

Antecedents of mobile banking app adoption during COVID19: A perspective of Jordanian consumer

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CHRONICLE

ABSTRACT

Article history:

Received: June 14, 2022

Received in revised format: July 28, 2022

Accepted: August 26, 2022

Available online: August 26 2022

Keywords:

Service quality

System quality

Information quality

Trust in the app

COVID-19 health anxiety

Intentions to use MB-app

Technological readiness

The effect of contextual factors namely information quality, service quality, system quality, Technological readiness, trust in applications (app) and COVID-19 health anxiety, on the intention and consequently the actual use of Mobile Payment (MP) app was examined in this study. Trust, as mediator to the relationship between technological readiness and intention to use MB-app was examined also. Data were obtained from 740 Jordanian Mobile Banking (MB) app users through an online survey. The relationship between service quality, system quality, information quality, trust in the app, COVID-19 health anxiety, Technological readiness and the intentions to use MB-app and the actual use of MB-app was empirically examined. The results showed a positive relationship between service quality, system quality, information quality, trust in the app and COVID-19 health anxiety, and the intentions to use MB-app, and in turn the actual use of MB-app, and a positive mediation of trust on the relationship between COVID-19 health anxiety and the intentions to use MB-app.

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1. Introduction

The Coronavirus Disease 2019 or COVID-19 is a highly dangerous and contagious disease, and its outbreak has dramatically altered the personal, social and professional life of everyone all over the world (Yuan et al., 2021). The fast spread of COVID-19 has quickly turned it into a pandemic, compelling some drastic measures like social distancing, closure of businesses, and closing of borders, just to name a few, to curb its further spread and to save lives. Nonetheless, the survival of man requires interaction and socialization with others. This is where modern technologies come into play; these technologies could assist people in their communication and socialization with peers, colleagues and significant others, and in their daily affairs like working, shopping, paying bills, and so forth, safely, without having to physically interact with others, in the midst of the pandemic (Islam et al., 2021; Flavian et al., 2005).

The mobile phone apps have been useful for businesses in maintaining relationships with the customers (Islam et al., 2020). In the industry of banking for instance, Khan and Ali (2018) reported that mobile banking has ousted the conventional methods of transaction. Mobile banking provides customers with ubiquitous payment solutions, and this has been regarded as a significant reform of the consumer services method. Notably, the innovative and versatile MB-app allows consumers to perform banking transactions through their mobile phones. MB-app is indeed a pioneering technological development in the banking sector, which, according to Verissimo (2016), is able to satisfy the needs of customers irrespective of time and place.

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ISSN 2561-8156 (Online) - ISSN 2561-8148 (Print)

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doi: 10.5267/j.ijds.2022.8.011

The use of MP-app for financial transactions and bill payment was increased during COVID-19 pandemic, particularly among users of mobile phones (Rafidinal & Senalasar, 2021). In fact, the use of technologies has increasingly become part of people's adaptation in living with COVID-19 (Brem et al., 2021), and the pandemic has indeed opened up opportunities for the increased use of certain technologies. In the banking sector, Kala et al. (2021) reported the attempts of integrating MB-apps into the systems of banks to increase the effectiveness and efficiency of banking services. Verissimo (2016) found a positive impact of the use of mobile apps on customer service and satisfaction, while Sharma and Sharma (2019) had mentioned the direct relationship between MB-app and smartphone penetration in society. Somehow, in light of the COVID 19 crisis, the factors affecting MB-app adoption need to be examined further. Hence, the factors leading to the intention of customers to use MB-app, and consequently the actual use of the app, were examined in this study.

Approximately 4.9 billion people globally are smartphone users (Statista, 2022), while in Jordan, there were approximately 7.83 million smartphone users in 2021, and the number was expected to increase to 8.28 million by 2025 (Statista, 2022).

Mobile banking is a developing trend, and in Jordan, it was reported that users of mobile phones are more likely to shift to the Internet banking from cash transactions, with the use of MB-app. MB-app has been proven to benefit clients, but for banks, keeping the existing and attracting new users of MB-app have been challenging. Among the hurdles faced by banks include comparable products offered by rivals, technical requirements, knowledge of users, and security concerns towards MB-app (Sharma & Sharma, 2019). Still, the fact is, people worldwide depend on their smart mobile devices, and so, banks, service providers, and MB-app developers need to provide users with efficient MB-app banking to increase the effectiveness of online banking. The factors affecting mobile apps adoption among users have been examined in various studies, as can be exemplified by Picoto and Pinto (2021) who examined the effect of culture on mobile app adoption. Meanwhile, some have noted the Impact of technological, social and contextual factors on mobile apps adoption (Kim et al., 2009; Kala., 2021; Sharma & Sharma, 2019). In the information technology (IT) domain however, especially when speaking about mobile apps, a user-acceptable artifact cannot be built solely through technological features. In fact, some factors have been found to affect the potential acceptance of a technical application.

Among the factors affecting the acceptability of a technological artifact include service quality, information quality, system quality and trust (Sharma & Sharma, 2019; Kim et al., 2009). The present study relevantly employed adaptive structuration theory in examining MB-adoption. The choice of the theory was based on DeSanctis and Poole (1994) who reported service quality, information quality, system quality and trust, and contextual factors as the factors that significantly affect the adoption of MB-app. A positive context will increase the likelihood of people to appreciate service quality, information quality, system quality and trust, in MB-app's actual use. Mobile banking apps adoption, in terms of use intention and actual use, has been examined in several studies. As reported by Khan et al. (2021), the intention to use mobile banking significantly affects the actual use of the mobile payment system. In a related study involving the Chinese banking system, Wu et al. (2020) reported that the intention to use MB and the actual use of MP were linked. Meanwhile, Kim et al. (2010) reported the impact of COVID-19 pandemic on the mobile phone banking services chosen and adopted by clients. Zheng et al. (2021) relevantly mentioned the increase in the reliance towards e-banking among bank clients owing to fear towards COVID-19, and the requirement of quarantine and social distancing. Hence, the question that the present study attempted to address concerns whether the pandemic affected the adoption of mobile banking, specifically terms of intent and actual use. The technological and contextual factors affecting the intentions of users to adopt an MB-app and then to actually use the MB-app were examined in this study, and this adds to relevant literature in several ways. The first contribution of this study was its use of the DeLone and McLean's information systems (IS) success model with contextual factors in examining the use of MB-app during the pandemic – this expands the use of the model. Secondly, the inclusion of COVID-19 health anxiety as a contextual factor, expands the literature on COVID-19 and its impacts on technology use. The inclusion of other factors namely service quality, information quality, system quality and trust in the MB-app, in examining the intentions to use and consequently the actual use of MB-app enrich the extant literature further.

Additionally, the present study investigated the trust of the public towards digital technologies usage in financial affairs, and trust in this study was examined as a motivator for customers to show their intent towards and actual use of MB-app, as a contextual factor in the study's research model. In digital platforms usage, trust is a vital factor to consider (Kim et al., 2009; Chung & Kwon, 2009; Merhi et al., 2019; Cao et al., 2018). As such, COVID-19 anxiety was expected to intensify the intentions and the actual use of MB-app.

2. Theoretical foundation and hypotheses development

As mentioned previously, this study employed the DeLone and McLean's (1992) IS success model. Initially, it comprised six factors of information quality, system quality, system use, user satisfaction, individual effect and organizational impact, before the addition of service quality measure in the revised version in (2003). Service quality measure in the revised model comprises the aspects of individual use and organizational influence, into the construct of net benefit. DeLone and McLean's (2003) revised model comprises factors including information quality, service quality, system quality and system use.

The use of the IS success model can be observed in many studies, for instance, Wu and Wang (2006) who employed it in examining knowledge management. The model was used in Lin (2008) in examining learning success. In Schapp et al.

(2006), the DeLone and McLean model was used in their examination of website success goals. In their study, Sharma and Sharma (2019) expanded DeLone and McLean's model by including the factor of trust in the app, in examining mobile applications. Talwar et al. (2020) also employed the IS success model by DeLone and McLean in examining the intent of customers to continue their mobile payment. In a related study by Chen et al. (2020), the determinants of location-based applications were examined using the IS success model of DeLone and McLean.

Past relevant studies have proven the significant effect of social context on the adoption and success of any technological item, but it is not easy to combine the social and technological factors that define its adoption. In examining the benefits of technology, Cao et al. (2021) indicated the significance of integrating the technological and social systems, but early works that employed the DeLone and McLean model did not consider this notion, and so, the present study attempted to bridge this literary gap. Accordingly, the DeLone and McLean model was applied in finding out the contextual aspects which may justify technology adoption.

Accordingly, the present study employed the factors of COVID-19 health anxiety and technological readiness as main predictors to the intentions to use the MB-app – both factors were added to the DeLone and McLean's model. Figure 1 displays the theoretical model.

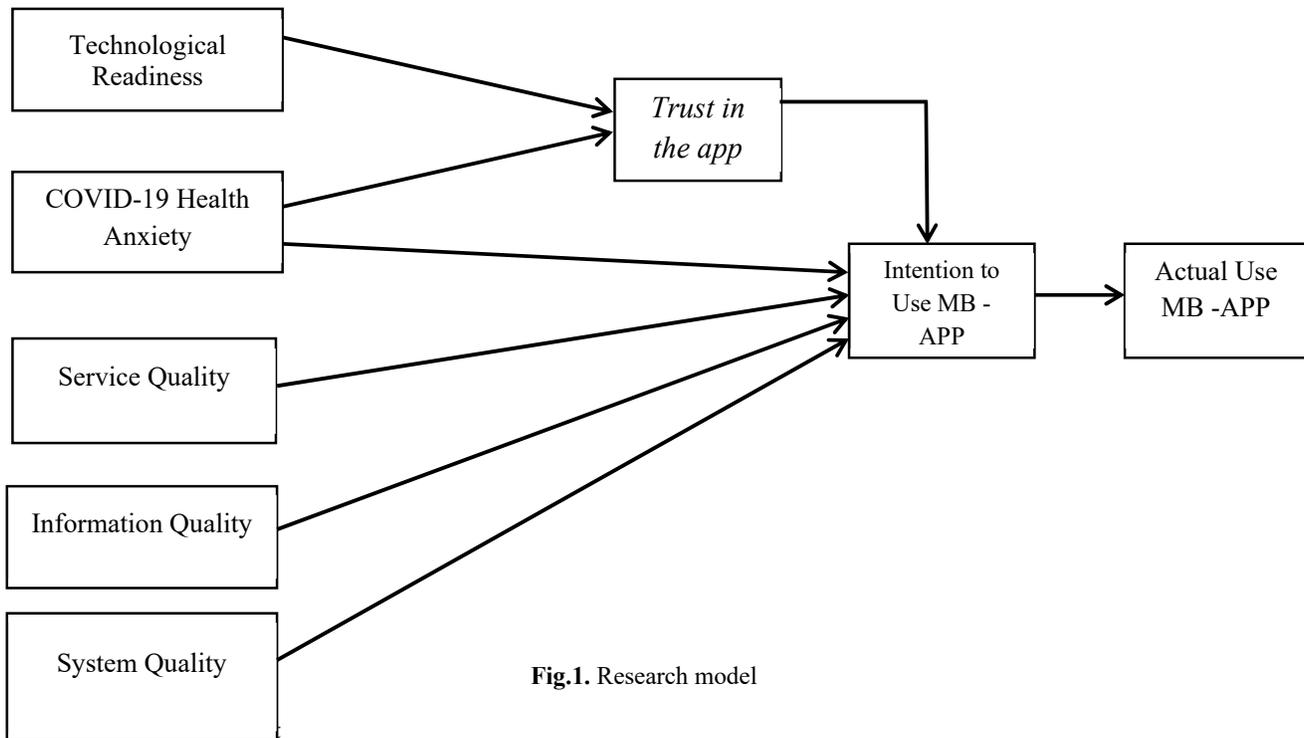


Fig.1. Research model

Information quality and intention to use MB-app

Information quality can be viewed as a desirable IT application output feature (Petter & McLean, 2009). It can also be described as criteria like timeliness, consistency, relevance, format and aptness of information that is conveyed by an IT application to end users (Reicks & Rod, 2001). In MB-app's context, accuracy, timeliness, completeness, and recentness are among the criteria required of the information. Information quality and use intent of technology has been proven to have significant relation (Zheng et al., 2013; Petter et al., 2008; Lin, 2008). Therefore, the present study expected a significant impact of information quality on use intentions of MB-app, with the following hypothesis:

H₁: *Information quality is positively related to an individual's intention to use an MB-app.*

Service quality and intention to use MB-app

Service quality has been proven crucial in the determination of the IS quality in general (Mohammadi, 2015). In IT applications, Allen and Burgess (2010) described service quality as the capability of a given application in satisfying users' needs. Additionally, studies on e-learning like Poulouva and Simonova (2014) and Tajuddin et al. (2013) have reported a significant link between service quality and use intention. In a related study, Bolen and Ozen (2020) concluded that service quality was linked to the readiness of students in accepting an open online course. Relevantly, Marinkovic and Obradovic (2015) mentioned that end-user satisfaction is a resultant of service quality. The present study therefore proposed the hypothesis below:

H₂: *Service quality is positively related to an individual's intention to use MB-app.*

System quality and intention to use MB-app

System quality illustrates the interactions manners of individuals in their efforts of obtaining information. In this regard, DeLone and McLean (2003) presented a number of factors that affect system quality. These factors include reliability, flexibility, precision, speed of response, and ease of use. Meanwhile, within the context of the Internet, features of system quality include availability, reliability, usability, adaptability and response time. Furthermore, in some situations, the use decision of a certain system is significantly affected by system quality (Devece et al., 2017; Bolen & Ozen, 2020; Alsabawy et al., 2013; Bolen & Ozen, 2020). The hypothesis below was therefore proposed:

H₃: *System quality is positively related to an individual's intention to use MB-app.*

Trust in the app and intention to use MB-app

Trust is an important matter when people are involved (Boateng, Adam, Okoe, & Anning-Dorson, 2016), and in IT context, trust can reflect the attitude of an individual concerning certain technology (Chang et al., 2016; Suh & Han, 2003). In their study on the adoption of Fintech, Hu et al. (2019) stated the importance of trust, considering the significance and vulnerability of data in the service. In fact, the trust of consumers towards Fintech services was found to affect the adoption of Fintech significantly (Hu et al., 2019; Nangin et al., 2020). Additionally, Hu et al. (2019) and Nawayseh (2020) reported that trust mediated the link between consumers' perceived risks and their willingness in adopting the services and products offered by Fintech. As such, this study proposed the following hypothesis:

H₄: *Trust in the app is positively related to an individual's intention to use an MB-app.*

COVID-19 health anxiety and intention to use MB-app

Health anxiety has been reported to be caused by factors including the feeling of stress, physiological excitement, and defensive behaviors (Rachman, 2012; Trougakos et al., 2020). In their study, McCleskey and Gruda (2021) described health anxiety as an emotional state that is portrayed by the feelings of worry and tense, increased blood pressure and expectation of incoming danger. Some suffer from health anxiety every day, and as indicated by Hu et al. (2020), health anxiety is a serious issue which can impair one's daily affairs. Meanwhile, the contagious COVID-19 caused by a novel coronavirus (Ozen et al., 2020) can be spread through close contact with infected individuals, or with objects and surfaces previously in contact with the infected individuals. The danger of COVID-19 can cause health anxiety, while social distancing is one of the employed measures to curb the spread of this disease. However, people still need to resume life and interact as part of their daily affairs. Hence, the use of technology allows people to interact with others and perform certain tasks while maintaining social distance. The following hypothesis below was proposed:

H₅: *COVID-19 health anxiety is positively related to an individual's intention to use MB-app.*

Intention to use MB-app and actual use of MB-app

As a core construct in technology acceptance model (TAM), Intention has been commonly employed among IS researchers, especially in examining IT applications adoption. It can be described as the likelihood that the user will employ a given IT application (Mohammadi, 2015; Lee, 2009), and can be perceived as a form of attitude as well (DeLone & McLean, 2003). In their study, Ting et al. (2016), mentioned the need to understand the contextual factors affecting the intent of consumers toward the use of mobile payment systems, especially among consumers in developing economies. In new technology adoption, Davis (1989) stated the importance of intention. In another study on the use of mobile payment services, Liu and Tai (2016) found that trust directly affected intention to use. In new technology adoption, Intention appeared to be significantly linked to actual usage (Chow et al., 2012; Venkatesh et al., 2003). In examining m-payment adoption intentions during COVID-19 pandemic, Zhao and Bacao (2021) reported that the technological and mental viewpoints of consumers affected their M-payment adoption intentions. The hypothesis below was proposed:

H₆: *Intention to use MB-app is positively related to actual use of MB-app.*

Technological Readiness (TR)

Technological readiness relates to the belief of consumer concerning the resources and support available for the full execution of the behavior (e.g., availability of required technical infrastructure, facilities, and support to ease and speed up the service use) (Venkatesh et al., 2012), and innovation adoption appears to be influenced by the technological environment (Archibugi & Coco, 2004; Bhatt & Bhatt, 2016; Frimpong et al., 2020). The positive effect of technical conditions on new technology adoption has been reported (Gerlach & Lutz, 2019; Oliveira & Martins, 2010), and so, the readiness of the required infrastructure like the Internet connectivity will stimulate new technology adoption. However, the impact of technology readiness on trust was not identified. Meanwhile, Dimitriadis and Kyrezis (2010) found that the predisposition of individuals towards new

technologies generally affect their perception towards the credibility of the innovation of financial services. Finally, technological preparedness can affect whether or not a consumer will put their trust in a certain good or service (Elliott et al., 2013).

In relation to technological readiness and trust of consumer as user, the following hypotheses was proposed:

H7: *Technological readiness has a significant positive impact on trust of consumers towards the use of MB-app.*

COVID-19 health anxiety and trust in the app

The study by Johnson and Tversky (Johnson and Tversky 1983) found that after reading the news, people either overestimate or underestimate the number of deaths caused by smoking or floods. Similar to the last study, this one looks into the specific effects of emotions other than valence on users' trust in particular applications, in this case, health apps that help with COVID-19 pandemic surveillance and contamination. Fear can influence people's risk assessments of bad events like strokes and their view of potential terrorist strikes in the future (Lerner and Keltner 2000). Therefore, individuals are more likely to experience anxiety with increased acceptance of innovation when they directly confront or are exposed to a risk occurrence. The following hypothesis below was proposed:

H8: *COVID-19 health anxiety is positively related to individual's trust in the app.*

Mediation effect of trust in the app

Schneider et al. (2021) contribute to the growing body of research investigating the circumstances in which digital mediation might improve distant connections between professionals and parents by shedding light on the significance of trust for the implementation of distanced, digitally mediated interactions. Thus, the following hypotheses was proposed:

H9: *Trust in the app mediate the relationship between COVID-19 health anxiety and intention to use MB -app.*

3. Method

The main aim of the present study was to ascertain the factors affecting MB-apps among Jordanians. In doing so, managers from 10 bank branches were briefed on the goals and objectives sought by this study. In order to obtain the study participants comprising bank customers who were MB-app user, the researcher sought consent and assistance from these managers. The researcher then contacted the identified samples using their email and WhatsApp number obtained from the bank managers. These samples were provided with the details of the research. The samples that took part in this study were doing it voluntarily, and they answered the survey online. The survey was developed using Google Forms, and a web link was sent to the study samples' email and WhatsApp. This study employed convenience sampling techniques because it was difficult to obtain a sampling frame with a complete list of potential MB-apps consumers, in Jordanian context. During the first week, 770 responses were received, but 20 were incomplete, while 10 showed identical responses for all survey items, and so, they were excluded. The total number of usable responses was 740, denoting 96% response rate. Accordingly, Table 1 presents the respondents' demographic profiles. Table 1 displays the demographic profiles of the study respondents.

Table 1
Demographic Characteristics of Respondents

Category	Coding	Frequency	Percent
Gender	Male	350	47.2%
	Female	390	52.8%
	Total	740	100%
Age	Less than 18 years	5	0.06%
	18-34	300	41%
	35-44	200	27%
	45-54	100	13.5%
	More than 54 years	135	18.2%
	Total	740	100%
Educational level	High school or less	30	0.04%
	Diploma	10	0.01%
	Bachelor's degree	300	41%
	Master's degree	200	27%
	Above Master	200	27%
	Total	740	100%
Income level	Less than 500 JD	400	54%
	501JD- 1000JD	290	39%
	More than 1000JD	50	7%
	Total	740	100%

4. Measures

The items of the questionnaire were all adapted from past studies, and each item, with the exclusion of items in the demographic section, was equipped with a 7-point Likert scale. The construct of service quality of MB-app was represented by three items adapted from Tam and Oliveira (2016) and Urbach et al. (2010). The construct of System quality was represented by three items adapted from Tam and Oliveira (2016) and Urbach et al. (2010). The construct of Information quality was represented by three items adapted from Urbach et al. (2010) and Tam and Oliveira (2016). The construct of trust in MB-app was represented by three items adapted from Boateng et al. (2016). The construct of perceived COVID-19 health anxiety was represented by five items adapted from Lee et al. (2020). The construct of individual's intentions to use MB-apps was represented by three items adapted from Liebana-Cabanillas et al. (2017). The construct of technological readiness was measured using three items adapted from Gerlach and Lutz (2019) and Venkatesh et al. (2012). Finally, the construct of actual use of MB-apps was measured using three items adapted from Moon and Kim (2001).

5. Data Analysis

Table 2 shows the results of factor loading, Cronbach's alpha, composite reliability (CR), average variance extracted (AVE), and Heterotrait-Monotrait (HTMT). The table shows that the loading and Cronbach's alpha of the study items were within the recommended range. Meanwhile, the obtained CR values were between 0.94 and 0.82 which were above the recommended value of 0.70, and the obtained AVE values were between 0.932 and 0.672 which were above the recommended value of 0.50 as proposed by Hair et al. (2014) and Hair et al. (2013). Hence, reliability and validity of the first-order constructs model can be affirmed. Next, Table 3 presents the results of Fornell-Larcker, 1981 evaluation. As can be observed in both Table 2 and Table 3, all obtained figures fulfilled the recommended criteria, and so, it can be affirmed that the measurement model of the study is reliable.

Table 2

Factor Loading, Cronbach's Alpha, CR, AVE and HTMT

Latent Variable	Indicators Code	Reliability & Validity				
		Convergent Validity		Internal Consistency Reliability		Discriminant Validity
		Factor Loadings	Average Variance Extracted	Cronbach's Alpha	Composite Reliability	HTMT
		Loading > 0.50	AVE ≥ 0.50	α ≥ 0.70	CR ≥ 0.70	HTMT < 0.90
Technological readiness	TR1	0.655				
	TR2	0.701	0.839	0.87	0.82	Yes
	TR3	0.652				
COVID 19 health anxiety	Anx 1	0.711				
	Anx 2	0.544				
	Anx 3	0.570	0.689	0.89	0.85	Yes
	Anx 4	0.637				
	Anx5	0.637				
Service quality	Srv1	0.504				
	Srv 2	0.655	0.713	0.80	0.83	Yes
	Srv 3	0.539				
Information quality	Inf1	0.811				
	Inf 2	0.649	0.682	0.84	0.86	Yes
	Inf 3	0.826				
System quality	Sys1	0.805				
	Sys 2	0.629	0.762	0.85	0.90	Yes
	Sys 3	0.710				
Trust	Tru1	0.617				
	Tru 2	0.530	0.672	0.90	0.93	Yes
	Tru 3	0.817				
Intention to use app	Inte1	0.513				
	Inte 2	0.572	0.932	0.93	0.94	Yes
	Inte 3	0.753				
Actual use MB-app	Ause1	0.648	0.891	0.91	0.91	Yes
	Ause2	0.655				
	Ause3	0.580				

Table 4 displays the hypotheses outcomes in summary form (path coefficients-β). In general, the results showed the significant effect of the factors of COVID-19 health anxiety, service quality, information quality, system quality and trust on the intention to use MB-apps among Jordanians, particularly bank customers. Additionally, the results showed the significant effect of technological readiness on trust. Furthermore, trust appears to affect intention to use MB-apps positively. Also, the results showed that the actual MB-apps use is influenced by intention to use, both significantly and positively. As can be observed from the table, all hypotheses were supported.

Table 3
The Fornell-Larcker Discriminant Validity Correlation Matrix

	TR	Anx	Srv	Inf	Sys	Tru	Inte	Ause
TR	0.851							
Anx	0.111	0.830						
Srv	0.340	0.127	0.844					
Inf	0.522	0.221	0.316	0.921				
Sys	0.633	0.341	0.331	0.811	0.847			
Tru	0.520	0.711	0.545	0.604	0.661	0.907		
Inte	0.739	0.450	0.421	0.590	0.530	0.538	0.950	
Ause	0.540	0.221	0.588	0.636	0.530	0.631	0.736	0.881

Table 4
Results of Hypotheses Testing

#	Paths	Estimate	S.E.	C.R.	P	Conclusion
H1	Inf → Inte	0.111	0.040	1.331	0.01	Accepted
H2	Srv → Inte	0.210	0.050	4.111	0.00	Accepted
H3	Sys → Inte	0.731	0.044	7.221	0.00	Accepted
H4	Tru → Inte	0.144	0.121	1.343	0.03	Accepted
H5	Anx → Inte	0.233	0.031	3.410	0.07	Accepted
H6	Inte → Ause	0.333	0.041	3.210	0.05	Accepted
H7	TR → Tru	0.201	0.067	3.440	0.06	Accepted
H8	Anx → Tru	0.335	0.143	3.201	0.04	Accepted

Result of Trust in the app as Mediator

The factor of Trust in the apps was tested in terms of its mediating effect on the relationship between COVID-19 health anxiety and Intention to use MB - apps, and the result can be viewed in the following Table 5. The determination of mediating effect was based on Hair et al. (2010), and so, full mediating effect can be concluded when the indirect effect is larger than the direct effect, but not otherwise. As shown by the table, the direct effect value was 0.121, which was smaller than the indirect effect value which was 0.132. Hence, the mediation of trust in the app in relationship between COVID-19 health anxiety and Intention to use app was affirmed. H8 was hence supported.

Table 5
Summary of proposed results for the theoretical model

Hypothesis	From	Mediation	To	Direct effect	Indirect effect	Total effect	Results
H9	Anx	Tru	Inte	0.121	0.132	0.253	Accepted

6. Discussion, implications and limitation

6.1 Discussion

The present study examined the factors impacting the use of MB-app among Jordanian bank customers, based on the IS success model by DeLone and McLean model. Data were obtained from bank customers who were also MB-apps users. The outbreak of COVID-19 pandemic has pushed people to increase their dependence on technology in their daily affairs as they had to limit their physical interactions with others to curb the spread of the disease. Many had very limited opportunities to leave their houses (Khan, 2021), and so, many activities had to be carried out online, including banking activities, via the use of technology like the mobile banking applications. Fortunately, the current technological advancements have made dealing with the pandemic easier. Accordingly, the present study attempted to examine the effect of technological factors on user intention and consequently the actual use of MP-apps during COVID-19 pandemic. The results showed positive linkage between the factors of system quality, information quality, service quality, trust in the app and COVID-19 anxiety, and the intention to use MB-app.

Hence, based on the results, H1 was supported, as the results showed significant impact of information quality on the intention to use MB-apps, in line with Mohammadi (2015) and Petter et al. (2008). Mohammadi (2015) in examining e-learning, employed the DeLone and McLean model alongside TAM, and concluded a significant impact of information quality on an individual's intention to use. H2 was also supported as the results proved a positive effect of service quality on the intention to use MB-apps. It should be noted that the research model proposed in this study included the factor of trust owing to its significance in the stimulation of intention and the actual MB-apps usage. In fact, in the use of digital platforms, trust has been reported to be an essential aspect (see: Kim et al., 2009; Chung & Kwon, 2009; Merhi et al., 2019). The significance of trust was also reported in studies that employed the DeLone and McLean model, including Petter et al. (2008), Petter and

McLean (2009) and Wang and Liao (2008). Notably, it is challenging to gain public trust in digital technologies especially when it comes to matters associated with finance.

The results showed a significant effect of the factor of system quality on the intention of the user, and so, H3 was supported. The results implied the link between system quality and the potential use of MB-apps. In a related study, Talwar et al. (2020) reported the positive link between information quality and the intent to use technology related items. Further, the results supported H4 as trust in the app was found to be a significant predictor of intention to use MB-apps. This finding was in agreement with Kaabachi et al. (2017) and Kim et al. (2009) who reported that trust intensifies the confidence and willingness of users towards mobile banking usage. H5 was also supported because COVID-19 health anxiety was found to be positively linked to MB-apps use intention. Relevantly, McCleskey and Gruda (2021) and Nikcevic et al. (2021) also reported similar outcomes. H6 was supported as well, when the results proved positive linkage between intention to use MB-apps and the actual use of MB-app, in line with the findings by Mohammadi (2015) and Davis (1989). Similarly, H7 and H8 were both supported as the results showed a positive impact of both technological readiness (H7) and COVID-19 health anxiety (H8) on trust. This finding suggests that when people are exposed to a risk event, those who experience anxiety are more inclined to trust mobile apps. Since COVID-19 has been described as a virus that spreads rapidly, those who already worry about contamination may be more susceptible to worry about coming into contact with the disease's origins.

Trust of consumers towards MB-apps is undeniably important as it affects their adoption level. Hence, this study examined the direct effect of trust on the intent to use MB-apps. The mediating impact of trust on COVID-19 health anxiety and intention to use the consumer was examined as well. In fact, trust has been reported to allow adoption (Akhlaq & Ahmed, 2013; Hu et al., 2019; Nawayseh, 2020; Singh & Srivastava, 2018; Slazus & Bick, 2018). The study results proved the significance of consumer trust, as well as its mediating power, to the link between environmental drivers and use intent of consumers. Hence, based on the results, H9 was supported. This implies the need to implement certain measures to increase positive attitudes of consumers towards the MB-apps use, and to eliminate or reduce all their concerns relating to the apps usage, so that the use of MB-apps among consumers, particularly Jordanian consumers, could be increased.

6.2 Theoretical contributions

Several theoretical contributions of this study are worthy of mention. Firstly, this study is among the early ones that examined the factors impacting the use of MB-apps in the midst of COVID-19 pandemic. Notably, studies on mobile banking adoption have been mainly focusing on the technological factors (Zhou et al., 2021; Kala Kamdjoug et al., 2021; Sharma & Sharma, 2019). However, as mentioned by Cao et al. (2021), technology is but only a fraction of a vast system that comprises context which is vital to the technology's success, and so, the present study examined the contextual factors, i.e., the COVID-19 pandemic. The DeLone and McLean IS success model (DeLone and McLean, 1992) was employed in this study in examining the adoption of MB-apps among bank customers. Uncertainty and anxiety caused by COVID-19 pandemic have forced people to employ the technology in performing their activities which otherwise would be performed manually and face to face, like purchasing items and performing banking transactions.

The findings of the present study are valuable to the IS domain, as they relate to the factors affecting the intent and actual usage of consumers of MB-apps during COVID-19 pandemic. The intention to use MP-apps in this study to establish an association between technological factors and actual MP-app use provides a broad understanding of the factors affecting the intent of people, particularly Jordanian bank clients, to use MB-apps, and motivates their actual use. It should be noted however, that this phenomenon has been examined in normal situations (Ting et al., 2016).

Additionally, the use of user intention to use MB-apps as mediator to the relationship between technological factors and actual MB-app use during COVID-19 pandemic was a significant contribution of this study. The significant effect of COVID-19 on the intent of mobile apps users was proven in prior studies, and it was affirmed that the use of mobile apps imparts a sense of comfort and security to users amidst the pandemic. Hence, through its findings, the present study could justify the intention of users to use MB-apps, particularly among Jordanian banking consumers.

6.3 Practical implications

A number of practical implications of this study are highlighted in this section, and they would be of value to relevant managers, policymakers and government regulators. Firstly, the present study adds to knowledge of the factors affecting the intention and consequently actual use of MB-apps, and so, the results would be of value to apps developers and banks in improving their MB-apps services to their consumers. From the results, the present study concluded that information quality, system quality, and service quality were significant predictors of the intent to continue the MB-apps usage. Hence, it is important that developers of MB-apps allocate more resources as an effort to prevent system failure through improving their apps' infrastructure – failure could impair the intent of users to continue using the apps (Mohammadi, 2015). Additionally, a user-friendly interface could be integrated into the apps as this could increase usage. Trust is an important factor as well, as it increases the likelihood of users to use the apps. Hence, it is important that some security measures are integrated into the apps to assure security, and consequently, the trust of users towards the apps.

Finally, the use of social media by banks in demonstrating their MB-apps capacities could increase intent to use by consumers as well. Through social media, which is popularly used nowadays by mobile phone users, banks could reach more potential consumers in conveying its MB-apps information. Additionally, the inclusion of more comprehensive and useful information also will increase consumer's trust and confidence, like information on troubleshooting, and more detailed information on how to deal with transaction failures or user mistakes during apps usage. For service providers, an effective complaint system should be in place so that customers could be assisted promptly for their online banking troubles. Lastly, considering the impact of COVID-19 on the life affairs of people, including on their banking affairs, banking industry executives, policymakers and management need to determine the best strategies for MB-apps users so that they could make better banking service choices amidst the pandemic.

6.4 Limitations

There was one major limitation of this study, and it concerns its theoretical model that was employed to evaluate data from Jordanian commercial bank customers who were MB-apps users. Considering that Jordan is a developing nation, it would be worthy to use the same model on MB-apps users who were customers of banks in developed countries with different experience and culture. This would allow comparison of results, while also increasing generalization of outcomes.

7. Conclusion

The present study explored the factors affecting the usage of mobile banking apps. Mobile banking apps adoption was previously examined using the IS success and TAM model, but in this study, the IS success model by DeLone and McLean was employed in examining the factors affecting the intention to use MB-apps. A research model was proposed, with the inclusion of the factor of COVID-19 health anxiety. All nine hypotheses were supported, and the present study concluded that Intention to use MB-apps was significantly related to system quality, service quality, information quality, COVID-19 anxiety and trust in MB-apps.

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