placing</b>
1	Mobile banking application	46.53%
2	Vipps	39.19%
3	Internet banking (web)	29.69%
4	Physical bank	93.31%

However, when only including those over 65, internet banking was the option rated as the most used bank-related technology, and mobile banking being the third most preferred option, as shown in Table 8. These findings will be further discussed in Chapter 7.

**Table 8***Ranking options for those over 65 years of age.*

<b>Rank</b>	<b>Banking option</b>	<b>Percentage placing</b>
1	Internet banking	56.03%
2	Vipps	35.40%
3	Mobile banking application	19.44%
4	Physical bank	92.45%

Furthermore, the descriptive statistics for preferred learning choice are illustrated in Table 9. The first table shows the preferred learning choices for the entire sample, followed by the preferred choices for those over 65 years of age (Table 10).

**Table 9***Learning choices for the entire sample*

<b>Learning choice</b>	<b>Count</b>	<b>Percentage</b>
Video-learning	105	22.58%
Download step-by-step	86	16.48%



Individual learning in bank	53	11.40%
Online simulation game	51	10.97%
Step-by-step delivered in mail	33	7.10%
Group learning in the bank	21	4.52%
None of the options	116	24.95%

**Table 10**

*Learning choices for those over 65 years of age*

<b>Learning choice</b>	<b>Count</b>	<b>Percentage</b>
Video-learning	29	16.48%
Download step-by-step	29	16.48%
Individual learning in the bank	28	15.91%
Step-by-step delivered by mail	18	10.23%
Online simulation game	14	7.95%
Group learning in the bank	11	6.25%
None of the options	47	26.7%

Another interesting finding is the age group of the respondents who stated they never use the mobile banking application. The age group to which those belonged is shown in Table 11 and will be further examined in the discussion section.

**Table 11**

*Illustrating the respondents who never use the mobile banking application and their age group.*

<b>Age</b>	<b>Frequency</b>	<b>Percentage</b>
Younger than 16	-	-
16-25	-	-
26-35	1	3.45%
36-45	-	-
46-55	3	7.90%
56-65	7	6.54%
66-75	16	17.20%

76-85	4	16%
85 and older	3	100%

*Note.* Percentage = Percentage of the total in the relevant age group

### 5.5.3 Difference between the technologies regarding performance expectancy

As mentioned, the survey considered performance expectancy in relation to the different digital banking tools. Performance expectancy considers to what degree the respondents find the banking tool useful in their daily life and if they find it to be an efficient tool for completing bank-related tasks.

**Table 12**

*Performance expectancy mean across the different technologies (Useful and Efficient)*

<b>Banking tool</b>	<b>Mean, Useful</b>	<b>Mean, Efficient</b>
Mobile banking application	4.23	4.13
Vipps	3.60	4.07
Internet banking	4.17	3.98

The mean response to the mobile banking application being useful was 4.23, indicating that the response is between agree (4) and strongly agree (5). The same is evident among the mobile banking application being efficient, where the value is slightly closer to 4.

Considering internet banking being useful, the mean was 3.60, indicating that they are neutral (3) to agree (4). However, the mean of efficiency was measured at 4.07, indicating that the average respondents perceive internet banking as an efficient tool for conducting bank-related tasks.

The mean related to Vipps being useful in everyday life was measured at 4.17, indicating that the respondents were concentrated around “agrees”. Further, the mean of Vipps being an efficient tool for completing bank-related tasks was slightly lower, measuring 3.98. The means are quite similar, but the difference can potentially be described as the respondents have not given Vipps consent to its different functions and, therefore, not considering it a suitable tool for bank-related tasks. For instance, these functions can be related to adding bank accounts and direct debit.

## 5.6 Variables

When designing the survey, we took inspiration from the scales and items used in UTAUT (Venkatesh et al., 2003) and adapted them to fit our study. The scales consist of ‘Performance Expectancy’, ‘Effort Expectancy’, ‘Facilitating Conditions’, and ‘Social Influence’. However, since we got the impression from the interviews that people react differently to influence from friends to family, we divided social influence into two scales (see Appendix F for measure summary). We also had the impression that many seniors used Vipps and internet banking and included those in addition to mobile banking applications. However, because we included three digital banking tools, we removed some irrelevant items from UTAUT to keep the survey manageable (e.g., “If I use the system, I will increase my chances of getting a raise” and “The senior management of this business has been helpful in the use of the system”).

In the next section, we will describe the independent variables, which are tested and presumed to affect another variable. We will also describe the dependent variables, which depend on other variables. Lastly, a description of the included control variables, which are only controlled for and will not be further examined, will follow (Vogt, 2005, pp. 62, 86, 151).

### *5.6.1 Performance Expectancy MBA*

The original Performance Expectancy scale consisted of four items on a Likert Scale and was developed by Venkatesh et al. (2003). However, as we adapted it to our study, we removed two items because we did not find them relevant. The items removed were related to getting a raise on the job and job productivity. The items we included from Venkatesh et al. (2003) considered usefulness and efficiency of the mobile banking application. However, the scale did not reach an acceptable Cronbach’s Alpha value (.66) and was used as two independent variables. They were added to see if they significantly impacted behavioral intention toward using the mobile banking application. Both were constructed using a Likert Scale, ranging from 1 to 5, where 1 was the minimum value, and 5 was the maximum value (e.g., 1 is highly useless and 5 is highly useful).

### *5.6.2 Effort expectancy*

The scale Effort Expectancy originally consisted of four items related to learning and using a system (Venkatesh et al., 2003). However, one item was used when adapting it to the study (To what degree do you find the mobile banking application easy to use). The item was constructed using a Likert Scale, ranging from the minimum of 1 to the maximum of 5, where 1 is “very difficult” and 5 is “very easy”.

### *5.6.3 Facilitating conditions*

The original Facilitating Conditions scale (Venkatesh et al., 2003) consisted of four items, considering resources, knowledge, compatibility, and assistance constructed in a Likert Scale. Adapting the scale to our thesis, we initially included four items related to resources, physical hindrance, and knowledge. However, the scale did not reach an accepted value of Cronbach Alpha (.41), so we decided to move forward with the item related to knowledge about the mobile banking application. As was found in our qualitative interviews, we saw that seniors that did not use mobile banking lacked awareness of the application, which is why this item was used for Facilitating Conditions. The item was constructed as a categorical dichotomous variable, where ‘yes’ was constructed to 1 and ‘no’ to 0.

### *5.6.4 Social Influence Friends and Family*

The Social Influence Friends and the Social Influence Family scales originally comprised five items. We constructed them based on previous literature, findings, and interviews. The scales are identical, but one is related to friends, while the other is related to family. All items were constructed using a Likert Scale ranging from 1 to 5. However, following the factor analysis, we decided to remove one of the items, leaving the scales with four items each. The items were connected to friends or family in relation to the bank’s technology (e.g., To what degree do you trust advice from friends in relation to banking and technology). Both scales are made up of latent variables, meaning that it cannot be observed or directly measured (Vogt, 2005, p. 169).

### *5.6.5 Behavioral Intention*

The original Behavioral Intention scale was developed by Venkatesh et al. in 2003 and consisted of three items related to intent, prediction, and plan to use the system. However, adapting it to our study, we used “want to use the mobile banking application in the next few months”. The item was on a Likert Scale ranging from a minimum value of 1, highly disagree, to the maximum value of 5, highly agree.

### *5.6.6 Actual usage*

Actual usage is an ordinal variable that consisted of one question and considered the frequency of usage, including the options daily, weekly, monthly, yearly, and never.

### *5.6.7 Control variables*

When conducting the analysis, we used gender, educational level, work situation, and location as control variables. Control variables are used to control for alternative explanations but are not to be examined.

The variable gender originally had three options, male, female, and none of the above. However, none of the respondents were in the 'none of the above' section, and the option was removed from the dataset. Further, we adapted the variable to a dichotomous variable such that male = 1 and female = 0.

Educational level is an ordinal variable ranging from 1 to 3. Whereas 1 represented the lowest level of education, primary school. 2 represented the middle level of education, high school. Lastly, 3 represented the highest level of education, college and university.

The variable Work Situation is nominal and ranged from 1 to 7. This included being a student (1), student with a job (2), unemployed (3), full-time employed (4), part-time employed (5), retired (6), and lastly, none of the options (7).

The final control variable considered location. The variable was initially made up of postal codes, which we coded into an ordinal variable: (1) Big City, (2) City, (3) Suburban Area, (4) Countryside, and (5) Abroad.

## 6.0 Results

In the following section, we will present our data analysis results. IBM SPSS software has been used to analyze the data. Firstly, we will present the correlation analysis before we move on to the regression analysis.

### 6.1 Correlation analysis

A correlation analysis lays the conceptual foundation before doing a regression analysis. The correlation analysis looks at the strength of the association between two metric variables. It indicates to what degree the variation in one variable is related to the variation in another variable. However, in our case, we only had nonmetric variables: ordinal and nominal values, meaning we had to conduct a nonparametric correlation. This correlation method measures nonmetric variables and relies on rankings to compute the correlation (Pallant, 2020, p. 135).

Before doing the correlation analysis, preliminary analysis was conducted to ensure that there were no violations of the assumptions for the correlation analysis, such as checking the effect of non-linear relationships and outliers (Pallant, 2020, p. 136). Although we found some outliers in our variables, we kept them because they did not occur due to data entry errors or affect the assumptions. In addition, missing data was removed from the dataset, leaving us with 288 responses.

For a nonparametric correlation, Spearman's rho and Kendall's tau are the two measures that could be used when examining the correlation between the variables. For our dataset, we chose Spearman's rho correlation. Correlation values ranging from 0 to -1 indicate a negative correlation between the variables, while 0 to +1 indicates a positive correlation. Cohen (1988, p. 79-81) says values above +.5 indicate a strong correlation.

The relationship among the different variables is presented in Table 13 using Spearman's rho correlation coefficients:

**Table 13***Correlation table using Spearman's rho correlation on all variables.*

Scale	Mean	St.D	$\alpha$	1	2	3	4	5	6	7	8	9	10	11	12
1 BI	3.82	1.12	-	-											
2.AU	2.34	1.18	-	.43**	-										
3. Age	5.82	1.60	-	-.43**	-.31**	-									
4. Gender	.33	.47	-	-.01	.08	.02	-								
5.Education	2.42	.64	-	.10	.06	-.16**	.02	-							
6.Location	2.46	.83	-	-.07	-.10	.16**	.00	-.07	-						
7.Work_situation	4.92	1.28	-	-.35**	-.26**	.66**	-.03	-.11*	.18**	-					
8. EE	4.19	.72	-	.34**	.42**	-.26**	-.14*	.03	-.04	-.19**	-				
9. PE	4.18	.75	-	.45**	.49**	-.31**	-.12*	.09	-.09	-.23**	.72**	-			
10.FC	0.5	.22	-	-.21**	-.29**	.09	-.02	-.05	.08	.20**	-.10	-.12*	-		
11. SI Friends	3.19	.75	.81	.26**	-.16**	-.29**	-.19**	.07	-.08	-.27**	.09	.19**	-.10	-	
12. SI Family	3.47	.79	.89	.11*	-.03	-.12*	-.26**	-.02	-.06	-.15**	-.00	.06	-.05	.61**	-

*Note.* Significance level: \* $p < .05$ , \*\* $p < .01$ , \*\*\* $p < .001$

Our results in Table 13 show that Performance Expectancy and Effort Expectancy ( $r = .72, p = .01$ ), and Social Influence Friends and Social Influence Family ( $r = .61, p = .01$ ) had a strong positive correlation. Most of the correlations were also significant, which means we could have 95% confidence in the results that have been obtained (Pallant, 2020, p. 141).

We also observed that Gender negatively correlates with all the independent variables and Behavioral Intention. This means that they have a negative relationship. Age also had a negative relationship with both dependent and independent variables except Facilitating Conditions. Further, none of the variables correlate too much with each other, meaning we could move forwards with the regression analysis.

## 6.2 Regression analysis

When performing regression, the two main methods are logistic and multiple regression. Logistic regression is usually performed when the dependent variable is categorical, while multiple regressions are usually used to test relations when the dependent variable is continuous (Pallant, 2020, pp. 153, 175). However, Eikemo and Clausen (2007, p. 175) state that it is possible to use multiple regression if the categorical dependent variable consists of a scale with five or more items, e.g., a Likert scale. Furthermore, multiple regression tests the relationship among the independent, moderating, and dependent variables.

By conducting a moderated hierarchical multiple regression, it was possible to explore the effect of age as a moderating variable on the relationship between the independent and dependent variables (Leech et al., 2015, p. 153). It also enabled us to perform the regression in multiple steps. By adding the variables blockwise, it was also possible to inspect how the different blocks of variables could be used to predict the dependent variable after controlling for the previous blocks (Pallant, 2020, p. 154). Considering our hypotheses, we found multiple regression the most suitable method, even though we had an ordinal variable for behavioral intention.

Prior to conducting the regression, some assumptions had to be met. We tested for normality, linearity, multicollinearity, and homoscedasticity and found no violation of the assumptions, except for multicollinearity. Multicollinearity occurs when there is a high correlation between two or more independent variables (Field, 2018, p. 401). Even though there was multicollinearity in some variables, it is related to the interaction term, which uses the same variables multiplied by age. Therefore, it was not surprising but expected, and we could still see the effect of age on the variables (Friedrich, 1982).



### 6.2.1 Regression analysis for $H_1$ to $H_{4b}$

For our first regression, we wanted to examine how the variables Performance Expectancy, Effort Expectancy, Social Influence (Family and Friends), and Facilitating Conditions predict Behavioral Intention.

The regression equation for this test is:

*Behavioral Intention<sub>i</sub>*

$$\begin{aligned} &= \beta_0 + \beta_1 * \text{Gender Dummy} + \beta_2 * \text{Education Level} + \beta_3 \\ &* \text{Performance Expectancy Useful} + \beta_4 \\ &* \text{Performance Expectancy Efficiency} + \beta_5 * \text{Effort Expectancy} + \beta_6 \\ &* \text{Facilitating Conditions} + \beta_7 * \text{Social Influence Friends} + \beta_8 \\ &* \text{Social Influence Family} + \varepsilon_i^1 \end{aligned}$$

, where  $\beta_0$  is the constant,  $\beta$  is the independent and control variables, and  $\varepsilon$  is the sum of errors. We wanted to control for Gender and Education Level and see if the variables Performance Expectancy Useful, Performance Expectancy Efficiency, Effort Expectancy, Facilitating Conditions, and Social Influence Family and Friends predict Behavioral Intention regarding the use of mobile banking applications.

Furthermore, a regression equation was made by including Age as the interaction term:

*Behavioral Intention<sub>i</sub>*

$$\begin{aligned} &= \beta_0 + \beta_1 * \text{Gender Dummy} + \beta_2 * \text{Education Level} + \beta_3 \\ &* \text{Performance Expectancy Useful} + \beta_4 \\ &* \text{Performance Expectancy Efficiency} + \beta_5 * \text{Effort Expectancy} + \beta_6 \\ &* \text{Facilitating Conditions} + \beta_7 * \text{Social Influence Friends} + \beta_8 \\ &* \text{Social Influence Family} + \beta_9 * \text{Performance Expectancy Efficiency} \\ &* \text{Age} + \beta_{10} * \text{Performance Expectancy Useful} + \beta_{11} \\ &* \text{Effort Expectancy} * \text{Age} + \beta_{12} * \text{Facilitating Conditions} * \text{Age} + \beta_{13} \\ &* \text{Social Influence Friends} * \text{Age} + \beta_{14} * \text{Social Influence Family} \\ &* \text{Age} + \varepsilon_i^1 \end{aligned}$$

, where the variables have been computed to include age as an interaction term (variable \* Age).

We first entered the control variables Gender and Education level, shown in Model 1, which only explains 1.4% of the variance in behavioral intention, and the model is not significant. By adding the independent variables, the model explained an additional 28% of the variance after

controlling for Gender and Education Level,  $R$  squared change = .28,  $F$  change (7,278) = 15.73,  $p < .001$ . Further, Model 2 as a whole explained 29.4% of the variance in Behavioral Intention,  $F$  (9, 278) = 12.87,  $p < .001$ .

When including Age as an interaction effect in Model 3, the model explains an additional 2.6% of the variance,  $R$  squared change = .026,  $F$  change (4,274) = 2.66,  $p < .033$ . The final model, therefore, explains a total of 32% of the variance,  $F$  (13, 274) = 9.93,  $p < .00$ . The regression output is illustrated in Table 14:

**Table 14**

*Hierarchical multiple regression analysis for  $H_1$  to  $H_{4a/b}$ .*

Variables	Behavioral Intention		
	Model 1	Model 2	Model 3
(Constant)	3.328(B)***	2.521(B)***	9.04(B) ***
Gender	-.02	.07	-.00
Education	.12**	.03	.03
PE_Useful		.19***	-.89
PE_Efficiency		.08	.06
EE		.06	.06
FC		-.12**	-1.42***
SI_Friends		.18**	.90**
SI_Family		.03	-.69**
Age		-.25***	-2.33**
PE_Useful * Age			2.05**
FC * Age			1.43***
SI_Friends *Age			-.71
SI_Family*Age			.74**
R2	.01	.29	.32
R2 Change	.01	.28	.03
Sig F. Change	.13	<.00	.03

Note<sub>1</sub>. Significance level: \* $p < .05$ , \*\* $p < .01$ , \*\*\* $p < .001$

Note<sub>2</sub>. PE\_Useful = Performance Expectancy Useful, PE\_Efficiency = Performance Expectancy Efficiency, EE = Effort Expectancy, FC = Facilitating Conditions, SI\_Friends/SI\_Family = Social Influence Friends/Family.

From Model 1, the model itself is not significant. However, the control variable Education Level did have a significant effect on Behavioral Intention. A higher education level has a positive effect on Behavioral Intention, meaning that having a higher educational level, e.g., a university degree, positively influences the likelihood of wanting to use the mobile banking application.

In Model 2, Performance Expectancy Useful, Facilitating Conditions, Social Influence from Friends, and Age significantly affect Behavioral Intention. Age has a negative beta coefficient (-.25), which indicates that the higher the age, the less likely it is that they want to use the mobile banking application within the next few months. Facilitating Conditions is also negative (-.12), meaning that if they answer “no” on the “aware of the bank’s mobile banking application”, it reduces the Behavioral Intention towards mobile banking application. For Social Influence from Friends, a positive relationship can be seen from the beta coefficient (.18). This indicates that Behavioral Intention increases if the user has friends influencing them.

Performance Expectancy Useful is also significant, with a beta value of .19. This means that when the user perceives the mobile banking application as useful, the Behavioral Intention increases. In the model, Social Influence from Family, Effort Expectancy, and Performance Expectancy Efficiency is not significant. This means that these variables have no significant impact on Behavioral Intention in our study.

In the third and last model, the interaction term explains an additional 2.6% of the variance, indicating that the interaction term affects Behavioral Intention. Also, some of the interaction effects were significant. A change from model 2 to model 3 is that the variable Social Influence from Family has become significant ( $b = -.688, p < .05$ ). That means that influence from family is negatively related to Behavioral Intention. In addition, Facilitating Condition is still negative and significant ( $b = -1.416, p < .05$ ). Further, we see that Social Influence from Friends is still significant and positive in relation to Behavioral Intention ( $b = .902, p < .05$ ). Age is still significant and had a negative relationship ( $b = -2.33, p < .05$ ), meaning that higher age is negatively affecting Behavioral Intention.

For the interaction terms, the positive beta coefficient for the interaction indicates that the relationship between Performance Expectancy Useful and Age increases the probability of Behavioral Intention. The same happens for Facilitating Conditions and Age when the variables are multiplied. It increases the probability of wanting to use the mobile banking application within the next few months. Lastly, we also see that Age moderates the relationship between Social Influence from Family and Behavioral Intention and has a positive influence.

Effort Expectancy and Performance Expectancy Efficiency were excluded from the model because they did not contribute to it, indicating that these variables have no impact on Behavioral Intention when using Age as a moderating variable. It should also be mentioned that the relationship between social influence from friends and behavioral intention with interaction effect is not significant, meaning that we cannot say that age significantly impacts the relationship.

Several simple slope analyses were created to visualize the interaction between the dependent, the independent and the moderating variable (these can be found in Appendix G). From the illustrations, it is possible to see the interaction effect, supporting the findings in the regression output and the linear relationship between the variables.

To see the variables' unique contribution to the percentage of variance explained, we examined the part correlation coefficient – when the overlapping effects of all other variables are removed. One uses the part correlation value to see if the effect shown in the regression output has any importance to Behavioral Intention (Pallant, 2020, p. 172). Table 15 illustrates the different variables and their part correlation coefficient.

**Table 15**

*Part correlation coefficient for the second regression.*

Variable	Part Correlation Coefficient
FC	-.15
SI_Friends	.11
SI_Family	-.10
Age	-.12
PE_Useful * Age	.11
FC * Age	.14
SI_Family * Age	.11

*Note.* PE\_Useful = Performance Expectancy Useful, PE\_Efficiency = Performance Expectancy Efficiency, EE = Effort Expectancy, FC = Facilitating Conditions, SI\_Friends/SI\_Family = Social Influence Friends/Family.

### 6.2.2 Regression analysis for $H_{5a}$ and $H_{5b}$

Multinomial logistic regression was used to predict the impact of predictor variables on the odds of actual usage of the mobile banking application. This type of regression is used when the dependent variable consists of categories and can even be used on categories with a meaningful order, such as the ordinal variable Actual Usage (Field, 2018, p. 916). The model had two control variables (Work Situation and Location) and two independent variables (Age and Predicted Behavioral Intention), and an interaction effect (Age \* Predicted Behavioral Intention). The dependent variable's reference category is Never, which refers to a respondent never using the mobile banking application. This means that the probability of membership in other categories is compared with the probability of being part of the category 'never' (Menard, 2010, p. 171). For the independent variable, the reference category is Seniors (above 65 years of age) and will not display any values.

That means that the regression equation is:

$$\begin{aligned} \text{Actual Usage}_i &= \beta_0 + \beta_1 \text{Work Situation} + \beta_2 \text{Location} \\ &+ \beta_3 \text{Predicted Behavioral Intention} \\ &+ \beta_4 \text{Predicted Behavioral Intention} * \text{Age} + \varepsilon_i^1 \end{aligned}$$

Only those interaction terms which are significant will appear in the results. However, the interaction term (Predicted Behavioral Intention \* Age) was not significant in the model. The goodness of fit was assessed using the Chi-square statistic. The Chi-square value was 50.31, and the p-value was less than .001 (see Table H1). This proves a significant relationship between the dependent and independent variables and that the final model accounts for more variability in the outcome. To ensure the fit of the model, Pearson and Deviance should not be significant. Both measures are not significant, and the model is a good fit for the data (see the attached output in Table H2) (Field, 2018, p. 924-926).

In addition, using Cox and Snell (.16) and Nagelkerke (.18), we see that the values suggest that the model fit is between 16% and 18%. McFadden indicates a 7.5% improvement in the model fit to the final model related to the intercept-only model (Louviere et al., 2000, p. 54).

Further, the Likelihood Ratio Tests displays the significance of the predictors in the model but does not explain which category it is a predictor for (Field, 2018, p. 926-927). This indicates

that, in our model, the Predicted Behavioral Intention had a significant main effect on Actual Usage,  $X^2(2) = 29.86, p < .001$ .

**Table 16**

*Multinomial logistic regression output*

	b(SE)	95% CI for Odds Ratio		
		Lower	Odds ratio	Upper
<b>Yearly VS Never</b>				
Intercept	13.056			
Youngest	-5.895***	.00	.003	.038
Intermediary	-18.317	.000	.000	-
Senior	-	-	-	-
P BI	2.088	.261	8.065	249.509
<b>Monthly VS Never</b>				
Intercept	11.445			
Youngest	-6.042***	.001	.002	.008
Intermediary	-19.053	.000	.000	-
Seniors	-	-	-	-
P BI	3.050	.69	21.11	643.07
<b>Weekly VS Never</b>				
Intercept	9.967			
Youngest	-6.069***	.001	.002	.006
Intermediary	-18.81	.000	.000	-
Senior	-	-	-	-
P BI	3.663**	1.28	39.00	1187.65
<b>Daily VS Never</b>				
Intercept	6.674		-	
Youngest	-5.92	.003	.003	.003
Intermediary	-18.978	.000	.000	-
Seniors	-	-	.	-
P BI	4.284**	2.30	72.52	2291.51

*Note.* The reference category is: 1 Never

When comparing yearly usage of the mobile banking application, the young age group ( $b = -5.90$ ,  $Wald = 19.57$ ,  $p < .001$ ) are significantly less likely to use it yearly rather than never when compared to seniors. This indicates that belonging to the age group ‘youngest’ (Below 55 years of age) decreases the likelihood of using the mobile banking application yearly relative to never.

The same results are obtained when comparing monthly use to never. The respondents in the ‘youngest’ group ( $b = -6.04$ ,  $Wald = 101.33$ ,  $p < .001$ ) have significantly less odds of using the mobile banking application monthly rather than never when compared with seniors.

Further, considering the weekly use of the mobile banking application, Predicted Behavioral Intention ( $b = 3.66$ ,  $Wald = 169.39$ ,  $p < .001$ ) and being in the ‘youngest’ age group ( $b = -6.07$ ,  $Wald = 4.42$ ,  $p < .05$ ) significantly affected the usage habit compared to never. First, Predicted Behavioral Intention has a significant positive effect on the odds of weekly use compared to never. This indicates that the weekly users are more likely to use the mobile banking application due to an increase in predicted behavioral intention keeping the other variables constant. However, belonging to the ‘youngest’ group decreases the likelihood of using the mobile banking application weekly as opposed to never.

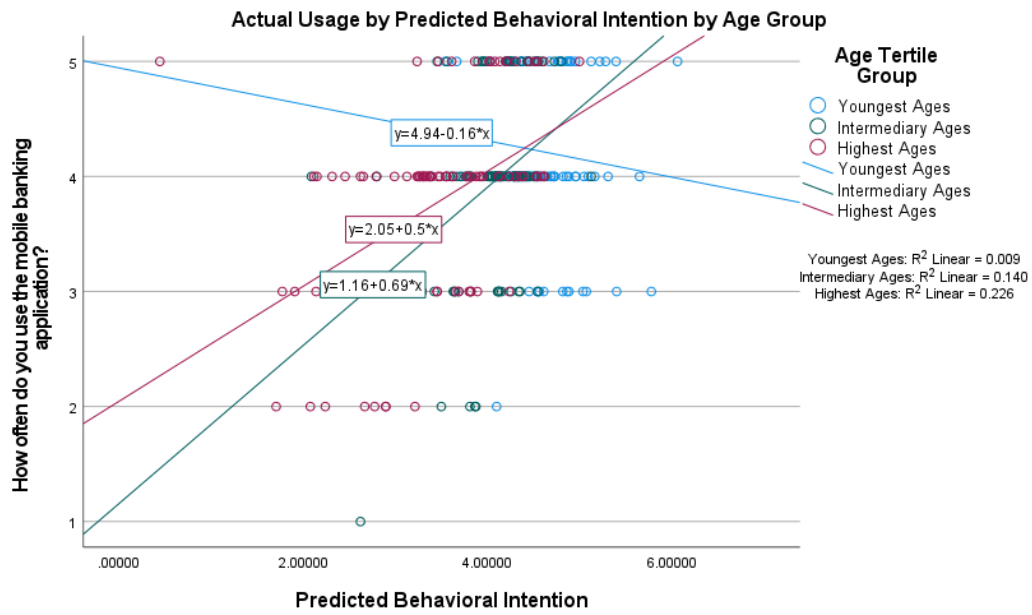
Among those using the mobile banking application daily, predicted behavioral intention had a significant impact on the actual usage habit of the respondents ( $b = 4.28$ ,  $Wald = 5.91$ ,  $p < .05$ ). If the predicted behavioral intention increases, the probability of using the mobile banking application daily, compared to never, increases.

From the model, it is possible to identify that being in the ‘youngest’ group compared to ‘senior’ has a significant negative effect on weekly, monthly, and yearly usage compared to never. It also shows that predicted behavioral intention has a significant influence on those using the mobile banking application daily and weekly compared to never.

As illustrated in the simple slope analysis below, we see that behavioral intention has a negative effect on actual usage for the youngest age group (16-55 years of age). It also shows that for the intermediary (56-65 years of age) and highest (above 65 years of age) age groups, it is the opposite – actual usage is positively influenced by behavioral intention, as visualized in Figure 5:

**Figure 5**

*Actual usage by Predicted Behavioral Intention by Age Group*





## 7.0 Discussion

In this section, the findings of our analysis will be discussed and related to theory and existing literature. The first section highlights the findings related to age as an independent variable, followed by the findings concerning behavioral intention as a dependent variable and the variables influencing it. Further, the focus will be on actual usage as the dependent variable. Some general discussion will also be elaborated on based on other findings from our study.

### 7.1. Age as the independent variable

Previous studies show that age as a moderator has influenced the constructs' relationship with behavioral intention (Hoque & Sorwar, 2017; Venkatesh et al., 2003). However, when considering age as an independent variable, it has a significant negative influence on behavioral intention. This indicates that with increasing age, it is less likely that they want to use the mobile banking application in the next few months.

This is further emphasized in previous studies, where higher age negatively affects the use of digital technologies (Hoque & Sorwar, 2017). Based on this sample and the results, we see that there might be a connection to seniors being excluded from the bank's digital transformation because higher age is less likely to influence behavioral intention in a positive direction. It could also be seen in relation to the data collection process, where it was hard to get responses from those 65 years and above. As van Dijk stated in 2005 (p. 40), seniors are less motivated than younger people in relation to learning and adopting digital technologies – which is consistent with our findings when looking at age as an independent variable.

Another interesting finding is the age group of the respondents who stated they never use the mobile banking application. As illustrated in Table 11, there is a clear difference related to the use of the mobile banking application between those aged 56-65 ( $N= 107$ , 6.54%) and 66-75 ( $N=93$ , 17.20%). This shows that the higher age groups do not use the mobile banking application – which can be seen in relation to age as an independent variable negatively influencing behavioral intention. We could also relate this to the grey digital divide, where we can see that seniors have moved beyond the motivational and the material access stages. As seen from the statistics mentioned in the introduction, 96% of the Norwegian population has access to a smartphone. This further indicates that the digital gap is related to the lack of skills and usage, consistent with Scheerder et al. (2017).

## 7.2 Behavioral Intention as a dependent variable

Firstly, we will examine the first regression using behavioral intention as the dependent variable. For this thesis, performance expectancy considers how useful and efficient the participants view the mobile banking application to further consider if it is a variable that has a relationship with behavioral intention. Our findings indicate that the ‘useful’ part of performance expectancy before including the interaction term has a significant impact on behavioral intention – and if the user views the mobile banking application as useful, the effect on behavioral intention is positive. This is consistent with previous findings on mobile banking applications, where they highlight usefulness as a reason for using the technology (Orehovački et al., 2022).

The results concerning the hypothesis stating that the relationship between performance expectancy and behavioral intention being weakened by higher age were not significant. Thus, H<sub>1</sub> is not supported. Our findings show that higher age combined with performance expectancy, on the contrary, contributes to and strengthen the relationship with behavioral intention. This is further emphasized using the original theory by Venkatesh et al. (2003) where they find performance expectancy to have a positive impact on behavioral intention when moderated by gender and age.

It is even further emphasized when we look at the findings from Natarajan et al. (2017), where for older people, it was found that they find mobile shopping applications more useful, while for younger people, it relates more to being easy to use. Therefore, it complies with our findings, where effort expectancy was not significant.

Effort expectancy considers how easy the users perceive the mobile banking application, and the hypothesis aims to investigate if the relationship between effort expectancy and behavioral intention is weakened by higher age. Moreover, the relationship between effort expectancy and behavioral intention has been found to be significant in multiple studies after Venkatesh et al. (2003) introduced the variable in UTAUT (Bankole & Bankole, 2017; Bhatiasevi, 2016; Zhou et al., 2010). Orehovački et al. (2022) also found that one of the reasons for using the mobile banking application was its ease of use. The relationship did not prove to be significant in our sample, so we cannot say for certain that effort expectancy influences behavioral intention. However, when age was used as a moderating variable, it was not included in the regression output. This further implies that we are unable to confirm H<sub>2</sub> and cannot state that there is a relationship between the variables. The study by Zhou et al. (2010) also found non-significant

results and could not support their hypothesis about effort expectancy and a user's adoption of mobile banking.

Although there is no significant relationship between effort expectancy, age, and behavior intention, it can be assumed that it had something to do with the scale that was used. The scale only had one item and might not be representative of the sample. If we were to include more items related to effort expectancy, there could have been a different outcome – which could be further researched.

Moreover, facilitating conditions is related to knowledge about the mobile banking application. In our study, facilitating conditions was used as a requirement that had to be met to even consider using the mobile banking application. For this sample, facilitating conditions had a significant negative effect on behavioral intention. This indicates that the behavioral intention is reduced when the user is unaware of the mobile banking application. This is not surprising, as it is necessary to be aware of the technology to use it. When combining the interaction term (Age) and facilitating conditions, the behavioral intention is positively influenced. This suggests that the relationship between knowledge and intent to use the mobile banking application is strengthened with increasing age, not supporting H<sub>3</sub>. On the contrary, Venkatesh et al. (2003) found that facilitating conditions did not significantly contribute to behavioral intention.

Social influence is divided by friends and family and indicates how the respondents perceive and trust their friends or family in relation to the bank's technology. Firstly, when investigating the relationship between social influence from friends and behavioral intention moderated by age, the findings were not significant. The hypothesis stated that the relationship between social influence from friends and behavioral intention would be strengthened with higher age of the user. The direction of the hypothesis was consistent with the findings by Venkatesh et al. (2003) who found that social influence from those the user perceives as important positively affects behavioral intention when moderated by a mandatory setting, age, gender, and experience. However, the model did not yield any significant result concerning the relationship between social influence moderated by age on behavioral intention. Thus, we cannot support H<sub>4a</sub>.

This is quite contrary to the interviews done in this study. Several participants preferred getting help and advice from their friends because it occurred more naturally. They did not want to take away time from their grandchildren and family when they finally got to spend time with them – and they did not want to be a burden either.

Therefore, it was surprising that our hypothesis regarding social influence from family (H<sub>4b</sub>), which states that age weakens the relationship between social influence and behavioral intention, was not supported. The significant results show that age increases the effectiveness of social influence from family on behavioral intention. In other words, it indicates that social influence from family has a positive effect on seniors' behavioral intentions. This is consistent with Venkatesh et al. (2003) findings, who found a positive relationship between behavioral intention and social influence from those perceived as important to the user. Zhou et al. (2010) also found social influence to be a variable that influences a user's adoption of mobile banking. This is also contrary to our findings when gathering insights into seniors' thoughts, attitudes, and experiences around mobile technology, as mentioned previously. Also, a previous study concerning healthcare information technology states that children and grandchildren can discourage seniors from using that type of technology (Zhao et al., 2022). One might assume then that family ties are closer in the Norwegian population and that seniors feel they are mainly influenced by what their families think they should do.

### 7.3 Actual usage as a dependent variable

Next, we look at the actual usage as the dependent variable and how the independent variables, predicted behavioral intention and age, influenced the usage of the mobile banking application.

Our findings show a significant relationship between predicted behavioral intention and actual usage, where behavioral intention positively affects usage habits among those using the mobile banking application daily and weekly. This supports our hypothesis, H<sub>5a</sub>, to some degree and coincides with the findings from Venkatesh et al. study in 2003, where they found behavioral intention to impact usage. On the contrary, one of the interview participants stated that he could potentially use it – meaning he had the intention. He had, however, not chosen to download and use the application yet.

Looking at the relationship with age as a moderator, we see that the interaction effect was not significant, meaning we cannot support hypothesis H<sub>5b</sub>. However, when examining the results, we see that seniors are more likely to use the mobile banking application compared to the youngest age group (below 55 years of age). This might indicate that the variables found to be significant for behavioral intention influence the adoption of the mobile banking application for those over 65 years of age.

Furthermore, the simple slope analysis shows that the predicted behavioral intention affects the older groups but not the younger ones. One can assume that this might be related to the fact that

most younger people already use the application daily – which was found in our results. In Figure 5, we see that for the younger group, they start at daily use, and it shows that predicted behavioral intention influences usage negatively. As the variables in predicted behavioral intention is related to higher age, it might be that they do not influence actual usage for the younger segment. The mobile banking application is already a part of their habit and are already at the actual usage stage.

#### 7.4 General discussion

In the multiple regression, one control variable was significant: education level. It is not surprising to see that the education level plays a part in behavioral intention. Through higher education, one has learned to absorb new knowledge, which is imperative when adopting new technology.

Another interesting find in the survey was the ranking of the different digital solutions made for banking. We looked at Vipps, internet banking, physical bank, and mobile banking application. From Table 7, looking at the entire set of respondents, we see that mobile banking application is the preferred choice for banking, with Vipps being second than internet banking and physical bank lastly.

However, the ranking based on the respondents over 65 show that mobile banking application has dropped and is the third preferred option for banking. They prefer internet banking and Vipps instead. This, in relation to our findings in the interviews, is not surprising. Several interview participants mostly used internet banking to pay their bills and keep control of their finances and used Vipps to transfer money to friends and family. For those not using the mobile banking application, the most common answer as to why, was because they only needed internet banking and Vipps. The combination of these solutions satisfied the respondent enough that they did not feel the need for a third option.

Lastly, considering the measures that banks can take to include seniors more in their digital solutions is related to how accessible the learning options are. We dedicated the last spot on the survey to question which method was preferred for the respondents in order to learn how to use the mobile banking application. Table 17 illustrates the ones that were most preferred by the respondents over 65 years of age. The complete list is found in Table 10:

**Table 17***Top 3 preferred learning choices for those over 65 years of age.*

<b>Learning choice</b>	<b>Count</b>	<b>Percentage</b>
Video-learning	29	16.48%
Download step-by-step	29	16.48%
Individual learning in the bank	28	15.91%

The one with the highest response rate was the option “none of the alternatives”, but this could be due to respondents being content with internet banking and Vipps, or that they prefer getting help from family members. Further, it could be that they are comfortable using technology themselves and prefer finding out how it works on their own, and therefore do not find any of the options useful. When collecting survey responses, a passer-by whom we asked to participate had a smartphone but did not believe in technology and thus would not participate. Some might not want to use technology and, therefore, elevate the response rate for “none of the alternatives”.

For the bank to include non-digital seniors and foster the adoption of the mobile banking application, the preferred choices in Table 17 might be great alternatives. By providing easy access on their media platforms or locations that the potential user most prefers, they might elevate the adoption rate of the technology. During our observation, one of the contributing participants stated that she felt stupid for not being able to keep up with the technology. She also stated that she did not believe she had the time or interest to learn. By having online tutorial videos available, the possibility of feeling stupid might be eliminated. They get to learn in their own home without any judgment from others. It will also be more convenient, as the bank's opening hours will not be of concern, allowing digital training at the user's discretion.

## 7.5 Limitation

In this section, we will examine the limitation of the research and how it might impact the study. These limitations are related to the design of the study, the method, but also the scope of the thesis.

The first limitation is related to the different banking technologies distributed. In the survey, only Vipps was added as an option to the specific services delivered by the bank. We acknowledge that many more options are available, e.g., Apple Pay and Google Pay. However, we chose to focus on Vipps as it is well-established but also because it was mentioned several

times as being used frequently by the participants in the interviews. Furthermore, several Norwegian banks are not compatible with, for instance, Apple Pay (Jæren Sparebank, n.d.-b; Loeb, 2023; SpareBank1, n.d.-a).

The initial plan for the survey was to base it on and relate it to the items in the UTAUT model. However, due to context, we had to adapt the scale from latent variables to single variables. This made data analysis and reaching an approved Cronbach's Alpha measure of the scales difficult. Furthermore, one of the scales had to be modified to two distinct, independent variables for the model to be significant. However, this enables us to discover that the useful item of performance expectancy significantly contributed to behavioral intention, as opposed to efficient, which proved to be not significant.

The data used for analysis and hypothesis testing were collected in Norway. Thus, the findings only apply to similar populations with a high level of trust and a banking system that secures its customers.

Furthermore, the survey was primarily distributed online, which means that we were heavily reliant on people having some knowledge of technologies, technological devices, and internet access. Therefore, the results might be biased, as they are already somewhat digital, and the non-digital users might be excluded from the survey. The results are thus heavily based on people with at least some level of digital skills. As stated in the introduction, with approximately 50% of Norwegian seniors being non-digital, the results may differ if the survey was non-digital. Based on this, the results are to a high degree in relation to those who lack 'skills access' and 'usage access', the last stages in the digital divide (van Dijk, 2005, p. 21-48). However, due to the time restraint for the thesis, we could not gather enough respondents via a non-digital questionnaire and had to use the digital tools available.

When asking about the preferred learning options, the alternatives were predetermined. One could think that if they could suggest themselves, it could have been even more targeted towards which would be most preferred.

We also experienced some issues related to multicollinearity, which indicates a correlation between the independent variables. When collinearity appears, it may be hard to distinguish the effects of the variables, but it also affects the significance level (Eikemo & Clausen, 2007, p. 157). However, this was expected due to the interaction term added to the regression equation (Friedrich, 1982).

## 7.6 Implication

### *7.6.1 Theoretical*

Researchers have studied and emphasized the current digital divide, why it is happening, and measures that could be taken to reduce it. However, it was hard to find studies that highlight the grey digital divide in relation to the banking sector, specifically using the population in Norway. We expanded the use of UTAUT to a non-organizational setting and further concerning seniors. Additionally, we separated the performance expectancy variable into two and found significant results for the ‘useful’ item.

Previous research has used social influence in relation to those deemed important to the respondent. However, we divided the scale into two, distinguishing between the influence of friends and family. The results showed a significant difference between the two, and that in relation to the banks' technology, when moderated with age, social influence from family affects behavioral intention.

Regarding further research, we see the need to elaborate on the issue that seniors are facing. Throughout the research process for this thesis, several observations have been made that highlight the need for improvement in the area of digital exclusion. Many participants mentioned that the topic was very important and felt a need for change. Therefore, a study conducted using only seniors who are non-digital would be of interest.

Seeing as performance expectancy ‘efficient’ and effort expectancy turned out to be insignificant in this thesis, this should be further researched as well. Another interesting area would be to see if trust is more of a moderator than we anticipated.

As previously stated, the digital transformation has contributed to the reduction of physical services – allowing for more digital solutions. As a result, it would be worthwhile to highlight the grey digital divide in relation to other industries. Variables leading to behavioral intention and actual usage may differ across industries, deviating from our findings using the banking industry. Even studying other sorts of bank-related technology would be of interest – such as Apple/Google Pay or Vipps.

In addition, because the scope of this thesis was limited to Norwegians, a study conducted using participants in other parts of the world would be interesting. There might be cultural differences that can alter what variables are significant regarding behavioral intention toward using a



mobile banking application. Also, looking at a broader sample in Norway might contribute to different results and provide valuable insight into the grey digital divide.

### *7.6.2 Practical*

Even though the thesis' focus is on mobile banking applications, several factors have been highlighted that could be used in other businesses. As mentioned previously, we looked at several examples of businesses that are mainly application-based, therefore, some of these findings could also be interesting to them. What preferences seniors have when it comes to learning could be adapted to other industries. This study also illustrates the seniors' attitudes and thoughts regarding technology and mobile applications, which could be used for marketing purposes.

The digital divide, especially the grey digital divide, has been highlighted in previous studies, but mostly in relation to health-related technology. In this thesis, the grey digital divide has been related to the banking sector. The banking sector can be regarded as a service provider that everyone in society is connected to and have a relationship with. Connecting the remaining non-digital seniors to the bank's digital solutions would benefit both the bank and the user. The cost would be reduced for both parties, seniors would feel less excluded, and the bank could offer better terms and conditions for their services.

According to the survey, video-learning, step-by-step guides on the website, and individual guidance in the bank were the preferred learning methods among the respondents over 65 years of age. From this, we suggest that the banks consider distributing videos that are easy to follow and learn from but also incorporate and enable the step-by-step guide on their website. It also becomes clear from the survey that internet banking is the platform most used by those over 65, indicating that they would stumble upon both alternatives. Furthermore, a high percentage would also like individual guidance, which might require some planning for the bank. Due to the reduction of branches, they need to strategically locate themselves in accordance with those residing far from the bank's location. It would also be important that the bank reach out to seniors and have tutors who have some experience teaching seniors.

As higher awareness of the mobile banking application proved to be a positive influence on behavioral intention, we suggest that bank managers focus on and distribute marketing efforts specifically targeting seniors. We know from our research that seniors prefer internet banking as their banking option, which would be the perfect platform to reach out to them. From the survey, approximately 10% of the respondents did not use the mobile banking application.

Therefore, targeted marketing combined with incorporating the preferred learning methods found in this study would be a great way to get seniors to be aware of and adopt the mobile banking application as their primary banking solution.

The Norwegian industry standard for banks is found to be lacking, vaguely stating that banks are obligated to keep their analog options available and a possibility to get guidance. However, as mentioned, banks are reducing the number of operational branches, which can make it difficult and costly to get to the bank. With increasing age, the general health is likely to decrease, making traveling to the bank inconvenient and more expensive. If, for instance, the only option is to travel by car service or rely on friends and family for transportation, it elevates the costs. Therefore, we believe that a policy requiring banks to designate a certain number of hours to provide low-threshold guidance to seniors on how to use digital banking options would be a more suitable solution. This could also be a solution for closing the grey digital divide, especially the 'skills' access. However, for seniors who live far from the bank, providing guidance at convenient locations such as community centers or churches may be viable options.

As a final suggestion, ensuring that the digital option available is suitable for both tablets and smartphones should be highlighted. As can be seen in Appendix I, Jæren Sparebank's tablet version of their mobile banking application is the same format size as a smartphone, which can prove challenging to use for seniors who have poor eyesight.

## 8.0 Conclusion

The digital transformation and the use of digital technologies have enabled the reduction of bank branches. A high percentage of seniors are unaware of the mobile banking application, which leads us to conclude that seniors are excluded from the bank's digital transformation. Considering the interviews and feedback gathered from respondents, several felt excluded but also lacked knowledge about the technology that is present today. The industry standard, which emphasizes keeping analog options available, can be seen as a hindrance to closing the grey digital divide. The industry standard does not focus on eliminating the exclusion of non-digital people – which should be important when we see that the world is becoming increasingly digital.

The main findings of this thesis were which variables influence behavioral intention towards using the mobile banking application. Firstly, considering age as an independent variable before introducing the interaction effect, it is possible to state that age decreases behavioral intention. However, age is found to have a moderating effect on performance expectancy 'useful', facilitating conditions, and social influence from friends – where each variable contributed with a positive influence. This also indicates that these three variables positively influence behavioral intention toward using the mobile banking application. We also found that the predicted behavioral intention positively influenced the actual usage of the mobile banking application. In addition, the predicted behavioral intention positively influenced seniors' actual usage – meaning that the variables found contributed to the adoption of the application for seniors.

As mentioned, the number of seniors over 70 residing in Norway is to be doubled within 2060. This proves that the banks must consider which preferences seniors have when it comes to learning how to use the mobile banking application, but just as important, becoming aware of it. Even though the banks have many young customers who are primarily digital, they cannot forget about their customers with the highest purchasing power. Furthermore, from the findings, several options have been found that banks could implement in their services in order to make seniors feel included. To allow everyone to be included in the transformation of the banking industry, the banks must offer a mix of learning options. The suitable options that should be included are: having an instruction sheet to download, offering how-to videos online, or scheduling one-on-one training sessions for those that need them. This will make sure that everyone can, if they want to, use the mobile banking application.

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## 10.0 Appendices

### Appendix A: UTAUT

The following provides a more in depth explanation of the models used to create UTAUT.

#### *Theory of Reasoned Action*

The first model, the Theory of Reasoned Action (TRA) created by Fishbein and Ajzen in 1975, is “a behavioral intention measure will predict the performance of any voluntary act, unless intent changes prior to performance or unless the intention measure does not correspond to the behavioral criterion in terms of action, target, context, time-frame and/or specificity” (Sheppard et al., 1988, p. 325). The TRA includes attitude toward behavior and subjective norm as its core construct. Attitude toward behavior relates to “an individual’s positive or negative feelings (evaluative affect) about performing the target behavior” (Fishbein & Ajzen, 1975, p. 216). Subjective norm is defined as “the person’s perception that most people who are important to him think he should or should not person the behavior in question” (Fishbein & Ajzen, 1975, p. 302).

#### *Technology Acceptance Model (TAM/TAM2)*

Next up we have the Technology Acceptance Model (TAM) which was created in 1989 by Fred D. Davis. The Technology Acceptance Model focus primarily on the two core constructs: perceived usefulness and perceived ease of use. Perceived usefulness is defined in TAM as “the degree to which a person believes that using a particular system would enhance his or her job performance” (p. 320), and perceived ease of use is defined as “the degree to which a person believes that using a particular system would be free of effort” (Davis, 1989, p. 320). TAM has been used in order to address why some users accept a new technology or reject it, and how user acceptance has been influenced by certain system characteristics (Davis, 1993). There have been created a second TAM, which is named TAM2. The model was extended to include subjective norm – which was adapted from TRA as well as Theory of Planned Behavior. TAM2 was created by Venkatesh and Davis in 2000. From both TAM and TAM2, we see a similarity between the factors found in these models and UTAUT.

#### *Motivational Model*

Furthermore, we have the Motivational Model (MM) which was established and presented by Davis et al. in 1992. The main drivers of the MM are extrinsic and intrinsic motivation. It

focuses on an individual's intention to perform a given behavior – where the intention to perform a behavior is closely related to the actual behavior (Venkatesh & Speier, 1999). Extrinsic motivation relates to “the perception that users will want to perform an activity because it is perceived to be instrumental in achieving valued outcomes that are distinct from the activity itself, such as improved job performance, pay, or promotions” (Davis et al., 1992, p. 1112). Perceived usefulness, perceived ease of use and subjective norm are examples of extrinsic motivation. On the other hand, we have intrinsic motivation which is that the perception that the user will want to perform the activity, without any form of reinforcement other than the process of performing the activity – and examples can be using your computer for gameplay or just enjoyment (Davis et al., 1992).

#### *Theory of Planned Behavior*

Moreover, the Theory of Planned Behavior (TPB), which use attitude towards behavior, subjective norm and perceived behavioral control as the core constructs, is an extended version of TRA. The perceived behavioral control is stated as “the perceived ease or difficulty of performing the behavior”(Ajzen, 1991, p. 188). In the TPB model, a central factor is the intention that an individual must have to perform a certain, given behavior. As stated by Ajzen, “intentions are assumed to capture the motivational factors that influence a behavior; they are indications of how hard people are willing to try, of how much effort they are planning to exert, in order to perform the behavior” (1991, p. 181).

#### *Combined TAM and TPB (C-TAM-TPB)*

A hybrid model was created, which combined TAM and TPB, and was named C-TAM-TPB. The model was created by Taylor and Todd in (1995). In addition, this model is also called the Decomposed TPB, because it decomposes the factors attitude, subjective norm, and perceived behavioral control into the underlying belief structure in relations to technology adoption contexts (Venkatesh et al., 2003). The model includes two belief structures; normative belief, which includes peer influence and superior influence, and control belief, which includes self-efficacy, resource facilitating conditions and technology facilitating conditions (Taylor & Todd, 1995).

#### *Model of PC Utilization (MPCU)*

The model of PC Utilization is derived mostly from Triandis' theory of human behavior from 1977, which presents a competing perspective as to the ones proposed by TRA and TPB.

Triandis' theory says, "behavior is determined by what people would like to do (attitudes), what they think they should do (social norms), what they have usually done (habits), and by the expected consequences of their behavior" (Thompson et al., 1991, p. 126).

It was Thompson et al., in 1991 that adapted the Triandis' model, and used it to predict PC utilization. As mentioned by Venkatesh et al. (2003), the model is also well suited to predict acceptance and usage of a range of information technologies. The core constructs of the model include job-fit, complexity, long-term consequences, affect towards use, social factors, and facilitating conditions. All these core constructs, with definitions, is illustrated in the table below:

**Table A1**

*Constructs of MPCU*

<b>Core constructs</b>	<b>Definition</b>
Job-fit	"the extent to which an individual believes that using [a technology] can enhance the performance of his or her job" (Thompson et al., 1991, p. 129)
Complexity	"the degree to which an innovation is perceived as relatively difficult to understand and use" (Thompson et al., 1991, p. 128)
Long-term consequences	"Outcomes that have a pay-off in the future" (Thompson et al., 1991, p. 129)
Affect towards use	"feelings of joy, elation, or pleasure, or depression, disgust, displeasure, or hate associated by an individual with a particular act" (Thompson et al., 1991, p. 127)
Social factors	"the individual's internalization of the reference group's subjective culture, and specific interpersonal agreements that the individual has made with others, in specific social situations" (Thompson et al., 1991, p. 126)



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Facilitating conditions	“provision of support for users of PCs may be one type of facilitating condition that can influence system utilization” (Thompson et al., 1991, p. 129)
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*Innovation Diffusion Theory (IDT)*

E.M Rogers created the Innovation Diffusion Theory (IDT) which was used to study various types of innovations. Rogers (1962) presented five different attributes that had been shown to influence adoption: relative advantage, compatibility, complexity, observability, and trialability (Moore & Benbasat, 1991) However, it was Moore and Benbasat (1991) that adapted the characteristics which Rogers had presented so that it could be used to study the individual technology acceptance. They adapted and presented these as the new core constructs:

**Table A2**

*Constructs of IDT*

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<b>Core constructs</b>	<b>Definitions</b>
Relative advantage	“the degree to which an innovation is perceived as being better than its precursor” (Moore & Benbasat, 1991, p. 195)
Ease of use	“the degree to which an innovation is perceived as being difficult to use” (Moore & Benbasat, 1991, p. 195)
Image	“The degree to which an innovation is perceived to enhance one’s image or status in one’s social system” (Moore & Benbasat, 1991, p. 195)
Visibility	“The degree to which one can see others using the system in the organization” (Moore & Benbasat, 1991; Venkatesh et al., 2003)
Compatibility	“the degree to which an innovation is perceived as being consistent with the existing values, needs, and past experiences of potential adopters” (Moore & Benbasat, 1991, p. 195)

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Results Demonstrability	“the tangibility of the results of using the innovation, including their observability and communicability” (Moore & Benbasat, 1991, p. 203)
Voluntariness of Use	“the degree to which use of the innovation is perceived as being voluntary, or of free will” (Moore & Benbasat, 1991, p. 195)

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*Social Cognitive Theory (SCT)*

Lastly, we have the Social Cognitive Theory (SCT) which was created by Bandura in 1986, and is a widely accepted and empirically validated model of the behavior of individuals (Compeau & Higgins, 1995). The SCT is “based on the premise that environmental influences such as social pressures or unique situational characteristics, cognitive and other personal factors including personality as well as demographic characteristics, and behavior are reciprocally determined” (Compeau & Higgins, 1995, p. 190).

However, in order to relate the theory to the context of PC utilization, Compeau and Higgins (1995) adapted and extended the SCT. The core constructs of their model are as follows:

**Tabel A3**

*Constructs of SCT*

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<b>Core Constructs</b>	<b>Definitions</b>
Outcome Expectations – Performance	“The performance-related consequences of the behavior. Specifically, performance expectations deal with job-related outcomes” (Compeau and Higgins, 1995, as cited in Venkatesh et al., 2003, p. 432)
Outcome Expectations – Personal	“The personal consequences of the behavior. Specifically, personal expectations deal with the individual esteem and sense of accomplishment” (Compeau and Higgins, 1995, as cited in Venkatesh et al., 2003, p. 432).

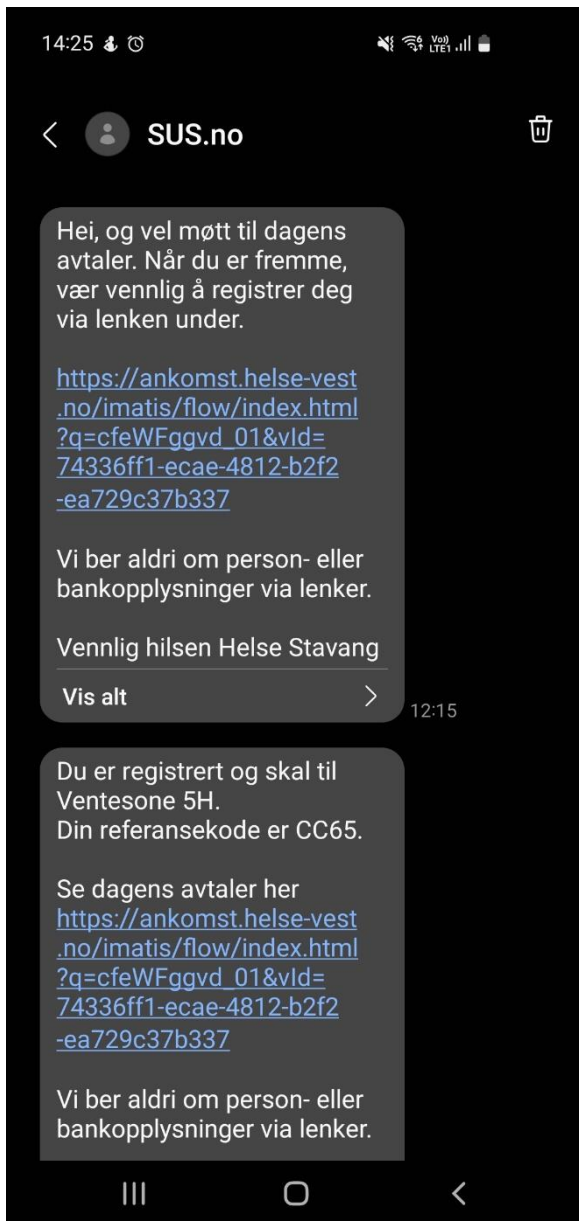
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Self-efficacy	<p>“People’s judgements of their capabilities to organize and execute courses of action required to attain designated types of performances” (Bandura, 1986, p. 391 as cited in Compeau &amp; Higgins, 1995, p. 191)</p> <p>“Computer self-efficacy, (...), a judgement of one’s capabilities to use a computer” (Compeau &amp; Higgins, 1995, p. 192).</p>
Affect	<p>“Individual’s liking for particular behavior(...)” (Compeau &amp; Higgins, 1995, p. 196).</p>
Anxiety	<p>“Evoking anxious or emotional reactions when it comes to performing a behavior (e.g., using a computer)” (Venkatesh et al., 2003, p. 432).</p>

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## Appendix B: SMS Helsenorge



## Appendix C: Interview guide

All interviews were conducted anonymously using participants with internet access and a smartphone or tablet.

**Table C1**

*Norwegian interview guide (user)*

Forhåndsbestemte spørsmål	Veiledende
Alder	
Kjønn	
Bosted og situasjon, barn og barnebarn	
Utdanning	
Hva blir smart telefon/nettbrett brukt til?	
Hvordan gjennomfører du bank tjenester?	
I banken	Hva er grunnene til at du foretrekker banken?
Via nettside	Hva er grunnene til at du foretrekker nettside? Er du fornøyd med nettsiden? Hva liker du/liker ikke med nettsiden?
Venner eller familie bruker for meg	Er det en grunn til at de ikke lærer deg opp? Hvorfor foretrekker du dette?
App	Hvordan fikk du kjennskap til appen? Hvor ofte bruker du appen? Hva bruker du appen til? Er du fornøyd med appen? – Hvorfor/hvorfor ikke? Synes du appen er nyttig i din hverdag? Hva er viktig for deg når du bruker appen? Er det noe du tenker er vanskelig ved appen? Hvorfor/hvorfor ikke? Er det noe du tenker er lett ved appen? Hvorfor/hvorfor ikke?

Kjenner ikke til appen

Er det noe du tenker ved appen du tenker kan forbedres? Hvorfor/hvorfor ikke?

Ville du foreslått appen til venner?

Hvorfor/hvorfor ikke?

Ville du foreslått appen til familie?

Hvorfor/hvorfor ikke?

Har du tilgang til hjelp når du bruker appen?

Kjenner du til fordelene ved å bruke appen?

Er du klar over at appen levert av banken?

Hva er grunnene til at du ikke har tatt den i bruk?

Ville du testet appen dersom banken hadde tilbydd veiledning? Hvorfor/Hvorfor ikke?

Ville du testet appen dersom venner hadde foreslått det? Hvorfor/Hvorfor ikke?

Ville du testet appen dersom venner hadde tilbydd veiledning? Hvorfor/ Hvorfor ikke?

Ville du testet appen dersom familie hadde foreslått det? Hvorfor/Hvorfor ikke?

Ville du testet appen dersom familie hadde tilbydd veiledning? Hvorfor/hvorfor ikke?

Ville du tatt i bruk appen dersom du hadde hatt hjelp tilgjengelig?

Er det noe du ønsker å tilføye?

---

**Table C2***English interview guide (user)*

<b>Predetermined</b>	<b>Guiding</b>
Age	
Sex	
Place of residence and living situation, children, grandchildren?	
Education	
What do you use your smartphone/tablet for?	
How do you conduct bank related tasks?	
In the bank	Why do you prefer going to the bank?
Via website	Why do you prefer using the website? Are you pleased with the website? What do you like/ not like about the website?
Friends or family use it for me	Is there a reason for them not teaching you to use it on your own? Why do you prefer this?
App	How did you get knowledge about the app? How often are you using the app? What do you use the app for? Are you pleased with the app? Why/Why not? Do you find the app useful in everyday life? Whats important for you when using the app? Are there something you find difficult when using the app? Why/Why not? Are there something you find easy when using the app? Why/Why not? Is there something you feel the bank should improve with the app? Why/Why not? Would you recommend the app to friends? Why/Why not?

---

Not aware of the app

Would you recommend the app to family? Why/Why not?

Do you have access to support when using the app? Is it important for you?

Were you aware of the app?

Are you aware of the advantages of using the app?

Is there a special reason for you not using the app?

Would you try the app if the bank distributed support/guidance? Why/Why not?

Would you try the app if friends had recommended it? Why/Why not?

Would you try the app if you had friends giving guidance? Why/Why not?

Would you try the app if family had recommended it? Why/Why not?

Would you try the app if you had family giving guidance? Why/Why not?

Ville du tatt i bruk appen dersom du hadde hatt hjelp tilgjengelig?

Would you use the app if you had support available?

Do you have anything to add?

---



**Table C3***Norwegian interview guide (bank)*

<b>Forhåndsbestemte spørsmål</b>	<b>Veiledende</b>
Alder	
Hvor lenge har du jobbet i banksektor?	
Hvilken stilling har du i banken?	
Hva oppfatter du som den vanligste årsaken til at folk kontakter kundeservice?	Har du noen tanker om dette?
Hva oppfatter du som den vanligste årsaken til at seniorer kontakter kundeservice?	Har du en tanke om de foretrekker fysisk bank, telefon eller hjelp over internett?
Får du henvendelser relatert til appen?	Hva er i så fall grunnene? Er seniorer komfortable med hjelp over telefon? Hva liker du/liker ikke med nettsiden?

**Table C4***English interview guide (bank)*

<b>Predetermined</b>	<b>Guiding</b>
Age	
How long have you been working in the banking sector?	
What kind of job position do you currently have?	
What is your perception of why people are contacting the banks customer service?	Do you have any thoughts on this?
What is your perception of why seniors are contacting the banks customer service?	Do you have a thought on whether seniors prefer getting help over the phone, internet or physically?
Do you get inquiries regarding the app?	What are the reasons for these inquiries? Are seniors comfortable getting help over the phone when using the app?

## Appendix D: Survey

# Master Thesis 2023

---

Start of Block: Default Question Block

Hi,

We are two master students at the UiS Business School. Therefore, we are looking for respondents for our survey concerning the use of mobile phones. We want to look at the use of mobile banking applications, the web-based bank, and the usage pattern. There is no requirement to use these technologies or be skilled on the topic – the only goal is to see how you use your mobile phone, computer or tablet.

The survey is anonymous, and there will not be any personal questions related to your economic situation. The survey will only be used in our master thesis. The survey will take approximately 5 to 10 minutes to complete.

Do not hesitate to contact us on our emails in case you have any concerns:

[Kris.simonsen@stud.uis.no](mailto:Kris.simonsen@stud.uis.no) or [lk.salte@stud.uis.no](mailto:lk.salte@stud.uis.no)

Best regards,

Lene Katrin Salte and Kristine Simonsen

---

End of Block: Default Question Block

Start of Block: Block 1

Q2 Your age?

- Younger than 16 years old (1)
  - 16-25 years old (2)
  - 26-35 years old (3)
  - 36-45 years old (4)
  - 46-55 years old (5)
  - 56-65 years old (6)
  - 66-75 years old (7)
  - 76-85 years old (8)
  - 85 years or above (9)
- 

Q3 Sex?

- Male (1)
  - Female (2)
  - Other (3)
- 

Q4 Where do you live? (Postal Code)

---

---

Q5 Education level

- Primary School (1)
  - High School (2)
  - College/university (3)
- 

Q6 Job situation?

- Student (1)
  - Student with a job (2)
  - Unemployed (3)
  - Full-time employee (4)
  - Part-time employee (5)
  - Retired (6)
  - None of the above (7)
- 

Q7 Do you own or rent?

- Own (1)
  - Rent (2)
  - None of the above (3)
-

Display This Question:

If Do you own or rent? = Own

Q8 Do you have a mortgage?

Yes (1)

No (2)

End of Block: Block 1

---

Start of Block: Block 2

Q9 Do you have any medical or physical ailments hindering the use of a mobile phone or tablet?

Yes (1)

No (2)

---

Q10 Do you have a smart phone or tablet?

Yes (1)

No (2)

---

Q11 Do you have internet access?

- Wi-Fi (1)
- Mobile data (2)
- Both (3)
- No (4)

*Skip To: End of Survey If Do you have internet access? = No*

---

Q12 Are you aware of your bank's mobile banking application?

- Yes (1)
  - No (2)
- 

Q13 To what degree do you **feel** that your bank is available to help if you stumble upon issues when using the mobile banking application?

- 1 – Strongly disagree (1)
  - 2 - Disagree (2)
  - 3 - Neutral (3)
  - 4 - Agree (4)
  - 5 – Strongly agree (5)
-

Q14 To what degree is it **important** for you that the bank is available to help if you run into problems when using the mobile banking application?

- 1 – Very unimportant (1)
- 2 - Unimportant (2)
- 3 - Neutral (3)
- 4 - Important (4)
- 5 – Very important (5)

Q15 Range these after usage. (Only one per option).

	1. Most used (1)	2. Second most used (2)	3. Third most used (3)	4. Least used (4)
Vipps (1)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Banks website (2)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Mobile banking-application (3)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Physical bank (4)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

End of Block: Block 2

Start of Block: Block 3

Q16 How often do you use the banks website?

- Daily (1)
  - Weekly (2 or more times per week) (2)
  - Monthly (1-4 times per month) (3)
  - Yearly (1-4 times per year) (4)
  - Never (5)
- 

Q17 To what degree do you find the online banking via webpage useful in your daily life?

- 1 – Highly useless (1)
  - 2 - Useless (2)
  - 3 – Neutral (3)
  - 4 - Useful (4)
  - 5 – Highly useful (5)
-



Q18 To what degree do you find the online banking via the webpage makes it possible to complete banking-related task efficiently?

- 1 – Very inefficient (1)
  - 2 – Inefficient (2)
  - 3 - Neutral (3)
  - 4 - Efficient (4)
  - 5 – Very efficient (5)
- 

Q19 To what degree do you find the online banking via the webpage easy to use?

- 1 – Very difficult (1)
  - 2 – Difficult d)
  - 3 - Neutral (3)
  - 4 - Easy (4)
  - 5 – Very easy (5)
-

Q20 Which of these factors are important for you when using the online banking via the webpage? (Can choose multiple alternatives.)

- Easy to use (1)
- Easy to learn (2)
- Understandable (3)
- Easy login (4)
- Possibility to get guidance from the bank (5)
- Security (6)
- Availability (9)
- Have friends available for help (7)
- Have family available for help (8)

End of Block: Block 3

---

Start of Block: Block 4

Q21 How often do you use Vipps?

- Daily (1)
- Weekly (2 or more times a week) (2)
- Monthly (1-4 times a month) (3)
- Yearly (1-4 times a year) (4)
- Never (5)

Q22 To what degree do you find Vipps useful in everyday life?

- 1 – Highly useless (1)
  - 2 - Useless (2)
  - 3 Neutral (3)
  - 4 – Useful (4)
  - 5 – Highly useful (5)
- 

Q23 To what degree do you think that Vipps makes it possible to complete banking-related task efficiently?

- 1 – Very inefficient (1)
  - 2 – Inefficient (2)
  - 3 - Neutral (3)
  - 4 - Efficient (4)
  - 5 – Very efficient (5)
-

Q24 To what degree do you find Vipps easy to use?

- 1 – Very difficult (1)
  - 2 - Difficult (2)
  - 3 - Neutral (3)
  - 4 - Easy (4)
  - 5 – Very easy (5)
- 

Q25 Which of these factors are important for you when using Vipps? (Can choose multiple alternatives).

- Easy to use (1)
- Easy to learn (2)
- Understandable (3)
- Easy login (4)
- Security (5)
- Availability (8)
- Have friends available for help (6)
- Have family available for help (7)

End of Block: Block 4

---

Start of Block: Block 5

Q26 How often do you use the mobile banking application?

- Daily (1)
- Weekly (2 or more times a week) (2)
- Monthly (1-4 times a month) (3)
- Yearly (1-4 times per year) (4)
- Never (5)

*Skip To: End of Block If How often do you use the mobile banking application? = Never*

---

Q27 To what degree do you find the mobile banking application useful in you daily life?

- 1 – Highly useless (1)
  - 2 - Useless (2)
  - 3 - Neutral (3)
  - 4 - Useful (4)
  - 5 - Highly Useful (5)
-

Q28 To what degree do you find the mobile banking application makes it possible to complete banking-related task efficiently?

- 1 - Very inefficient (1)
  - 2 - Inefficient (2)
  - 3 - Neutral (3)
  - 4 - Efficient (4)
  - 5 - Very efficient (5)
- 

Q29 To what degree do you find the mobile banking application easy to use?

- 1 – Very difficult (1)
  - 2 - Difficult (2)
  - 3 - Neutral (3)
  - 4 - Easy (4)
  - 5 - Very easy (5)
-

Q30 Which of these factors are important for you when using the mobile banking application?  
(Can choose multiple alternatives).

- Easy to use (1)
- Easy to learn (2)
- Understandable (3)
- Easy login (4)
- Have the possibility to get guidance from the bank (5)
- Security (6)
- Availability (9)
- Have friends available for help (7)
- Have family available for help (8)

End of Block: Block 5

---

Start of Block: Block 6

Q31 How much do you agree with this statement: “I am influenced by the usage habits of those around me?”

- 1 – Strongly disagree (1)
  - 2 - Disagree (2)
  - 3 - Neutral (3)
  - 4 - Agree (4)
  - 5 – Strongly agree (5)
- 

Q32 To what degree do you trust advice from friends in relation to banking and technology?

- 1 – Very small degree (1)
  - 2 – Small degree (2)
  - 3 - Neutral (3)
  - 4 – Large degree (4)
  - 5 – Very large degree (5)
-



Q33 How comfortable are you asking your friends for help using the bank's technology?

- 1 – Very uncomfortable (1)
  - 2 - Uncomfortable (2)
  - 3 - Neutral (3)
  - 4 - Comfortable (4)
  - 5 – Very comfortable (5)
- 

Q34 To what degree do you find it useful getting advice from friends related to the bank's technology?

- 1 - Highly useless (1)
  - 2 - Useless (2)
  - 3 - Neutral (3)
  - 4 - Useful (4)
  - 5 – Highly useful (5)
-

Q35 How likely are you to adopt technology recommended by friends?

- 1 – Very unlikely (1)
  - 2 - Unlikely (2)
  - 3 - Neutral (3)
  - 4 - Likely (4)
  - 5 - Very likely (5)
- 

Q36 To what degree do you feel like a nuisance if you must ask friends for help with the bank's technology?

- 1 - Very small degree (1)
  - 2 – Small degree (2)
  - 3 - Neutral (3)
  - 4 – Large degree (4)
  - 5 – Very large degree (5)
- 

Page Break

Q37 To what degree do you trust advice from family in relation to banking and technology?

- 1 - Very small degree (1)
  - 2 – Small degree (2)
  - 3 - Neutral (3)
  - 4 – Large degree (4)
  - 5 – Very large degree (5)
- 

Q38 How comfortable are you with asking your family for help using the bank's technology?

- 1 - Very uncomfortable (1)
  - 2 - Uncomfortable (2)
  - 3 - Neutral (3)
  - 4 - Comfortable (4)
  - 5 – Very comfortable (5)
-

Q39 To what degree do you think it is useful to get advice from family regarding the bank's technology?

- 1 – Highly useless (1)
  - 2 - Useless (2)
  - 3 - Neutral (3)
  - 4 - Useful (4)
  - 5 – Highly useful (5)
- 

Q40 How likely is it that you had adopted technology recommended by family?

- 1 – Very unlikely (1)
  - 2 - Unlikely (2)
  - 3 - Neutral (3)
  - 4 - Likely (4)
  - 5 Very likely (5)
-

Q41 To what degree do you feel like a nuisance if you must ask your family for help with the bank's technology?

- 1 - Very small degree (1)
- 2 - Small degree (2)
- 3 - Neutral (3)
- 4 - Large degree (4)
- 5 - Very large degree (5)

End of Block: Block 6

---

Start of Block: Block 7

Q42 To what degree do you agree with this statement: "I want to use the mobile banking application in the next few months"?

- 1 - Highly disagree (1)
  - 2 - Disagree (2)
  - 3 - Neutral (3)
  - 4 - Agree (4)
  - 5 - Highly agree (5)
-

Q43 To what degree do you agree with this statement: “I don’t need the mobile banking application in my everyday life”?

- 1 – Strongly disagree (1)
  - 2 - Disagree (2)
  - 3 - Neutral (3)
  - 4 - Agree (4)
  - 5 – Strongly agree (5)
- 

Q44 Which of these options could you have attended or used for training within the mobile banking app? (Possible to select several alternatives)

- Group training in the bank’s physical premises (1)
  - Individual training in the bank’s physical premises (2)
  - Video training via the bank’s website
  - Online simulation game via the bank’s website (4)
  - Downloading instruction sheet with step-by-step explanation (5)
  - Sent instruction sheet in the mail with step-by-step explanation (6)
  - None of the options (7)
-

Q46 If you do not use the mobile banking app, which of these reasons suits you best? (It is possible to choose several options, and you do not have to answer if you use the mobile banking app)

- No need (1)
- Wasn't aware of the application (2)
- Not comfortable using the application alone without help (3)
- Do not use digital solutions (4)
- Only need internet banking and Vipps (5)
- Prefer to physically go to the bank (6)
- Too difficult to use (7)

End of Block: Block 7

---

## Appendix E: Preliminary Analysis

**Table E1**

*Component matrix Social influence friends*

*Component Matrix<sup>a</sup>*

	Component 1
To what degree do you find it useful to get advice from friends related to the bank's technology?	.861
How likely are you to adopt technology recommended by friends?	.805
How comfortable are you asking friends for help using the bank's technology?	.780
To what degree do you trust advice from friends in relation to banking and technology?	.755

Extraction Method: Principal Component Analysis.  
a. 1 components extracted.

**Table E2**

*Component matrix Social influence family*

*Component Matrix<sup>a</sup>*

	Component 1
To what degree do you find it useful to get advice from family related to the bank's technology?	.886
To what degree do you trust advice from family in relation to banking and technology?	.876



How likely are you to adopt technology recommended by family? .855

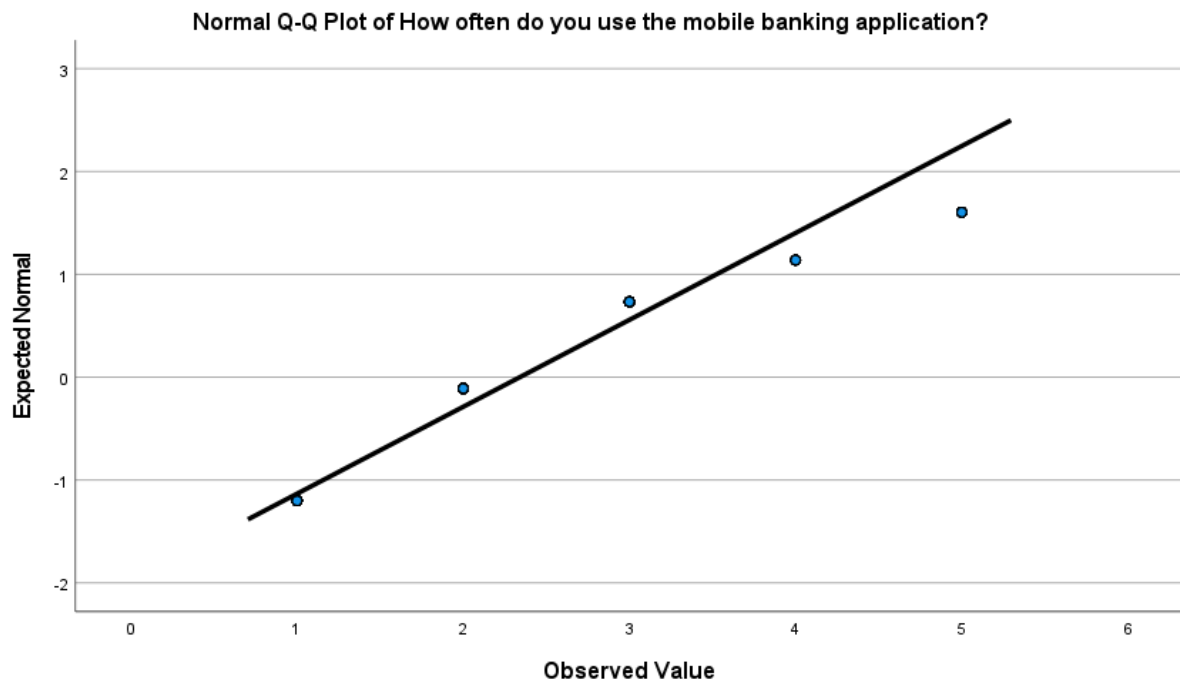
How comfortable are you with asking your family for help using the bank's technology? .837

---

Extraction Method: Principal Component Analysis.  
a. 1 components extracted.

**Table E3**

*Boxplot/Normaliy*



Actual usage as the dependent variable. Checking for normality of the distribution.

## Appendix F: Measure Summary

**Table F1:**

*Summary of constructs with measurement items Mobile banking application*

---

<b>Items used to estimate Behavioral Intention</b>	
<b>Performance Expectancy</b>	
Q27	To what degree do you find the MBA useful in daily life?
Q28	To what degree do you find the MBA enables you to efficiently compete bank related tasks?
<b>Effort Expectancy</b>	
Q29	To what degree do you find the MBA easy to use?
<b>Facilitating Conditions</b>	
Q12	Are you aware of the MBA?
<b>Social Influence Friends</b>	
Q32	To what degree do you trust advice from friends in relation to banking and technology?
Q33	How comfortable are you asking friends for help using the banks technology?
Q34	To what degree do you find it useful getting advice from friends related to the bank's technology?
Q35	How likely are you to adopt technology recommended by friends?
<b>Social Influence Family</b>	
Q37	To what degree do you trust advice from family in relation to banking and technology?
Q38	How comfortable are you asking family for help using the banks technology?
Q39	To what degree do you find it useful getting advice from family related to the bank's technology?
Q40	How likely are you to adopt technology recommended by family?
<b>Behavioral Intention MBA</b>	
Q42	I want to use the MBA in the next few months?

---

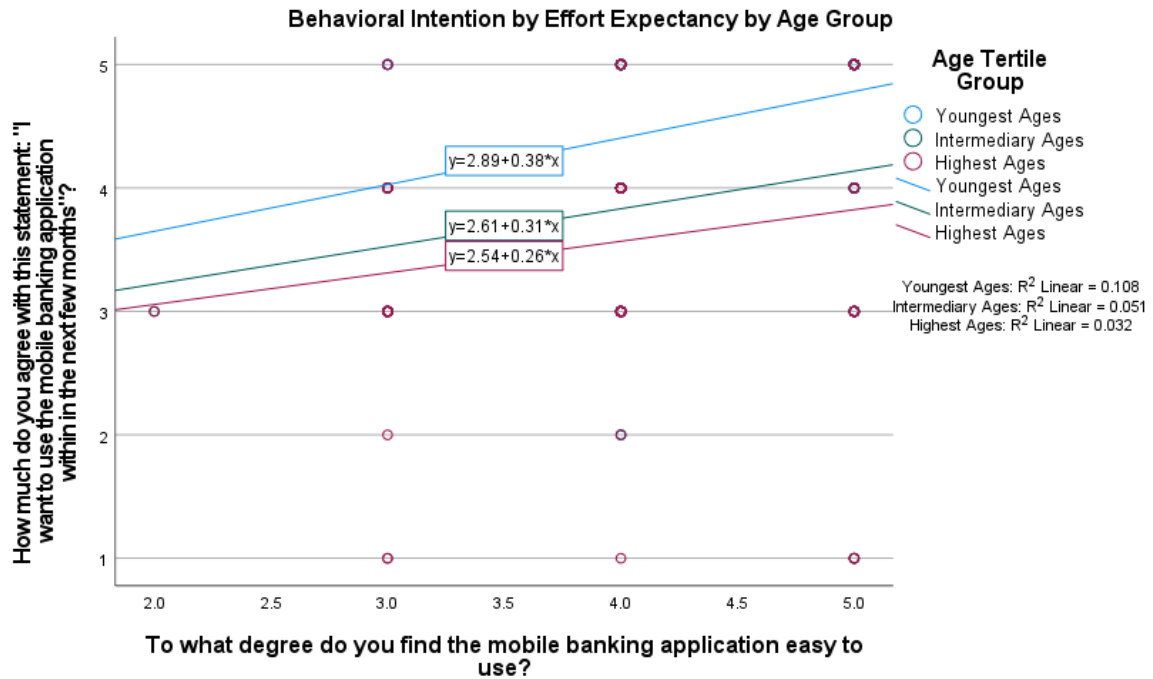
Note: MBA = Mobile banking applications

## Appendix G: Hierarchical Multiple Regression

The tables below will illustrate the simple slope analysis.

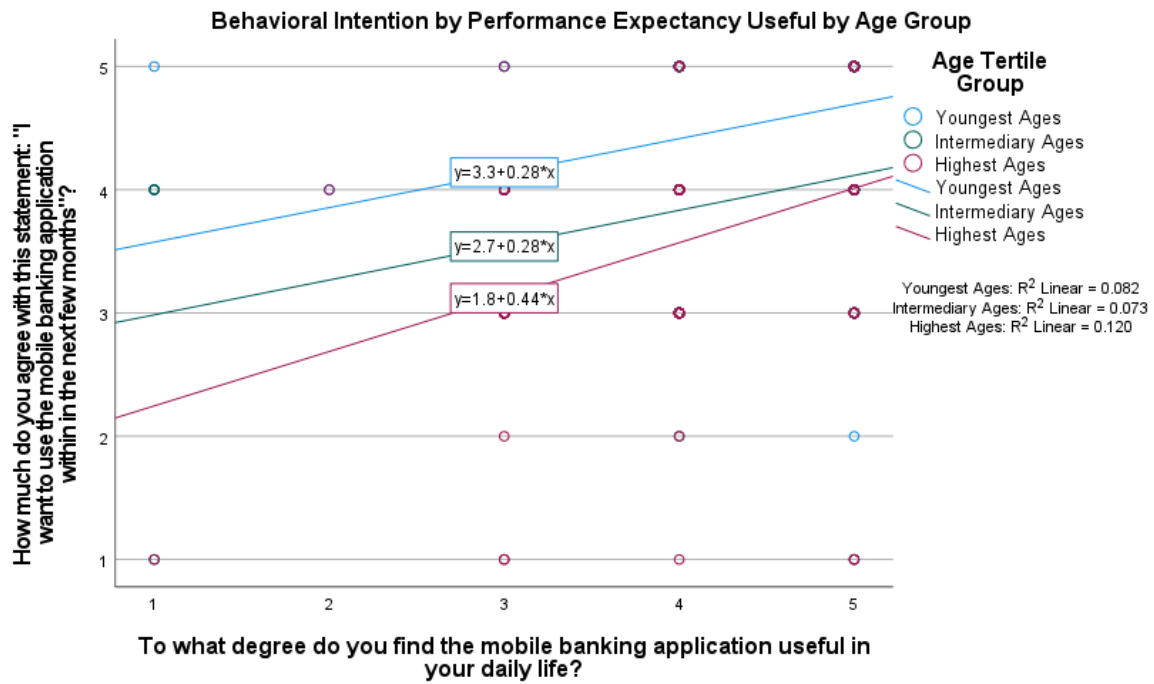
**Figure G1**

*Behavioral Intention by Effort Expectancy by Age Group*



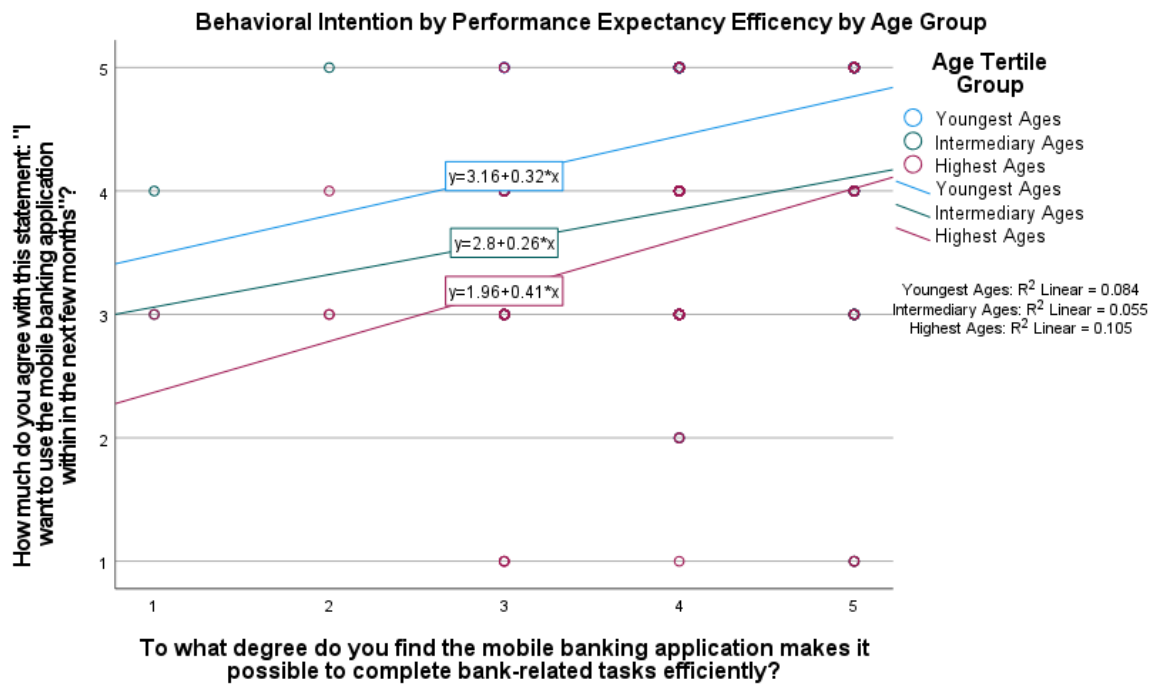
**Figure G2**

*Behavioral Intention by Performance Expectancy 'useful' by Age Group*



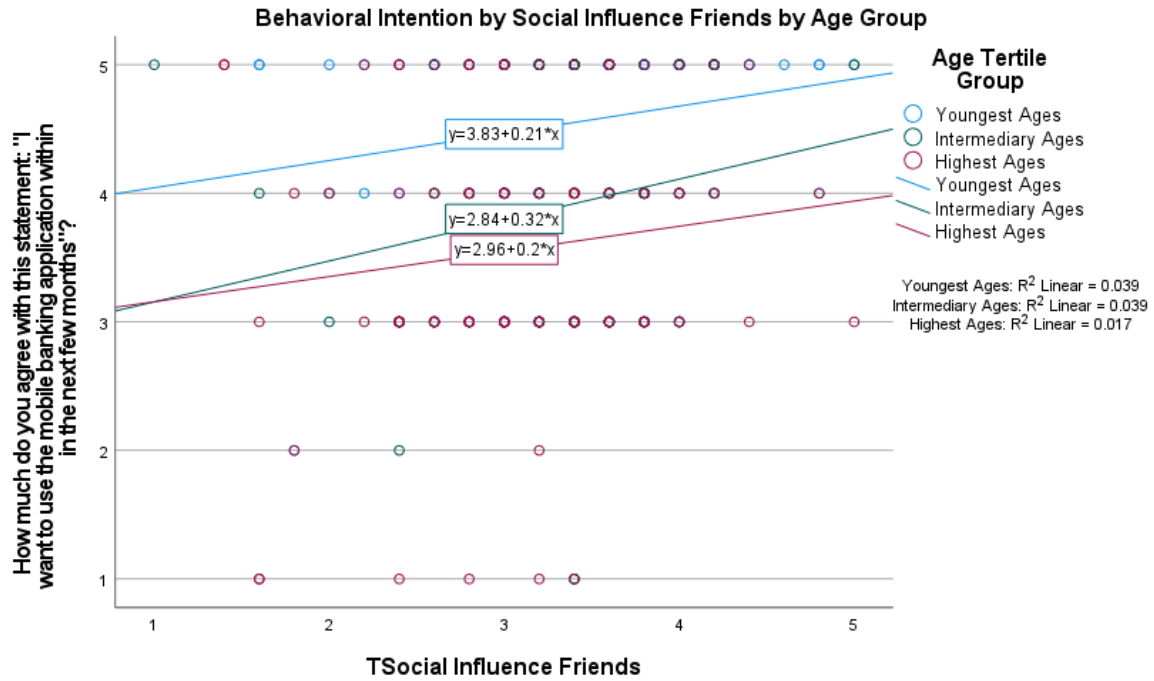
**Figure G3**

*Behavioral Intention by Performance Expectancy 'Efficiency' by Age Group*



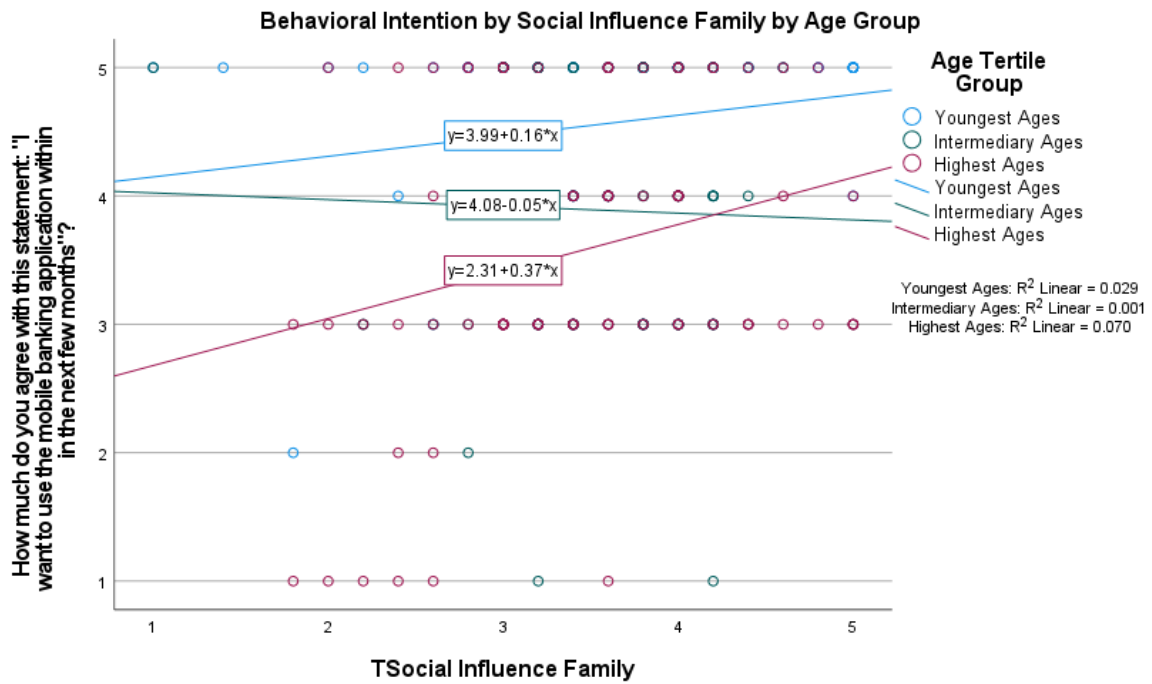
**Figure G4**

*Behavioral Intention by Social Influence Friends by Age Group*



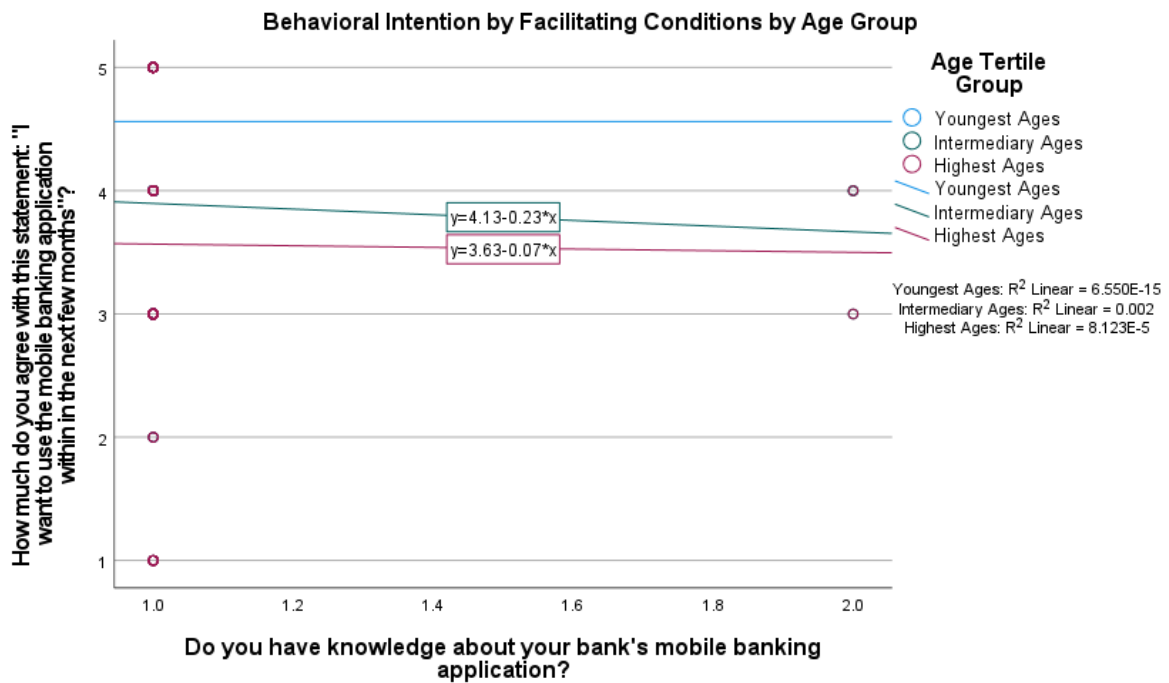
**Figure G5**

*Behavioral Intention by Social Influence Family by Age Group*



**Figure G6**

*Behavioral Intention by Facilitation Conditions by Age Group*



## Appendix H: Multinomial Logistic Regression

**Table H1**

*Model Fitting Information*

<b>Model</b>	<b>Model Fitting</b>	<b>Likelihood Ratio Tests</b>		
	<b>Criteria</b>	<b>Chi-Square</b>	<b>df</b>	<b>Sig.</b>
	<b>-2 Log Likelihood</b>			
Intercept only	669.42			
Final	619.12	50.312	12	<.001

**Table H2**

*Goodness-of-fit*

	<b>Chi-Square</b>	<b>Df</b>	<b>Sig.</b>
Pearson	1064.56	1132	.924
Deviance	619.11	1132	1

## Appendix I: Mobile Banking Application on Tablet

