The Effect Of COVID-19 On Consumer Behaviour In Saudi Arabia: Switching From Brick And Mortar Stores To E-Commerce

Mohamed Ahmed Salem, Khalil Md Nor

Abstract: Individuals' adoption has been reckoned as an important indicator of the success of new technology. Hence, it is crucial to identify the reasons why individuals choose to use or not to use a particular technology. Understanding one's behaviour towards accepting or rejecting technologies has been proven as one of the most challenging issues within the information systems (IS) domain, not to mention during exceptional circumstances, such as during pandemic times. As such, this study empirically assessed the factors that affect consumers' intention to adopt e-commerce during Coronavirus Disease 2019 (COVID-19) in Saudi Arabia. The 10 factors examined in this study are perceived usefulness (PU), perceived ease of use (PEOU), subjective norms (SN), perceived behavioural control (PBC), perceived lack of alternatives, perceived risk, perceived punishable infractions, risk-taking propensity, perceived external pressure, and government support. Data were collected online among social media users by employing the snowball sampling technique. A total of 190 valid responses were obtained. The data analysis showed that PU, risk taking propensity, PBC, perceived lack of alternatives, and government support significantly influenced consumers' intention to adopt e-commerce during the COVID-19 outbreak in Saudi Arabia. Meanwhile, PEOU, SN, perceived external pressure, perceived risk, and perceived punishable infractions exerted insignificant effect on consumers' intention to adopt e-commerce.

Index Terms: COVID-19, Coronavirus, e-commerce, Saudi Arabia, technology adoption, Technology Acceptance Model (TAM), Theory of planned behaviour (TPB).

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1. INTRODUCTION

SInce the beginning of December 2019, the outbreak of Coronavirus Disease 2019 (COVID-19) has had a momentous impact on consumers' behaviour not only in Saudi Arabia, but across the world at large. In Saudi Arabia, the economic productive activities witnessed a downward trend as the population of 37 million people living in various regions and cities were quarantined. Measures were put in place to curtail the socio-economic effect of the COVID-19 outbreak. Several effective measures, such as curfew, compelled people to adjust their individual daily behaviour, thus prompting them to become more proactive in managing the sudden situational change. Daily routines were, hence, shifted from offline to online; forcing many, for example, to work from home. Since the COVID-19 outbreak, the Saudi government has been doing a lot to curtail the spread of this virus by placing embargo using regulations to restrict gathering via suspension of workplace attendance. This suspension is not only imposed on workplace, but also across government agencies, schools, and universities, which are also on lockdown. Recreational centres, such as beach, parks, and resorts, are closed down. Strict curfew has been placed on all cities, while all sorts of gathering have been considered illegal and fine is imposed for violating the directive of the government. It is noteworthy to state that restaurants, which are allowed to open business, disabled in-house service, but only permitted take-away service. These efforts, nonetheless, have not stopped the spread of COVID-19 as cases have been escalating over time. Although the Saudi government has taken plenty of precautionary measures to discourage its citizens and other residents from leaving their homes, according to the Saudi Arabia Monetary Agency [1], transactional payments via Point

of Sales (POS) in shopping malls around March 2020 did not reduce drastically. This connotes that some people still shop by visiting the malls without minding that they could be vulnerable to contracting COVID-19. Practically, similar shopping experience can be efficiently performed online at the comfort of their homes, with no risk of any pandemic infection. The report by the SAMA indirectly indicates the attitude of the people towards e-commerce. The attitude is counterproductive to the efforts taken by the government in reducing the spread of COVID-19. This is because; shopping malls encourage human interactions and body contacts - a precursor to the spread of the pandemic disease.

Several studies have shed light on people's spending behaviour in light of COVID-19 pandemic. For instance, Baker, Farrokhnia [2] looked into household spending during the recent weeks of the COVID-19 outbreak in the United States. As expected, they found that across all spending categories, a reduction in movement had resulted in declined spending. Hence, the less people move, the less they spend in restaurants, for groceries or make purchases at brick and mortar retailers. The decline in consumer spending weakens the economy. Accordingly, prices fall, deflation occurs, businesses eventually go bankrupt, and layoffs take place. If slow consumer spending continues for an extended time, the economy is bound to collapse [3, 4]. Consumer spending drives Gross Domestic Product (GDP) [5]. Thus, in order to keep the economy moving, it is crucial to encourage people to keep spending, and concurrently, discourage them from leaving their homes during the COVID-19 pandemic. This can be realised by adopting e-commerce as the safer alternative than shopping at brick and mortar stores. According to Govender and Pretorius [6], technology adoption is a process where an individual or an organisation decides to use a certain technology based on certain conditions. The adoption of e-commerce as an alternative to brick and mortal shopping mode could be due to its convenience and flexibility, all-round availability of operations (24/7), promptness in service delivery, and reduction in human physical interactions. During this

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period of lockdown owing to the prevalence of pandemic disease, business owners should be proactive in ensuring that they possess digital presence by setting up e-commerce stores for the convenience of their customers. In order to understand the factors that influence technology adoption, a series of theoretical concepts have been developed, including intention models, wherein research efforts have initiated a number of theories, such as Theory of Planned Behaviour (TPB) [7] and Technology Acceptance Model (TAM) [8]. These intention models have been proven successful to predict individuals' acceptance behaviour of e-commerce. Based on these models, antecedents of e-commerce include perceived usefulness (PU), perceived ease of use (PEOU), subjective norm (SN), and perceived behaviour control (PBC) [9-11]. This study, hence, utilized these theories in assessing and analysing the factors that influence adoption intention of e-commerce by the Saudis during this COVID-19 pandemic. One of the significances of this study is that it is beneficial to the Saudi government, as the recommendations and propositions offered by this study may be integrated into crisis management plan of the government in a bid to curtail the spread of Corona virus as soonest as possible. Likewise, commercial businesses can also implement the recommendations and propositions put forward by this study. The study outcomes may facilitate in enhancing economic stability and rapid recover of the economy. These are within grasp if consumers are persuaded not to put a hold or reduce their expenditure due to the compulsory curfew, but switching from offline shopping to e-commerce as a safer alternative.

2 LITERATURE REVIEW

2.1 Saudi Arabia and the prevalence of COVID-19
Cases of virus are far from novelty in Saudi Arabia, as the country had its own experience of Middle East Respiratory Syndrome (MERS-CoV) in 2012. The MERS-CoV refers to a zoonotic viral disease that is transferred from 'one-humped' Arabian camels to humans. The MERS-CoV was endemic in Saudi Arabia. Its deleterious effect was widespread not only on the healthcare sector, but also on the security and the economy of the country. The transmission of the virus between people is limited within the walls of the hospital [12]. Although Saudi Arabia has successfully reduced the outbreak of MERS-CoV between 2014 and 2016, the economic and social impacts of COVID-19 are beyond comparable to those of MERS-CoV. The government has taken more stringent preventive measures to limit the spread of COVID-19. COVID-19 not only has adverse impacts on the country's economy, but equally in the high number of mortality rate. The attention of the world was drawn to Wuhan City in Hubei Province of China as the office of the World Health Organisation (WHO) was notified on 31st December 2019 about the cases of pneumonia with an unidentifiable cause. The Chinese government later officially announced they had discovered a new virus on 7th January 2020. The Corona virus belongs to a family that is symptomatic to Severe Acute Respiratory Syndrome (SARS-CoV) and MERS-CoV. Saudi Arabia experienced its first case of Corona virus on 2nd March 2020. The Saudi Ministry of Municipal and Rural Affairs, in March 14th, 2020, declared that there would be total lockdown in all recreational areas of the country, such as cinemas and parks. Besides, disinfection exercise is performed in places of high social interactions. As directed by the Ministry in an attempt to

curtail the chances of the proliferation of the pandemic disease, all social events, such as weddings and funerals, have been halted. The index case was confirmed as a Saudi citizen who returned from Iran via Bahrain. The cases of COVID-19 kept increasing in Saudi Arabia until the first person reported to have died of the virus on 23rd March in the same year. The deceased was a 51-year-old male, a citizen of Afghanistan who resided in Medina. On 24th March 2020, the number of confirmed cases of the virus hiked up to 767 cases. On 23rd March 2020, the Ministry of Interior declared complete lockdown. On April 11th, 2020, the Saudi MOH reported 382 new confirmed cases, thus raising the total number to 4,033 [13] (see Figure 1).
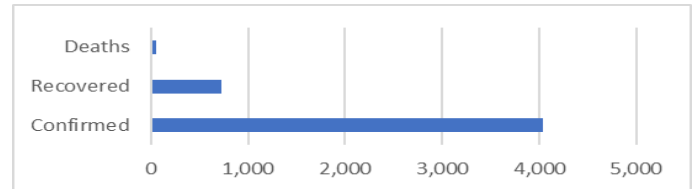

Figure 1: *COVID-19 cases overview in Saudi Arabia on 12th April 2020*

2.2 Effect of the pandemic on world economy
The world economic trajectory has been expected to experience a sharp but brief decline, as projected by the annual growth rate of real economic shock during the previous pandemics, such as the Spanish flu of 1918, the Asian flu of 1957, the Hong Kong flu of 1968, and SARS in 1957. History has brought upon the understanding that there is every chance that the world economy would recover, even as COVID-19 seems to pose a great threat of recession in the world economy. Without a doubt, every crisis always leaves a fundamental legacy behind for the world economy. Alibaba would not have risen to become the leading online store in China, if not for the outbreak of SARS that compelled people to embark on online shopping in China [14]. In a similar vein, the COVID-19 pandemic offers another opportunity for the adoption of e-commerce by consumers in Saudi Arabia. On the other side of the world, the prevalence of COVID-19 across Europe has brought plenty of changes in commerce, luring those residing there to adopt digital business transactions [15]. Among the businesses affected are football games that are now being played behind closed doors; out of view of the teeming spectators. The spectators have been restricted to watch these games on televisions and live streaming via online services. In fact, online demonstration of new products has boomed, as trade shows are banned. In the UK, customers have moved to online shopping, thus reducing personal visit to supermarkets. This has made Ocado, a popular online supermarket, to announce an increase of 6% in demand for its service [16]. Contrary to the revival of online businesses in the UK due to the increasing consumers' acceptance of e-commerce stemming from COVID-19 outbreak, Saudi consumers' acceptance of e-commerce is still very low. Prior to COVID-19 pandemic, the Saudi government has put in place friendly policies that should naturally encourage e-commerce, such as cashless transactions, sophisticated information technology (IT) infrastructure, and availability of various applications to ease access to products and brands. The low e-commerce acceptance rate demands the identification of factors that influence the Saudis'

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acceptance of e-commerce during a pandemic.

2.3 The present state of e-commerce in Saudi Arabia
To date, e-commerce has experienced a leap in what it offers to its customers as it now focuses on customer excellence, instead of focusing on the purchasing process alone. These days, live chat is available between customers and customer care agents to answer their questions regarding their services. There is also an avenue for customers to become knowledgeable about a product through the reviews provided by previous customers. Some online stores have developed a series of applications and websites that feature entertaining and animated demonstrations to encourage customers to visit the online store. Being one of the richest countries in the world and ranking one of the top three oil producing countries in the world, Saudi Arabia tends to fear from the danger of its mono-economy dependency on crude oil. The country leaders are indeed aware of this and have been making efforts to diversify the economy since the 1970s [17]. The Information and Communications Technology (ICT) is one of the areas that the government has looked into, so as to redirect the economy especially in this digital age [18]. The year 2004 witnessed the first attempt made by Saudi Arabia banks in adopting online banking payment [19]. It is essential to note that fostering e-commerce development in Saudi Arabia is tied to the effortless mode of online payment [20]. As such, SADAD payment system was set up in year 2004 by SAMA to back the country's economy. The SADAD was established to facilitate a payment framework for online transactions, collections, and presentation of bills [21]. Electronic transaction has become the order of the day with the support it receives from the government and the Saudis. The annual influx of millions of foreigners trooping into the country for religious pilgrimage, work purposes, and other reasons make online transaction inevitable. Large businesses in Saudi Arabia make use of ICT services for prompt and efficient service delivery, although the adoption of e-commerce by consumers is still at the low ebb [22, 23].

2.4 The technology acceptance models
Studies within the Information Systems (IS) domain have made significant contributions in formulating theories to examine and predict the determinant factors of IT acceptance [24]. Carr Jr [25] described technology adoption as a phase, whereby an individual or a business selects certain technology for use. The researchers had attempted to understand, predict, and explain multiple variables that influence the adoption of technology at individual and business levels [26-28]. Meanwhile, other studies have extended their focus beyond the individual to concentrate on the behaviour itself or the correlations among behaviour, individual, as well as social and physical environments in which they occur. The existing models of IT acceptance have their foundations grounded on several diverse theories. The models that have successfully explained the relationships among user beliefs, attitudes, intentions, and the actual system use are the Theory of Reasoned Action (TRA) [29], Theory of Planned Behavior (TPB) [7], and Technology Acceptance Model (TAM) [8]. The affluence of empirical support recently has caused both TAM and TPB to be the leading theories accepted by IS researchers [30-32].

2.5 The technology acceptance model (TAM)
One of the most cited theories in predicting IT use and acceptance is TAM. According to Davis [8], PU and PEOU are logical rationale behind the decision of any user to adoption a new IT. Perceived usefulness (PU) is defined as users' expectation that using new IT may result in improved job performance, while PEOU is the degree to which one believes that using a particular system would be free of effort [8]. The attention of TAM researchers was focused on workplace system used by professional users and incorporation of IS in completing their tasks. This has garnered exclusive attention towards cognitive beliefs, such as PU and PEOU. However, users' decisions to adopt an online shopping website may be dictated by other factors such as the needs for information searching before buying a product, and trust on the online sellers to name a few. Thus, some studies have embedded additional construct(s) to improve the explanatory power of their studies, such as trust [9, 10], social presence [10], perceived enjoyment [10], PBC [9, 33], and SN [9, 33].

2.6 The theory of planned behaviour (TPB)
The TPB is one of the most powerful theories that explains human behaviour [34]. It was introduced in 1985 by Ajzen not only to serve as a theory to explain human behaviour, but also to augment the existing theory of reasoned action (TRA) [35]. In TPB, factors, such as perceived behavioural control (PBC), attitudes, and subjective norm (SN), are prerequisite in predicting behaviour [7]. Apart from the fact that the TPB adds a new construct, PBC, it is comparable to the TRA. The PBC is the degree to which one feels that performance or non-performance of the behaviour in question is under his or her volitional control [7]. The PBC indicates that one's motivation is influenced by how difficult the behaviour is perceived to be, as well as the perception of how successfully one can, or cannot, perform the activity. Meanwhile, SN is the belief that an important person or group of people will approve and support a certain behaviour [7].

3 RESEARCH MODEL AND HYPOTHESES

3.1 Research model
Both TAM and TPB have been extensively used over the past decade to assess e-service and IT use [36, 37]. However, neither can provide consistently superior explanation or behavioural prediction [38]. Recently, a growing body of research has focused on integrating them to assess IT usage and e-service acceptance because the two models are complementary, wherein the results have showed that the integration model had better exploratory power than the individual use of TAM or TPB [30, 32]. In order to examine the intention of consumers to adopt e-commerce during the pandemic, which is the focus of this present study, a model that combines TAM and TPB is proposed, along with the integration of constructs related to personal characteristics and social system, which are considered appropriate in the pandemic. The research model of this study reflects the original TAM and TPB four constructs; (i) PU, (ii) PEOU, (iii) PBC, and (iv) SN and additional constructs (i) perceived lack of alternatives, (ii) perceived risk, (iii) perceived punishable infractions, (iv) risk-taking propensity, (v) government support, and (vi) perceived external pressure. During the exceptional circumstances, certain routine behaviours that do not pose any danger in normal circumstances may lead to dangerous

consequences. During the COVID-19 outbreak, interactions with other people may result in various forms of danger (e.g., transmission of infectious diseases). Avoiding interacting with people who pose certain kinds of threat [39-41] may trigger psychological responses to performing certain behaviour (e.g., adoption behaviour). Performing this new behaviour is the result of a motivational factor driven by one's willingness to move towards gaining certain benefits or away from threats or discomfort [42]. Motivation, which encourages one to engage in certain behaviour, may be either intrinsic or extrinsic. Intrinsic motivation refers to doing something because it is inherently interesting or enjoyable, whereas extrinsic motivation is doing something because it leads to an external outcome [43]. Hence, perceived punishable infractions, perceived risk, perceived external pressure, and perceived lack of alternatives are forms of extrinsic motivation, while risk-taking propensity reflects intrinsic motivation. Some studies have incorporated both intrinsic and extrinsic motivations into IT acceptance models [44-47]. This study has integrated several intrinsic and extrinsic motivations, apart from government support, into both TAM and TPB to identify factors that influence the adoption of e-commerce during COVID-19 outbreak. Based on the literature review and after integrating both TAM and TPB, a model that portrays the adoption of e-commerce was developed (see Figure 2). The model is composed of 10 constructs, which posit to influence consumers' adoption of e-commerce during the COVID-19 pandemic. These constructs include PU, PEOU, SN, PBC, perceived lack of alternatives, perceived risk, perceived punishable infractions, risk taking propensity, perceived external pressure, and government support. Figure 2 illustrates the theoretical model in a graphical manner.
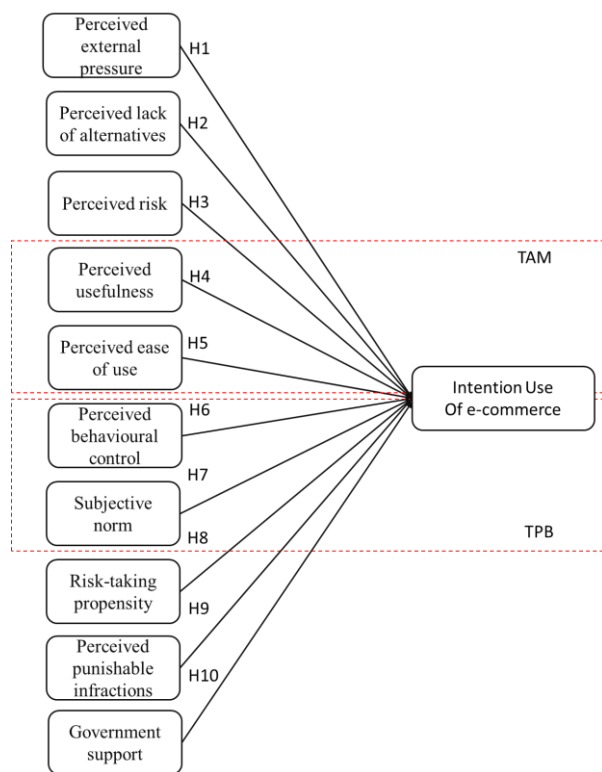

Figure 2. *The proposed research model*

3.1 The development of hypotheses

Perceived external pressure
External pressure refers to the degree that industry or business partners influence the adoption of a new technology [48]. For the purpose of this study, perceived external pressure reflects the degree of the external pressures enforced by government agencies or stakeholders upon individuals for adopting e-commerce. Technology adoption can be the result of pressure exerted on one by its environment or external circumstances [49, 50]. In this study, pressure is exerted by stakeholders (e.g., medical insurance, employer, and goods/services retailers) or by the government policies [51]. The literature on technology adoption has found rich support for the impact of external pressure on technology adoption intention [52-54]. Consequently, COVID-19 pandemic has led the government and several organisations to impose several restricted polices by enforcing people to stay at home and adopting alternative ways to perform daily chores, such as by using e-commerce instead of visiting the shopping malls. In this context, this study proposes the following hypothesis:

H1. Perceived external pressure has a positive effect on consumers' adoption intention of using e-commerce during the COVID-19 pandemic.

Perceived lack of alternatives
Perceived lack of alternatives refers to customer perceptions regarding the extent to which viable competing alternatives are available in the marketplace [55]. In light of this study, perceived lack of alternatives is the extent to which viable competing alternative i.e., e-commerce is available to perform a shopping. The availability of several alternatives will cause an individual to select one of the available options. For example, Patterson and Smith [56] asserted that the availability of alternative would make a user to abandon the traditional approach of executing tasks to a new one. Several studies found that when viable alternatives are lacking, the probability of terminating the existing behaviour decreases [57, 58]. Therefore, when individuals perceive the existence of several attractive alternatives, it is more likely that they will embrace one of these alternatives [55, 57, 58]. Consequently, the COVID-19 pandemic, which holds health risk and legal fine by going to the traditional shopping malls during the curfews, indicates fewer available options. This should encourage consumers to seek other alternatives, thus adopting e-commerce as an alternative for shopping is one of the options. Thus, perceived lack of alternatives will significantly affect the adoption of e-commerce. The following is hypothesised:

H2. Perceived lack of alternatives has a positive effect on consumers' adoption intention of using e-commerce during the COVID-19 pandemic.

Perceived Risk
Peter and Ryan [59] defined perceived risk as a kind of subjective expected loss, and similarly, Featherman and Pavlou [60] linked perceived risk with the possible loss when pursuing a desired result. In this study, a perceived risk indicates one's perception of the health hazards that one may be exposed to when physically shopping in malls and stores during the COVID-19 pandemic. Since the 1960s, the

perceived risk theory has been applied to explain consumers' behaviour. Considerable research work has examined the impact of risk on traditional consumer decision making [61]. The context of risks varies according to the challenges of each era. In this COVID-19 era, Conehealth (2020) has established that there are many things one can do to prevent the spread of COVID-19, such as maintaining social distancing, washing of hands, avoiding touching of face, nose, eyes or mouth, coughing into one's elbow, and staying at home when sick. An act of intentionally reducing close physical contact with people in crowd-prone areas, such as malls and stores, is referred to as social distancing. The chance of not contracting the virus and spreading it among family and community lies largely on reducing close physical contacts with people. As there is higher risk of contraction of the virus in public places, such as malls and supermarkets, a 6-feet distance should be maintained between themselves, along with the application of other preventive measures mentioned above. Although many studies have established perceived risks, such as financial risk, social risk, and security risk or privacy risk, on the adoption of technology [62, 63], in the context of the current study, health risk, i.e., the danger of contracting the virus when visiting malls and stores during curfew is a relevant perceived risk factor. In the decision-making context, individuals are expected to switch to choices that involve lower risks [64]. Hence, during the COVID-19 pandemic, the perceived lower risk of using e-commerce, when compared to other shopping methods, can positively affect its adoption intention. Consequently, one who perceives lower risk of using e-commerce as a safer way to shop will be motivated to embrace it for shopping, instead of brick and mortar stores. In this context, this study proposes this hypothesis:

H3. Perceived risk of using e-commerce has a negative effect on consumers' adoption intention of e-commerce during the COVID-19 pandemic.

Hypotheses related to TAM and TPB

The subsequent hypotheses are formed based on TAM and TPB in light of the theoretical model development featured in the research model section. To substantially explain the adoption of e-commerce, both TAM and TPB were employed. Hence, the following research hypotheses are formulated in this study.

Perceived usefulness (PU)

According to Davis (1989), PU refers to the degree to which a person believes that using a particular system would enhance his or her job performance. In this study, PU denotes the degree to which one believes that using e-commerce for shopping during the pandemic would enhance his or her health safety performance. In TAM [8], PEOU and PU are important perceptions that determine IT adoption. The reason PU is such an important antecedent of IT adoption is that in many cases, a new IT is adopted primarily because it is instrumental in achieving tasks that are not inherent in the use of the IT itself [47]. In the context of this study, the use of e-commerce reflects a precautionary measure from COVID-19. Numerous empirical studies have validated the relationship between PU and user acceptance of IS, such as e-commerce [65-67].

Hence, it is expected that consumers will adopt e-commerce if they perceive that using e-commerce would help them to attain the desired health safety by avoiding shopping at brick and mortar stores, thus leading to less physical interaction with others during the COVID-19 outbreak. As such, the following is hypothesised:

H4. Perceived usefulness has a positive effect on consumers' adoption intention of using e-commerce during the COVID-19 pandemic.

Perceived ease of use (PEOU)

Davis [8]asserted that PEOU refers to the degree to which a person believes that using a particular system would be free of effort. As for this study, PEOU is the degree to which one believes that using e-commerce would be free of effort. TAM upholds that one's acceptance of a technology is hypothesised to be determined by his or her beliefs, such as PEOU. It measures the prospective user's assessment of the mental efforts required of the use of the target applications [47]. Mental effortlessness demanded by an IT attracts more adoption behaviour; innovations with perceived complexities of user interface and steep learning curve are thought risky to adopt [68]. Several empirical findings have verified the positive relationship between ease of use and users' intention to accept IT [69].

Thus, it is expected that consumers will embrace e-commerce if they realise that using e-commerce can help shopping without mental stress and effort. Thus, this study proposes the following hypothesis:

H5. Perceived ease of use has a positive effect on consumers' adoption intention of using e-commerce during COVID-19 outbreak.

Perceived behavioural control (PBC)

Perceived behavioural control (PBC) is defined as the extent to which the individual's assessment of self-efficacy and perceived control ability in accomplishing the behaviour [7, 70]. In this study, PBC denotes the extent to which one's assessment of self-efficacy and perceived control ability in using e-commerce. The TPB extends the TRA by including PBC. Ajzen suggested that PBC "should be read as perceived control over the performance of a behaviour" [71] p. 668. The literature shows support for the role of PBC on behavioural intention. For example, behavioural control has been confirmed in the literature regarding its impact on behavioural intentions, such as that concluded by Taylor and Todd [72] and Mathieson [73]. A similar examination on consumers' behaviour regarding e-commerce was carried out by Chai and Pavlou [74]. In terms of e-commerce, one's positivity over online purchasing behavioural control can only be established when he or she is confident about the online purchase that leads to more individual e-commerce use [75]. In precise, this feeling of the control over the behaviour fuels further engagement with e-commerce. As such, it is expected that consumers will embrace e-commerce if they realise that they have the required control and confidence to shop online. Thus, the following is hypothesised:

H6. Perceived behaviour control has a positive effect on consumers' adoption intention of using e-commerce.

Subjective norm

Subjective norm (SN) refers to one's perception of social pressure to perform or not to perform the behaviour (Ajzen, 1991). As for this study, SN refers to one's perception of social pressure to shop via e-commerce. The link between SN and behavioural intentions has been reported in several studies. A positive relationship between SN and intention for behaviour was highlighted by Karahanna, Straub [76]. The SN has also been established by studies in e-commerce as an important deciding factor of behavioural intention [74, 77, 78]. Subjective norm (SN) reflects the influence important others have on acceptance decision. The important others may be family members, relatives, friends, classmates, and colleagues. Consequently, if social expectations are that one should use e-commerce for shopping during the COVID-19 outbreak, then he or she is more likely to do so. In this context, this study proposes the hypothesis given below:

H7. Subjective norm has a positive effect on consumers' adoption intention of using e-commerce.

Risk-taking propensity

Risk-taking propensity refers to the appetitive processes underlying a behavioural tendency to take risks in response to cues for potential reward with a probability for undesirable results [79, 80]. For the purpose of this study, risk-taking propensity reflects the zest behind a behavioural tendency of visiting a store or a mall for shopping and adventure, all the time being aware of the risk of contracting COVID-19. Cossens and Gin [81], in their study regarding New Zealand tourists' behaviour, concluded that although the tourists were aware of HIV infection risk, the majority did not intend to change their preferred travel destination. They referred this behaviour to a high level of risk-taking propensity. Several studies have verified the significant impact of risk-taking propensity among individuals by violating the norm, as well as breaking the society and governmental rules for adventure [82-84]. In this study, one can break societal norm and rules made by the government to have an adventurous experience by shopping in stores, while being aware of the risks posed by COVID-19. Consequently, it is expected that consumers will embrace e-commerce if they have a low risk-taking propensity to avoid any infection through dealing physically with the shopping mall or other consumers during the shopping visit to the mall. As such, the following is hypothesised:

H8. Risk taking propensity has a negative effect on consumer's adoption intention of using e-commerce.

Perceived punishable infraction

Punishable infraction refers to those acts which violates a rule or regulation and may receive some form of penalty [85]. For the purpose of this study, perceived punishable infraction refers the extent to which one perceives that punishments could be served on penalty bound offences, such as breaching curfew rules during COVID-19 pandemic.

According to Mushonga [86], curfew is described as rules and regulations that compel people to stay indoors or lockdown of different places like commercial and places of assembly within particular hours, although not particularly in the evening. In order to protect people from dangers of communicable disease or war, curfew is always one of the instruments employed by the government [86]. Early researchers found that threat of punishment reduces prohibited behaviours [87]. Besides, several studies contend the significant effect of the punishment on an individual's behaviour by refraining from performing certain behaviour to avoid being punished [85, 88]. A punishment leads to a stimulus which reduces the future probability of behaviour's occurrence [88, 89]. This study argues that the important effect of punishment (e.g. fine) on an individual will make him/her to avoid being punished, hence will shun certain behaviour such as breaking the curfew to visit storesConsequently, it has been expected that consumers will embrace e-commerce as an alternative of the traditional shopping malls if they have a belief that shopping at malls during the curfew may lead to some form of penalty. Thus, this study proposes the hypothesis below:

H9. Perceived punishable infraction has a positive effect on consumers' adoption intention of using e-commerce.

Government support

Government support refers to the assistance provided by the authority to encourage the spread of technology innovations [90]. In this study, government support denotes the assistance provided by the authority to encourage the adoption of e-commerce. Some studies have suggested that government support is required for the spread of technological innovations, such as e-commerce, in a country. Chau and Jim [91] prescribed that the spread and adoption of technological innovation, such as e-commerce, demand strong governmental inputs and encouragement. Similarly, Dimitrova and Chen [92] found that for consumers to develop interest in adopting technological innovation; there must be some governmental undertone of support therein. Tan and Teo [93] stated that government can influence the adoption of new technologies, depending on the level of support that they provide. As such, government support can intervene and have a leadership role in diffusing an innovation [93]. It is possible to predict one's inclination to accept a technology based on the level of support given. The greater the level of government support perceived by an individual (e.g., lowering the cost of using the Internet and setting up e-commerce facilities), the more likely one would adopt certain behaviour. The role of the government in developing countries varies, and e-commerce is an area that has been receiving increased government resources through awareness programs, technology support facilities, and consumer rights guarantee [94]. It has been expected that consumers will embrace e-commerce if they realise that they have government support. Besides, governmental awareness campaigns encourage them to shop via e-commerce during this COVID-19 pandemic. In this context, this study proposes the following hypothesis:

H10. Government support has a positive effect on consumers' adoption intention of using e-commerce.

4 METHODOLOGY

4.1 Study instrument

In order to test the proposed hypotheses, a questionnaire instrument was developed in this study. The instrument was designed to include two main sections, as presented in Appendix A. The first section includes socio-demographic

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characteristics to collect basic information about the participants, including gender, age, education, and employment status. The second section of the questionnaire was developed based on the constructs of the proposed model that comprised of the factors and their corresponding items. A five-point Likert scale ranging from "disagree strongly" (1) to "agree strongly" (5) was employed. Table 1 lists the constructs and their sources, whereas the constructs and their corresponding items are presented in Appendix A.

Table 1 Constructs and their sources

Constructs	Source	No. of items
Perceived external pressure	[95]	3
Perceived lack of alternatives	[96]	3
Perceived risk	[97]	3
Perceived usefulness	Cheng et al. (2006)	4
Perceived ease of use	Cheng et al. (2006)	4
Subjective norm	Wu and Chen (2005)	3
Perceived behavioural control	Wu and Chen (2005)	3
Perceived Punishable infractions	[98]	3
Government support	[99]	4
Risk taking propensity	[97]	3
Intention to use	Cheng et al. (2006)	3

4.2 Data collection

An online version of the questionnaire was administered to the participants on the social media. The participants were randomly selected using the snowball sampling technique as it was the most suitable method for this study. Snowball sampling addresses several other sampling process drawbacks, demands little planning, and requires less workforce, when compared to other sampling techniques. This is because; it is easier to start communicating with a small population, especially when targeting unknown individuals, besides minimising sampling bias [100, 101]. The questionnaires were distributed to the researcher's contacts, as well as to those who met the population age and residency criteria (above 18 years of age and residing in Saudi Arabia). Each participant was required to nominate another participant to complete the questionnaire. The questionnaires were disseminated for two weeks. In total, 190 questionnaires were collected. A total of 77.4% of the valid respondents were males, while 22.6% were females. The median age of the respondents was 25-44 years old, and most of them held a bachelor's degree. Table 2 presents the details of the respondents' socio-demographic characteristics.

Table 2 Demographic profile of the participants

Items		Frequency	Percentage
Gender	Male	147	77%
	Female	43	23%
Age	18 - 24 years old	3	2%
	25 - 44 years old	159	84%
	45 - 54 years old	27	14%
	Above 55	1	1%
Marital status	Single	33	17%
	Married	151	79%
	Divorced	2	1%

	Other	4	2%
Highest level of academic qualification	High school equivalent	2	1%
	Diploma	16	8%
	Bachelor	113	59%
	Master	53	28%
	PhD	6	3%
Employment status	Student	3	2%
	Healthcare worker*	87	46%
	Employee**	100	53%

* Doctor, nurse, or health-related administrator
** In government, private sector, and self-employed

4.3 Data analysis

According to Hair Jr, Hult [102], measurement model refers to the relationship between the latent constructs and their corresponding items. The two types of validities are required to evaluate a measurement model, namely convergent validity and discriminant validity. Convergent validity is the degree to which two or more maximally different measures of the same concept correlate [103]. Meanwhile, discriminant validity refers to the extent to which a construct is truly distinct from the other constructs [104]. The following sub-sections describe the two types of validities in this study.

4.4 Convergent validity

In order to measure convergent validity, several aspects should be measured, such as factor loadings, average variance extracted (AVE), and composite reliability (CR) [102]. Factor loadings are the correlation between the observed variables and the underlying factor [105]. Composite reliability (CR) determines the reliability of the constructs' indicators, and it refers to the degree of consistency between latent variable and its corresponding observed variable [106]. Average variance extracted (AVE) denotes the average quantity of the variance that explains the latent construct [107]. According to Hair et al., (2016), the acceptable values of indicator loadings and CR should be equal or greater than 0.7, while AVE values should exceed 0.5. The partial least squares-structural equation modeling (PLS-SEM) using SmartPLS was used to perform these measures. Table 3 shows that the loading and AVE values of all the indicators are above 0.7 and 0.5, respectively. Therefore, the convergent validity is confirmed in this study [108].

Table 3   Convergent validity results

Constructs	Items	Loading	AVE	CR
Perceived external pressure (Pressure)	Pressure_1	0.857	0.727	0.888
	Pressure_2	0.935		
	Pressure_3	0.757		
Perceived lack of alternatives (Alt)	Alt_1	0.834	0.716	0.883
	Alt_2	0.902		
	Alt_3	0.799		
Perceived risk (Risk)	Risk_1	0.809	0.653	0.849
	Risk_2	0.859		
	Risk_3	0.752		
Perceived usefulness (PU)	PU_1	0.82	0.749	0.922
	PU_2	0.857		
	PU_3	0.897		
	PU_4	0.885		
Perceived ease of use (PEOU)	PEOU_1	0.866	0.685	0.896
	PEOU_2	0.875		
	PEOU_3	0.757		
	PEOU_4	0.806		
Subjective norm (SN)	SN_1	0.903	0.843	0.942
	SN_2	0.929		

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Construct	Item	Loading	AVE	CR
	SN_3	0.922		
Perceived behavioural control (PBC)	PBC_1	0.907	0.742	0.896
	PBC_2	0.875		
	PBC_3	0.799		
Perceived Punishable infractions (PPI)	PPI_1	0.888	0.773	0.911
	PPI_2	0.899		
	PPI_3	0.85		
Government support (GOV)	Gov_1	0.723	0.653	0.882
	Gov_2	0.784		
	Gov_3	0.893		
	Gov_4	0.821		
Risk-taking propensity (RTP)	RTP_1	0.8	0.756	0.903
	RTP_2	0.925		
	RTP_3	0.88		
Intention to use (IU)	IU_1	0.945	0.904	0.966
	IU_2	0.957		
	IU_3	0.951		

4.5 Discriminant Validity

Hair Jr, Hult [102] suggested that one of the main measures to assess discriminant validity is Fornell-Larcker scale. The Fornell-Larcker scale ensures that the square root of the AVE for each latent variable is greater than the correlations among the latent variables [109]. Table 4 tabulates the results of Fornell-Larcker scale, in which the bold diagonal elements in the table demonstrate the square root of the AVE scores, while the other elements signify the correlations between the constructs. In this study, for instance, the latent variable government support (Gov) was 0.653 (see Table 3); hence its square root is 0.808. This value exceeds the correlation values in the column of Gov (e.g., 0.489, 0.482, etc.) and also larger than those in the row of Gov (0.31). Similar observation was made for the other latent variables. The results indicate that discriminant validity is well established in this study.

Table 4   Fornell-Larcker scale results

Construct	Alt	Gov	IU	SN	PBC	PEOU	PPI	PU	Pressure	RTP	Risk
Alt	0.846										
Gov	0.31	0.808									
IU	0.555	0.489	0.951								
SN	0.485	0.482	0.656	0.918							
PBC	0.431	0.483	0.743	0.64	0.862						
PEOU	0.388	0.482	0.547	0.539	0.683	0.827					
PPI	0.241	0.335	0.312	0.28	0.395	0.276	0.879				
PU	0.464	0.426	0.703	0.669	0.706	0.624	0.251	0.865			
Pressure	0.372	0.309	0.233	0.281	0.291	0.296	0.310	0.217	0.853		
RTP	-0.008	-0.005	-0.023	-0.017	-0.012	0.061	-0.014	-0.014	0.079	0.87	
Risk	0.509	0.396	0.54	0.536	0.515	0.427	0.322	0.703	0.14	-0.012	0.808

4.6 Structural model assessment

After determining the validity and reliability of the measurements, the next step is to evaluate the structural model. In assessing the structural model, the coefficient of determination (R^2) and the path coefficient should be examined (Hair et al., 2016). Upon the analysis, the model displayed an R^2 value of 0.694 for the intention to use e-commerce during COVID-19. Chin (1998) contended that R^2 above 0.67 denotes high coefficient of determination (see Figure3). Table 5 tabulates the results of the path analysis.

Table 5   Structural model results

H	Relationship	Std. Beta	Std. Deviation	T Value	P Values	Decision
H1	Pressure > IU	-0.064	0.046	1.37	0.171	Not Supported
H2	Alt > IU	0.236	0.059	3.997	0.000	Supported**
H3	Risk > IU	-0.051	0.066	0.77	0.442	Not Supported
H4	PU > IU	0.25	0.081	3.086	0.002	Supported**
H5	PEOU > IU	-0.068	0.065	1.045	0.297	Not Supported
H6	PBC > IU	0.417	0.079	5.268	0.000	Supported**
H7	SN > IU	0.114	0.081	1.409	0.16	Not Supported
H8	RTP > IU	-0.111	0.039	2.849	0.005	Supported**
H9	PPI > IU	-0.021	0.051	0.411	0.681	Not Supported
H10	GOV > IU	0.127	0.059	2.162	0.031	Supported*

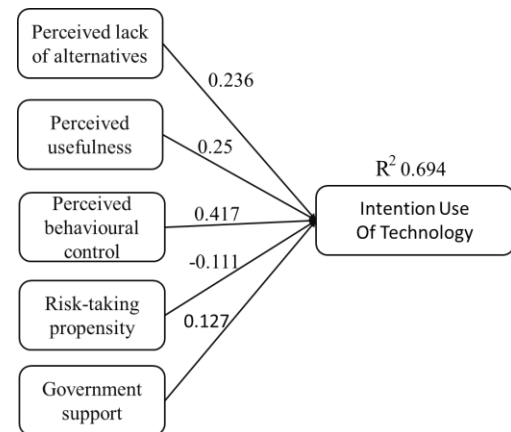Significant at P**= < 0.01,   p* <0.05

Figure 3 - Technology Adoption During Pandemic Framework (TADPF)

5 DISCUSSION

This study is among the few that assess the adoption of e-commerce during COVID-19 outbreak. The main objective of this study is to provide better understanding of the determinants that affects the adoption of e-commerce in the Saudi Arabia during COVID-19. In order to meet this objective, a new model has been formulated by extending the TAM and TPB with several variables (perceived lack of alternatives, perceived risk, perceived punishable infractions, risk-taking propensity, perceived external pressure, and government support). This study indicated that PU has a pivotal role in influencing the behavioural intention of adopting e-commerce during the COVID-19 outbreak. Hence, consumers' intention to adopt e-commerce is increased when they find it useful. E-commerce users can perform the purchase transaction without being infected, thus achieving high health and safety performance. Nevertheless, the study outcomes displayed no significant effect of PEOU on the behavioural intention of adopting e-commerce. This finding contrasted that reported in previous studies (see Luarn & Lin, 2005; Lin & Wang, 2005; Jahangir & Begum, 2008). However, the said result is consistent with findings reported by Cho, Kwon [110], Wei, Marthandan [111], which suggested the absence of significant impact of PEOU on the behavioural intention to adopt e-commerce. It can be inferred that since most of the e-commerce users in this study are in a maturity age range (25-44) and very well educated (91% possess bachelor's degree or higher), it is possible that e-commerce can be learned easily by them, thus PEOU had no impact on their e-commerce adoption. This study found that SN had no significant effect on the behavioural intention of adopting e-commerce. This finding contrasted with previous studies (see Wei, Marthandan [111], Kurnia, Smith [112]). However, the finding that SN is not a significant predictor of the behavioural intention of adopting e-commerce is consistent with the findings reported by other researchers (see Morowatisharifabad, Gerayllo [113], Bozionelos and Bennett [114], Deng, Zhang [115], Arias-Oliva, Pelegrín-Borondo [116]). This reinforces the fact that SN only exerted a marginal influence on technology adoption behaviour among the general population within the context of this study [117]. The unexpected result regarding SN in this study is ascribed to the users' high independency level, as most of the participants are above the age of 25 years, are considered to be in the lead segment [118, 119], and are rarely influenced by others. Thus, the influence that comes from mass media or peers may not easily influence their decision to adopt e-commerce. Next, this study found that PBC plays a critical role in influencing the behavioural intention to adopt e-commerce during the COVID-19 outbreak. Consumers' intention to adopt e-commerce increases when they find it under their entire control. Surprisingly, perceived risk was not a significant factor. This could be because; most of the participants might consider using e-commerce is riskier in terms of money frauds, whereby lack of variability in their responses to the questions about perceived risk explains this lack of explanatory power. This finding is in line with that reported by Arias-Oliva, Pelegrín-Borondo [116]. As for the other proposed variables, this study found no significant effect of perceived punishable infractions and perceived external pressure on the behavioural intention of adopting e-commerce. Nonetheless, risk-taking propensity exerted a significantly negative influence on the behavioural

intention of adopting e-commerce during the COVID-19 outbreak. The higher the risk-taking propensity of consumers, the lower the level of e-commerce adoption. This is attributed to the professional nature of most of the participants, whereby 46% of the participants were from the healthcare field, thus the low anxiety level and high risk-taking propensity [120-122]. Finally, government support plays an important role as the inducer of e-commerce practices (Chan & Al-Hawamdeh, 2002; Tigre, 2003). Consistent with Looi [99], AlGhamdi, Drew [123], Khoo, Ahmi [124], government support is a significant determinant to predict the intention to adopt e-commerce in this study.

5.1 Implications

While Saudi Arabia has extensive experience with another member of the coronavirus family known as MERS-CoV, the level of disruption caused by COVID-19 to the Saudi society, and the threat to public health, is unprecedented. In addition to shutting down of schools and universities, as well as suspending international flights and all public events, the government has announced a curfew and has temporarily halted umrah to contain the spread of the virus due to the escalating number of infections on a daily basis. As of May 10th, 2020, Saudi Arabia had recorded 39,048 cases of the respiratory disease COVID-19, the largest number of infections reported in a single Arab country, as well as 246 deaths, according to the WHO (2020). Endless effort and money have been invested in e-commerce systems across Saudi Arabia [23], hence it is essential to ensure that individuals are indeed using them during the COVID-19 outbreak as a healthier alternative than shopping at block and mortar stores. Understanding the individuals' behaviour towards accepting or rejecting technologies, such as e-commerce, has proven to be one of the most challenging issues within the IS domain. Comprehending users' behaviour will help businesses to build e-commerce systems that encourage individuals to accept and fully utilise them during COVID-19. This study suggests that the adoption of e-commerce during COVID-19 would require awareness and promotion campaigns to enlighten the people about the health benefits of using e-commerce as the best alternative for shopping during this COVID-19 outbreak. Such programs would serve to dispel concerns regarding security of transactions and privacy of data by emphasising on the support offered by the government for e-commerce, which in turn, provides a transparent view of e-commerce operations for end users. Businesses may implement some social commerce strategies, such as building forums and communities on e-commerce platforms, to facilitate interaction of consumers, as well as sharing of knowledge and experiences about new services and products. These can increase consumers' confidence in using e-commerce and minimise their need to visit physical stores. The combined TAM/TPB framework is indeed a suitable framework to investigate the factors that influence the adoption of e-commerce, as also depicted in several studies (see Awa, Ojiabo [9], Lee [33], Safeena, Date [125]). However, it does not work with the same explanatory power level to investigate factors affecting e-commerce adoption during this COVID-19 pandemic period. In this study, two of the main constructs (SN and PEOU) of these models were insignificant to predict the adoption of e-commerce during the COVID-19 outbreak. Hence, the proposed model (see Figure 3) may be used by

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future researchers to investigate factors affecting the adoption of several technologies during pandemic period. Understanding these factors can help governments to formulate the corresponding measures to promote more people to use the e-commerce service, thus reducing visits to physical stores during pandemic outbreak. Besides, the empirical data presented in this study may serve as a benchmark value to broaden knowledge pertaining to the adoption and diffusion research work across developing countries.

5.2 Conclusion, limitations, and future studies

The present technology is a crucial factor in gaining competitive advantage and success in this competitive era of globalisation. It helps in faster production and decision-making. Therefore, businesses are seeking innovative solutions to enhance their business performances, to gain more relative advantages, to slash costs, as well as to improve the quality of their services and products by adopting cutting-edge technological developments. However, Venkatesh, Morris, and Davis (2003) noted that the successful implementation of IS heavily relies on the extent to which such a system is used and eventually adopted by the potential users. During this COVID-19 outbreak, businesses may benefit from the global circumstances that encourage the consumers to adopt their e-commerce channels. In order to motivate consumers to use e-commerce, it is necessary to understand the key factors that influence the adoption of e-commerce by consumers. The proposed model explained 69% of the variance in the intention to adopt e-commerce during COVID-19. PU, PBC, risk-taking propensity, perceived lack of alternatives, and government support emerged as significant determinants to predict the intention to adopt e-commerce. Meanwhile, perceived risk, perceived punishable infractions, perceived external pressure, PEOU, and SN were insufficient to influence the consumers' intention to adopt e-commerce. The study outcomes are subject to several limitations. This research work was conducted in the Kingdom of Saudi Arabia, and whether the results of this study are consistent with e-commerce users in other countries, should be verified through further empirical studies. The study does not direct to a specific e-commerce system, so for a specific e-commerce system, it should be better to carry out a questionnaire survey or interview sessions to analyze factors that influence the individual adoption of e-commerce services. In the near future, the COVID-19 outbreak will be controlled, as will consumers' behaviour continue to change. Therefore, future research work should both include longitudinal study to track the evolutionary adoption of e-commerce and seek to update the model to future circumstances.

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7 APPENDIX A. THE QUESTIONNAIRE

Table 6 *Constructs and their corresponding items*

Questionnaire items: please respond to questions below by circling your choice (1 = strongly disagree, 5 = strongly agree).

Constructs	
Perceived external pressure	
a) The government is pressuring me to adopt e-commerce during COVID-19 pandemic. b) The goods and services retailers are pressuring me to adopt e-commerce during COVID-19 pandemic. c) My employer is pressuring me to adopt e-commerce due to COVID-19 pandemic.	[95]
Perceived lack of alternatives	
a) I adopt the e-commerce because there are no good alternatives. b) Among the available alternatives, e-commerce is the only good choice. c) Compared to e-commerce, there are not many other choices that would be satisfactory.	[96]
Perceived risk	
a) In general, using e-commerce for shopping involves low risk of being infected by COVID-19. b) There would be a low potential for infection with using e-commerce for shopping during COVID-19 pandemic. c) There would not be too much uncertainty associated with using e-commerce for shopping during COVID-19 pandemic.	[97]
Perceived usefulness	
a) I think that using the e-commerce would enable me to accomplish my shopping healthier during COVID-19 pandemic. b) I think using e-commerce enhances my health safety performance during COVID-19 pandemic. c) Overall, I think that using the e-commerce has health benefits.	Cheng et al. (2006)
Perceived ease of use	
a) E-commerce is easy-to-use. b) Learning to operate e-commerce is easy. c) E-commerce is flexible to interact with. d) My interaction with e-commerce is clear and understandable.	Cheng et al. (2006)
Subjective norm	
a) People who are important to me would think that I should use e-commerce during COVID-19 pandemic. b) People who influence me would think that I should use e-commerce during COVID-19 pandemic. c) People whose opinions are valued to me would prefer that I should use e-commerce during COVID-19 pandemic.	Wu and Chen, (2005)
Perceived behavioural control	
a) I think that I would be able to use the e-commerce well for shopping. b) I think that using e-commerce would be entirely within my control. c) I think that I have the resources, knowledge, and ability to use e-commerce.	Wu and Chen, (2005)
Perceived Punishable infractions	
a) I think if I get caught while the curfew, I think the punishment would be very high. b) I think if I get caught while the curfew, the probability I would be punished is very high. c) In general, violating the curfew is subject to a deterrent punishment.	[98]
Government support	
a) The government is helping to lower the cost of using the Internet and setting up e-commerce facilities during COVID-19 pandemic. b) Support from government is important to encourage me to use more of e-commerce during COVID-19 pandemic. a) The government often inform us about the good points of e-commerce during COVID-19 pandemic. b) The government is helping in giving all kinds of assistance to guarantee consumers' rights of e-commerce transactions.	[99]
Risk-taking propensity	
a) I am willing to take substantial risks to visit shopping mall during COVID-19 pandemic. b) I am willing to accept some risk of getting infected if visiting shopping malls is likely to involve an insignificant amount of risk during COVID-19 pandemic. c) I am willing to accept some risk of getting fined if visiting shopping malls during the curfew is likely to involve an insignificant amount of risk during COVID-19 pandemic.	[97]
Intention to use	
a) I would use the e-commerce for my shopping needs. b) Using the e-commerce for handling my shopping is something I would do. c) I would see myself using the e-commerce for handling my shopping.	Cheng et al. (2006)