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Abstract: The online pharmacy business in Saudi Arabia is facing a great challenge in adoption. Therefore, this paper aims to examine the factors influencing the adoption of online pharmacy in Saudi Arabia. This study was carried out under the Unified theory of acceptance and usage of technology-2 (UTAUT-2) to examine the perception of customers on adopting online pharmacy. SPSS and structural equation modelling-Smart-PLS are used for data analysis. The main findings showed that technology trust and technological awareness has a significant impact on the behavioural intention of the consumer to adopt online pharmacy. On the other hand, it is found that perceived risk has an insignificant influence on the consumer's behavioural intention. It is recommended to further investigate the effect of other factors influencing online pharmacy adoption in Saudi Arabia such as performance expectancy, effort expectancy, social influence and hedonic motivation.

Keywords: Saudi Arabia; healthcare; pharmaceutical trade; e-commerce; UTAUT-2.

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1 Introduction

The growing use of smartphones, the internet and various social media platforms are excellent opportunities for businesses to prosper. These opportunities are made possible with internet marketing which includes marketing of mobile phone (M-Marketing) and marketing of Facebook (F-Marketing) (Jain and Yadav, 2017). Retail businesses are increasingly providing services and goods via online platforms. The number of businesses and activities online has been growing. The Kingdom of Saudi Arabia (KSA) is one of the major retail markets in the region of the Arabian Peninsula. The Saudi Arabian market represents the biggest share of the Gulf Corporation Council's retail industry. In particular, the kingdom continues to outperform in the hypermarket sector. The fast spread of the services of the internet, together with fast-growing social media platforms and applications represent the latest trends in the kingdom. Various metrics may influence E-customers' behaviour. Research has shown that not all website visitors are shoppers. Therefore, it is important to identify what makes visitors shop. Two-thirds of the shoppers online stated that they do not prefer to shop from a website that is poorly designed; well-off online shoppers also have similar perceptions (Elliott and Speck, 2005). Such figures are expected to increase as Saudis have become attracted to 'social commerce', a newly growing term in the e-commerce model. Social commerce involves using social media platforms to surf products and services and shop through social media accounts; the use of social media has created better insight into shopping styles and customer trends (Razi et al., 2019). However, the current situation in KSA poses some limitations and challenges. The challenges are reflected in the kingdom's readiness to embark on the e-commerce and digital transaction transformation journey. The kingdom's readiness for e-commerce can be evaluated by several factors. These factors include among others, the network's infrastructure, i.e., broadband, and narrow, and the cost of accessing the internet (Alkhamisi and Monowar, 2013; Alotaibi et al., 2021). In

the same vein, e-commerce has been seen to have brought changes to the healthcare sector. However, several challenges have arisen. For instance, some studies argued that even though in several developing countries, the online pharmacy market has flourished, there are still some challenges and setbacks (Yin et al., 2016). Yin et al. (2016) further highlighted these challenges to be two-fold. Firstly, it is related to strict regulations set by the government's operations of online pharmacies which serve as a limitation to the higher rates of online pharmacies in KSA. Second, most consumers' find it uncomfortable when dealing with online pharmacies, and this has resulted in a poor acceptance rate (Sonawane and Mahajan, 2020).

Worldwide, Saudi Arabia is ranked third for smartphone penetration and 64 for internet penetration. The kingdom is home to an advanced infrastructure of information technology and communications (ICT) but people in the country have been utilising e-commerce platforms at a comparatively slow pace. Saudi Arabia has witnessed a low implementation of e-commerce services and systems in several sectors, including the online pharmacy sector. Research has empirically established that only a few people were found to be aware of the online pharmacy platform with even fewer people who use the platform to buy medicine. These challenges are present despite technological advancements in mobile telecommunications which have significantly changed the customers' purchasing behaviour (Khalilzadeh et al., 2017). In contrast, there is evidence that some developing countries have comparatively higher levels of online pharmacy acceptance in comparison with KSA. In some developed countries, sales of online pharmacies are approximately 30% of the total sales in the pharmaceutical and health supplies trade sector (Yin et al., 2016). In Saudi Arabia, young consumers are the primary demographic interested in online pharmacies and internet marketing. Additionally, other consumer demographics interested in online pharmacies also include well-educated businessmen, and people who are familiar with the use of computers in business. Thus, the role of the information communication technology service companies has been documented as they help businesses in creating websites to enable e-commerce facilities. This study aims to investigate the factors that affect the consumer's behavioural intention towards e-pharmacy adoption in KSA including the perceived risk, technology trust, and technology awareness.

2 Literature review

Technology adoption has continued to penetrate every aspect of human activity. Business activities and services are being executed or carried out through online platforms. Online services provide a compelling model that affects the nature of the economy in general, including the pharmaceutical and healthcare sectors.

2.1 Online pharmacy

According to Orizio et al. (2011), the digital pharmacy was established in the USA where both authorised and non-prescription of medication (drugs) was put on sale via the internet around the 1990s. Global health regulatory organisations (i.e., World Health Organization) face many challenges including issues of mental health safety and consumer public concerns such as the counterfeit and replicate drugs (WHO, 2010). Accordingly, internet or online services can be used to facilitate and ease the acquiring of

drugs and support the abuse of prescription by consumers. Some experts have stated that healthcare applications and systems need a powerful system that is secure and robust. Digital pharmacy or electronic pharmacy is a system that utilises the application of internet technologies in a digital platform (Sheikh et al., 2021). The digital pharmacy allows its customers to engage digitally in a platform to order what they need easily and secure. According to Alfahad et al. (2015), the purchase of patient medication using online platforms is not a common norm in Saudi Arabia due to the relatively low adoption (Al Hosni et al., 2010). However, the consideration of purchasers undertaken for online pharmaceutical services is considered an important development to healthcare services mostly in the KSA. The study utilised the Unified Theory of Acceptance and Usage of Technology-2 (UTAUT-2) as the main drivers of consumers' adoption of online pharmacies in KSA. The perceived risks, as well as technology trust, are extended drivers of UTAUT-2.

2.2 Perceived risk

The perceived risk is the potential risk in the pursuit of ones' desired consequence or results in the utilisation of digital technology (Featherman and Pavlou, 2003). Perceived risk is when consumer utilisation of novel digital technologies results in unfavourable responses. These risk factors could be divided into dimensions of risks such as performance, privacy, financial, time, social and security risk (Akturan and Tezcan, 2012). In the study, perceived risk will be assessed as a uni-dimensional variable. Several studies have shown the uni-dimensionality (De Kerviler et al., 2016; Koenig-Lewis et al., 2010; Riquelme and Rios, 2010; Sripalawat et al., 2011).

Different research has unified risk or preciseness and perceived trust such that the latter construct has a causal effect on the perceived risk through two-dimensional elements that include reliability and technology trust. These elements of technology trust are significantly positive toward the induction of trust and, therefore, reduce risks linked to using online technology in retail service. The study of Alalwan et al. (2017) examined the intention of using mobile banking technology. Constructs extracted from the UTAUT-2 theory along with perceived risk and perceived trust is harmonised to hypothesise the behavioural intention of use and adaption process. However, examining the behavioural elements could result in introducing performance and effort expectancy, hedonic motivations, risk, and price value trust constructs that can have a positive influence on the development of behavioural intention on the use of online technology, this positive significance varies from one construct to another depending on the degree of capacity and strength on the mutual significant between these constructs. Consequently, based on the literature, it is important to employ perceived risk independently as a construct to define the intention of using e-pharmacy in the Saudi retail system.

2.3 Technology trust

Consumer inclination to accept risk on the propensity of positive presumption on behaviour in a digital platform could be regarded as the technology of trust (Ennew and Sekhon, 2007). Technology trust as a variable has been recently applied in studies on the adoption of digital medication. Technology trust is an essential construct in predicting and examining online behavioural intention in medical sciences (Thong et al., 2006). Trust is the UTAUT-2 model's extension consistent with research on online

pharmaceuticals in the health sector and management studies (Alalwan et al., 2017; Oh and Yoon, 2014; Tarhini et al., 2017; Yin et al., 2016). The greatest confusion and ambiguity associated with using the internet and online applications may be attributed to a lack of trust in technology (Gefen et al., 2003). Related research on technology, however, showed that it was a primary predictor of behavioural purpose (El-Masri and Tarhini, 2017; Kim et al., 2009; Luo et al., 2010; Thong et al., 2006; Yin et al., 2016). The literature showed that trust in technology can be introduced in the framework of the UTAUT-2 theoretical model in a different context, which this study has incorporated accordingly.

A recent research study by Barua et al. (2018) posed that technology trust is a construct that perceives reliability and is significant to customer satisfaction on the adoption of online pharmacy. The study further opined that security and control systems are the most efficient drivers of technology trust while effort expectancy does not play a significant role in elevating technology trust among individuals who thrive to develop their perceptions towards using self-service technology. Therefore, based on the varying literature observed, adding technology trust complements the existing factors of the UTAUT-2 theory and would directly influence behavioural intention on the discovery of self-service technology drivers in the adoption of online pharmacy simultaneously.

2.4 Technology awareness

Technology awareness reflects the individual's values and beliefs on the adjacency and alignment with the use of the new technology. In an organisation, this means the extent to which others can be seen utilising a modern technical method (Venkatesh et al., 2003). Technology awareness has a small effect compared to other constructs. The compatibility along with enjoyment, control and usefulness form the four main components of innovation as claimed by the innovation diffusion theory (Rogers, 1995). The results showed that prior usage experiences reduce technology risks and improve the usefulness and compatibility of those elderly individuals who develop better behavioural intentions to use new technologies.

Many studies on awareness in technology have focused on the behavioural intention of the consumer. Some studies found that awareness of technology predicted the consumer's behavioural intention. According to previous studies made, technology awareness predicted Lebanese participants' behavioural intention when examining their level of awareness regarding electronic government services. Wan et al. (2012) developed the concept of technical knowledge of consequences and investigated its impact on upcycling behaviour among staff members, as well as students at university. Further examinations depicted that technology awareness predicts behavioural.

According to the study by Tongnamtiang and Leelasantitham (2019), in the different contexts that tracked a similar path, technology awareness passes five main stages that include identification, evaluation, commitments, preparation and implementation. According to Amaro and Duarte (2015), innovation is influenced by relative advantage, complexity, perceived compatibility, trainability and visibility. However, the study of Tongnamtiang and Leelasantitham (2019) on using top-up vending machines (TVMs) examined the factors influencing consumers' acceptance and use of self-service technology by integrating a ground theory model such as the technology acceptance model (TAM) and the theory of innovation adoption. Among other variables, compatibility showed little influence on the positive attitude toward the behavioural

intention. Rather, relative advantage, perceived usefulness, effort expectancy and knowledge played a bigger role in defining the behavioural intention for using the TVM.

2.5 Research hypotheses

2.5.1 The association of perceived risk with behavioural intention

The perceived risk, as defined by Featherman and Pavlou (2003), involves the potential for losses in the pursuit of the desired goals when adopting e-services. Thus, it involves customers adopting innovative technologies to have experienced adverse consequences, in other words, harmfulness and uncertainty. The perceived risk was divided into several risk dimensions. These include the perceived social, financial, performance, security, time and privacy risk. It was reported that perceived social risk, perceived usefulness, and perceived performance risk directly affect attitudes towards mobile banking, and that attitude is the major determinant of mobile banking adoption intention (Akturan and Tezcan, 2012). Furthermore, the influence of the perceived risk on behavioural intentions is considered significant according to the findings of many studies (De Kerviler et al., 2016; Koenig-Lewis et al., 2010; Riquelme and Rios, 2010; Sripalawat et al., 2011).

Most of these studies extend UTAUT-2 with perceived risk in studies related to e-payment and other financial transactions. Few apply it in the online pharmacy context (Yin et al., 2016). The perceived risk is the second important predictor of behavioural intentions according to previous studies (Luo et al., 2010; Riquelme and Rios, 2010; Slade et al., 2015). Similarly, other research studies have shown that perceived risk negatively influences behavioural intention to adopt IT in general (Martins et al., 2014) and online pharmacy adoption (Yin et al., 2016). Moreover, the complexity of making transactions in a virtual environment (online) left customers confused, thereby increasing the perceived risk regarding technology use (Gaur and Ondrus, 2012). Therefore, if users have the perception that buying medicine through an online pharmacy is highly risky, there is a likelihood that might negatively affect their intention to adopt the system and vice versa.

H1 A negative relationship exists between perceived risk and behavioural intention regarding e-pharmacy adoption.

2.5.2 The association of technology trust with behavioural intention

In a situation characterised by interdependency and danger, trust is described as the person's willingness to agree to undertake vulnerability according to positive assumptions about other people's actions or intentions (Ennew and Sekhon, 2007). Trust as a variable was extensively used in the technology-adoption studies. It was found to be a key factor in predicting behavioural intention (Venkatesh et al., 2016; Yadav and Pathak, 2016). Similarly, trust was used as an extension of UTAUT-2 in many other studies such as mobile banking (Alalwan et al., 2017), e-learning (Alalwan et al., 2017), online information services (Oh and Yoon, 2014) and online pharmacy (Oh and Yoon, 2014). The problem of protection and trust when using the system will dominate the application of trust value to the users' decisions. The high ambiguity, intangibility, heterogeneity, and vagueness associated with using the internet and technologies can explain the interest in this construct (Gefen et al., 2003).

As a result, confidence has been identified as a key predictor of behavioural intention in the literature on technology adoption (El-Masri and Tarhini, 2017; Kim et al., 2009; Luo et al., 2010; Venkatesh and Zhang, 2010; Yadav and Pathak, 2016). The literature has shown that trust can be incorporated into the UTAUT2 variables in a different context. Yin et al. (2016) empirically validated that perceived trust significantly influences the customers' intention of adopting e-pharmacy.

The assurance of the pharmaceutical e-commerce industry and the assurance of online pharmacy are the key sources of perceived confidence. Inadequate monitoring of these dimensions can also increase the perception of risk among consumers. As a result, adding confidence to the UTAUT2 complements the existing factors and is expected to have a direct impact on behavioural intention to use online pharmacies. The intention to use the online system, according to this report, is ultimately determined by the degree of confidence in the system; if the trust level is strong, they are more expected to follow it.

H2 A positive relationship exists between technology trust and behavioural intention regarding e-pharmacy adoption.

2.5.3 The association of technology awareness with behavioural intention

Prospective consumers of online pharmacy adoption in Saudi Arabia, according to technology knowledge experts, are unaware of the scheme, which has a significant impact on their behavioural intentions. The penetration of the system among online users would be highly successful if there is adequate technology knowledge. It has been determined that the greater the degree of technological awareness, the greater the diffusion of behavioural purpose and online pharmacy acceptance, and vice versa. Furthermore, previous research on the relationship between UTAUT-2 constructs and behavioural intention and online service adoption has shown mixed results (Alrawashdeh et al., 2012; Birch and Irvine, 2009; Foon and Fah, 2011). As a result, when contradictory results emerge, the same research can be repeated to broaden the scope of literature awareness. In case there are inconclusive previous results, a test of the hypothesis impact is recommended by Baron and Kenny (1986).

Even though awareness is an important prerequisite for the creation of moral norms, there is a lack of awareness in developing countries, particularly regarding the adoption of online pharmacy in some major service sectors (Rehman et al., 2012). Experts have attributed the sluggish adoption of online pharmacies in Saudi Arabia to a lack of technological knowledge. Studies in developing countries revealed that one of the main reasons behind the inactive adoption of e-services is the lack of technology awareness on the advantages of the system (Yaqub et al., 2013). Therefore, there is a need for technology awareness to aid the diffusion of online service adoption, such as online pharmacy behavioural intention. According to Chiemeke and Evwiekpaefe (2011), the economist intelligence unit (EIU), in 2006, argued that the introduction of e-commerce services is hampered by a lack of technology awareness on how to use the technologies, thus limiting behaviour intention. The study concluded that 'technology awareness' is a contributing factor to know the effects on behavioural intention and online pharmacy adoption to facilitate the conditions to use UTAUT-2 model. The technology awareness construct could significantly influence behavioural intention and online pharmacy adoption simultaneously; this makes the hypothetical relationship for the above-mentioned relationships.

H3 A positive relationship exists between technology awareness and behavioural intention regarding e-pharmacy adoption.

3 Methodology

The design of a study involves the prearrangement of a group of conditions for the two-phase of data collection and data analysis. A blueprint for data collection, analysis, and measurement is referred to as a research design. It is a conceptual framework that is observed in the study process (Kothari, 2004). It involves the plan for shaping the study, involving all the procedures used in a specific study from conceptualising the raised issues, identifying the research gaps, as well as the design of the study questions and objectives, collecting and analysing the data, followed by the results to decide on the best method to be applied (Creswell and Plano Clark, 2007; Walliman, 2006).

This study examined the potential associations between the factors that are related to the online pharmacy practice in KSA. This study is explanatory because it applied statistical analysis for identifying validity, as well as reliability of the IVs and DVs independent variables. Since the research variables are well-defined and numerical data will be provided, a quantitative approach was used in this study. The analysis employs the quantitative approach, with relational questions being answered for the variables defined for the study.

3.1 Study population and sample size

The target population in the current study includes regular customers who purchase either pharmaceutical or non-pharmaceutical products from a pharmacy and who have access to online pharmacy services. The number of online buyers in Saudi Arabia is 23.5 million individuals (AlGhamdi et al., 2011).

A sample represents a specific ratio of the studied population (Polit et al., 2010). The sample is a selected category of the larger community. It involves the respondents of the study, who are used to predict or estimate a certain condition (Richardson and Kramer, 2006). According to Bryman and Bell (2015), sampling simplifies the analysis as the entire population is hard to be measured. Therefore, a representative sample is easier to measure. The researcher can save time and money by using a representative sampling technique. In this study, the researcher determined the minimum sample size using the Raosoft (2004) online sample calculator. The recommended sample size was 385. A total of 500 copies of the survey questionnaire were sent out. The probability sampling technique has been considered for the current study because probability sampling is adopted when each constituent of the population is known and non-zero chance of being incorporated in the sample (Fox et al., 2007). The probability sampling method is the most suitable technique for quantitative studies. In this study, simple random sampling was adopted for the selection of respondents.

3.2 Data collection

In this study, the data were collected in two waves. The data was collected by sending a web link to the respondents after designing the data collection instrument (the questionnaire); the web link used the customers' database at the online pharmacies in

Saudi Arabia. The first wave emphasises 'intention' and the second wave focuses on 'actual use' to discover the intention and actual use separately (Vehkalahti, 2000; Venkatesh and Zhang, 2010). The questionnaire includes a few questions to exclude unmatched respondents according to the inclusion/exclusion criteria. The final collected data was exported to a .csv file for further data sanitisation and analysis.

3.3 Research instrument

3.3.1 Instruments for measuring perceived risk

Perceived risk will be measured through 7-items adapted from Corbitt et al. (2003). The items emphasised that customers feel worried about performance risk, financial risk, and time risk when buying from the internet and less about social risk and physiological risk. Items are showed in Table 1.

Table 1 The questions on measuring perceived risk

Code	*Items*
PR1	I believe that online purchases are risky because the products/services delivered may fail to meet my expectations.
PR2	I believe that online purchases are risky because the products/services delivered may be of inferior quality.
PR3	I believe that online purchases are risky because the products/services delivered may be dangerous to use.
PR4	I believe that online purchases are risky because the products/services may be available at a lower price somewhere else.
PR5	I believe that online purchases are risky because they may cause others to think less highly of me.
PR6	I believe that online purchases are risky because the products/services delivered may fail to fit well with my image or self-concept.
PR6	I believe that online purchases are risky in terms of time because the products/services delivered may fail to be delivered within the expected time frame.

Table 2 The items on measuring technological trust

Code	*Items*
TT1	The pharmacy web system (PWS) guarantees the anonymity of users
TT2	The pharmacy web system (PWS) ensures the security of my data
TT3	The pharmacy web system (PWS) is efficient and always works reliably
TT4	The pharmacy web system (PWS) is predictable and unchanging
TT5	I can rely on the pharmacy web system (PWS)
TT6	On the pharmacy web, I can express my opinion about service, products, and quality without any fear

3.3.2 Instruments for measuring technological trust

To measure the technological trust, 6-items were adapted from (Ejdys, 2018), the items emphasise trust in technology as it is always the case that the fact of a person believing in the development of technology has an impact on the trust in a particular technology that

is already used or will be used in the future. The Cronbach's alpha was (0.83), Table 2 shows the items of trust in technology.

3.3.3 Instruments for measuring technological awareness

To measure the construct of technological awareness, items were adopted from Peter (2005), as the Cronbach's alpha (0.870). A total of five (5) items were chosen to measure technological awareness as illustrated in Table 3.

Table 3 The questions on measuring technological awareness

Code	*Items*
TA1	I am knowledgeable of the benefits of online shopping in general
TA2	I am aware of the technical pros and cons of using the online pharmacy
TA3	I am aware of the drawbacks and challenges that come with using an online pharmacy
TA4	I am aware of the economic benefits of using the online pharmacy as an approach to saving time and money
TA5	Overall, I have full awareness of the technological, economical, and social factors

3.4 Questionnaire development

In this study, the questionnaire survey comprised of two sections. The questionnaire is attached in Appendix as a reference. All demographic profile questions are included in Section A, whereas Section B includes the questions about measuring the perceived risk, technology trust, technology awareness, and behavioural intention to adopt online pharmacy services.

3.5 Data analysis

According to Polit et al. (2010), data analysis is a method of systematically organising data, synthesising research data, and testing hypotheses using those data. The data analysis process consists of a series of interconnected procedures that will turn raw data into useful information (Zikmund et al., 2013). An investigator may use analytical statistics to condense, explain, and summarise quantitative data obtained from empirical evidence (Polit and Beck, 2014). For several years, social science researchers have used statistical analysis methods to improve their ability to validate and develop study results (Hair et al., 2021). Moreover, data analysis encompasses a broad variety of techniques for predicting, exploring, understanding, proving, and explaining data samples (Ringle et al., 2010). Data was collected and analysed using structural equation modelling (SEM) with Smart-PLS and SPSS version 23 packages for this study.

4 Data analysis and results

4.1 Response rate

The survey questionnaire was administered to regular customers, who usually purchase either pharmaceutical or non-pharmaceutical products from a pharmacy and who have

access to online pharmacy services in KSA. The study employed 500 questionnaires for those customers. However, only 425 questionnaires were valid and they can be used for analysing the data of the study as illustrated in Table 4.

Table 4 The response rate of the questionnaire

Distributed questionnaires	*Returned questionnaires*	*%*	*Completed questionnaires*	*%*
500	465	93%	425	85%

4.2 Profile of respondents

The study sample comprises 425 respondents and their profile is illustrated in Table 5. 13.9% of respondents were under 25 years old, and 22.1% were 25 to 30 years old, 47.7% of them were 31 to 40 years old, 13.8% were between 41 and 50 years old and 2.5% were above the age of 51. Regarding their gender, 74.6% of the respondents were males and 25.4% were females. In terms of education level, 9.6% of them finished high school, 10.4% hold a Diploma, 59% hold a bachelor's degree, 17.8% hold a Master's degree and 3.2% hold a PhD.

Table 5 Respondents' demographic profile (*N = 425*)

Demographic item	*Categories*	*Frequency*	*Percentage*
Age	18–25 years	58	13.9
	25–30 years	94	22.1
	31–40 years	203	47.7
	41–50 years	59	13.8
	More than 51 years	11	2.5
	Total	*425*	*100.0*
Gender	Male	317	74.6
	Female	108	25.4
	Total	*425*	*100.0*
Level of education	High school	41	9.6
	Diploma	44	10.4
	Bachelor's degree	251	59
	Master's degree	76	17.8
	Doctorate degree	13	3.2
	Total	*425*	*100.0*

4.3 Construct reliability assessment (composite reliability and cronbach's alpha)

Reliability measures the relationship between the examined constructs with corresponding items to achieve a correlation between these measures (Hair et al., 2021). Internal consistency (e.g., Cronbach's alpha) is the traditional criterion for internal consistency that provides an estimation of the reliability based on inter-correlations of the observed predictor variables (Hair et al., 2019, 2021). Because of the shortcomings of

Cronbach's alpha, a new measure of internal consistency reliability called composite reliability (CR) is proposed (Hair et al., 2021). The factor loading values should be greater than 0.5. Construct reliability ranging between 0.60 and 0.70 is acceptable in exploratory studies. However, CR values of 0.70 to 0.90 are satisfactory for more advanced testing levels. Cronbach's alpha values are poor, suggesting low reliability. CR, on the other hand, overestimates internal quality reliability and creates high-reliability estimates.

Also, reliability with a threshold value of 0.50 or higher shows that items capture a particular latent variable well; but this threshold value is versatile. This means that any object with an outer loading of less than 0.40 should be removed from the build immediately. However, items with outer loadings between 0.40 and 0.70 should be evaluated, which means that removing them boosts the CR and AVE above their threshold values. Only then should items with outer loadings between 0.40 and 0.70 be deleted. Otherwise, they should be kept in the build (Hair et al., 2021). Therefore, upon utilising these guidelines, the items' outer loadings, the constructs' reliability, including Cronbach's alpha with CR were assessed to determine the reliability of the measurement models. The average variance extracted (AVE) is another way of conducting convergent validity. The AVE is calculated through CFA as the mean-variance extracted for the items loading on a construct and is a summary indicator of convergent (Hair et al., 2019). Therefore, according to Hair et al. (2021) a high AVE value which is represented by a value that is greater than 0.5 indicates that the latent variables have high convergent validity.

Table 6 Measurement model: item loading, construct reliability and convergent validity

Constructs	*Items*	*Loading (> 0.5)*	*Cronbach's alpha (> 0.7)*	*CR (> 0.7)*	*AVE (> 0.5)*
Technological awareness	TA1	0.589	0.796	0.860	0.554
	TA2	0.739			
	TA3	0.825			
	TA4	0.739			
	TA5	0.807			
Perceived risk	PR1	0.657	0.730	0.815	0.627
	PR2	0.807			
	PR3	0.625			
	PR4	0.635			
	PR5	0.561			
	PR6	0.608			
Technological trust	TT1	0.832	0.807	0.863	0.561
	TT2	0.78			
	TT3	0.745			
	TT4	0.619			
	TT5	Dropped			
	TT6	0.751			

Notes: CR = Composite reliability; AVE = Average variance extracted; TT5 was dropped due to low loading.

The loadings of the items on their respective items were above the threshold value of 0.5, as shown in Table 6. However, since all of the objects have outer loadings greater than the suggested value of 0.5, Hair et al. (2021) proposed a criterion for determining whether to keep or delete them. Thus, except for TT5, which was dropped due to low loading, all of the products are accurate. As a result, these objects were held in all data sets on their respective constructs. Similarly, Cronbach's alpha and CR were found to be above 0.70 for all constructs, which ranged between (Cronbach's alpha, 0.730–0.818) and (CR, 0.815–0.904) (see Table 6). Construct validity was assessed through AVE as the most used measure for establishing convergent validity at construct levels. The grand mean value of the indicators' squared loadings associated with the construct is known as AVE. An AVE of 0.50 or higher suggests that the construct accounts for more than half of the variance in the indicators. Thus, when the AVE is less than 0.50, it means that the construct describes less variance on average and that more variance remains in the items' error (Hair et al., 2021). Hence, the AVE was found above the threshold value of 0.50 ranging from (0.521 to 0.653) in all data sets as shown in Table 6. Hence, we may conclude that the measurement model was established in terms of reliability and validity as indicated in Table 6.

4.4 Assessment of discriminant validity

The discriminant validity measures the extent to which items measure distinct concepts or differentiate among constructs (Ramayah et al., 2018; Ramayah and Rahbar, 2013). Traditionally, the researchers used the Fornell-Larcker criterion to measure the discriminant validity. The first approach is to assess the indicators' discriminant validity. However, recent literature has proposed a new technique, the Heterotrait-Monotrait ratio of correlations (HTMT) that is considered the most reliable approach. Thus, this study employed both the Fornell-Larcker criterion and Heterotrait-Monotrait ratio of correlations (HTMT) as described below.

Table 7 Discriminant validity via Fornell-Larcker criterion

Constructs		*1*	*2*	*3*	*4*	*5*
1	Behavioural intention	*0.734*				
2	Online pharmacy adaption	0.617	*0.696*			
3	Perceived risk	0.417	0.539	*0.653*		
4	Technological awareness	0.613	0.588	0.488	*0.744*	
5	Technology trust	0.515	0.543	0.453	0.537	*0.682*

Note: Italics values on the diagonal are the square roots of the AVE, shared between the constructs and their respective measures.

4.4.1 Discriminant via Fornell-Larcker criterion

The Fornell-Larcker criteria are used to test discriminant validity. The square root of the AVE values is compared to the latent variable's correlations using this tool. Each construct's square root of AVE should be greater than its correlation with other constructs. The rationale behind this approach is that a construct's metrics share more variance than other constructs (Hair et al., 2021). Therefore, as shown in Table 7, the square root of the AVE for each of the constructs is shown in the diagonals that are

greater than the other values in the columns and rows on that specific construct indicating sufficient discriminant validity (Henseler et al., 2015).

4.4.2 Discriminant via HTMT criterion

Recent research has critically evaluated the performance of the Fornell-Larcker criterion to assess the discriminant validity and has found that this approach is not reliable in detecting the issues of discriminant validity (Henseler et al., 2015). To assess the discriminant validity, the Heterotrait-Monotrait Ratio (HTMT) was suggested. The Heterotrait-Monotrait ratio of correlations (HTMT) are the mean of all correlations of indicators across constructs measuring various constructs compared to the (geometric) mean of the average correlations of indicators measuring the same construct (Hair et al., 2021). The HTMT method is used to calculate the true association between two perfectly calculated constructs. Dis-attenuated correlation is another name for genuine correlation. If the dis-attenuated correlation between two constructs is similar to one, discriminant validity is lacking. Henseler et al. (2015) proposed a 0.90 threshold for HTMT. Discriminant validity is absent when the value is greater than 0.90. For each of the constructs, the HTMT value was found to be less than 0.90 as shown in Table 8. Thus, as presented the HTMT values are less than the suggested value which is 0.90. So, the discriminant validity is established by the HTMT criterion.

Table 8 Discriminant validity via (HTMT criterion)

Constructs		*1*	*2*	*3*	*4*	*5*
1	Behavioural intention					
2	Online pharmacy adaption	0.738				
3	Perceived risk	0.762	0.693			
4	Technological awareness	0.732	0.777	0.635		
5	Technology trust	0.855	0.652	0.578	0.685	

Note: HTMT should be lower than 0.90.

4.5 Structural model assessment via PLS-SEM

For hypothesis testing, the research model of this study was built using SmartPLS. As mentioned in the previous section, the path coefficients are produced by PLS Algorithm procedures, and the t-value determines the bootstrapping procedure. Hair et al. (2021) mentioned that the bootstrapping results in a larger sample claimed to model the unknown population. So, the new sample provides the data from which conclusions can be drawn. Thus, the results can be determined at a level of 5% significance (t-value: 1.645) which is used as a statistical decision criterion for one-tailed (t-value 1.96) and two-tailed (Hair et al., 2021). Furthermore, after confirming the reliability and validity of the constructs in the measurement models' analysis, the structural models' results were then assessed in the second step. This involved evaluating the predictive capabilities of the model and relationships between the constructs (Hair et al., 2021).

4.5.1 Assessment for collinearity issues

The values of the variance inflation factor (VIF) were tested to assess the collinearity issues in the structural model. Based on Hair et al. (2021) suggestion regarding the purpose of multicollinearity, it needs to assess via the VIF. When a VIF value is higher than 5, it suggests the existence of a multicollinearity problem. Thus, the results of the multicollinearity are illustrated in Table 9. Based on the abovementioned results there was no problem in multicollinearity since the VIF values were below 5.

Table 9 Assessment of multicollinearity

Variables	*Variance inflation factor (VIF)*
Perceived risk	1.898
Technological awareness	2.166
Technology trust	2.700
Behavioural intention	N/A
Online pharmacy adaption	N/A

Note: N/A = Not applicable (VIF) is not applicable for the endogenous constructs.

4.5.2 Structural model path coefficients

The structural model, also known as the inner mode, is connected to the path model by the hypothesised relationships between the constructs, which imply the degree and existence of their interactions. The model also shows how much clarified and unexplained variation there is in the endogenous constructs (Hair et al., 2019, 2021). The estimation of the inner structural models' parameters by using 5000 re-samples in a bootstrapping procedure, as was suggested by Hair et al. (2021).

4.5.2.1 Testing of direct effects

This section discusses the analysis of the direct effect; thus, the presentations of the hypotheses of direct effects are presented in Table 10. For hypothesis one (H_1) the relationship between perceived risk and behavioural intention was not accepted with (β = –0.037, t-value = 0.998, p-value = 0.159). Regarding the relationship between technology trust and behavioural intention presented in H_2 was statistically significant (β = 0.181, t-value = 1.784, p-value = 0.037). Similarly, the relationship between technological awareness and behavioural intention (H_3) is statistically significant (β = 0.200, t-value = 3.776, p-value = 0.000). Finally, the relationship between behavioural intention and online pharmacy adaption (H_4) was supported as per (β = 0.322, t-value = 6.853, p-value = 0.000).

Table 10 Path coefficients analysis (direct effect)

Hypothesis	*Relationship*	*SB*	*SE*	*t-value*	*p-value*	*Bias and corrected bootstrap 95% CI*		*Decision*
						BCI 95% LL	*BCI 95% UL*	
H-1	Perceived risk -> Behavioural intention	–0.037	0.037	0.998	0.159	0.235	0.391	Not supported
H-2	Technology trust -> behavioural intention	0.181	0.101	1.784	0.037	0.020	0.351	Supported
H-3	Technological awareness -> Behavioural intention	0.200	0.053	3.776	0.000	0.109	0.283	Supported
H-4	Behavioural intention -> Online pharmacy adaption	0.322	0.047	6.853	0.000	0.435	0.578	Supported

Notes: N = 425. Bootstrap sample size = 5,000. SE = standard error; LL = lower limit; UL = upper limit, CI = confidence interval.

4.5.2.2 Assessment of the effect size f^2

To assess the R^2 values of all the endogenous constructs, the effect size f^2 is needed to be evaluated to determine the substantial influence of a particular exogenous construct on the specific endogenous latent variable. The f^2 effect size can be determined by observing the change in R^2 value after omitting the particular exogenous construct from the model. The effect size of any specific construct on a particular latent variable can be calculated by using the following formula:

$$f^2 = \frac{R^2_{included} - R^2_{excluded}}{1 - R^2_{included}}$$

Cohen (1988) has provided the guidelines for evaluating the f^2 effect size of any selected exogenous construct for a particular endogenous latent variable. According to his guidelines, values of 0.35, 0.15, and 0.02 f^2 effect sizes are considered as large, medium, and small effects of the exogenous constructs. However, Hair et al. (2021) mentioned that 0.025, 0.01, and 0.005 indicate more realistic standards for large, medium, and small effect sizes respectively. Thus, the f^2 effect-size values were summarised in Table 11 for all the sample models.

Table 11 f^2 effect sizes

Constructs	f^2	*Magnitude*
Behavioural intention	0.443	[L]
Perceived risk	0.097	[M]
Technological awareness	0.059	[M]
Technology trust	0.016	[M]
Online pharmacy adaption	N/A	-

Notes: N/A = Not applicable f^2 is not applicable for the endogenous constructs;
S = Small, M = Medium, L = Large.

5 Discussion

5.1 Effect of perceived risk on behavioural intentions towards online pharmacy

With regards to the relationship between perceived risk and behavioural intentions. The result of these findings indicates that perceived risk is negatively related to behavioural intentions. It should be noted that it is a perceived risk that influences the behavioural intention of customers, but not an observable risk (Büttner and Göritz, 2008; Pavlou, 2003). Here, perceived risk refers to the subjective expectations of customers in an online transaction regarding possible negative effects (Büttner and Göritz, 2008; Yang et al., 2015). Consumers with a high degree of perceived risk have been described as being less willing to buy on the internet. Kim et al. (2008) found that the perceived risk was negatively linked to the intentions of customers on the internet.

The high level of perceived risk will increase the chances of customers experiencing a loss in an online purchase (Pavlou, 2003). The consumers' willingness to buy online will be harmed by such negative perceptions. The consumer's perceived risk of internet

pharmacies could be even higher than that of other general goods (Yin et al., 2016). This is because drugs and drug details are extremely health-related, and any possible issues with such purchases may result in customers experiencing not only financial losses but also health consequences. Internet pharmacies are thought to pose threats such as fake drugs, drug information quality, data protection, and unlicensed pharmacists etc. (Jain and Yadav, 2017). Given the high degree of risk associated with buying drugs online, it is not surprising that customers will be more aware of possible risks associated with internet pharmacies (Kim et al., 2008). This may also allow readers to understand why non-adopters want to keep internet pharmacies out of their lives.

5.2 Effect of technology trust on behavioural intentions to online pharmacy

In a situation marked by interdependence and danger, technology trust is described as an individual's willingness to accept vulnerability based on positive assumptions about another's intentions or behaviours (Ennew and Sekhon, 2007). However, the results indicate that the relationship between technology trust and behavioural intentions are significant, and this may be interpreted as followed. Perceived confidence (PT) is another important factor that determines how the approach is used. As a result, confidence was widely used as a predictor in technology adoption studies and it was discovered to be a significant predictor of behavioural intention (Venkatesh et al., 2016; Yadav and Pathak, 2016).

5.3 Effect of technology awareness on behavioural intentions to online pharmacy

The relationship between technology awareness and behavioural intention was found to be significant. This is based on adequate awareness of technology, the penetration of the system will be highly effective among online users. It can be measured that the greater the knowledge of technology, the greater the propagation of behavioural intent and the acceptance of online pharmacy, and vice versa. However, Athavale et al. (2015) argued that awareness is an important requirement for the development of moral norm. Unfortunately, there is a lack of awareness in developing countries, especially in respect of adopting online pharmacy in some major sectors of services (Rehman et al., 2012). Interestingly and specific to the factors influencing the adoption of online pharmacy in Saudi Arabia, experts have attributed the slow adoption to lack of technology awareness. For instance, some studies in developing nations believed that the reason for the slow adoption of online services in merchandise is due to the lack of technology awareness on the advantages of the system (Srivastava and Raina, 2020). Therefore, there is a need for technology awareness to aid the diffusion of online service adoption, such as online pharmacy behavioural intention. Therefore, technology awareness was so crucial for advancing theory and context as well.

5.4 Interpretation of relationship between behavioural intention and online pharmacy adoption

This section interprets the effect of behavioural intention towards online pharmacy adoption. The user's intention to recommend available existing research supports the hypothesis that consumers with an advanced stage of intent to implement a new platform

or application for information technology are likely to become enthusiastic adopters (Lemire et al., 2008) and are eager and empowered to suggest the technology to others (Lancelot Miltgen et al., 2013). Therefore, the behavioural intention to adopt positively and significantly impacts the adoption of online pharmacy. The results indicate that when a user or consumer perceives a technology to be compatible, their behavioural intention to adopt is higher.

6 Conclusions

The goal of this research was to identify the factors that affect the online pharmacy adoption. This was built on the relational as followed. In Saudi Arabia, there is a low level of adoption and acceptance of online pharmacies, only small groups of Saudi citizens are aware of the existence of online pharmacies, and even fewer Saudis use online pharmacy systems to access and purchase medications. Thus, the online pharmacy business faces a major challenge in adoption despite numerous attempts to use web applications that mimic the actual pharmacy operations. Such attempts are still preliminary and require more theoretical modelling and practical improvements to confidence, reliability, effectiveness and other success factors. For example, the UTAUT-2 was employed to examine the perception of customers on adopting online pharmacy. Nevertheless, the most important factors such as performance expectancy, effort expectancy, and social influence, facilitating condition and these were extended by several other factors such as habit, hedonic motivation, perceived risk, technology trust, and technology awareness. Importantly, this study focuses on the effect of perceived risk, technology trust and technology awareness. The data were collected from the regular customers that purchase either pharmaceutical or non-pharmaceutical products from a pharmacy and who have access to online pharmacy services in Saudi Arabia and analysed using SPSS and structural equation modelling-Smart-PLS. The results demonstrated that perceived risk was negatively related to behavioural intentions. On the other hand, the relationship between technology trust and behavioural intentions was found to be significant. Also, the relationship between technology awareness and behavioural intention was found to be significant.

References

Abanmy, N. (2017) 'The extent of use of online pharmacies in Saudi Arabia', *Saudi Pharmaceutical Journal*, Vol. 25, No. 6, pp.891–899, https://doi.org/https://doi.org/10.1016/j.jsps.2017.02.001.

Abed, S.S., Dwivedi, Y.K. and Williams, M.D. (2015) 'SMEs' adoption of e-commerce using social media in a Saudi Arabian context: a systematic literature review', *International Journal of Business Information Systems*, Vol. 19, No. 2, pp.159–179, https://doi.org/10.1504/IJBIS.2015.069429.

Abubakar, F.M. and Ahmad, H.B. (2013) 'The moderating effect of technology awareness on the relationship between UTAUT constructs and behavioural intention to use technology: a conceptual paper', *Australian Journal of Business and Management Research*, Vol. 3, No. 02, pp.14–23.

Akturan, U. and Tezcan, N. (2012) 'Mobile banking adoption of the youth market', *Marketing Intelligence & Planning*, Vol. 30, No. 4, pp.444–459, https://doi.org/10.1108/02634501211231928.

Al Hosni, N., Ali, S. and Ashrafi, R. (2010) 'The key success factors to mobile commerce for Arab countries in Middle East', *Proceedings of the 12th International Conference on Information Integration and Web-Based Applications & Services*, pp.787–790, https://doi.org /https://doi.org/10.1145/1967486.1967615.

Alalwan, A.A., Dwivedi, Y.K. and Rana, N.P. (2017) 'Factors influencing adoption of mobile banking by Jordanian bank customers: extending UTAUT2 with trust', *International Journal of Information Management*, Vol. 37, No. 3, pp.99–110, https://doi.org/https://doi.org/10.1016 /j.ijinfomgt.2017.01.002.

Alfahad, N.F., Albelali, M.T., Khurshid, F., Al-Arifi, M.N., Al-Dhawailie, A.A. and Alsultam, M. (2015) 'Perception and knowledge to online pharmacy services among consumers in Riyadh, Saudi Arabia: a pilot survey', *Lat. Am. J. Pharm.*, Vol. 34, No. 6, pp.1113–1118.

AlGhamdi, R., Nguyen, A., Nguyen, J. and Drew, S. (2011) 'Factors influencing Saudi customers' decisions to purchase from online retailers in Saudi Arabia: a quantitative analysis', *IADIS International Conference E-Commerce 2011*, pp.153–161.

Alkhamisi, A. and Monowar, M. (2013) 'Rise of augmented reality: current and future application areas', *International Journal of Internet and Distributed Systems*, Vol. 1, No. 4, pp.25–34.

Alotaibi, A., Saleh, W.M.A., Abdulbaqi, A.H. and Alosaimi, M. (2021) *Setting the Health Research Priority Agenda for the Ministry of Health (MoH)*, Riyadh, Kingdom of Saudi Arabia 2020-2025 Project.

Alrawashdeh, T.A., Muhairat, M.I. and Alqatawnah, S.M. (2012) *Factors Affecting Acceptance of Web-Based Training System: Using Extended UTAUT and Structural Equation Modeling*, ArXiv:1205.1904. https://arxiv.org/abs/1205.1904.

Amaro, S. and Duarte, P. (2015) 'An integrative model of consumers' intentions to purchase travel online', *Tourism Management*, Vol. 46, pp.64–79, https://doi.org/https://doi.org/10.1016 /j.tourman.2014.06.006.

Athavale, A.S., Banahan III, B.F., Bentley, J.P. and West-Strum, D.S. (2015) 'Antecedents and consequences of pharmacy loyalty behavior', *International Journal of Pharmaceutical and Healthcare Marketing*, Vol. 9, No. 1, pp.36–55, https://doi.org/10.1108/IJPHM-02-2013-0003.

Baron, R.M. and Kenny, D.A. (1986) 'The moderator-mediator variable distinction in social psychological research: conceptual, strategic, and statistical considerations', *Journal of Personality and Social Psychology*, Vol. 51, No. 6, pp.1173–1182.

Barua, Z., Aimin, W. and Hongyi, X. (2018) 'A perceived reliability-based customer satisfaction model in self-service technology', *The Service Industries Journal*, Vol. 38, Nos. 7–8, pp.446–466, https://doi.org/10.1080/02642069.2017.1400533.

Birch, A. and Irvine, V. (2009) 'Preservice teachers' acceptance of ICT integration in the classroom: applying the UTAUT model', *Educational Media International*, Vol. 46, No. 4, pp.295–315, https://doi.org/10.1080/09523980903387506.

Bryman, A. and Bell, E. (2015) *Business Research Methods*, 4th ed., Oxford University Press [online] https://books.google.com.my/books?id=JTLdqpYb7FAC (accessed 25 August 2020).

Büttner, O.B. and Göritz, A.S. (2008) 'Perceived trustworthiness of online shops', *Journal of Consumer Behaviour*, Vol. 7, No. 1, pp.35–50, https://doi.org/https://doi.org/10.1002/cb.235.

Chiemeke, S.C. and Evwiekpaefe, A.E. (2011) 'A conceptual framework of a modified unified theory of acceptance and use of technology (UTAUT) Model with Nigerian factors in E-commerce adoption', *Educational Research*, Vol. 2, No. 12, pp.1719–1726.

Corbitt, B.J., Thanasankit, T. and Yi, H. (2003) 'Trust and e-commerce: a study of consumer perceptions', *Electronic Commerce Research and Applications*, Vol. 2, No. 3, pp.203–215, https://doi.org/https://doi.org/10.1016/S1567-4223(03)00024-3.

Creswell, J. and Plano Clark, V. (2007) *Designing and Conducting Mixed Methods Research*, SAGE Publications Inc., Thousand Oaks, CA.

De Kerviler, G., Demoulin, N.T.M. and Zidda, P. (2016) 'Adoption of in-store mobile payment: are perceived risk and convenience the only drivers?', *Journal of Retailing and Consumer Services*, Vol. 31, pp.334–344, https://doi.org/https://doi.org/10.1016/j.jretconser.2016.04.011.

Ejdys, J. (2018) 'Building technology trust in ICT application at a university', *International Journal of Emerging Markets*, Vol. 13, No. 5, pp.980–997, https://doi.org/10.1108/IJoEM-07-2017-0234.

Elliott, M.T. and Speck, P.S. (2005) 'Factors that affect attitude toward a retail web site', *Journal of Marketing Theory and Practice*, Vol. 13, No. 1, pp.40–51, https://doi.org/10.1080/10696679.2005.11658537.

El-Masri, M. and Tarhini, A. (2017) 'Factors affecting the adoption of e-learning systems in Qatar and USA: extending the unified theory of acceptance and use of technology 2 (UTAUT2)', *Educational Technology Research and Development*, Vol. 65, No. 3, pp.743–763, https://doi.org/10.1007/s11423-016-9508-8.

Ennew, C. and Sekhon, H. (2007) 'Measuring trust in financial services: the trust index', *Consumer Policy Review*, Vol. 17, No. 2, p.62.

Featherman, M.S. and Pavlou, P.A. (2003) 'Predicting e-services adoption: a perceived risk facets perspective', *International Journal of Human-Computer Studies*, Vol. 59, No. 4, pp.451–474, https://doi.org/https://doi.org/10.1016/S1071-5819(03)00111-3.

Foon, Y.S. and Fah, B.C.Y. (2011) 'Internet banking adoption in Kuala Lumpur: an application of UTAUT model', *International Journal of Business and Management*, Vol. 6, No. 4, p.161.

Fox, W., Bayat, S. and Ferreira, N. (2007) *A Guide to Managing Public Policy*, Juta [online] https://books.google.com.my/books?id=pHZczfNlk_gC (accessed 25 August 2020).

Gaur, A. and Ondrus, J. (2012) 'The role of banks in the mobile payment ecosystem: a strategic asset perspective', *Proceedings of the 14th Annual International Conference on Electronic Commerce*, pp.171–177, https://doi.org/10.1145/2346536.2346570.

Gefen, D., Karahanna, E. and Straub, D.W. (2003) 'Trust and TAM in online shopping: an integrated model', *MIS Quarterly*, Vol. 27, No. 1, pp.51–90, https://doi.org/10.2307/30036519.

Hair, J.F., Hult, G.T.M., Ringle, C.M. and Sarstedt, M. (2021) *A Primer on Partial Least Squares Structural Equation Modeling (PLS-SEM)*, 3rd ed., SAGE Publications Inc. [online] https://books.google.com.my/books?id=6z83EAAAQBAJ (accessed 25 August 2020).

Hair, J.F., Sarstedt, M. and Ringle, C.M. (2019) 'Rethinking some of the rethinking of partial least squares', *European Journal of Marketing*, Vol. 53, No. 4, pp.566–584, https://doi.org/10.1108/EJM-10-2018-0665.

Henseler, J., Ringle, C.M. and Sarstedt, M. (2015) 'A new criterion for assessing discriminant validity in variance-based structural equation modeling', *Journal of the Academy of Marketing Science*, Vol. 43, No. 1, pp.115–135, https://doi.org/10.1007/s11747-014-0403-8.

Jain, E. and Yadav, A. (2017) 'Marketing and technology: role of technology in modern marketing', *IOSR Journal of Business and Management*, Vol. 19, No. 5, pp.49–53.

Khalilzadeh, J., Ozturk, A.B. and Bilgihan, A. (2017) 'Security-related factors in extended UTAUT model for NFC based mobile payment in the restaurant industry', *Computers in Human Behavior*, Vol. 70, pp.460–474, https://doi.org/https://doi.org/10.1016/j.chb.2017.01.001.

Kim, D.J., Ferrin, D.L. and Rao, H.R. (2008) 'A trust-based consumer decision-making model in electronic commerce: the role of trust, perceived risk, and their antecedents', *Decision Support Systems*, Vol. 44, No. 2, pp.544–564, https://doi.org/https://doi.org/10.1016/j.dss.2007.07.001.

Kim, G., Shin, B. and Lee, H.G. (2009) 'Understanding dynamics between initial trust and usage intentions of mobile banking', *Information Systems Journal*, Vol. 19, No. 3, pp.283–311, https://doi.org/https://doi.org/10.1111/j.1365-2575.2007.00269.x.

Koenig-Lewis, N., Palmer, A. and Moll, A. (2010) 'Predicting young consumers' take up of mobile banking services', *International Journal of Bank Marketing*, Vol. 28, No. 5, pp.410–432, https://doi.org/10.1108/02652321011064917.

Kothari, C.R. (2004) *Research Methodology: Methods and Techniques*, 2nd ed., New Age International (P) Limited [online] https://books.google.com.my/books?id=hZ9wSHysQDYC (accessed 25 August 2020).

Lancelot Miltgen, C., Popovič, A. and Oliveira, T. (2013) 'Determinants of end-user acceptance of biometrics: integrating the 'Big 3' of technology acceptance with privacy context', *Decision Support Systems*, Vol. 56, pp.103–114, https://doi.org/https://doi.org/10.1016/j.dss.2013.05.010.

Lemire, M., Paré, G., Sicotte, C. and Harvey, C. (2008) 'Determinants of Internet use as a preferred source of information on personal health', *International Journal of Medical Informatics*, Vol. 77, No. 11, pp.723–734, https://doi.org/https://doi.org/10.1016/j.ijmedinf.2008.03.002.

Luo, X., Li, H., Zhang, J. and Shim, J.P. (2010) 'Examining multi-dimensional trust and multi-faceted risk in initial acceptance of emerging technologies: an empirical study of mobile banking services', *Decision Support Systems*, Vol. 49, No. 2, pp.222–234, https://doi.org/https://doi.org/10.1016/j.dss.2010.02.008.

Martins, C., Oliveira, T. and Popovič, A. (2014) 'Understanding the Internet banking adoption: a unified theory of acceptance and use of technology and perceived risk application', *International Journal of Information Management*, Vol. 34, No. 1, pp.1–13, https://doi.org/https://doi.org/10.1016/j.ijinfomgt.2013.06.002.

Oh, J-C. and Yoon, S-J. (2014) 'Predicting the use of online information services based on a modified UTAUT model', *Behaviour & Information Technology*, Vol. 33, No. 7, pp.716–729, https://doi.org/10.1080/0144929X.2013.872187.

Orizio, G., Merla, A., Schulz, P.J. and Gelatti, U. (2011) 'Quality of online pharmacies and websites selling prescription drugs: a systematic review', *Journal of Medical Internet Research*, Vol. 13, No. 3, p.e74, https://doi.org/10.2196/jmir.1795.

Pavlou, P.A. (2003) 'Consumer acceptance of electronic commerce: integrating trust and risk with the technology acceptance model', *International Journal of Electronic Commerce*, Vol. 7, No. 3, pp.101–134, https://doi.org/10.1080/10864415.2003.11044275.

Polit, D.F. and Beck, C.T. (2014) *Essentials of Nursing Research: Appraising Evidence for Nursing Practice*, Wolters Kluwer Health /Lippincott Williams & Wilkins [online] https://books.google.com.my/books?id=2WJ6MAEACAAJ (accessed 22 January 2020).

Polit, D.F., Hungler, B.P. and Beck, C.T. (2010) *Essentials of Nursing Research*, Wolters Kluwer Health/Lippincott Williams & Wilkins, Philadelphia.

Ramayah, T. and Rahbar, E. (2013) 'Greening the environment through recycling: an empirical study', *Management of Environmental Quality: An International Journal*, Vol. 24, No. 6, pp.782–801, https://doi.org/10.1108/MEQ-07-2012-0054.

Ramayah, T., Cheah, J., Chuah, F., Ting, H. and Memon, M.A. (2018) *Partial Least Squares Structural Equation Modelling (PLS-SEM) using smartPLS 3.0: An Updated and Practical Guide to Statistical Analysis*, Pearson, Singapore.

Raosoft (2004) *Sample Size Calculator* [online] http://www.raosoft.com/samplesize.html (accessed 22 January 2020).

Razi, M.J.M., Sarabdeen, M., Tamrin, M.I.M. and Kijas, A.C.M. (2019) 'Influencing factors of social commerce behavior in Saudi Arabia', *2019 International Conference on Computer and Information Sciences (ICCIS)*, pp.1–4, https://doi.org/10.1109/ICCISci.2019.8716463.

Rehman, M., Esichaikul, V. and Kamal, M. (2012) 'Factors influencing e-government adoption in Pakistan', *Transforming Government: People, Process and Policy*, Vol. 6, No. 3, pp.258–282, https://doi.org/10.1108/17506161211251263.

Richardson, R. and Kramer, E.H. (2006) 'Abduction as the type of inference that characterizes the development of a grounded theory', *Qualitative Research*, Vol. 6, No. 4, pp.497–513, https://doi.org/10.1177/1468794106068019.

Ringle, C.M., Sarstedt, M. and Mooi, E.A. (2010) 'Response-based segmentation using finite mixture partial least squares BT, in Stahlbock, R., Crone, S.F. and Lessmann, S. (Eds.): *Data Mining: Special Issue in Annals of Information Systems*, pp.19–49, Springer, USA, https://doi.org/10.1007/978-1-4419-1280-0_2.

Riquelme, H.E. and Rios, R.E. (2010) 'The moderating effect of gender in the adoption of mobile banking', *International Journal of Bank Marketing*, Vol. 28, No. 5, pp.328–341, https://doi.org/10.1108/02652321011064872.

Rogers, E.M. (1995) 'Diffusion of Innovations: modifications of a model for telecommunications', in *Die Diffusion von Innovationen in der Telekommunikation*, pp.25–38, Springer Berlin Heidelberg, https://doi.org/10.1007/978-3-642-79868-9_2.

Sheikh, A., Anderson, M., Albala, S., Casadei, B., Franklin, B.D., Richards, M., Taylor, D., Tibble, H. and Mossialos, E. (2021) 'Health information technology and digital innovation for national learning health and care systems', *The Lancet Digital Health*, Vol. 3, No. 6, pp.e383–e396, https://doi.org/https://doi.org/10.1016/S2589-7500(21)00005-4.

Slade, E.L., Dwivedi, Y.K., Piercy, N.C. and Williams, M.D. (2015) 'Modeling consumers' adoption intentions of remote mobile payments in the United Kingdom: extending UTAUT with innovativeness, risk, and trust', *Psychology & Marketing*, Vol. 32, No. 8, pp.860–873, https://doi.org/https://doi.org/10.1002/mar.20823.

Sonawane, M.S.R. and Mahajan, V.C. (2020) 'Has the outbreak of the Coronavirus pandemic impacted the online pharmacy in Serving the nation or capitalization of business opportunities in India?', *BVIMSR's Journal of Management Research*, Vol. 12, No. 2, pp.94–101.

Sripalawat, J., Thongmak, M. and Ngramyarn, A. (2011) 'M-Banking in Metropolitan Bangkok and a comparison with other countries', *Journal of Computer Information Systems*, Vol. 51, No. 3, pp.67–76, https://doi.org/10.1080/08874417.2011.11645487.

Srivastava, M. and Raina, M. (2020) 'Consumers' usage and adoption of e-pharmacy in India', *International Journal of Pharmaceutical and Healthcare Marketing*, Vol. 15, No. 2, pp.235–250, https://doi.org/10.1108/IJPHM-01-2020-0006.

Tarhini, A., Masa'deh, R., Al-Busaidi, K.A., Mohammed, A.B. and Maqableh, M. (2017) 'Factors influencing students' adoption of e-learning: a structural equation modeling approach', *Journal of International Education in Business*, Vol. 10, No. 2, pp.164–182, https://doi.org/10.1108/JIEB-09-2016-0032.

Thong, J.Y.L., Hong, S-J. and Tam, K.Y. (2006) 'The effects of post-adoption beliefs on the expectation-confirmation model for information technology continuance', *International Journal of Human-Computer Studies*, Vol. 64, No. 9, pp.799–810, https://doi.org/https://doi.org/10.1016/j.ijhcs.2006.05.001.

Tongnamtiang, S. and Leelasantitham, A. (2019) 'An integration of TAM with usage barriers and ability to understand consumers intention to use SSTs', *ECTI Transactions on Computer and Information Technology (ECTI-CIT)*, Vol. 13, No. 2, pp.137–150, https://doi.org/10.37936/ecti-cit.2019132.201930.

Tongnamtiang, S. and Leelasantitham, A. (2019) 'An integration of TAM with usage barriers and ability to understand consumers intention to use SSTs', *ECTI Transactions on Computer and Information Technology (ECTI-CIT)*, Vol. 13, No. 2, pp.137–150.

Vehkalahti, K. (2000) *Reliability of Measurement Scales: Tarkkonen's General Method Supersedes Cronbach's Alpha*, Statistical Research Reports No. 17, Finnish Statistical Society, Helsinki.

Venkatesh, V. and Zhang, X. (2010) 'Unified theory of acceptance and use of technology: U.S. vs. China', *Journal of Global Information Technology Management*, Vol. 13, No. 1, pp.5–27, https://doi.org/10.1080/1097198X.2010.10856507.

Venkatesh, V., Morris, M.G., Davis, G.B. and Davis, F.D. (2003) 'User acceptance of information technology: toward a unified view', *MIS Quarterly*, Vol. 27, No. 3, pp.425–478, https://doi.org/10.2307/30036540.

Venkatesh, V., Thong, J.Y.L. and Xu, X. (2016) 'Unified theory of acceptance and use of technology: a synthesis and the road ahead', *Journal of the Association for Information Systems*, Vol. 17, No. 5, pp.328–376 [online] https://ssrn.com/abstract=2800121 (accessed 22 January 2020).

Walliman, N. (2006) *Social Research Methods*, SAGE Publications [online] https://books.google.com.my/books?id=eeuo9yZDDrcC (accessed 22 January 2020).

Wan, C., Cheung, R. and Qiping Shen, G. (2012) 'Recycling attitude and behaviour in university campus: a case study in Hong Kong', *Facilities*, Vol. 30, Nos. 13/14, pp.630–646, https://doi.org/10.1108/02632771211270595.

WHO (2010) *Counterfeit Medicines* [online] http://www.who.int/mediacentre/factsheets/fs275/en/ (accessed 22 January 2020).

Yadav, R. and Pathak, G.S. (2016) 'Young consumers' intention towards buying green products in a developing nation: extending the theory of planned behavior', *Journal of Cleaner Production*, Vol. 135, pp.732–739, https://doi.org/https://doi.org/10.1016/j.jclepro.2016.06.120.

Yang, Y., Liu, Y., Li, H. and Yu, B. (2015) 'Understanding perceived risks in mobile payment acceptance', *Industrial Management & Data Systems*, Vol. 115, No. 2, pp.253–269, https://doi.org/10.1108/IMDS-08-2014-0243.

Yaqub, J.O., Bello, H.T., Adenuga, I.A. and Ogundeji, M.O. (2013) 'The cashless policy in Nigeria: prospects and challenges', *International Journal of Humanities and Social Science*, Vol. 3, No. 3, pp.200–212.

Yin, M., Li, Q. and Qiao, Z. (2016) 'A study on consumer acceptance of online pharmacies in China', *Proceedings of the 18th Annual International Conference on Electronic Commerce: E-Commerce in Smart Connected World*, https://doi.org/10.1145/2971603.2971616.

Zikmund, W.G., Carr, J.C. and Griffin, M. (2013) *Business Research Methods*, 9th ed., Cengage Learning [online] https://books.google.com.my/books?id=ydcKAAAAQBAJ.