



PRINT ISSN: 2519-9781

ONLINE ISSN: 2710-1320

An investigation of the Moderating Role of Income in Customer Mobile Banking Use: Quantitative Study

Abdulkadir Jeilani

Mogadishu University, Faculty of Computer Science & IT

Email: a.jeilani@mu.edu.so

Abdisatar Arabow

Mogadishu University, Faculty of Computer Science & IT

Email: abdisatar.e337@mu.edu.so

doi.org/10.70457/MUJ00114

Abstract

The study aims at acquisition perceptions of customer intention to use mobile banking services. Social presence, Task – Technology Fit, and moderating role income were used as a basis to develop and confirm a research model. convenience sampling was employed to conduct this research and select potential participants in this study. Three – hundred eighty-three respondents participated and the data was collected using a structured survey questionnaire. Data were analyzed using analysis of moment structures - statistical package for social science (AMOS – SPSS). The result revealed that there is a negative and positive

moderating role of income on the relationship between perceived advantage, perceived task, and customers' intention use of mobile banking; the moderating role of income on the relationship among perceived privacy, information quality, service quality, system reliability, interactivity and customers' intention use of mobile banking were not significant. This research has several implications for the researchers, bank authorities, and other interested entities. Furthermore, the study's limitations are discussed.

Keywords: Income, social presence, task–technology fit, mobile banking, intention use.

1. Introduction

Mobile banking is performed on an app using a portable device, such as a smartphone or tablet. Online banking can be carried out on any device with an internet connection (e.g., desktop or laptop computer, smartphone, tablet) and doesn't require users to download an app. Mobile banking enables consumers to complete financial transactions such as checking bank accounts, transferring money, and making transactions without using traditional channels such as attending the bank branch, using the automated teller machine (ATM), calling the bank via the telephone, or using e-banking(Merhi et al., 2020).

Comprehensive use of mobiles and smartphones will provide an opportunity for banks to absorb potential customers in a competitive environment and add to their profitability by introducing the electronic banking services in line with customers' needs and eliminating problems and limitations of traditional banking(Ahmadi Danyali, 2018). Furthermore, M-banking services offer convenience and speed for customers together with cost savings. This has been a strategy for banks to expand their markets through the introduction of mobile services and reduce the cost of running banking operations. ATMs, e-banking, and m-banking are some examples of technological advancements that have generated new service routes for banks' products and services in Somalia. Seeking more cost-effective technologies which add value to customers is the main concern of most banks to serve their customers in more convenient ways while growing their profits and enhancing their competitiveness in the banking industry(Owusu Kwateng et al., 2019). At the moment, like other countries, almost all commercial banks in Somalia offer ATM services to their clients by networking their ATMs to enhance their utility to these customers. Banks need to better understand their

clients, as this may lead to reducing costs and maximizing profits for the banks(Al-Dmour et al., 2020).

one of the successful sectors in Somalia is the telecommunication sector which was developed by private companies. These private companies provide affordable fixed lines, mobile phones, and internet services in every major city in Somalia with the lowest international calling rates and high quality as well(Sayid & Echchabi, 2013). Due to the availability and fast-growing telecommunication systems, Hormuud Telecom in Mogadishu, Golis Telecom in Bossaso, and Telesom in Hargeisa introduced a mobile banking service in 2009, which is known as Zaad or Sahal⁽¹⁾ financial Services allowing customers to utilize their mobile phone to transfer money, to pay bills and to purchase goods and services. Within a very short period, this product became more popular in the Somali community from Ras Kamboni to Rascaseyr. However, Al-Shabab rejected Zaad or Sahal financial services, arguing that this will lead the economy to be controlled by international corporations and bankers, and to the elimination of local currency (So. Sh) in circulation⁽²⁾. Therefore, the Zaad or Sahal financial service was suspended in South Somalia, in the area where Hormuud Telecom is operating, while Zaad and Sahal financial service are operating effectively in Puntland and Somaliland states because these two states are not under the control of Al-Shabab which banned Zaad and Sahal services. But now, the majority of commercial banks in Somalia can offer mobile banking, electronic banking, and ATM (Automatic Teller Machine), even though security issues exist. Somalia banks are working on developing mobile banking

(1) <http://www.salaamsombank.com/pages.php?id=10>, accessed 04 March 2023

(2) Harakat Al-Shabab Al-Mujahideen, Department of Politics and Wilaayaat “Statement Regarding the Closure of Mobile Money Transfer (MMT) Service in Somalia”, Oct 18 2010.

applications to meet and satisfy the client's needs using smartphones. The researchers argued that gaining a better theoretical understanding of education differences is important in promoting individual adoption and sustained usage of new information technologies and their adaption(Merhi et al., 2020).

In addition, there are empirical researches that have investigated the factors influencing customers' continuance intentions towards internet banking(Ofori et al., 2017), Customer centrality in mobile banking: a customer experience perspective(Komulainen & Saraniemi, 2019), Factors influencing customers' change of behaviors from online banking to mobile banking in Tejarat Bank, Iran(Ahmadi Danyali, 2018), Mobile banking service quality and customer relationships(Arcand et al., 2017), Acceptance and use of mobile banking: an application of UTAUT2(Owusu Kwateng et al., 2019)The effect of customer lifestyle patterns on the use of mobile banking applications in Jordan(Al-Dmour et al., 2020), Consumer use of mobile banking (M-Banking) in Saudi Arabia: Towards an integrated model(Baabdullah et al., 2019), Examining the role of consumer satisfaction within mobile eco-systems: Evidence from mobile banking services(Geebren et al., 2021) An empirical examination of the moderating role of age and gender in consumer mobile banking use: a cross-national, quantitative study(Merhi et al., 2020), The moderating effect of e-bank structure on French consumers' trust(Kaabachi et al., 2020),

On the other hand, a clear understanding of factors that influence customers' intention to use m – banking in Somalia has not been extensively examined empirically. Moreover, the study integrated the social presence theory, the Task-Technology Fit (TTF) Model, and income as moderator variables to deepen the scope of its application to customers' intention to use mobile banking. Nevertheless, the researchers

seek empirical evidence for the confirmation of theoretical models and constructs outside of the developed countries. Thus, some of the researchers identified that their studies excluded the question related to income because it was viewed as violating their privacy (Arcand et al., 2017; Geebren et al., 2021; Komulainen & Saraniemi, 2019; Merhi et al., 2020). Thus, the research questions are set out: ***(1) Does income explain customers' intention to use mobile banking? (2) What are the comprehensive approaches to making customers intention use mobile banking?***

2. Theoretical Framework and hypotheses

2.1 Mobile Banking

Mobile banking also referred to as cell phone banking, is the use of mobile terminals such as cell phones and personal digital assistants (PDAs) to access banking networks via the wireless application protocol (WAP) (Zhou et al., 2010). The term mobile banking can be defined in different terms like m-banking, m-payments, m-transfers, and m-finance and pocket banking (Sripalawat et al., 2011; Tran and Corner, 2016). mobile banking is generally defined as an application of m-commerce, which is supported by mobile technology and products to enable consumers to process banking services on their own mobile devices, including smartphones, tablets, smartwatches, and other smart technologies. Mobile banking can include a broad range of services, such as using text-based banking, accessing bank websites via mobile devices, and processing banking services through mobile apps installed on consumers' mobile devices (Zhang et al., 2018).

M-banking can be described as “a service or product offered by financial institutions that make use of portable technologies” (Tam and Oliveira, 2017) with the support of mobile banking services, customers

can perform various banking activities, for example, they can pay invoices, check the balance of their account, conduct payment transactions, retrieve credit card details and perform bank transfers (Babtista and Oliveira, 2016).

Since mobile applications are usually designed to be used by the masses, quantitative studies regarding customer experience, value, and m-banking services could provide us with complementary information, for example, information regarding the kinds of issues that users value the most in a service or the kinds of correlations various value elements have with each other. In addition, studying consumers using different types of m-banking services in different countries is a future area of research exploring customer experience in m-banking (Komulainen & Saraniemi, 2019). Somalia has a well-developed ICT sector and telecommunications infrastructure. There are five main Mobile Network Operators (MNOs) that work all over the country, and some of them connect the different zones and federal states. Mobile phone availability and popularity in Somalia have also resulted in the growth of mobile banking services. According to the 2014 Global Financial Inclusion Survey, Somalia is one of the most active mobile banking marketplaces. Mobile Network Operators, banks, and remittance businesses now facilitate mobile money account-to-bank account transfers and the direct deposit of overseas remittances into mobile money accounts.

2.2 Income

Over the 12 months preceding the survey, 21.3 and 14.4 percent of households received income from aid in cash and in kind, respectively. Investment is a source of unearned income for 1.1 percent of urban and 0.8 percent of rural households. Households in urban areas also collect

income from the rental of property (2.2 percent) and pension payments (0.6 percent)⁽¹⁾. Personal income refers to all the earnings made by a household in a given year. It includes various sources of revenue like salaries, wages, investment, dividends, rent, and contributions being made by an employer towards any pension plan. Mobile banking as a new service requires users to have certain skills such as configuring and operating mobile phones to connect to the wireless Internet. In addition, users need to bear usage costs such as data service and transaction fees when using mobile banking. If users do not have these necessary financial resources and operational skills, they will not adopt or use mobile banking (Zhou et al., 2010). Therefore, it is hypothesized that there is a positive moderating role of income on the relationship between perceived benefits and customers' intention to use mobile banking.

2.3 Customers' Intention use of mobile banking

An intention to use is a user's desire to utilize technology in the future, according to the literature on technology acceptance. As a dependable predictor of actual technology use, the intention to utilize technology was chosen as the outcome variable in this study. Compared to the abundant research on initial adoption, continuance intention has received relatively less attention. Access quality, information quality, perceived ease of use, usefulness, uncertainty avoidance, perceived enjoyment, service quality, reliability, readiness, trust, attitude, social influence, and familiarity were verified to affect the customers' intention to use mobile banking and Internet services (Ahmadi Danyali, 2018; Khan et al., 2021; Komulainen & Saraniemi, 2019; Ofori et al., 2017;

(1) 2022 Somalia Integrated Household budget survey by National Bureau of statistics, the federal republic of Somalia accessed 04.03.2023.

Zhang et al., 2018). In this context, the customers are willing or desire to use mobile banking.

2.3 Task-technology fit (TTF) theory

TTF is a very precise exploration of the links between work-related matters and the use of technology proposed by Goodhue & Thompson (1995). The task technology fit (TTF) model argues that individuals will adopt a technology based on the fit between the technical characteristics and task requirements.

A crucial area of information system (IS) research is the comprehension of the factors that affect users' intention to use information technology (IT). Many theoretical models developed from psychology and sociology-related theories are being used in explaining technology acceptance and use. A comprehensive body of academic research (Davis, 1989; Goodhue & Thompson, 1995; Venkatesh et al., 2003).

Task-technology fit (TTF) theory holds that IT is more likely to have a positive impact on individual performance and be used if the capabilities of the IT match the tasks that the user must perform. Goodhue & Thompson (1995) developed a measure of task-technology fit that consists of 8 factors: quality, capability, authorization, compatibility, ease of use/training, production timeliness, systems reliability, and relationship with users. Each factor is measured using between two and ten questions with responses on a seven-point scale ranging from strongly disagree to strongly agree. The study focuses on the TTF model. According to TTF, a user will only adopt information technology if it helps them execute their current tasks better (Gebauer & Ginsburg, 2009; Goodhue, 1995; Goodhue & Thompson, 1995).

TTF has been widely used and combined with other models such as TAM to explain user adoption of information technology (Dishaw & Strong, 1999). Recently, TTF has been applied to explain user adoption of emerging Internet services such as blogs (Shang, Chen, & Chen, 2007). compared with traditional and Internet-based banking services, mobile banking is more advantageous for mobile users who are constantly on the go, resulting in a higher task technology fit.

2.3.1 Relative Advantage

The first fundamental component of technology addiction is perceived usefulness. Through mobile banking, customers can enjoy faster transaction speed, avoidance of wait time, 24/7 personalized service, higher information transparency, convenience, and no location constraints(Zhang et al., 2018). This is an important mobile app platform through which banks provide financial services to customers to perform a variety of banking operations on their mobile devices(Owusu Kwateng et al., 2019). The advantages of mobile banking such as ubiquity and immediacy will allow a user to make convenient payments and reduce his/her time and effort investments(Zhou et al., 2010). Furthermore, compared with the complex interfaces of online banking, which provide many functions, mobile banking has fewer functions and clearer interfaces. Therefore, the present research suggests the moderating role of income on the relationship between customers' intention to use mobile banking and relative advantage.

2.3.2 Information Quality

Information quality has been confirmed as one of the main factors that influence trust, satisfaction, and use in information systems and e-business contexts (Motiwalla et al., 2019; Oliveira et al., 2017). Thus, in defining information quality, Ghasemaghaei and Hassanein (2016) argue that good quality information includes accuracy, relevance, timeliness,

completeness, and accessibility. Information is very important for consumer decision-making. Poor quality information can cause significant issues from a consumer perspective, poor, out-of-date, inaccurate, and irrelevant information can raise concerns about the ability and integrity of MB resulting in a low level of customer trust (Zhou, 2011). This can result in a low level of customer trust in MB services. By extension, the lack of trust can lead to failure in achieving a high level of customer satisfaction (Lee & Chung, 2009; Sharma & Sharma, 2019). Therefore, the need for banks to provide adequate and quality information for their customers. Customers require relevant, timely, and accurate information for decision-making (Ofori et al., 2017). Researchers identified if quality information is not provided, customers may doubt the integrity of the service provider (Nicolaou et al., 2013). Therefore, the research posits the moderating role of income on the relationship between customers' intention to use mobile banking and information quality.

2.3.3 System Reliability

System reliability is the percentage of non-failures that occur within a unit of time. Reliability is the probability that a system performs correctly during a specific time duration. During this correct operation: No repair is required or performed. The system adequately follows the defined performance specifications. Firms operate with different systems and the quality of these systems has implications for customers' trust in firms. Perceived reliability (PR) is defined as the extent to which individuals subjectively believe that technology is reliable (Zhang et al., 2018). The reliability of a system is essential to providing reliable technical services that allow users to achieve their intended purposes (Park et al., 2015). Moreover, when purchasing and consuming services via mobile technologies, most bank customers have to provide their

private information, such as debit and credit card information, birth date, name, address, stocks, and funds. A lack of reliability may induce concern regarding privacy(Zhang et al., 2018).

2.4 Social presence

Social Presence Theory (SPT) was originally defined by Short, Williams, and Christie (1976) as, “the degree of salience of the other person in the interaction and the consequent salience of the interpersonal relationships.” A more modern definition of social presence theory was refined by Gunawardena (1995) to state, “the degree to which a person is perceived as a ‘real person’ in mediated communication.” Social presence is a dynamic variable. The degree of social presence is based on the characteristics of the medium and the user’s perception. Moreover, social presence can be defined as the amount of social presence is the degree to which a user feels access to the intelligence, intentions, and sensory impressions of another. Factors that contribute to an appreciable degree of social presence are facial expression, the direction of gaze, posture, dress, and non-verbal and vocal cues. Short et al. (1976) hypothesized social presence to be an attribute of the medium itself or technological social presence.

Tu (2002) described three dimensions of social presence: social context, online communication, and interactivity. Social contexts, such as task orientation (Steineld, 1986), privacy (Champness, 1972; Steineld, 1986), topics (Argyle and Dean, 1965; Walther, 1992), recipients/social relationships (Walther, 1992), and social process (Walther, 1992), etc., contribute to the degree of social presence.

2.4.1 Perceived Task

Task types influence the degree of social presence and communication processes. A good task technology fit will promote user

adoption of mobile banking. In contrast, a poor task technology fit will decrease users' adoption intention. For example, although mobile banking has many advantages such as ubiquity and immediacy, if users do not require mobile transactions (for example, they are mostly in the office and have a low demand for mobile payments), they will select traditional or online banking services rather than mobile banking (Zhou et al., 2010). Hence, it is hypothesized that there is a positive significant moderating role of income on the relationship between customers' intention to use mobile banking and perceived task.

2.4.2 Perceived privacy

Perception of privacy affects the degree of social presence. A less private setting results in a decreased perception of social presence by users. A study conducted by Yang et al. (2015) shows that privacy and security concerns reduce the trust customers have in mobile payment systems which in effect limits their intentions to use mobile payment systems. The private information they have to put on the network suffers the risk of being violated. Thus, enhancing the reliability of mobile technology may improve bank customers' belief of low risk of privacy violation, and, in turn, enhance their perceptions of privacy and trust (Zhang et al., 2018). In the banking industry, mobile technology users' perceived privacy is closely related to the innate characteristics of mobile technology. For one thing, people are likely to put personal information (bank account number and stocks and funds routing numbers) and behavioral identifiers (e.g. addresses, cell phone numbers, etc.) in their smartphones, tablets, or other mobile devices. Mobile devices are considered electronic extensions of persona. For another, the mechanics of m-commerce transactions are ambiguous in that consumers are generally not sure how their information will be used (Zhang et al., 2018). Therefore, the research posits that there is a significant

moderating role of income in the relationship between customer's intention to use mobile banking and perceived privacy

2.4.3 Interactivity

Interactivity refers to the system's capability to better communicate between the sender and receiver and the communicator (Rice, 1984). Interactivity includes the activities in which CMC users engage and the communication styles they use. The potential for feedback from the other also contributes to the degree of salience of the other person in the interaction. Interactivity involves the availability and effectiveness of customer support tools on a website, as well as how well that website provides tailored and desired information (Kaabachi et al., 2020). Mobile application interactivity improves consumer engagement, enhancing usability and personalization (Lee et al., 2015). The m-banking application interactivity includes the interface navigation, content, user, control, and responsiveness to enhance the consumer experience (Lee et al., 2015). Moreover, interactivity also reduces consumers' perceived transaction risks and enhances consumer engagement (Shankar, 2021). Banks are interested in learning ways to increase the interactivity of m-banking applications to increase customer engagement. Hence, it hypothesized the moderating role of income on the correlation between customers' intention to use mobile banking and perceived interactivity.

Based on the above discussion, the researchers suggest the following research hypotheses:

- H1.** Income moderates the relationship between relative advantage and customers' intention to use mobile banking.
- H2.** Income moderates the relationship between social context and customers' intention to use mobile banking.

- H3.** Income moderates the relationship between perceived privacy and customers' intention to use mobile banking.
- H4.** Income moderates the relationship between information quality and customers' intention to use mobile banking.
- H5.** Income moderates the relationship between service reliability and customers' intention to use mobile banking.
- H6.** Income moderates the relationship between perceived trust and customers' intention to use mobile banking.
- H7.** Income moderates the relationship between interactivity and customers' intention to use mobile banking.

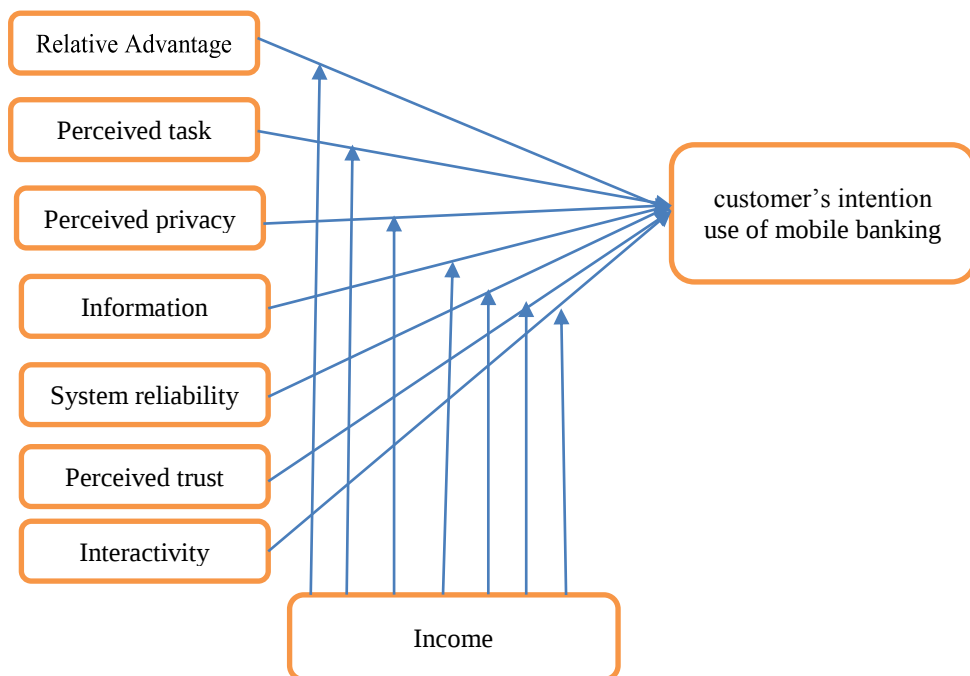


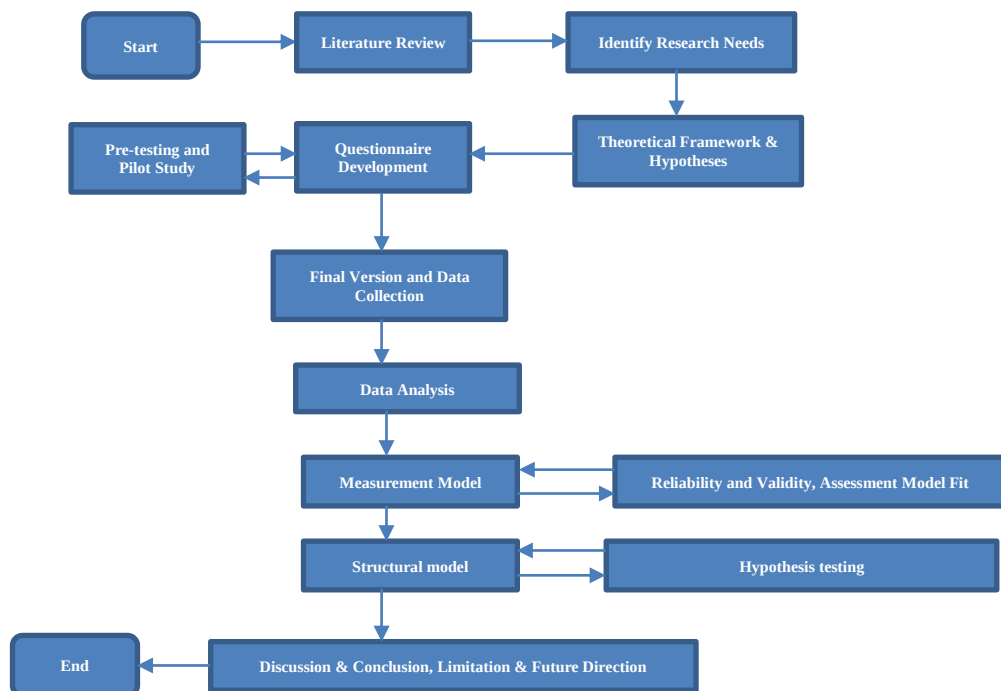
Fig1. Proposed model

Mobile banking offers banks a chance to competitive advantage over their counterparts and enhances the satisfaction of their customers and final customers' intention to use mobile banking. Existing research has called for further into mobile banking while existing research has assessed the effect of trust, attitude, security and privacy, relative advantage, and perceived ease of use/training on customer's intention to use m- banking (Baabdullah et al., 2019; Ofori et al., 2017).

The study makes mobile banking contributions to the body of knowledge. The research will discover information quality, system reliability, perceived ease of use/training, relative advantage, perceived privacy, task orientation, and interactivity in fostering customers' intention to use mobile banking. Secondly, the study explores the mechanism through which mobile banking can impact customers' intention to use mobile banking by assessing the moderating role of income, to verify the above-proposed research model, the researchers tested a set of hypotheses.

3. Method

To establish mobile banking intention to use and the factors influencing it. The researchers collect the data from a population of various socio-cultural and economic backgrounds and the population of the study will be users of m – banking services in Somalia. Based on the hypotheses stated above, our study conducted quantitative analysis and uses survey methodology to test the research model. The model contains the constructs such as relative advantage, system reliability, social context, perceived privacy, information quality, perceived trust, interactivity, customer intention uses mobile banking, and two other moderator variables such as length of time mobile usage and income. The researchers followed the below road map.



3.1 Population and sample

The banking sector encompasses the largest sector in Somalia's economy, and the consumers of Somalian banks were chosen as the target population. The population is the theoretically specified aggregation of study elements (Babbie, 2004). The population of this study refers to mobile bank consumers who have at least one year of experience using the mobile bank. Due to unknown the population size, a convenience sample was employed to conduct this research. convenience sampling technique is the “method of collecting samples by taking samples that are conveniently located around a location, Internet service or close to hand” (Edgar & Manz, 2017). The population for this study consists of people who own a mobile phone and who are customers of local banks that provide m-banking services. Since there is no readily

available information on the target population's size, it is assumed that there are more than 100,000 people in the area. The sample size of this study is around 383 responses this is in line with the statistical table of Saunders (2002).

3.2 Research Instrument

Data for this study was collected through self-administered questionnaires from Mogadishu, Somalia. This particular city was chosen the reason was Mogadishu lives around four million citizens and the other reason as it was difficult to conduct research in the whole country because it requires a lot of time and high financial expense. The researchers adapted survey items from prior validated instruments for measuring the constructs and contextualized them following our research design. Items used relative advantage, system reliability, social context, perceived privacy, information quality, perceived trust, interactivity, customer's intention uses mobile banking, and two other moderator variables such as length of time mobile usage and income appear in Appendix. A five- point Likert scale with (1) indicating 'strongly disagree' and (5) indicating 'strongly agree' was used to measure the survey items. In ensuring the reliability and validity of the present confirmatory study, the items were adapted based on acceptable composite reliability above 0.70 in previous research (Hair et al., 2010).

3.3 Data collection

To maximize the response rate, the survey was administered online using the survey tool kobo collect tool. The survey link was sent to the targeted respondents through WhatsApp. Respondents were instructed in the survey to offer information about their experiences to use mobile banking. The researchers distributed the surveys and requested the

respondents to fill out the form and it took around 15 minutes to complete the survey.

3.4 Data analysis

This study used a questionnaire survey to gather data from the respondents and a polite study was conducted. The data analysis was employed using Analysis Moment of Structure – Statistical Package for Social Science (AMOS- SPSS).

4. Results and discussions

4.1 Background of the respondents

The survey link was sent to 485 respondents, 383 respondents returned the survey and were useful for the study, with a response rate of 78.96%. Table 1. indicates the background of the respondents. The survey was completed by 16.7% of female respondents while males made up 83.3% of the sample. The majority of the respondents were aged between 18 to 23 years. The majority of the customers have obtained some form of higher education, of which 29.2% of bachelor's degree; 23.8% have a diploma; 22.2% have a master's degree; 14.6% have a higher school certificate; 8.9% have a primary certificate. The rest have only doctorate degrees 1.3%. 98.2 % are mobile bank users. Moreover, the sample is made up Length of time of m-banking usage as well. 39.7% of the respondents possess 5 – 7 years; 36.8% have experienced 2 – 4 years; 9.9% less than 1 year and the rest have only experienced over 8 years. Furthermore, 38.1% of the respondents have a monthly income that ranged from less than 300 - \$500. 24.8 ranged their income between 900 to \$1100. 18.5% ranged between 600 to \$800. 9.4% have less than \$200 of income, with only a small percentage of 9.1% having a monthly income that is over \$1200.

Table 1. Users' profile data

Demographic variable	Categories	No. of respondents	Percentage (%)
Gender	Female	64	16.7
	Male	319	83.3
Age	Less than 18 years	4	1.0
	18 - 23 years	247	64.5
	24 - 32 years	74	19.3
	33 - 40 years	43	11.2
	41 - 50 years	15	3.9
Educational Level	Primary	34	8.9
	High School	56	14.6
	Diploma	91	23.8
	Bachelor degree	112	29.2
	Master degree	85	22.2
	Doctorate	5	1.3
Mobile Banking Users	Yes	376	98.2
	No	5	1.3
	I don't know	2	.5
Length of time of m-banking usage	Less than 1 year	38	9.9
	2 - 4 years	141	36.8
	5 - 7 years	152	39.7
	Over 8 years	52	13.6
Average monthly income	Less than \$200	36	9.4
	300 - \$500	146	38.1
	600 - \$800	71	18.5
	900 - \$1100	95	24.8
	Above \$1200	35	9.1

4.2 Statistical Analysis

To analyze the collected data, the researchers adapted Structural Equation Modeling. To test our model, the researchers used AMOS – SPSS [Analysis of a moment structures - Statistical Package for Social Science] which offers two models; the measurement model and the structural model. The measurement model examines the relationship of the measured variables to their theoretical constructs by evaluating the reliability and validity of the measures. The structural model examines the relationship between the theoretical constructs.

4.2.1 Measurement model

The researchers evaluated the measurement model using the following measures: (1) composite reliability, (ii) convergent validity, (iii) and discriminant validity.

4.2.1.1 Composite reliability

Composite reliability (sometimes called construct reliability) is a measure of internal consistency in scale items, much like Cronbach's alpha (Richard G. Netemeyer, 2003). To assess the internal consistency reliability, the researchers used the composite reliability measure and Cronbach's Alpha. The composite reliability and Cronbach's Alpha of all our constructs were greater than .7 as the table 2. Shown

Table 2. Construct reliability

Items	Composite reliability	Cronbach's alpha
Relative advantage (RA)	0.889	0.762
Social Context (SC)	0.846	0.819
Perceived Privacy (PP)	0.913	0.834
Information Quality (IQ)	0.909	0.797

Items	Composite reliability	Cronbach's alpha
System reliability (SR)	0.721	0.701
Perceived Trust (PT)	0.853	0.862
Interactivity	0.929	0.933
Customer's Intention Use (CIU)	0.906	0.872

4.2.1.1 Convergent validity

“Convergent validity refers to how closely the new scale is related to other variables and other measures of the same construct”(Krabbe, 2017). If the measures of factor loadings into their respective constructs were at least 0.60, convergent validity was achieved(Bagozzi et al., 1990). Table 2. Shows the range of factor loadings between 0.637 and 0.910. All squared multiple correlations (R-square) must be at least 0.40(Bollen, 1989). Regarding the study, squared multiple correlations were between 0.405 and 0.829. Average variances extracted (AVEs) of the constructs were used to assess convergent validity. AVEs, provide the amount of variance captured by the indicators of a latent construct relative to the amount of variance captured due to the measurement error(Chin, 1998). Fornell & Larcker (1981) recommended an AVE greater than 0.5.

Table 3. Square Multiple Correlation (SMC), Average Variance Extracted (AVE)

Construct	Item	Factor loading	SMC	AVE
Relative Advantage	RA1	.649	0.421	0.574
	RA2	.818	0.669	
	RA3	.745	0.555	
	RA4	.687	0.472	
	RA5	.807	0.651	

Construct	Item	Factor loading	SMC	AVE
	RA6	.822	0.676	
Social context	SC1	.771	0.595	0.578
	SC2	.778	0.605	
	SC3	.770	0.593	
	SC4	.721	0.519	
Perceived Privacy	PP1	.794	0.630	0.724
	PP2	.883	0.780	
	PP3	.863	0.745	
	PP4	.862	0.742	
Information Quality	IQ1	.804	0.646	0.627
	IQ2	.790	0.624	
	IQ3	.827	0.683	
	IQ4	.843	0.711	
	IQ5	.762	0.580	
	IQ6	.718	0.515	
System Reliability	SR1	.664	0.441	0.425
	SR2	.654	0.428	
	SR3	.637	0.405	
Perceived Trust (PT)	TR1	.608	0.370	0.540
	TR2	.820	0.672	
	TR3	.776	0.603	
	TR3	.770	0.594	
	TR5	.678	0.460	

Construct	Item	Factor loading	SMC	AVE
Interactivity	IN1	.851	0.724	0.787
	IN2	.904	0.817	
	IN3	.910	0.829	
	IN4	.910	0.827	
	IN5	.860	0.739	
Customer's Intention to use mobile banking	CIU1	.694	0.482	0.617
	CIU2	.814	0.663	
	CIU3	.788	0.621	
	CIU4	.798	0.637	
	CIU5	.782	0.612	
	CIU6	.828	0.686	

4.2.1.1 Discriminant validity

Discriminant validity “refers to the extent to which a test is not related to other tests that measure different constructs”(Stephanie, 2015). One of the most widely used methods for evaluating the discriminant validity of measurement models is the Fronell-Larcker criterion. This criterion states that the correlation between a construct and any other construct must be greater than the square root of the average variance extracted by the construct. Moreover, discriminant validity can be evaluated by examining the correlation between the latent variables and the square root of the Average Variance Extracted (AVEs) of those latent variables. Table 4. Shows the diagonal elements of the square-root average variance extracted (AVE).

Table 5. Discriminant validity

	RA	SC	PP	IQ	SR	PT	IN	CIU
RA	0.757							
SC	0.331	0.760						
PP	0.484	0.472	0.850					
IQ	0.250	0.420	0.136	0.791				
SR	0.960	0.480	0.336	0.960	0.651			
PT	1.046	0.469	0.307	1.023	1.046	0.734		
IN	0.932	0.418	0.314	0.598	0.586	0.232	0.887	
CIU	0.061	0.021	0.083	0.094	0.085	-0.124	0.023	0.785

4.2.2 Structural model

The researchers employed AMOS – SPSS software to test the stated hypotheses. The AMOS–SPSS can assess a series of interdependent relationships concurrently.

4.2.2.1 Mean centering

In the moderating variable, there are numerous ways to test for moderation using Structural Equation Modeling (SEM). This interaction term will then let you know if the presence of the moderator is significantly influencing the relationship from the independent variable to the dependent variable. The interaction term is where you form a product term of the independent variable and the moderator. A problem that can occur with a product term is the issue of high collinearity with the original constructs which can cause problems in the analysis (Frazier et al., 2004). One way to resolve this problem is to mean center the variables in your data. There has been an ongoing debate on whether mean centering is necessary. Previous research has stated the results are essentially the same whether you mean center or leave the data in its raw form (Echambadi and Hess 2007; Hayes 2018). The advantage of mean-centering the data is not only are you accounting for potential collinearity

issues, but it also interpreting results makes easier. Thus, the recommendation to mean center your data before analyzing the data is encouraged (Dawson, 2014). Thus, the researchers assess the mean center of each variable before measuring.

4.2.2.2 Path coefficients

The path coefficients contain the C.R., probability value(p-value), and Beta. C.R. means critical ratio which is measured with a t-value or z-value based on the sample size. C.R. value is used to determine the significance of the results. Furthermore, the Probability value or P - value is also used for determining the significance of the results. C.R. value and P-value are used to explain the level of significance and to reject the null hypothesis or to accept the alternate hypothesis.

For statistical significance, the absolute value of the C.R. is expected to be greater than 2 and the P-value to be less than 0.05 for rejecting the null hypothesis. Usually, the researchers explain the level of significance based on choosing one value between C.R. and P-value. The Beta coefficient or estimate is the degree of change in the outcome variable for every 1 unit of change in the predictor variable.

4.2.2.3 Hypothesis testing

H1 - The study assesses the moderating role of customers' monthly income on the relationship between perceived benefits and customers' intention to use mobile banking. The results revealed a negative and significant moderating impact of Income on the relationship between perceived benefits and customers' intention to use mobile banking ($\beta = -.081, t = -1.992, p = 0.046$), supporting H1. The moderation analysis summary is presented in Table 4. The study found that customers who benefit from using mobile banking and their income so high will likely use it will intentionally use it.

H2- proposes the moderating role of customers' monthly income on the relationship between perceived tasks and customers' intention to use mobile banking. The results revealed a negative and significant moderating impact of Income on the relationship between perceived tasks and customers' intention to use mobile banking ($\beta = -.085, t = -2.186, p = 0.029$), thus supporting H2. This suggests that customers who perceived tasks from using mobile banking and their income so high will likely use mobile banking.

H3- proposes a negative moderating role of customers' monthly income on the relationship between privacy and customers' intention to use mobile banking. No support was found for this relationship ($\beta = -.070, t = -1.525, p = 0.127$), thus contradicting existing literature.

H4- proposes a negative moderating role of customers' monthly income on the relationship between information quality and customers' intention to use mobile banking. No support was found for this relationship ($\beta = -.043, t = -0.735, p = 0.462$).

H4- proposes a negative moderating role of customers' monthly income on the relationship between service quality and customers' intention to use mobile banking. No support was found for this relationship ($\beta = -.043, t = -0.735, p = 0.462$). thus the hypothesis contradicting with the previous studies (Ahmadi Danyali, 2018; Arcand et al., 2017; Khan et al., 2021; Komulainen & Saraniemi, 2019).

H5 – proposes a negative moderating role of customers' monthly income on the relationship between system reliability and customers' intention to use mobile banking. No support was found for this relationship ($\beta = 0.067, t = -0.735, p = 0.284$).

H6 – proposes a negative moderating role of customers' monthly income on the relationship between perceived trust and customers' intention to use mobile banking. No support was found for this relationship($\beta = 0.067$, $t = -0.735$, $p = 0.284$), thus contradicting the prior literature

H7 - proposes a positive moderating role of customers' monthly income on the relationship between interactivity and customers' intention to use mobile banking. No support was found for this relationship($\beta = 0.053$, $t = 1.019$, $p = 0.308$), thus contradicting with the prior literature(Shankar, 2021).

Hypotheses	Relationship	Beta	C.R	P- value	Findings
H1	PB $\rightarrow$ CIU	.502	10.685	***	Supported
	MI $\rightarrow$ PB	-.081	-1.992	.046	
H2	PT $\rightarrow$ CIU	.246	5.196	***	Supported
	MI $\rightarrow$ PT	-.085	-2.186	.029	
H3	PRI $\rightarrow$ CIU	.397	2.900	.004	Not Supported
	MI $\rightarrow$ PRI	-.070	-1.525	.127	
H4	INFO $\rightarrow$ CIU	.758	3.381	***	Not Supported
	MI $\rightarrow$ INFO	-.043	-.735	.462	
H5	REL $\rightarrow$ CIU	.417	3.381	.077	Not Supported
	MI $\rightarrow$ REL	.067	-.735	.284	
H6	TR $\rightarrow$ CIU	.537	3.381	***	Not Supported
	MI $\rightarrow$ TR	-.086	-.735	.081	
H7	CIU $\rightarrow$ IN	-.166	-1.026	.305	Not Supported
	MI $\rightarrow$ IN	.053	1.019	.308	

PB: perceived benefit, MI: Monthly income, CIU: customer, intention use, INFO: information, REL, reliability, TR: Trust, IN: interactivity.

4.2.3 Evaluation of the model fit

Several indicators are measured for the model fit. The study revealed the chi-Square = 736.357, DF=416, the relative Chi-Square = 1.770, and $p = 0.000$. Kline (2013) states that a relative chi-square test with a value under 3 is considered an acceptable fit. Some researchers say that values as high as 5 are okay (Schumacker and Lomax, 2004). Bentler and Bonett(1980) is the most widely cited research encouraging researchers to pursue model fit statistics (CFI, TLI, NFI, IFI) that are greater than .90. according to the study, all the indicators meet the criteria except GFI and AGFI 0.888 and 0.867 respectively. The RMSEA was 0.045, indicating a reasonable error of approximation and a close fit to the model. Overall, the findings suggest that the fit for the structural model was more than satisfactory. Hair (2010) suggests 3 to 4 fit indices to establish model fit.

Table Error! No text of specified style in document.Model fit

Fit measure	Criteria	Value for the research model
χ^2		736.357
Degree of freedom (df)		416
Relative chi-square (CMIN/DF)	< 3	1.770
A probability value (p – value)	< 0.05	0.000
Goodness fit index (GFI)	≥ 0.90	0.888
Adjusted goodness fit index (AGFI)	≥ 0.90	0.867
Comparative fit index (CFI)	≥ 0.90	0.961
Incremental fit index (IFI)	≥ 0.90	0.961
Normed fit index (NFI)	≥ 0.90	0.915
Tucker Lewis index (TLI)	≥ 0.90	0.957
Root mean square error of approximation (RMSEA)	≤ 0.08	0.045

5. Discussion and conclusion

This paper examines the underlying reasons for customer intention to use mobile banking. The study assesses the moderating of customers' income on the relationship between, perceived benefit, perceived task, privacy, information quality, service quality, system reliability, perceived trust, and interactivity. This study found a negative moderating role of income on association with perceived benefit and customer intention to use mobile banking. The result implies that customers who have strong benefits and income are highly likely to use mobile banking services. The results indicated that positive moderating role of income on association with perceived task and customer intention to use mobile banking. The research shows that customers who perform their daily activities on mobile banking their income are high more likely to use mobile banking services.

6. Theoretical contribution

The paper began with the following research questions: (1) Does income moderation explain customers' intention to use mobile banking? (2) What are the comprehensive approaches to making customers intention use mobile banking?

The Internet and mobile device have pushed the use and growth of mobile banking. As consumers increasingly turn to their mobile devices as their main source of information and entertainment, businesses have gradually moved away from the traditional form (Wong et al., 2022). Customers use mobile banking to get updated information, check their bank account statements, and transfer money from bank to bank. Furthermore, the use of mobile banking is not without risks because people are complaining about both physical and information security. As the result suggests income moderates the relationship between perceived benefit, and perceived task on customers' intention to use mobile

banking. Based on the social presence theory (SPT) and task–technology fit (TTF) theoretical postulation, the study extends, moderates, and confirms the research model in gaining insights into income and its customers' intention to use mobile banking. The finding suggests that individuals who are perceived benefit and task simplicity will likely use mobile banking. Contrary to expectations and previous studies in social presence and task–technology fit, this research does not find evidence that supports the moderating role of income associated with perceived privacy, information quality, system reliability, service quality, perceived trust, and interactivity. This implies that customers' intention to use mobile banking does not moderate role in their income. Both theories seem to propose that they are accomplished in explaining to increase customers' intention to use mobile banking; thus, contributing to new knowledge in mobile banking. In terms of methodological contribution, by adapting past research instruments to suit the intention to use of mobile banking context, the research establishes the reliability and validity of the instrument in a country outside of the developed countries. Some banks have not yet introduced the use of mobile banking. As researchers, we suggest that mobile banking services should be expanded by considering privacy issues.

7. Limitations and future research directions

The study has several limitations in terms of methodological approach. First, the researchers used across–sectional survey design static. Second, even though the sample size was 384 only customers who use mobile banking were included. Future research may consider adopting a longitudinal approach and include other entities of the banks like managers and staff.

References

- Ahmadi Danyali, A. (2018). Factors influencing customers' change of behaviors from online banking to mobile banking in Tejarat Bank, Iran. *Journal of Organizational Change Management*, 31(6), 1226–1233. <https://doi.org/10.1108/JOCM-07-2017-0269>
- Al-Dmour, R., al Haj Dawood, E., Al-Dmour, H., & Masa'deh, R. (2020). The effect of customer lifestyle patterns on the use of mobile banking applications in Jordan. *International Journal of Electronic Marketing and Retailing*, 11(3), 239–258. <https://doi.org/10.1504/ijemr.2020.10029013>
- Arcand, M., PromTep, S., Brun, I., & Rajaobelina, L. (2017). Mobile banking service quality and customer relationships. *International Journal of Bank Marketing*, 35(7), 1066–1087. <https://doi.org/10.1108/IJBM-10-2015-0150>
- Baabdullah, A. M., Alalwan, A. A., Rana, N. P., Kizgin, H., & Patil, P. (2019). Consumer use of mobile banking (M-Banking) in Saudi Arabia: Towards an integrated model. *International Journal of Information Management*, 44(August 2018), 38–52. <https://doi.org/10.1016/j.ijinfomgt.2018.09.002>
- Babbie, E. R. (2004). The Logic of Sampling. In *The Practice of Social Research*.
- Bagozzi, R. P., Yi, Y., & Baumgartner, J. (1990). The level of effort required for behaviour as a moderator of the attitude–behaviour relation. *European Journal of Social Psychology*. <https://doi.org/10.1002/ejsp.2420200105>
- Bollen, K. A. (1989). A New Incremental Fit Index for General Structural Equation Models. *Sociological Methods & Research*. <https://doi.org/10.1177/0049124189017003004>
- Chin, W. W. (1998). Issues and opinion on structural equation modeling. In *MIS Quarterly: Management Information Systems* (Vol. 22, Issue 1).
- Davis, F. D. (1989). Davis 1989.pdf. In *Information Technology*. <https://doi.org/10.2307/249008>
- Edgar, T. W., & Manz, D. O. (2017). Exploratory Study. *Research Methods for Cyber Security*, 95–130. <https://doi.org/10.1016/B978-0-12-805349-2.00004-2>

- Fornell, C., & Larcker, D. F. (1981). Evaluating Structural Equation Models with Unobservable Variables and Measurement Error. *Journal of Marketing Research*, 18(1), 39–50. <https://doi.org/10.1177/002224378101800104>
- Frazier, P. A., Tix, A. P., & Barron, K. E. (2004). Testing moderator and mediator effects in counseling psychology research. *Journal of Counseling Psychology*, 51(1), 115–134. <https://doi.org/10.1037/0022-0167.51.1.115>
- Geebren, A., Jabbar, A., & Luo, M. (2021). Examining the role of consumer satisfaction within mobile eco-systems: Evidence from mobile banking services. *Computers in Human Behavior*, 114(September 2020), 106584. <https://doi.org/10.1016/j.chb.2020.106584>
- Goodhue, D. L., & Thompson, R. L. (1995). Task-technology fit and individual performance. *MIS Quarterly: Management Information Systems*, 19(2), 213–233. <https://doi.org/10.2307/249689>
- Hair, J., Black, W., Babin, B., & Anderson, R. (2010). Multivariate Data Analysis: A Global Perspective. In *Multivariate Data Analysis: A Global Perspective*.
- Kaabachi, S., ben Mrad, S., & Fiedler, A. (2020). The moderating effect of e-bank structure on French consumers' trust. *International Journal of Bank Marketing*, 38(2), 501–528. <https://doi.org/10.1108/IJBM-04-2019-0119>
- Khan, A. G., Lima, R. P., & Mahmud, M. S. (2021). Understanding the Service Quality and Customer Satisfaction of Mobile Banking in Bangladesh: Using a Structural Equation Model. *Global Business Review*, 22(1), 85–100. <https://doi.org/10.1177/0972150918795551>
- Komulainen, H., & Saraniemi, S. (2019). Customer centricity in mobile banking: a customer experience perspective. *International Journal of Bank Marketing*, 37(5), 1082–1102. <https://doi.org/10.1108/IJBM-11-2017-0245>
- Krabbe, P. F. M. (2017). Validity. *The Measurement of Health and Health Status*, 113–134. <https://doi.org/10.1016/B978-0-12-801504-9.00007-6>
- Merhi, M., Hone, K., Tarhini, A., & Ameen, N. (2020). An empirical examination of the moderating role of age and gender in consumer mobile banking use:

- a cross-national, quantitative study. *Journal of Enterprise Information Management*, 34(4), 1144–1168. <https://doi.org/10.1108/JEIM-03-2020-0092>
- Ofori, K. S., Boateng, H., Okoe, A. F., & Gvozdanovic, I. (2017). Examining customers' continuance intentions towards internet banking usage. *Marketing Intelligence and Planning*, 35(6), 756–773. <https://doi.org/10.1108/MIP-11-2016-0214>
- Owusu Kwateng, K., Osei Atiemo, K. A., & Appiah, C. (2019). Acceptance and use of mobile banking: an application of UTAUT2. *Journal of Enterprise Information Management*, 32(1), 118–151. <https://doi.org/10.1108/JEIM-03-2018-0055>
- Richard G. Netemeyer, W. O. B. S. S. (2003). *Scaling Procedures: Issues and Applications*. https://books.google.so/books?id=c2dN7HDbr7kC&printsec=frontcover&source=gbs_ge_summary_r&cad=0#v=onepage&q&f=false
- Saunders, G. (2002). Introducing technology onto a traditional course: turning the classroom upside down. *Publishingeur.nl*, 39–45. <https://ep.eur.nl/handle/1765/1228>
- Sayid, O., & Echchabi, A. (2013). Attitude of Somali Customers towards Mobile Banking Services: The Case of Zaad and Sahal Services. *Economic Insights: Trends and Challenges*, 65(3), 9–16.
- Shankar, A. (2021). Impact of mobile banking application interactivity on consumer engagement: An experiment-based investigation. *Journal of Global Information Management*, 30(5), 1–17. <https://doi.org/10.4018/JGIM.290368>
- Stephanie. (2015). *Convergent Validity and Discriminant Validity: Definition, Examples - Statistics How To*. <https://www.statisticshowto.com/convergent-validity/>
- Tu, C.-H. (2002). International Journal on E-Learning; The measurement of social presence in an online learning environment. *International Journal on E-Learning*, 1(2).

- Venkatesh, V., Morris, M. G., Davis, G. B., & Davis, F. D. (2003). User acceptance of information technology: Toward a unified view. *MIS Quarterly: Management Information Systems*. <https://doi.org/10.2307/30036540>
- Yang, Q., Pang, C., Liu, L., Yen, D. C., & Michael Tarn, J. (2015). Exploring consumer perceived risk and trust for online payments: An empirical study in China's younger generation. *Computers in Human Behavior*, 50. <https://doi.org/10.1016/j.chb.2015.03.058>
- Zhang, T., Lu, C., & Kizildag, M. (2018). Banking “on-the-go”: examining consumers’ adoption of mobile banking services. *International Journal of Quality and Service Sciences*, 10(3), 279–295. <https://doi.org/10.1108/IJQSS-07-2017-0067>
- Zhou, T., Lu, Y., & Wang, B. (2010). Integrating TTF and UTAUT to explain mobile banking user adoption. *Computers in Human Behavior*, 26(4), 760–767. <https://doi.org/10.1016/j.chb.2010.01.013>