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ABSTRACT

This study, conducted in Saudi Arabia, delves into understanding the factors influencing behavioral intention and use behavior to adopt m-payment in Saudi Arabia, particularly focusing on the role of performance expectancy, effort expectancy, social influence, facilitating conditions, grievance redressal, mobile skillfulness, and personal innovation. The primary objective is to ascertain how these factors interact and affect behavioral intentions and actual use behavior in the Saudi context. Employing Structural Equation Modeling (SEM), the study analyzed responses from a diverse demographic sample, applying SPSS and Smart PLS algorithm for factor analysis. Key findings indicate that performance expectancy, social influence, and grievance redressal significantly

impact both behavioral intention and actual use behavior. Contrary to expectations, effort expectancy and facilitating conditions did not show a significant effect on behavioral intention. The study also highlights the importance of personal innovation and mobile skillfulness in shaping user behavior. The novelty of this research lies in its contextual focus on Saudi Arabia, providing new insights into the interplay of technological, social, and personal factors in a rapidly evolving digital landscape. This contributes to a deeper understanding of technology adoption and usage patterns in the Middle Eastern context, which has been relatively underexplored in existing literature.

Keywords: Individual characteristics, Grievance redressal, Mobile (m)-payment, Unified theory of acceptance and use of technology (UTAUT).

1. Introduction

As a result of the rapid advancement in communications and mobile technologies, as well as the increased proliferation of mobile devices, mobile payment (m-payment) services have grown in importance for users (Sahu & Maity,2023; Baptista & Oliveira, 2015). While the m-payment system is convenient, ubiquitous, and time-saving, it is only sometimes readily accepted or used by consumers. At the same time, due to the growing importance of m-payments, researchers must fully comprehend why some consumers prefer to use the new m-payment method while others are still hesitant to do so (Dash et al., 2023; Wu et al., 2017). According to Dass and Pal (2010), m-payment systems are the services of financial activities that are typically performed

using mobile devices, such as cell phones, tablets, smartphones, personal digital assistants, and packet assemblers/disassemblers, or by using radio frequency and near-field communication. The primary benefit of m-payment systems is that they facilitate business transactions by allowing users to pay for goods and services through this payment channel wherever and whenever they want (de Luna et al., 2019).

During COVID-19, electronic payment was highly encouraged by the government of Saudi Arabia as a preventive measure to curtail the spread of the COVID-19 virus. However, the precautionary measures implemented by the Saudi government resulted in a downward trend in productive economic activities as 37 million people living in various regions and cities were quarantined (Salem & Nor, 2020).

Therefore, technological advances have created a significant opportunity for the development of the payment industry. Financial services are provided via digital channels such as smartphones and tablets. Hence, the consumer experience is faster, safer, and more accessible than that offered by traditional payment methods as a result of the collaboration among information technology, retailers, banks, and telecommunications companies (Tran et al., 2018). Alotaibi and Faleel (2021) identified that, when shopping online, cash on delivery is the most preferred payment method among the Saudi population. Nevertheless, due to the growing use of mobile devices and the advent of new technology and COVID-19 preventative measures, m-payment is expected to grow steadily. Thus, this study aims to identify the issues

affecting the intention to use the m-payment system in Saudi Arabia during the COVID-19 pandemic. In Saudi Arabia, as elsewhere, the COVID-19 pandemic has motivated citizens/residents to consider the m-payment system as a wise and safe choice during this period.

A review of the related literature shows that only a few articles discuss the issues affecting the intention to use m-payment in different countries such as Malaysia, Germany, Thailand, and India. Moreover, there needs to be more research to explore the factors in the context of COVID-19 (Ooi & Tan, 2022; Zhu et al., 2022). Thus, this study aims to bridge this gap by identifying these factors from different perspectives during the COVID-19 pandemic. The researchers believe that there is a greater need to study the issues affecting the intention to use m-payment in Saudi Arabia during the COVID-19 pandemic and plan appropriate strategies to overcome the obstacles that have been found to encourage the use of m-payment. Based on the literature pieces of evidence:

1. Develop a model using the Unified Theory of Acceptance and Use of Technology (UTAUT) to understand behavioral intention and use behavior to adopt m-payment.
2. Explore the effect of individual characteristics on behavioral intention to use m-payment.
3. Present recommendations to encourage the use of m-payment in Saudi Arabia.

2. Literature review and theoretical framework

2.1 Mobile payment

At present, consumers take advantage of various mobile phone features, including a variety of services, capabilities, and applications. Mobile payment (m-payment), in particular, is a popular feature. As a result of the collaboration of information technology, when dealing with businesses, retailers, banks, and telecommunication companies, customers experience payment that is faster, safer, and more accessible than traditional payment methods (Tran et al., 2018). M-payment services have various definitions. According to Dahlberg et al. (2003), the term m-payment can be applied to transactions that are made possible through the use of wireless or other communication technologies and involve paying for goods and services with a mobile device. An m-payment is also known as a payment where a person uses a mobile device to make a transfer of value in exchange for goods or services (Au & Kauffman, 2008). Slade et al. (2013) explained that m-payment systems can be classified into remote and proximity categories. In order for consumers to pay bills via remote m-payment, they must connect to a remote payment server via telecommunication networks such as the Global System for Mobile Communication (GSM) or the Internet.

Any of the following technologies, including Short Message Services (SMS), NFC, Wireless Application Protocol (WAP), and QR, can be used for mobile payments (Chen & Li, 2017). The customer's monthly phone bill is debited for the payment (Ondrus & Pigneur, 2006). Customers' mobile phones must have an NFC-enabled

chip in order to use NFC-based payment methods. However, businesses with card readers can begin the payment process (Li et al., 2014). Using WAP-based m-payment systems, customers can either use mobile browsers to begin payments through banks that have registered for m-payments or they can download mobile apps (such as STC Pay and Tabby) that link to their bank accounts. This will consequently enable them to make purchases with the money that they have in their bank accounts (Isaac & Sherali, 2014). Customers use m-payment apps to log in and then scan a QR code to begin payments (Lee et al., 2011). In order to ensure the safety and security of transactions, Apple Pay only works with Apple devices, employs only NFC technology, and employs encryption and tokenization (Kang, 2018). With NFC, Samsung Pay also uses magnetic secure transmission (MST), which means that even if the retailer does not have an NFC reader, mobile wallet customers can still use Samsung Pay in-store (Kang, 2018; Wang et al., 2016).

2.2 Factors influencing m-payment adoption

Although many consumers appreciate the relevance of mobile payments, the number of individuals who use m-payment needs to be increased (Namahoot & Jantasri, 2023; Qasim & Abu-Shanab, 2016). It should come as no surprise that numerous research studies have been undertaken into the uptake of mobile payments (Namahoot & Jantasri, 2023; Dahlberg et al., 2015). Many scholars have conducted empirical studies to determine the key elements that influence the acceptance or adoption of m-payments. Alabdan and Sulphey (2020) examined the factors influencing m-payment acceptance in Saudi Arabia by conducting an online survey with 414

respondents. The study successfully identified factors that could lead to the acceptance of m-payment options, including ease of use, utility, security, and awareness. It was also discovered that, among the Saudi population, male respondents have higher mobile acceptance. Patil et al. (2020) used the TAM and meta-UTAUT models to identify the significant determinants of consumer m-payment adoption in India. An empirical test of the model on 491 consumers revealed that performance expectancy, intention to use, and grievance redressal were all significant positive predictors of consumer user behavior regarding m-payment.

Additionally, attitude, social influence, and facilitating conditions significantly influence intention to use. However, Koenig-Lewis et al. (2015) examined general m-payment uptake among young consumers. They discovered that perceived utility and social impact are important factors for m-payment acceptance.

2.2.1 Performance Expectancy

The UTAUT model defines *performance expectancy* as "the degree to which an individual believes that using the system would enable him or her to increase job performance" (Venkatesh et al., 2003, p. 447). According to the UTAUT2 model (Venkatesh et al., 2012, p. 159), *performance expectancy* in a consumer environment is defined as "the degree to which consumers will profit from adopting technology to conduct particular activities." M-payment systems provide increased convenience for clients by enabling them to execute financial transactions via their mobile devices anytime and from any location. When clients recognize the m-payment system's

utility value, their performance expectation beliefs also increase (Oliveira et al., 2016; Zhou, 2014). As a result, the following hypothesis is proposed:

H1: *Performance expectancy significantly influences the intention to use m-payment systems.*

2.2.2 Effort Expectancy

Effort expectation is defined in the UTAUT model (Venkatesh et al., 2003, p. 447) as "the degree of ease associated with the system's use." Venkatesh et al. (2012, p. 159) adopted this construct in the UTAUT2 paradigm, defining it as "the degree of ease with which customers use technology." Customers anticipate a straightforward user interface from their mobile payment system, which adds to its utility value. Payment methods that are simple to use increase initial acceptability and play a significant part in the intention to continue. Previous studies have established that the expectation of effort affects the initial uptake of mobile payment systems (Cao & Niu, 2019; Teo et al., 2015). As a result, the following hypothesis is suggested:

H2: *Effort expectancy significantly influences the intention to use m-payment systems.*

2.2.3 Social Influence

Social influence is the extent to which an individual believes that significant others believe she or he should use the new way (Venkatesh et al., 2003). According to the UTAUT, social influence has a direct positive effect on behavioral intentions. Maillet

et al. (2015) found no effect of social influence on other UTAUT components in their study since effort expectation is a subjective assessment and social influence is a social pressure. Social influence rather than effort expectations affect performance. As a result, the following hypothesis is put forward:

H3: *Social influence on accepting m-payment technology positively impacts customer intention to use it.*

2.2.4 Facilitating Conditions

A person's belief that an organizational and technological infrastructure exists to facilitate the use of a system is a facilitating condition (Venkatesh et al., 2003). Conducive conditions in the UTAUT paradigm directly influence user behavior but do not affect behavioral goals (Venkatesh et al., 2003). Yang (2010) similarly asserts that enabling situations have a direct favorable impact on behavioral intention. The original UTAUT model has two different dimensions of behavior: use behavior and behavioral intention. As a result, based on the above arguments, the following hypotheses are proposed:

H4: *Facilitating conditions for using m-payment technology positively impact customers' intention to use.*

H5: *Facilitating conditions for using m-payment technology positively impact effort expectancy.*

2.2.5 Behavioral Intention and use behavior

The key dependent variable of the UTAUT model is behavioral intention, which is defined as the degree to which an individual formulates a mindful plan to undertake specified future behavior (Warshaw & Davis, 1985). Venkatesh et al. (2003) claim that four built performance expectations, effort expectations, social influence, and facilitating factors all directly influence behavioral intentions and user acceptance. On this basis, the following hypothesis is advanced:

H6: *User behavioral intention has an impact on the use behavior of m-payments.*

2.2.6 Grievance Redressal

Consumer grievance redressal is one method for consumers to address and resolve issues, difficulties, and problems with mobile payment service providers. It benefits clients significantly by quickly resolving issues following a purchase (Rana et al., 2016). A research study on mobile wallet adoption by Kumar et al. (2018) examined the importance of a grievance mechanism for failing transactions, which is expected to have an effect on m-payment and m-wallet services. Patil et al. (2020) discovered that, in India, the grievance redressal system had a significant positive effect on users' ongoing willingness to use m-payment. Because grievance resolution is a post-purchase behavior, its impact on consumers' use of the m-payment system should be favorable and significant. As a result of the above discussion, the following hypothesis is proposed:

H7: *Grievance redressal has an impact on the use behavior of m-payments.*

2.3 Individual Characteristics of M-payment Users

Individual characteristics, including various criteria such as gender, age, educational achievement, and work experience, are used to identify differences between persons. Hence, the impact on mobile payment of an additional two individual characteristics variables, namely users' skillfulness and personal creativity, are investigated in this study.

In the UTAUT model, gender is a critical mediator in many consumer behavior and technology usage studies (Venkatesh et al., 2003). Sun et al. (2015) discovered that males are more likely than females to use banking technologies. In an exploratory study on mobile commerce, Yang et al. (2012) discovered that gender affects perceived ease of use and usefulness, but negatively, contrary to expectations. In addition, gender influences the effect of attitudes on m-payment acceptance intention in studying gender differences in m-payment use (Liébana-Cabanillas et al., 2014). Gender differences in the perception of privacy risk and its consequences have also been discovered in recent studies. For example, Hoy and Milne (2010) discovered that females are more concerned about privacy threats than men, although males place a higher value on efficacy when utilizing social networking services. Female users are more concerned about Internet privacy than male users, according to Taddicken (2014), and are more hesitant to divulge critical information.

Midgley and Dowling (1978) reported that innovativeness can be described as a personality trait that influences one's ability to embrace and absorb new ideas,

products, and processes. Rogers et al. (2005) also introduced the concept of innovativeness, stating that people can be innovative if they are approximately engaged in adopting and using new products and systems compared to other people in the same social system. Indeed, mobile Internet is still a novel and new system in its early stages of development. Customers should be motivated to embrace this approach to a certain extent if they are genuinely innovative. Aldás-Manzano et al. (2009) statistically validated the importance of innovativeness in accelerating the adoption of technology and reducing the risk associated with its use. Das (2011) successfully established the function of innovativeness in customer intention to use mobile Internet in mobile technology literature. It is also worth noting that customers may derive more intrinsic benefits from using mobile Internet if a new system is more inventive and novel (Venkatesh et al., 2012). Customers will be motivated to use this system if the level of innovation is increased, but they will also perceive more hedonic rewards. A later study by Thakur and Srivastava (2014) found that factors such as adoption readiness, personal innovation, and perceived risk were linked to the intention to use m-payment. The hypotheses based on individual characteristics are discussed below:

2.3.1 Mobile User Skillfulness

Skillfulness, or the capacity to use a particular technology, is characterized as a mix of an individual's experience, training, and knowledge of that technology. A more significant internal incentive to use technology will result from the increased trust in one's ability to use it (Ali et al., 2023; Compeau & Higgins, 1995). From a different

perspective, perceived usefulness measures how people believe a specific technology might help them be more productive or perform better at work (Davis, 1989). Furthermore, a positive assessment of a user's mobile competence will lower the level of concern about adopting mobile services, boost their enjoyment of mobile purchases/payments, and their view of the utility of mobile information, all of which will increase their intention to use it (Silva & Martins, 2016; Chang et al., 2017). Based on these arguments, the following research hypothesis is proposed:

H8: **Skillfulness has an impact on the behavioral intention of m-payments.**

2.3.2 Personal Innovation

According to Agarwal and Prasad (1998), personal innovation is defined as an individual's willingness to experiment with advanced information and communication technologies (ICTs), characterized as a feature that is unaffected by environmental or external factors. Consistent with Liébana-Cabanillas et al. (2018), this present work recognizes that NFC payment is a cutting-edge mobile technology that will become a global trend in general commerce within a few years. Perceived innovation is concerned with the product/service itself and with improving customer emotion, interest and, subsequently, intention to use (Ramos-de-Luna et al., 2016). As a result, consumer propensity to use the suggested payment method may be influenced by the level of innovation, resulting in the following research hypothesis:

H9: *Personal innovation has an impact on the behavioral intention of m-payments.*

The proposed conceptual model for the current investigation is shown in Figure 1. This model consists of 9 hypotheses, which should improve the model's predictive validity and help to explain any discrepancies.

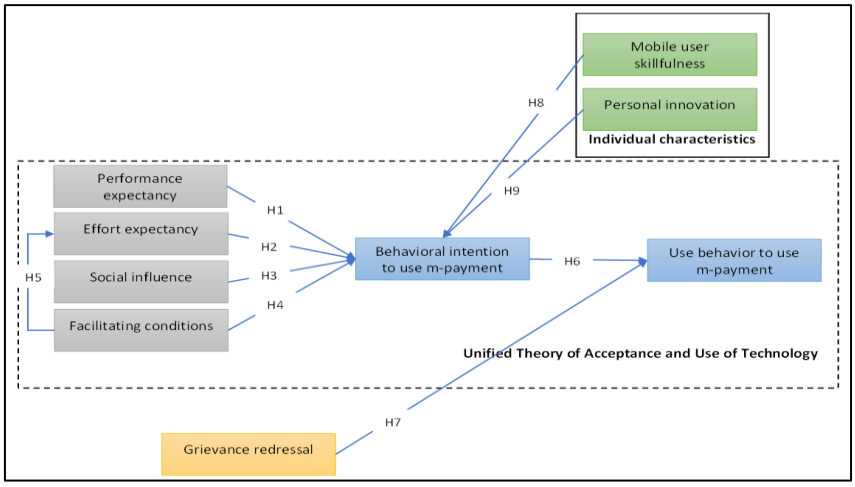

Figure 1. Theoretical framework

3. Research methodology

3.1 Research design

In academic research, both qualitative and quantitative methodologies are frequently used. The study's nature, goal, and context dictate the methods used (Bryman & Burgess, 1999). When examining relationships between variables, a quantitative research method is applicable (Mehrad & Tahriri, 2019). This research study intends to evaluate the issues affecting the intention to use mobile payment in Saudi Arabia amid the Covid-19 pandemic. As a result, a quantitative research approach is deemed to be suitable and is consequently adopted to enable the proposed study model to be

tested. A survey is used to collect data since it allows for the solicitation of all participants' perceptions in order to quantify the constructs. Additionally, this strategy can aid in the collection of data on the difficult-to-observe factors affecting the intention to utilize m-payment in Saudi Arabia. Additionally, the survey method is relatively simple to administer (Shapiro et al., 2004). The population of interest in the research study is Saudi Arabia citizens and residents aged 18-65. Data were obtained by handing out printed copies of the survey to participants and by utilizing the most appropriate online data collection approach and a cross-sectional online questionnaire since it is more cost effective to quickly collect data from a high sample size in order to complete the research study on time.

3.2 Populations and Research Sample

A research population can be defined as a group of individuals or objects that share the same characteristics or experiences. A nonprobability judgmental sampling technique (Aaker et al., 2007) is used and the study targeted individuals who are between 18-65 age range, living in Saudi Arabia's main cities who have bank accounts to ensure that the correct responses who can provide information about the factors that can influence their use m-payments.

The questionnaire was sent out to 200 respondents, of which there were 180 completed returns. After screening and filtering, 164 participants were selected.

Google Drive was used to construct and administer the online questionnaire. Google Drive was chosen because it can automate (design, create, and help) the survey process and includes several analytical tools that will be useful during the

results analysis. Potential participants were first identified using online invitations via social media applications with a web link to the poll. The online invitation stated the research's goal and desired outcomes. The online invitation also included the researcher's contact information. Additionally, participants were advised that all questionnaire replies would be anonymous and that no personally identifiable information would be gathered. Participants were asked for permission to take the survey by clicking "Yes" to a consent question. Those individuals who did not want to participate could choose "No" and leave. The questionnaire was designed to be completed in under 15 minutes.

3.3 Questionnaire Development

This section discusses how the questionnaire was created, including the questions and measurement scales used to collect demographic and background information from participants. The following section describes the measurement items used to assess the constructs in the proposed research model. The constructs were all classified as first-order reflective constructs.

Table 1 presents the measurement of the research variables, categorizing them into different parts and detailing their sources. It shows that the survey draws heavily on the work of Venkatesh et al. (2012) with items in four categories (Performance expectancy, Social Influence, Facilitating conditions, and Behavioral intention) totaling 18 items from their 2003 and 2012 publications. Liébana-Cabanillas et al. (2020) contribute to two categories (Effort expectancy and Mobile user skillfulness) with a total of 8 items. Additionally, Kumar et al. (2018) and Patil et

al. (2020) are each cited for one category, contributing 3 items for Grievance redressal and 4 for Perceived security, respectively. Lastly, Agrawal & Prasad (1998) are referenced for the Personal innovation category, adding 4 items. This composition reflects a comprehensive integration of various established theories and research findings in the study.

Table 1: Measurement of research variables and their sources

Variables	Measures		Source
Performance Expectancy	PE1	M-payment during covid-19 pandemic was useful for us.	Venkatesh et al. (2003,2012); Liébana-Cabanillas et al. (2020) ; Venkatesh et al. (2003, 2012); Venkatesh et al. (2003,2012)
	PE2	M-payment has a positive impact on the performance of most of our everyday life.	
	PE3	M-payment helps me to accomplish my work more quickly.	
	PE4	M-payment increases the differentiation of companies.	
	PE5	Using m-payment systems increases my productivity.	
	PE6	Using m-payment systems makes it easier for me to do transactions (e.g., shopping, purchases, transfers.)	
Effort Expectancy	EE1	Learning how to use m-payment applications is easy for me.	
	EE2	In my interactions with m-payment applications, I find them clear and understandable.	
	EE3	M-payment systems assist me in accomplishing my goals and completing my transactions.	
	EE4	It is easy for me to become proficient in using mobile applications.	
	EE5	I find m-payment systems easy to interact with.	
Social Influence	SI1	People who are important to me think that I should use m-payment.	
	SI2	People who influence my behavior think that I should use m-payment.	
	SI3	People whom I respect and admire encourage me to use m-payment.	
	SI4	People around me who use m-payment systems have more prestige than those who do not.	
	SI5	Using m-payment systems is considered a status symbol among my friends.	

Table 1 (Cont.)

Facilitating Conditions	FC1	I have the knowledge necessary to use m-payment applications.	
	FC2	M-payment is compatible with other applications I use (e.g., hotel reservations, flight reservations, transportation reservations,).	
	FC3	I can get help from others when I have difficulties in using m-payment applications.	
	FC4	Specialized instructions concerning use of m-payment applications are available to me.	
Mobile user skillfulness	MS1	I am confident in my ability to perform my online transactions quickly and efficiently utilizing the payment application.	Liébana-Cabanillas et al. (2020)
	MS2	I would be able to learn how to use the payment applications to complete my online transactions in a short period of time.	
	MS3	I have sufficient ability to perform my online purchases using the m-payment application.	
Personal Innovation	PI1	I like to experiment with new technologies.	Agrawal & Prasad (1998)
	PI2	Among my friends and family, I am usually the first to try out new information technologies.	
	PI3	In general, I would not hesitate to test new technologies.	
	PI4	I would like to look for new ways to experiment with new technologies.	
Grievance Redressal	GR1	In the case that an m-payment transaction fails, there are laws in place to deal with the situation.	Kumar et al. (2018)
	GR2	There are clear systems in place for resolving disputes arising from failed m-payment transactions.	
	GR3	Legal disputes about m-payment should be resolved in a timely manner.	
Behavioral Intention to use m-payments	BI1	I will always try to use m-payment applications in my daily life.	Venkatesh et al. (2012)
	BI2	I plan to use m-payment applications frequently.	
	BI3	I will recommend others to use mobile payment applications.	
User Behavior	UB1	I use m-payment systems.	Patil et al. (2020); Sivathanu (2019)
	UB2	I pay for purchases using m-payment systems.	
	UB3	I use m-payment systems for transferring money to my family, friends and/or other contacts.	
	UB4	I use m-payment systems when doing online shopping.	

3.4 Data analysis

The study uses a statistical package for social sciences (SPSS) to run descriptive and regression analysis. The study used Smart PLS 4 to test the validity and reliability of the measurement items using confirmatory factor analysis (CFA). Various statistical methods were used to analyze and interpret the data collected scientifically and test the research hypotheses, including descriptive and inferential statistical methods. The descriptive statistical methods include frequencies, percentages, and the mean and standard deviation used to assess participants' responses. Moreover, Pearson's Correlation Coefficient, which was used to test the research hypotheses, was also used to test the survey questionnaire method validity, while Cronbach's Alpha was used to measure the survey questionnaire reliability.

4. Results

4.1 Demographic analysis

The demographic characteristics of the respondents in this study, as outlined in Table 2, present a diverse range of backgrounds and experiences, with a total sample size of 164 individuals. Notably, there is a higher representation of females (61%) compared to males (39%). The age distribution is fairly spread out, with the largest groups being those aged 36-45 and 46-55, each constituting 24.4% of the sample. This is followed by the age groups 18-25 and 26-35 (12.8% each), 56-65 (11.6%), and those above 66 years (14%). Educationally, the majority of respondents have a Bachelor's degree (58.5%), with smaller proportions having completed high school (11%), a diploma (13.4%), a Master's (8.5%), or a Doctorate (8.5%). The usage period of the product or

service in question varies, with 30.5% having used it for 1-2 years and 26.2% for 3-4 years. Notably, 12.8% have not used it at all.

Table 2. Demographic characteristics

Respondents Characteristics		Final Sample size (n =164)	Percentage (%)
Gender	Male	64	39%
	Female	100	61%
Age (in years)	18-25	21	12.8%
	26-35	21	12.8%
	36-45	40	24.4%
	46-55	40	24.4%
	56-65	19	11.6%
	Above 66	23	14.0%
Education	High School	18	11.0%
	Diploma	22	13.4%
	Bachelor	96	58.5%
	Master	14	8.5%
	Doctorate	14	8.5%

Table 3(Cont.)

Respondents Characteristics		Final Sample size (n =164)	Percentage (%)
Usage period	Less than one year	15	9.1%
	1-2 years	50	30.5%
	3-4 years	43	26.2%
	5-6 years	12	7.3%
	More than 6 years	23	14.0%
	I have not used it	21	12.8%
Occupation	Student	15	9.1%
	Unemployed	18	11.0%
	Pensioner	31	18.9%
	Employee Public Sector	70	42.7%
	Employee Private Sector	23	14.0%
Incentive	Yes	50	30.5%
	No	114	69.5%
Mobile Type	Android based smartphone	73	44.5%
	IOS based smartphone	3	1.8%
	Microsoft based smartphone	87	53.0%
	Simple basic mobile handset without touchscreen	1	0.6%

Table 2 provides further insights into the sample profile in terms of occupation and other characteristics. The largest occupational group is public sector employees (42.7%), followed by pensioners (18.9%), and private sector employees (14%). Students and unemployed individuals represent smaller segments at 9.1% and 11.0%, respectively. When it comes to incentives, a significant majority (69.5%) did not receive any, while 30.5% did. In terms of mobile device preferences, a slight majority use Microsoft-based smartphones (53.0%), followed by Android users (44.5%). Only a very small fraction use iOS-based smartphones (1.8%), and an even smaller percentage use basic mobile handsets without a touchscreen (0.6%). These findings suggest a diverse group in terms of demographics, education, and occupational backgrounds, with a variety of experiences and preferences regarding technology usage.

4.2 Validity and reliability

The findings from Table 3, which details the validity and reliability of various variables, can be assessed against standard threshold values typically used in factor analysis conducted through Smart PLS.

Table 3. Validity and reliability

Variables	Measures	Loading	T-value	Composite reliability	Cronbach's alpha (α)	Average Variance Extracted (AVE)
Performance	PE1	0.793	70.975	0.850	0.796	0.509
Expectancy	PE2	0.656	64.613			

Variables	Measures	Loading	T-value	Composite reliability	Cronbach's alpha (α)	Average Variance Extracted (AVE)
	PE3	0.632	78.086			
	PE4	0.618	61.169			
	PE5	0.777	93.547			
	PE6	0.697	47.584			
Effort	EE1	0.838	91.319	0.919	0.881	0.694
Expectancy	EE2	0.769	61.661			
	EE3	0.801	87.851			
	EE4	0.843	74.464			
	EE5	0.907	89.379			
Social	SI1	0.871	76.242	0.914	0.795	0.680
Influence	SI2	0.925	85.261			
	SI3	0.799	64.565			
	SI4	0.761	46.316			
	SI5	0.754	41.931			
Facilitating	FC1	0.663	29.540	0.853	0.830	0.508
Conditions	FC2	0.666	46.259			
	FC3	0.800	29.078			
	FC4	0.801	30.699			
Skillfulness	MS1	0.737	66.899	0.787	0.746	0.552
of Mobile	MS2	0.716	80.750			
Use	MS3	0.774	69.510			

Variables	Measures	Loading	T-value	Composite reliability	Cronbach's alpha (α)	Average Variance Extracted (AVE)
Personal	PI1	0.728	72.088	0.803	0.812	0.578
Innovation	PI2	0.720	73.081			
	PI3	0.743	63.609			
	PI4	0.779	81.148			
Grievance	GR1	0.766	65.949	0.814	0.801	0.595
Redressal	GR2	0.779	49.330			
	GR3	0.767	35.989			
Behavioral	BI1	0.771	74.402	0.739	0.821	0.507
Intention	BI2	0.677	79.779			
	BI3	0.641	40.582			
User	UB1	0.610	48.541	0.882	0.770	0.655
Behavior	UB2	0.835	53.405			
	UB3	0.897	54.142			
	UB4	0.864	51.945			

Convergent validity is primarily evaluated using the Average Variance Extracted (AVE), which should exceed 0.5 (Hair & Alamer, 2022), indicating that, on average, the model explains more than half of the variance of the observed variables. In this study, all variables meet this threshold: Performance Expectancy (0.509), Effort Expectancy (0.694), Social Influence (0.680), Facilitating Conditions (0.508), Skillfulness of Mobile Use (0.552), Personal Innovation (0.578), Grievance Redressal (0.595),

Behavioral Intention (0.507), and User Behavior (0.655). This suggests a good level of convergent validity for each construct.

Reliability, assessed by Composite Reliability and Cronbach's Alpha, is also adequately demonstrated in this study. The threshold for both Composite Reliability and Cronbach's Alpha is generally considered to be 0.7 (Sarstedt et al., 2022), indicating acceptable internal consistency. All variables exceed this benchmark, with Composite Reliability ranging from 0.739 to 0.919 and Cronbach's Alpha ranging from 0.746 to 0.881. These high values indicate strong internal consistency and reliability of the constructs. Additionally, the loadings of each item on its respective construct are mostly above the acceptable threshold of 0.6, with only a few exceptions (like UB1 at 0.610). Overall, the study exhibits strong convergent validity and reliability, suggesting that the measurement model is robust and the constructs are well-defined and reliable.

In Table 4, the Fornell-Larcker criterion requires that the square root of the Average Variance Extracted (AVE) for each construct be greater than its highest correlation with any other construct to assess discriminant validity (Fornell & Larcker, 1981). The bold diagonal elements in the table are the square roots of each construct's AVEs. PE has a correlation of 0.798, higher than any other construct (Effort Expectancy has 0.792). Since diagonal values are higher than off-diagonal values in their row and column, this pattern is consistent across constructs. Thus, the study meets the Fornell-Larcker criterion, indicating strong construct discriminant validity. Each construct appears to capture a different aspect of the phenomenon under study.

Table 4. Discriminant validity

	1	2	3	4	5	6	7	8	9
1. Performance expectancy	**0.798**								
2. Effort expectancy	0.792	**0.833**							
3. Social influence	0.738	0.729	**0.825**						
4. Facilitating conditions	0.484	0.298	0.577	**0.713**					
5. Mobile skillfulness	0.457	0.471	0.374	0.283	**0.774**				
6. Personal innovation	0.570	0.568	0.552	0.371	0.758	**0.743**			
7. Grievance redressal	0.566	0.495	0.558	0.435	0.471	0.624	**0.770**		
8. Behavioral intention	0.264	0.202	0.235	0.176	0.153	0.203	0.250	**0.698**	
9. Use behavior	0.662	0.557	0.565	0.372	0.405	0.554	0.640	0.345	**0.809**

4.3 Assessment of Path Model

Using a bootstrapping technique with 5000 sub-samples, the Structural Equation Modeling (SEM) analysis, as shown in Table 5 and figure 2, provide informative findings regarding the relationships between various constructs at a 5% significance level with a 95% confidence interval. Nine hypotheses (H1–H9) are tested in the analysis, each of which looks at a distinct path relationship between the constructs.

Table 5. Path analysis

No.	Hypothesis path	R^2	Path coefficient (β)	T-Value	p-Value	Supported?
H1	Performance expectancy →Behavioral intention	0.070	0.264	3.482	0.001*	Yes
H2	Effort expectancy→ Behavioral intention	0.041	0.202	2.631	0.009	No
H3	Social influence→ Behavioral intention	0.055	0.235	3.084	0.002*	Yes
H4	Facilitating conditions→ Behavioral intention	0.031	0.176	2.276	0.024	No
H5	Facilitating conditions→ Effort expectancy	0.089	0.298	3.981	0.000*	Yes
H6	Behavioral intention →Use behavior	0.119	0.345	4.676	0.000*	Yes
H7	Grievance redressal→ Use behavior	0.409	0.640	10.597	0.000*	Yes
H8	Mobile skillfulness→ Behavioral intention	0.050	0.223	2.208	0.000*	Yes
H9	Personal innovation→ Behavioral intention	0.087	0.295	3.933	0.000*	Yes

Note: *Statistically significant at $p<0.05$

Performance Expectancy (PE) [R^2 = 0.070; β = 0.264; T-Value = 3.482; p-Value = 0.001*] and Social Influence (SI) [R^2 = 0.055; β = 0.235; T-Value = 3.084; p-Value = 0.002*] demonstrate noteworthy positive effects with respect to the influence on Behavioral Intention (BI), supporting H1 and H3. This suggests that SI and PE are significant BI predictors. H2 and H4 are not supported because it was found that neither Effort Expectancy (EE) [R^2 = 0.041; β = 0.202; T-Value = 2.631; p-Value = 0.009] nor Facilitating Conditions (FC) [R^2 = 0.031; β = 0.176; T-Value = 2.276; p-Value = 0.024] significantly influenced BI. This indicates that although users' behavioral intentions are heavily influenced by social influences and performance expectations, the context-specific factors such as ease of use and facilitating conditions are not very important.

Furthermore, H5 is supported by the significant relationship between FC and EE [R^2 = 0.089; β = 0.298; T-Value = 3.981; p-Value = 0.000*], which shows that facilitating conditions have a positive impact on effort expectancy. Higher behavioral intention is a strong predictor of actual use behavior, as suggested by the significant positive relationship [R^2 = 0.119; β = 0.345; T-Value = 4.676; p-Value = 0.000*] for the path from BI to Use Behavior (UB). Grievance Redressal (GR) confirms H7 by demonstrating a strong positive effect on UB (R^2 = 0.409; β = 0.640; T-Value = 10.597; p-Value = 0.000*). This demonstrates how grievance redressal mechanisms have a big impact on how people use technology. Ultimately, H8 and H9 are supported by the fact that both Mobile Skillfulness (MS) [R^2 = 0.050; β =

0.223; T-Value = 2.208; p-Value = 0.000*] and Personal Innovation (PI) [R^2 = 0.087; β = 0.295; T-Value = 3.933; p-Value = 0.000*] significantly improve BI. This emphasizes how crucial it is for people to use mobile devices skillfully and for their own creativity to influence their behavioral intentions.

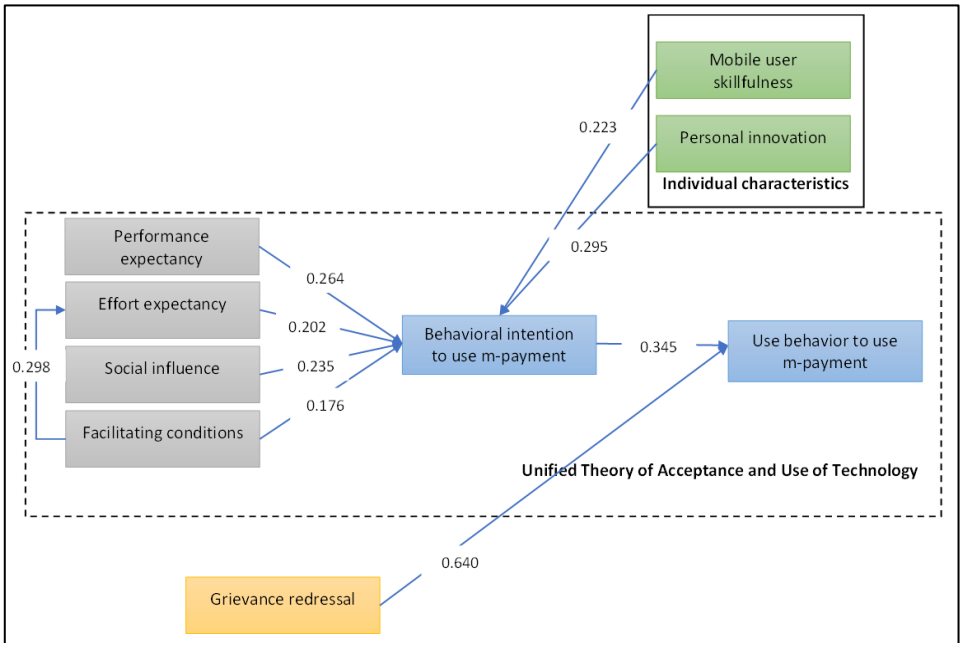

Figure 2. Structural Equation Modeling (SEM)

To summarize, the SEM analysis indicates that the following factors are important in this model: Performance Expectancy, Social Influence, Facilitating Conditions (in relation to Effort Expectancy), Behavioral Intention, Grievance Redressal, Mobile Skillfulness, and Personal Innovation. Though to differing degrees,

they are important factors in behavioral intention and use behavior. This offers insightful information about the factors influencing user behavior and intentions in the context under study.

5. Discussion

The hypothesis testing outcomes are discussed in this section, as indicated in Table 5, where it is observed that 7 of the 9 hypotheses submitted are supported. H2 and H4, which are associated with effort expectation and the effect of facilitating conditions for m-payment technology use on customers' intention to use it, are not supported. Participants in the study are typically between the ages of 36 and 55, hold a Bachelor's degree, and have utilized mobile payment for one to two years. The majority of respondents work in government. Additionally, the majority of participants would prefer m-payment over alternative payment methods if there were a financial incentive. Moreover, either an Android or a Microsoft-based smartphone is the preferred device of the majority. According to previous studies, performance expectations greatly influence behavioral intention to use an m-payment service (Handayani & Sudiana, 2017; Ali & Qaisar, 2018; Chao, 2019; Jung et al., 2020).

The more enthusiastic users are about a technology, the more they believe it is simple to use. During the COVID-19 pandemic, individuals have become more interested in embracing m-payment services, particularly those that assist them with online transactions. As a result, Saudi Arabian m-payment developers should concentrate on developing m-payment applications that increase the performance of m-payment user transactions.

In contrast, effort expectancy has a negligible negative effect on behavioral intention to use m-payment. This is because Saudi Arabia residents have found it difficult to learn how to utilize m-payment applications during the period COVID-19 restrictions. This assertion contradicts previous studies that assert that learning and using mobile payment systems are straightforward (Oliveira et al., 2016). As a result, developers of m-payment applications should strive to produce user-friendly and simple-to-use programs in order to enhance the positive intention of m-payment users in Saudi Arabia. However, it is observed that social influence has a substantial positive effect on behavioral intention. The results show that the greater the influence of an individual's closest social circle on the use of m-payment services, the greater the intention to adopt it. This conclusion contradicts the findings of earlier studies (Alshehri et al., 2019; Jung et al., 2020), which demonstrate that social pressure and the opinions of critical peers have no effect on behavioral intentions to utilize m-payment.

Numerous research works have also established that the facilitating condition has a substantial effect on behavioral intention. Sivathanu (2019) discovered that the conductive condition for m-payment has a beneficial effect on the behavioral intention of Indian consumers to use digital payment systems. However, other research, such as that by Slade et al. (2015), established that the enabling condition has a negligible detrimental effect on Saudi Arabian behavioral intention to use m-payment. As a result, Saudi Arabian customers will employ m-payment regardless of the surrounding circumstances during the COVID-19 pandemic. Prior

research has also established a significant link between enabling situations and effort expectancy. As an example, Stefi (2015) discovered that enabling conditions are likely to greatly minimize the effort required by software developers when integrating existing components. As a result, this present study indicates that enhanced resources and technical infrastructure can aid clients in comprehending and utilizing the mobile payment system.

While the impact of users' individual characteristics regarding mobile user skillfulness on behavioral intention for m-payment is favorable, the results indicate that the greater the users' confidence in their ability to conduct an online transaction swiftly and efficiently, the more they used m-payment. Additionally, the findings indicate a favorable association between users' personality traits toward personal innovation and their behavioral intention toward m-payments, with a coefficient of (0.295). Thus, the higher the willingness of users to learn new technologies, the more often m-payment will be used. However, in regard to the effect of users' behavior intention on their use of m-payment behavior, the outcome indicates a positive association with a coefficient of (0.345). This means that the greater the number of individuals who are willing to use mobile payment, the more transactions will be completed.

Finally, in terms of the effect of users' intentions toward grievance resolution on m-payment usage, the findings indicate a positive association with a coefficient of (0.409). Thus, in order to increase customer adoption of such services, operators of mobile payment services must offer a transparent grievance process and sufficient

security measures (Kumar et al., 2018). They should also respond promptly to consumers in the event of failed m-payment transactions and be transparent in resolving disputes resulting from such unsuccessful transactions. Moreover, where any legal conflicts arise in connection with an m-payment, the m-payment service providers must handle them expeditiously.

5.1 Limitations and Recommendations for Future Research

The purpose of this study is to ascertain the factors that influence individuals' intentions to use m-payment in Saudi Arabia during the COVID-19 outbreak. Hypotheses were produced as a preliminary step toward addressing research concerns and challenges. These hypotheses are summarized in Figure 1 and Table 5 of the study model. After testing the hypotheses, the results are given in Table 5. Compelling evidence to support each of the presented ideas has been identified.

5.1.1 Research Limitations

The study's conclusions and generalizability are hampered by a number of study constraints. Firstly, the survey was conducted in Saudi Arabia's major cities, but some cities were excluded. Secondly, the study was conducted within a brief period without considering the external environmental factors affecting m-payments at the time. Finally, although a thorough review of existing journal articles, official documents, and books as information sources, was conducted, there is a limited number of previous studies on this subject.

5.1.2 Recommendation for Future Research

Future study should broaden the scope of data collection to include additional cities in Saudi Arabia, as well as individuals of different language backgrounds and educational levels. In order to increase the number of responders, the data collection period should be extended to six months. Additionally, future research could analyze this issue in the context of other theories, such as the Rogers Model or Motivation Theory, or could incorporate a quality effect construct.

5.2 Contribution of the Research Study

Despite the limitations and difficulties described in 5.1, this research and its findings greatly contribute to an understanding of the factors that influence the intention to use mobile payment in Saudi Arabia during the COVID-19 pandemic. This study contributes to the UTAUT theory by examining the validity and reliability of factors affecting users' desire to utilize m-payments, such as their attitude toward security concerns, individual characteristics, and grievance redressal. As previously mentioned in 5.1, there have been few studies on the factors driving Saudi Arabian intentions to use m-payment during the COVID-19 pandemic, thus this research will assist the public in understanding and exploring the elements that influence Saudi Arabian intentions to use m-payment. Additionally, the findings of this study will aid m-payment providers in enhancing the security of the services they provide in order to encourage the adoption of m-payment.

5.3 Conclusions

This study investigates the most crucial concerns that affect the inclination of Saudi Arabians to adopt mobile payments during the COVID-19 pandemic. The study initially uses the UTAUT model as a theoretical lens, which is then modified to include security concerns and individual characteristics in order to make it more applicable to the consumer m-payment setting. The model is experimentally validated using 164 respondents to ascertain the major characteristics that impact Saudi Arabian consumer willingness to adopt m-payment. The findings indicate that the newly introduced variables of user attitudes towards perceived security threats and individual characteristics were major indirect concerns affecting customers' usage behavior via behavioral intention. Meanwhile, alongside behavioral intention, the issue of grievance redressal is revealed as a strong direct predictor of Saudi Arabian consumers'' m-payment use behavior. The strongest predictor of use behavior is grievance resolution, indicating the utilitarian value of mobile payment in Saudi Arabia.

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