

El Khoury, Charbel M.; Choudhary, Mrinalini; Al Alam, Adel F.

Article

Consumers' online purchasing intentions post COVID-19: Evidence from Lebanon and the Kingdom of Bahrain

Administrative Sciences

Provided in Cooperation with:

MDPI – Multidisciplinary Digital Publishing Institute, Basel

Suggested Citation: El Khoury, Charbel M.; Choudhary, Mrinalini; Al Alam, Adel F. (2023) : Consumers' online purchasing intentions post COVID-19: Evidence from Lebanon and the Kingdom of Bahrain, Administrative Sciences, ISSN 2076-3387, MDPI, Basel, Vol. 13, Iss. 1, pp. 1-19, <https://doi.org/10.3390/admsci13010017>

This Version is available at:

<https://hdl.handle.net/10419/275483>

Standard-Nutzungsbedingungen:

Die Dokumente auf EconStor dürfen zu eigenen wissenschaftlichen Zwecken und zum Privatgebrauch gespeichert und kopiert werden.

Sie dürfen die Dokumente nicht für öffentliche oder kommerzielle Zwecke vervielfältigen, öffentlich ausstellen, öffentlich zugänglich machen, vertreiben oder anderweitig nutzen.

Sofern die Verfasser die Dokumente unter Open-Content-Lizenzen (insbesondere CC-Lizenzen) zur Verfügung gestellt haben sollten, gelten abweichend von diesen Nutzungsbedingungen die in der dort genannten Lizenz gewährten Nutzungsrechte.

Terms of use:

Documents in EconStor may be saved and copied for your personal and scholarly purposes.

You are not to copy documents for public or commercial purposes, to exhibit the documents publicly, to make them publicly available on the internet, or to distribute or otherwise use the documents in public.

If the documents have been made available under an Open Content Licence (especially Creative Commons Licences), you may exercise further usage rights as specified in the indicated licence.



<https://creativecommons.org/licenses/by/4.0/>

Article

Consumers' Online Purchasing Intentions Post COVID-19: Evidence from Lebanon and the Kingdom of Bahrain

Charbel M. El Khoury ^{1,*}, Mrinalini Choudhary ¹ and Adel F. Al Alam ² ¹ College of Business and Financial Sciences, Royal University for Women, Riffa 37400, Bahrain² USEK Business School, Holy Spirit University of Kaslik, Jounieh P.O. Box 446, Lebanon

* Correspondence: celkhoury@ruw.edu.bh

Abstract: The future of consumers' online shopping trends post COVID-19 remains among the contemporary topics that necessitate further explorations. The aim of this research is to explore the intention of Lebanese and Bahraini consumers to shop online in the post pandemic era. This study extends the technology acceptance model that has exhibited prominent results when it comes of online purchasing. An online survey was addressed to consumers in Lebanon and the Kingdom of Bahrain to collect the data. More precisely, a total of 778 responses equally divided between the two countries was collected. Following the analysis of the data, it was found that both Lebanese and Bahraini shoppers demonstrate variations in the positive evidence associated with the elements of the technology acceptance model, except the perceived usefulness positive impact on consumers' intention toward online shopping where no significant impact was shown in both countries. Contactless payment modes have no significant impact on attitudes in both countries contrary to their positive impacts on the intention toward online shopping in both countries. The use of social media and price consciousness also have variations in the positive evidence linked to consumers attitudes in both countries. Finally, both the use of social media and price consciousness reveal differences in the level of negative association with consumers' intention toward online shopping in Lebanon and the Kingdom of Bahrain.

Keywords: online shopping; contactless payment; social media usage; price consciousness; technology acceptance model; COVID-19; Lebanon; Kingdom of Bahrain



Citation: M. El Khoury, Charbel, Mrinalini Choudhary, and Adel F. Al Alam. 2023. Consumers' Online Purchasing Intentions Post COVID-19: Evidence from Lebanon and the Kingdom of Bahrain. *Administrative Sciences* 13: 17. <https://doi.org/10.3390/admsci13010017>

Received: 7 December 2022

Revised: 15 December 2022

Accepted: 23 December 2022

Published: 6 January 2023



Copyright: © 2023 by the authors. Licensee MDPI, Basel, Switzerland. This article is an open access article distributed under the terms and conditions of the Creative Commons Attribution (CC BY) license (<https://creativecommons.org/licenses/by/4.0/>).

1. Introduction

The COVID-19 pandemic has played since its occurrence a significant role in restructuring most consumers' patterns. To maintain a reasonable number of positive cases in line with the struggles of local healthcare systems, subsequent measures and lockdowns have taken place in most of the world's countries. The daily reported news and awareness campaigns have also leveraged the number of people who prefer to avoid being present in public and congested places to minimize the infection threat rate. All these elements have forced people to seek alternative means to move forward into their daily life activities, including online shopping. According to Zidane (2021), global e-commerce sales have faced a radical increase since the beginning of the pandemic.

Several spending habits were transformed, with many consumers making their first online purchases. A MasterCard 2020 study results show that online shopping nearly increased by 73% among Middle Eastern consumers compared with prior to the pandemic. For Wamda (2020), an approximate 9% increase in the frequency of online shopping was demonstrated among young Arabs since the presence of the virus. In a more recent study from PwC Middle East region, findings of the Global Consumer Insights Survey (PwC Middle East 2021) reveal that 67% of the consumers have turned to be "more digital" than before. As for Nahas (2021), a notable growth in the e-commerce sector of Lebanon has been shown in the past year of the pandemic with the presence of an increasing number of

consumers requesting to pay online. Moving to the Kingdom of Bahrain, the e-commerce sector in its turn, has witnessed a remarkable rise since the start of the epidemic ([The Daily Tribune 2021](#)).

Numerous research papers have been issued since the start of the pandemic to investigate the impact of the COVID-19 on online shoppers' behaviors. Within an international context, [Sheth \(2020\)](#), initially explored the impact of the pandemic on consumers' former habits after the crisis. [Aggarwal and Kapoor \(2020\)](#) explored the drivers of online shopping in India and gained a specific knowledge about consumers' attitudes after the pandemic. In their turn, [Jo et al. \(2021\)](#) examined the consumers' behavioral changes of South Korean citizens following the epidemic. Moreover, [Gu et al. \(2021\)](#) listed the typical consumers' online buying behavior changes within the leading 10 countries in e-commerce. Moving into more regional context examinations, [Salem and Nor \(2020\)](#) examined the correlation between COVID-19 and factors affecting consumers' behavioral intentions towards e-commerce in the Kingdom of Saudi Arabia. In his turn, [Alhaimer \(2021\)](#) investigated the risks that affect the online shopping in Kuwait during the pandemic, whereas [Almajali and Hammouri \(2021\)](#) studied the effects of COVID-19 pandemic on consumers' online perceived risk and ease of use, as well as trust in Jordan. Besides, [Easa and Kaakour \(2021\)](#) investigated the association between Lebanese consumers' online purchasing intention and factors, such as website quality, brand, trust, and electronic word of mouth, in addition to mobile usage, during the pandemic. Additionally, [Boustani et al. \(2022\)](#) investigated the Lebanese consumers' attitudes toward online shopping in Lebanon during pandemics while considering the social factors, platform quality and Gender. [Al-Khalifa et al. \(2021\)](#) also examined the behavior of online shoppers during COVID-19 in the Kingdom of Bahrain, in relation with social media, product availability, details, and price, as well as easiness and convenience.

With the continuous rise in numbers of the world's vaccinated people, the current scientists' expectations that the Omicron variant might either mark the end of the severe stage of the virus or a turn to endemicity, as well as people's remarkable passion to return to normal life, this possibility has advanced a step further. Thus, will consumers who shifted towards online shopping because of the pandemic in the region, and more precisely in Lebanon and the Kingdom of Bahrain, intend to return to traditional brick-and-mortar shopping given the steadiness of the situation?

To our knowledge, a limited number of studies have empirically examined the intention of consumers to continue relying on technology to complete their online purchases the consumers' online post COVID-19. Moreover, as per our understanding, no studies were found to serve as an extension of the technology acceptance model when it comes to the assessment of the most emerging shopping trends post pandemic, namely their impact on both consumers' attitudes and intentions towards online shopping. To address this gap, this study that investigates the consumers' behavioral changes after almost 2.5 years from the start of the pandemic, relies on the technology acceptance model ([Davis 1989](#)) that has demonstrated efficient results in picturing e-commerce acceptance manners. Contactless payment modes ([McKinsey and Company 2021b](#)), price consciousness ([PwC Middle East 2021](#)), and social media usage ([PwC Middle East 2020](#)), are today considered among the most emerging shopping trends because of COVID-19, therefore serve as extended variables in our proposed study model.

Our outcomes would serve for the benefits of the Arab World's e-commerce sector in general, as well as Lebanese and Bahraini in particular. The study results may extend the understanding level of the sector, especially following the notable growth that it has faced since the start of the epidemic. The study results may also contribute to the reinforcement of the sector and shed light on some of the consumers' trends to be considered for an appealing and a sustainable shopping journey.

The e-commerce sector in both Lebanon and the Kingdom of Bahrain Lebanon has witnessed an exponential growth since the start of the pandemic. Despite this fact, and the belongingness of the two countries to the Arab world, the policies, technologies, and other environmental considerations related to e-commerce and online shopping may not be

typically the same. A comparative study that assesses the intention of consumers toward online shopping post pandemic would thus fit the purpose.

2. Literature Review

2.1. COVID-19 Pandemic, E-Commerce, and Consumer Behavior

COVID-19 has led to various behavioral and daily life changes in various aspects including e-commerce. New consumer habits and behavioral changes have emerged because of the pandemic.

2.1.1. COVID-19 Pandemic

The 2019 coronavirus disease known as COVID-19 was initially discovered in Wuhan, China before being spread all over the world ([Shereen et al. 2020](#)). Since its discovery, the pandemic has led to various restrictions on the peoples' activities and interactions to control the spread of the virus. The consequences of staying at home influenced peoples' lifestyles, habits, and health, among others ([Galluccio et al. 2021](#)). More precisely, notable global consumer shifts have occurred towards e-commerce even within cultures where online shopping is not commonly acknowledged, and where traditional shopping norms are still in place ([Forbes Magazine 2020](#)). The duration of digital sales dispersion thus radically decreased from 10 years to three months according to [McKinsey and Company \(2021a\)](#). Business activities have been therefore able to be preserved because of the replacement channel offered by digital technologies ([Netcomm Suisse eCommerce Association 2020](#)). Fundamental worldwide changes have been derived from the occurrence of COVID-19, including those affiliated to digital transformation ([Kim 2020](#)).

2.1.2. E-Commerce

The global e-commerce has witnessed a revolutionary change since the start of the pandemic. According to [Abdelrhim and Elsayed \(2020\)](#), e-commerce in most of the world's regions has been influenced by the pandemic. The Middle East and North Africa (MENA) is considered at the heart of the regions that witnessed a noteworthy evolution in the e-commerce sector in addition to the presence of high ratios of time spent online as well as smart device usage rates ([Statista Research Department 2021](#)). A 5 billion USD growth in the e-commerce sector was only demonstrated in the Gulf Cooperation Council region from 2015 to 2020 ([Kearney 2020](#)).

Most online platforms in Lebanon have emerged in food & beverage, home accessories, electronics, banking, and retail fashion because of the pandemic ([International Trade Administration 2021](#)). Senior Executives in the Lebanese retail industry also project an ongoing increase in the e-commerce sector in the coming five years despite the country's current economic, financial, and banking crisis. Yet, they believe that the e-commerce law initially introduced in 2004 and updated in 2018 still needs to be revised to convey further protection measures to online shoppers ([Nahas 2021](#)).

This is also found to counterpart the e-commerce sector in the Kingdom of Bahrain. New e-commerce legislations were therefore enacted in 2021 to regulate the sector. Moreover, several online shopping platforms were established by the Ministry of Industry, Commerce and Tourism in the Kingdom since the beginning of the pandemic ([International Trade Administration 2021](#)).

2.1.3. Consumer Behavior

In a study exploring the overall global consumer's shopping habits, [YouGov PLC \(2021\)](#) affirmed that online channel remained primary for items, such as apparel, footwear, home decor, and electronics. In contrast, everyday items, such as food and beverage, sanitary care, personal care, and cleaning products, continued to lead the brick-and-mortar options in consumers' preferences.

In Lebanon, lockdowns have prompted many people to shop online using their mobiles, tablets, and laptops ([Nahas 2021](#)).

A study conducted by Sitecore® in 2021 announced that 91% of MENA consumers have shifted towards digital shopping due to COVID-19 and will continue to pursue this online shopping experience ([The Bulletin 2021](#)). According to the same 2021 Sitecore® study, 86% of consumers in the Kingdom of Bahrain are viewed to have switched to e-commerce and will keep on purchasing online ([The Daily Tribune 2021](#)). Although cash on delivery payments remains used in the region, an increase in the digital payment options is also marking its growth ([Middle East Payment Models Market Report 2021](#))

2.2. The Technology Acceptance Model

The technology acceptance model (TAM) is an extended concept from the theory of reasoned action (TRA) suggested by [Fishbein and Ajzen \(1975\)](#) to explore and describe the user's behavior in multiple areas. TAM features the new technology user's behavioral intention (BI), and the factors that determine it ([Hsieh et al. 2015](#)). It is considered a principal theory when it comes to understanding the technology use behavior ([Ofori and Appiah-Nimo 2019](#)) as well as one of the utmost cited theories pertinent to information technology usage and acceptance ([Salem and Nor 2020](#)). In research, despite seeing it as a frugal, TAM proved to be considered a vigorous model of technology acceptance manners ([Gefen et al. 2003](#)).

Introduced by Davis in 1985 ([Davis 1985](#)), the model suggests that external factors generate perceived usefulness (PU) and perceived ease of use (PEOU) responses as elements that trigger the user's adoption decision of new technology. While (PU) associates the newly used technology to enhanced performance, (PEOU) is about the extent to which it is believed that the use of a specific system would be effortless ([Davis 1989](#)). In addition to PU and PEOU, TAM also embraces the attitude toward using technology (ATU) as an element of the model that elucidates the new technology user's intention toward online shopping (ITOS) ([Scherer et al. 2019](#)). For [Davis \(1989\)](#), ITOS is allied to future acts to be performed or not upon the creation of clear cognitive state.

Despite the general confirmations of the model's elements, the studies of [Pikkarainen et al. \(2004\)](#) and [Wu and Wang \(2005\)](#) revealed little association between (PEU) and (ATU) and (ITOS) in mobile commerce and online banking, respectively. It is noteworthy that TAM only functioned on users who hold a previous online shopping experience when being tested on both probable and recurrent shoppers ([Bruner and Kumar 2005](#)). The practicality of TAM in the Arabian context was confirmed, when associated with the adoption of computer technology ([Al-Gahtani 2001, 2008](#)).

2.3. Hypotheses Development and Study Model

2.3.1. Consumer's Perceived Usefulness

In the context of online shopping, (PU) refers to the extent towards which it is believed that this act would improve the shopping effectiveness ([Shih 2004](#)). Several studies explored the correlation between (PU) and (ATU) for shopping. [Mostafa and Hannouf \(2022\)](#) confirmed a positive correlation between (PU) and (ATU) in a Lebanese online apparel context. O. T. [Nguyen \(2020\)](#) also demonstrated a positive influence in the context of Vietnamese digital banking. Earlier studies ([Oentario et al. 2017](#); [Rahmiati and Yuannita 2019](#)) also confirmed the positive association between (PU) and (ATU) following their studies undertaken on online shopping within the Indonesian contexts. In addition to the (ATU), some studies have also demonstrated the direct correlation between (PU) and (ITOS). In a Taiwanese context, with regard to electronic learning, [Lee et al. \(2013\)](#) proved the direct impact of (PU) on (ITOS). In their study about rich site summaries (RSS) in Lebanese education, [Tarhini et al. \(2015\)](#) confirmed the direct influence of (PU) on (ITOS). Additionally, [Ait Youssef et al. \(2020\)](#) explored the relationship between (PU) and (ITOS) for online shoppers within the Moroccan context and obtained positive results. Based on the presented literature, the following is hypothesized:

Hypothesis 1. *PU is positively associated with ATU for online shopping post COVID-19 pandemic among Lebanese and Bahraini consumers.*

Hypothesis 2. *PU is positively associated with ITOS post COVID-19 pandemic among Lebanese and Bahraini consumers.*

2.3.2. Perceived Ease of Use

PEOU is referred to the free efforts invested in online shopping when mapped to the original definition of (Davis 1989). Raksadigiri and Wahyuni (2020), who conducted their study on card users in Indonesia, confirmed the strong impact of (PEOU) on (PU) and (ATU). The outcomes of this study go in parallel with the results of Prasetyo et al. (2021) conducted on online learning in Philippines and proved the strong impact of (PEOU) on (PU). In contrast, in the study of Crespo and del Bosque (2008) that aimed to identify the factors that lead to the shift of internet users towards online shopping in Spain, no evidence of impact was found when associating (PEOU) to (ATU). Within the case of apparel online shopping in Lebanon, Mostafa and Hannouf (2022), revealed that (PEOU) is confirmed to have a positive impact on (ATU). In the context of school's educational technology adoption in the Kingdom of Bahrain, Al-Ammary (2011) confirmed the positive effects on (PEOU) on (PU). A similar finding was revealed by Al-Ani et al. (2013) in the context of university mobile learning in the Kingdom of Bahrain. In reference to the existing literature, the following hypotheses are proposed:

Hypothesis 3. *PEOU is positively associated with ATU for online shopping post COVID-19 pandemic among Lebanese and Bahraini consumers.*

Hypothesis 4. *PEOU positively affects PU for online shopping post COVID-19 pandemic among Lebanese and Bahraini consumers.*

2.3.3. Attitude toward Using Technology

When linked to technology, (ATU) is the positive or negative appraisal of new technology integration within any context (Elias et al. 2012). In 2017, Wu and Chen (2017) explored the relationship between (ATU) and (ITOS) in Chinese educational learning and confirmed the positive influence of (ATU) on (ITOS). Similarly, Kong et al. (2021) generated similar results within the perspective of Chinese mobile social media. When examining the factors that influence attitudes of Jordanian consumers vis-à-vis online shopping, Akroush and Al-Debei (2015) confirmed the positive impact of (ATU) on (ITOS). In their turn, Mostafa and Hannouf (2022) presented a similar outcome for Lebanese shoppers. Additionally, in his study about educational technology in the Kingdom of Bahrain, Eksail (2021) asserted the positive impact of (ATU) on (ITOS) of pre-service educators. The below hypothesis is therefore generated based on the above literature:

Hypothesis 5. *ATU positively affects ITOS post COVID-19 pandemic among Lebanese and Bahraini consumers.*

Considering the post pandemic changes in psychological alterations related to consumption, shopping is intended to be more linked to digitalization. This is perceived to be consistent with shoppers' psychological states and the trend of pursuing health (Deng et al. 2020). Thus, in order to explore the consumers' online purchasing intentions through the focus on the TAM model, the incorporation of elements that have been given greater importance by online shoppers during the pandemic phase are considered vital. Those will reflect the foreseen variables to possibly keep on exercising influence on shoppers' intentions post pandemic, as per our study.

2.3.4. Contactless Payment Modes

Online shopping habits are seen to be directly influenced by the available options for payments (Le Tan et al. 2021). According to McKinsey and Company (2021b), digital payments in the region have witnessed a massive increase since the pandemic. Non-cash transactions are therefore expected to last. The same study revealed that only 10% of surveyed consumers opted for the cash mode whereas 58% strongly demonstrated preferences for the digital modes of payments. The cash-on-delivery (COD) option has therefore lost its priority in the region following the rise in popularity of contactless payments' modes (ResearchAndMarkets.com, accessed on 3 February 2022). In the wake of the pandemic, contactless payment options have gained popularity among Lebanese consumers (ReportLinker 2021). Similarly, consumers' have showed more preferences to use less cash at both online and points of sale since the outbreak in the Kingdom of Bahrain (Gulf Digital News 2020). The following hypotheses are presented based on the above:

Hypothesis 6a. *The presence of contactless payment modes (CPMa) is positively associated with ATU for online shopping post COVID-19 pandemic among Lebanese and Bahraini consumers.*

Hypothesis 6b. *The presence of contactless payment modes (CPMb) is positively associated with ITOS post COVID-19 pandemic among Lebanese and Bahraini consumers.*

2.3.5. Social Media Usage

The COVID-19 crisis has significantly reinforced the role of social media due to its clear effects on several patterns of our lives including shopping. Social media has been therefore considered among the primary means to connect with people (Ali Taha et al. 2021). This comes in alignment with Mason et al. (2021) who in their turn confirmed the important role that social media marketing has played because of COVID-19. For Kayyali (2021), the Arab world's countries have witnessed further upsurge in internet and social media usage during the pandemic. Shopping through social media has facilitated the process of buying as shoppers are able to perform it without the need to leave the social media application or navigate through a specific website page (T. Nguyen 2021). In the Middle East region, 47% of consumers regularly shop through their smartphones (PwC Middle East 2021). Consequently, Middle East and North Africa retailers have been reinforcing their connections with customers through social media platforms as part of the rise in "conversational commerce" (Wamda 2020). In Lebanon, most online shopping is still undertaken via social media platforms, such as Facebook and Instagram (Berytech 2021). In the Kingdom of Bahrain, Al-Khalifa et al. (2021) confirmed the impact of social media on online shopping behavior during the COVID-19 pandemic. It is therefore hypothesized that:

Hypothesis 7a. *The use of social media (SMUa) is positively associated with ATU for online shopping post COVID-19 pandemic among Lebanese and Bahraini consumers.*

Hypothesis 7b. *The use of social media (SMUb) is positively associated with ITOS post COVID-19 pandemic among Lebanese and Bahraini consumers.*

2.3.6. Price Consciousness

It is unequivocal that many consumers today prefer to buy affordable brands (Cai and Leung 2020) in line with the decrease in income reported by many online buyers (Hobbs 2020). PwC Middle East (2021) findings reveal that shoppers' price sensitivity during the pandemic in the region is considered higher than before. More precisely, 57% of consumers have become oriented towards price and their expenditure tendency has changed from the way it used to be before the pandemic. In his study conducted on Canadian food supply chains, Hobbs (2020) asserted that consumers are expected to be more price sensitive due an uncertain period like COVID-19. For Abdo et al. (2020), new economic and citizens' difficulties have been resulted in Lebanon because of COVID-19. It is from this perspective

that [Khalek and Eid \(2020\)](#) declared that Lebanese shoppers' behavior during COVID-19 is most importantly influenced by the price since shoppers are more seeking less expensive merchandise. In the Kingdom of Bahrain, the study of [Al-Khalifa et al. \(2021\)](#) that assessed the purchasing behavior of online consumers during the COVID-19 pandemic confirmed the strong influence of a product price on the shoppers' behaviors. We next present the related hypotheses:

Hypothesis 8a. *Price consciousness (PRCNa) is negatively associated with ATU for online shopping post COVID-19 pandemic among Lebanese and Bahraini consumers.*

Hypothesis 8b. *Price consciousness (PRCNb) is negatively associated with ITOS post COVID-19 pandemic among Lebanese and Bahraini consumers.*

Figure 1 illustrates our study model to be empirically validated in the upcoming part:

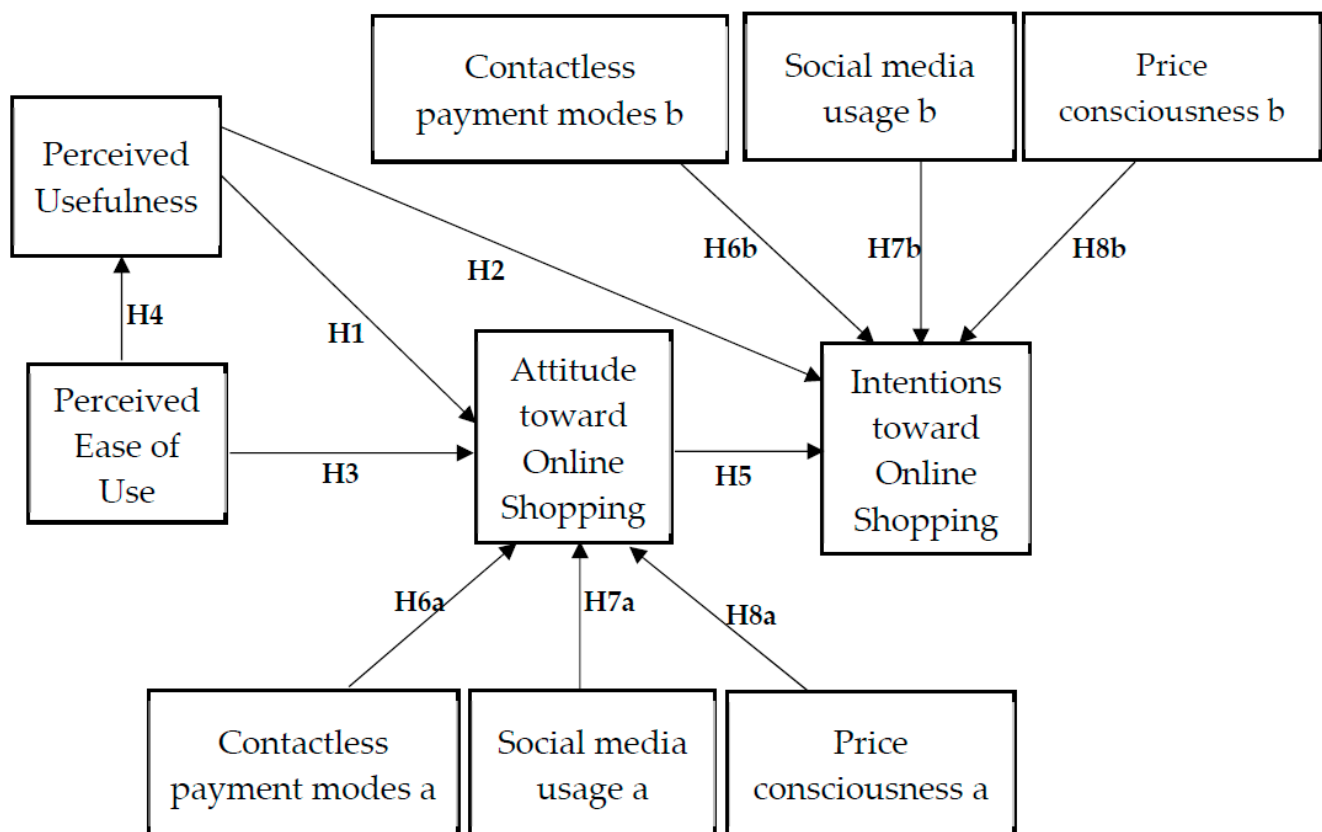


Figure 1. Study Model.

3. Method

3.1. Data Collection and Sample

Quantitative reasoning was followed to collect the data. Lebanese and Bahraini citizens and nationals who have primarily experienced online shopping via social media during the COVID-19 lockdowns were exclusively invited to participate in the study. An online survey created with Google Forms was distributed over a period of three weeks starting from 25 September 2022. During this time and even several months earlier, all the COVID-19 restrictive measures were abandoned despite the global continuous emergence of Omicron subvariants. This therefore allowed respondents to experience once again, the regular life and shopping habits which helped to preserve an ideal context for the topic under study.

Using the non-probability snowball sampling technique, the link of the survey was shared via the authors' social media accounts mainly Meta (previously Facebook) and

WhatsApp in addition to emails. To reach the largest possible group of prospective respondents, participants were also prompted in their turn to encourage other people who hold identical characteristics to partake in the study. The same process was followed until the target was reached. Before its massive dispatch, the survey was piloted on 45 representative participants from Lebanon and the Kingdom of Bahrain to perform any adjustment related to clarity of the questions, as well as the trustworthiness and rationality of obtained data. This is in concomitance with the study of [Johanson and Brooks \(2010\)](#) that recommended the 24–36 interval of representative participants.

The sample size was identified as per [Smith \(2013\)](#) at the 95% confidence level, 5% margin of error, a standard deviation of 0.5 and a Z-score of 1.96 using this formula related to substantial or undetermined population sizes $“(Z\text{-score})^2 * StdDev * (1 - StdDev) / (\text{margin of error})^2”$. Accordingly, 385 respondents were needed from each of Lebanon and the Kingdom of Bahrain. [Krejcie and Morgan \(1970\)](#) provided a relatively similar conclusion, noting that when the population rises, the sample size marginally grows and somehow remains stable at nearly 380 responses. Concerning our study, 778 participants in total properly completed the survey. More precisely, the sample size in both Lebanon and the Kingdom of Bahrain reached 389 respondents.

3.2. Measurements of Variables

The survey was divided into 2 sections. The first one related to the study variables where the latter were measured through statements of five-point Likert scale that range from strongly disagree to strongly agree. The second section covered the biographical part using dichotomous and multiple-choice questions. Variables were measured using items adopted and modified from previous studies.

Perceived usefulness (PU) was measured using the following items: purchasing online would enhance my overall shopping performance, purchasing online would increase my shopping productivity ([Fenech 1998](#)); purchasing online would reinforce the effectiveness of shopping, purchasing online is easier than physical in store shopping ([Ghani et al. 2019](#)); online purchasing is overall useful ([Lee et al. 2019](#)).

Similarly, perceived ease of use (PEOU) was measured through these items scale: learning to purchase online is easy, becoming skillful in conducting an online purchase is easy to achieve, finding what I want to purchase online is easy ([Fenech 1998](#)); finding the necessary information on what I want to purchase is easy ([Ghani et al. 2019](#)); online purchasing is comprehensible ([Davis 1989](#)).

Equally, attitude toward online shopping (ATU) was also assessed using the items: I am positive towards the conduct of online purchasing, online purchasing is a smart idea ([Fenech 1998](#)); purchasing online generally helps me to be more engaged in shopping ([Ghani et al. 2019](#)); I believe that online purchasing is entertaining ([Kempf 1999](#)); purchasing online is in general not safe ([Osman et al. 2010](#)).

In its turn, intentions toward online shopping (ITOS) was measured through: I intend to be a regular user of online shopping ([Fenech 1998](#)); I intend to widen the scope of my online purchasing activities, I intend to conduct further purchases online in the future ([Ghani et al. 2019](#)); I would prompt others to purchase online ([Kraft et al. 2005](#)).

Regarding contactless payment modes (CPM)a, these items were used to test this variable: contactless payment (any payment mode other than cash) is in general a good idea for online purchasing, contactless payment modes are safe when sufficient information is in hands while purchasing online ([Vejačka 2015](#)); contactless payment is good mean to pay, I enjoy the adoption of contactless payments ([Taylor and Todd 1995](#)). Moreover, CPMb items were: I plan to keep on using contactless payments for online shopping in the future ([Taylor and Todd 1995](#)); I would prefer contactless payment modes if I have the option ([Hidayanto et al. 2015](#)); keeping on using contactless payments for online shopping is something I would pursue, I will be regularly using contactless payments for online shopping in the future instead of abandoning their use ([Rahi and Ghani 2019](#)).

Likewise, social media usage (SMU)_a was assessed using shopping through social media platforms is entertaining (Kempf 1999), social media platforms are good means for purchasing, I enjoy the purchasing through social media platforms, (Taylor and Todd 1995); purchasing through social media risky (Osman et al. 2010). In addition, SMU_b was assessed using purchasing through social media platforms is something that I would keep on pursuing in the future (Taylor and Todd 1995); I would prompt others to purchase through social media (Kraft et al. 2005); I would favor the online purchasing through social media If I have the option (Hidayanto et al. 2015); I will be regularly shopping through social media platforms in the future instead of abandoning their use (Rahi and Ghani 2019).

Finally, price consciousness (PRCN)_a was measured via: purchasing an online product during a sales day makes me feel happy (Chaudhuri and Holbrook 2001); I find it worth to take some time to find low prices when conducting an online purchase (Burton et al. 1998); I only favor online purchasing when prices are less than the actual ones, online purchasing decreases the cost associated to traditional shopping (for instance fuel fees, parking fees, and so on) (Osman et al. 2010). In its turn, PRCN_b was assessed via I consider price as one of the most important factors that might affect my online purchasing activities, I will rely on price attractiveness when it comes to future online purchasing, I intend to purchase affordable priced online brands (Sinha and Batra 1999); I would prompt others to purchase online because prices are in general lower than traditional shopping (Kraft et al. 2005).

4. Results

This section reports some descriptive statistics of the sample and posits the good-ness of fit, validity, and reliability of the measurement model via confirmatory factor analysis (CFA). It then examines the research hypotheses via structural equation models (SEM). Data analysis was undertaken using the Statistical Package for the Social Sciences (SPSS) 23 and AMOS.

4.1. Sample's Descriptives

The sample comprises 778 respondents equally distributed between Lebanon and the Kingdom of Bahrain. The sample is almost equally distributed between men and women. Approximately 47% of the respondents were born between 1995 and 2004, followed by about 33% that were born between 1982 and 1994. The majority of the respondents, about 88%, spend one hour or more on social media per day. Moreover, around 82% of the respondents buy at least one time per month through social media platforms, were nearly 21% purchase food and beverage 20% purchase apparel and shoes, 18% purchase beauty, personal care, and healthcare products, and 14% percent purchase electronics. The sample's trends in gender, birth date, time spent on social media, shopping frequency on social media are almost faithfully reproduced in both countries. Only shopping preferences differs between Lebanon and the Kingdom of Bahrain with around 24% purchase food and beverage in the Kingdom of Bahrain versus 17% in Lebanon, around 28% purchase apparel and shoes in Lebanon versus 13% in the Kingdom of Bahrain, almost 21% purchase beauty, personal care, and healthcare products in Lebanon versus 16% in the Kingdom of Bahrain, and around 16% purchase electronics in the Kingdom of Bahrain versus 12% in Lebanon.

4.2. Measurement Tools

The measurement model is designed to capture 10 constructs using a reflective scheme based on 41 manifests gauged at the five-point Likert scale. CFA was applied to this initial model and, after 23 runs and the removal of manifests with eight weak loadings or cross-loadings, the best fit model was reached (Shek and Yu 2014). The latter comprises 24 manifests and has a normed χ^2 of 2.378 with $p < 0.001$, a general fit index (GFI) of 0.951, an adjusted fit index (AGFI) of 0.929, a Tucker Lewis index (TLI) of 0.959, a comparative fit index (CFI) of 0.970, a root mean square error of approximation (RMSEA) of 0.042, and a standardized root mean square residual (SRMR) of 0.0278. The latter indices elicit an excellent goodness of fit of the measurement model.

Alongside the goodness of fit, CFA provides useful tools to examine the validity and reliability of the measurement model. A visual inspection of Table 1 shows that all the retained manifests have strong loadings (all above 0.700) that are significant at $p < 0.001$. Moreover, average variance extracted (AVE) values for all constructs are greater than the threshold of 0.500, which supports the convergent validity of the measurement model.

Table 1. Validity and reliability of the measurement model as obtained from CFA.

Construct	Manifest	Loading	AVE	CR
Perceived Usefulness (PU)	PU1	0.749 ***	0.597	0.748
	PU2	0.796 ***		
Perceived Ease of Use (PEOU)	PEOU1	0.814 ***	0.629	0.772
	PEOU2	0.772 ***		
Attitude toward Online Shopping (ATU)	ATU2	0.715 ***	0.554	0.688
	ATU3	0.734 ***		
Intentions toward Online Shopping (ITOS)	ITOS1	0.780 ***	0.587	0.810
	ITOS2	0.798 ***		
	ITOS4	0.719 ***		
Contactless Payment Modes a (CPMa)	CPM3a	0.779 ***	0.663	0.797
	CPM4a	0.848 ***		
Contactless Payment Modes b (CPMb)	CPM1b	0.822 ***	0.607	0.861
	CPM2b	0.773 ***		
	CPM3b	0.745 ***		
	CPM4b	0.775 ***		
Social Media Usage a (SMUa)	SMU1a	0.795 ***	0.651	0.848
	SMU2a	0.813 ***		
	SMU3a	0.812 ***		
Social Media Usage b (SMUb)	SMU2b	0.735 ***	0.599	0.749
	SMU3b	0.811 ***		
Price consciousness a (PRCNa)	PRCN1a	0.747 ***	0.572	0.728
	PRCN2a	0.766 ***		
Price consciousness b (PRCNb)	PRCN2b	0.707 ***	0.571	0.726
	PRCN3b	0.801 ***		

*** Significant at the level $p < 0.001$.

On another note, discriminant validity is verified for a construct when the square root of its AVE is greater than its correlation coefficient with any other construct. Table 2 reports the square roots of AVEs and cross-correlations for all the constructs. It is clearly evident that the discriminant validity criterion is fulfilled for all the constructs, which supports the discriminant validity of the measurement model.

Table 2. Cross-correlation matrix where the diagonal values represent the square roots of AVEs.

Construct	PU	PEOU	ATU	ITOS	CPMa	CPMb	SMUa	SMUb	PRCNa	PRCNb
PU	0.773									
PEOU	0.633 ***	0.793								
ATU	0.731 ***	0.636 ***	0.744							
ITOS	0.686 ***	0.600 ***	0.675 ***	0.766						
CPMa	0.437 ***	0.474 ***	0.465 ***	0.516 ***	0.814					
CPMb	0.525 ***	0.489 ***	0.545 ***	0.556 ***	0.787 ***	0.779				
SMUa	0.521 ***	0.514 ***	0.658 ***	0.538 ***	0.442 ***	0.557 ***	0.807			
SMUb	0.474 ***	0.384 ***	0.547 ***	0.524 ***	0.375 ***	0.411 ***	0.746 ***	0.774		
PRCNa	0.610 ***	0.554 ***	0.606 ***	0.520 ***	0.448 ***	0.558 ***	0.613 ***	0.475 ***	0.756	
PRCNb	0.516 ***	0.500 ***	0.560 ***	0.530 ***	0.482 ***	0.510 ***	0.507 ***	0.462 ***	0.703 ***	0.756

*** Significant at the level $p < 0.001$.

Finally, the reliability of the measurement model is computed as the composite reliability coefficients (CR), whose value should be greater than 0.700 to elicit strong reliability. Table 1 reports the CRs for all constructs, where it is evident that they all abide by the criterion of reliability with the exemption of ATU, whose CR of 0.688 indicates an acceptable reliability.

4.3. Structural Model and Hypothesis Testing

The analysis of the structural model, i.e., the hypothesized relationships between the variables, is performed using the structural equation modeling (SEM). The structural model is depicted in Figure 2, where the constructs are connected with arrows pointing in the direction of causality. The standardized path coefficients (β) are shown above these arrows. The sign and statistical significance of these β s will indicate whether the research hypotheses are supported. Moreover, the coefficient of multiple correlations (R^2) is reported on the upper right-hand-side of the outcome constructs in order to show their amount of variability explained by the explanatory constructs.

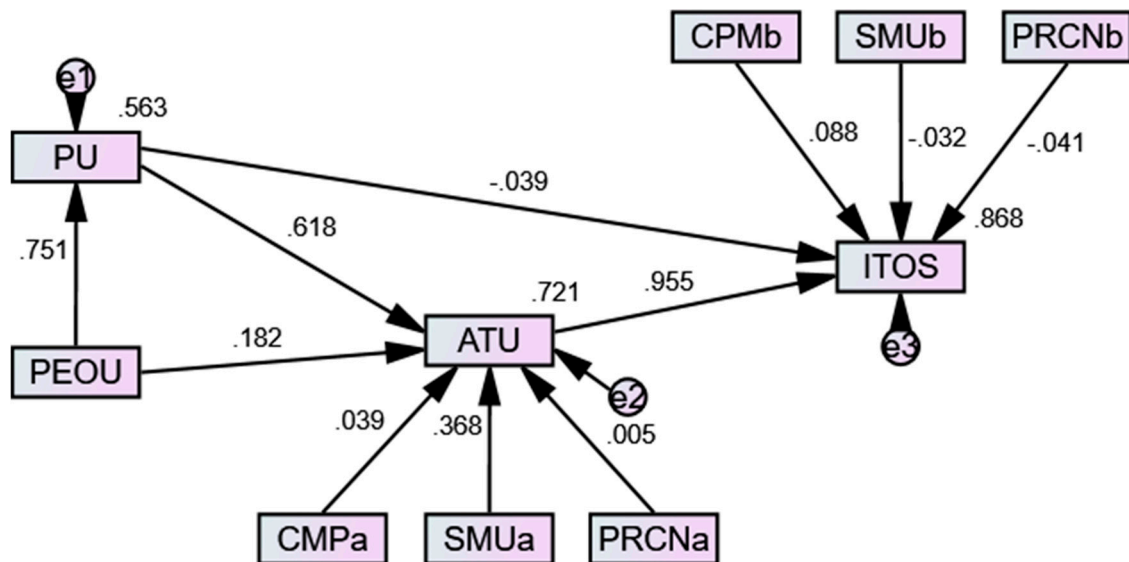


Figure 2. Structural Model.

Table 3 reports the results from the analysis of the structural equation using SEM. All research hypotheses are supported with the exemption of H2, H7b, and H8a.

Table 3. Validation of the research hypotheses from SEM.

Hypothesis	Standardized β	Decision
H1: PU → ATU	0.618 ***	Supported
H2: PU → ITOS	−0.039	Not supported
H3: PEOU → ATU	0.182 ***	Supported
H4: PEOU → PU	0.751 ***	Supported
H5: ATU → ITOS	0.955 ***	Supported
H6a: CPMa → ATU	0.039 *	Supported
H6b: CPMb → ITOS	0.088 ***	Supported
H7a: SMUa → ATU	0.368 ***	Supported
H7b: SMUb → ITOS	−0.032 *	Not supported
H8a: PRCNa → ATU	0.005	Not supported
H8b: PRCNb → ITOS	−0.041 **	Supported

Significant at the level *** $p < 0.001$, ** $p < 0.01$, and * $p < 0.05$.

Hypothesis Testing by Country

Table 4 reports the results from the moderation analysis by country.

Table 4. Validation of the research hypotheses by country.

Hypothesis	Standardized β	$\Delta\chi^2$	p -Value	Decision
H1: PU \rightarrow ATU	Lebanon: 0.630 *** Kingdom of Bahrain: 0.660 ***	11.847	0.001	PU has a significantly more positive impact on ATU in the Kingdom of Bahrain
H2: PU \rightarrow ITOS	Lebanon: -0.017 Kingdom of Bahrain: -0.018	3.404	0.065	PU has nearly no significant impact on ITOS in both countries
H3: PEOU \rightarrow ATU	Lebanon: 0.166 *** Kingdom of Bahrain: 0.190 ***	2.183	0.140	PEOU has roughly similar positive impact on ATU in both countries
H4: PEOU \rightarrow PU	Lebanon: 0.682 *** Kingdom of Bahrain: 0.771 ***	10.939	0.001	PEOU has a significantly more positive impact on PU in Lebanon
H5: ATU \rightarrow ITOS	Lebanon: 0.934 *** Kingdom of Bahrain: 0.942 ***	10.399	0.001	ATU has a significantly more positive impact on ITOS in the Kingdom of Bahrain
H6a: CPMa \rightarrow ATU	Lebanon: 0.016 Kingdom of Bahrain: 0.014	2.409	0.121	CPMa has nearly no significant impact on ATU in both countries
H6b: CPMb \rightarrow ITOS	Lebanon: 0.098 *** Kingdom of Bahrain: 0.085 ***	3.582	0.058	CPMb has almost similar positive impact on ITOS in both countries
H7a: SMUa \rightarrow ATU	Lebanon: 0.373 *** Kingdom of Bahrain: 0.365 **	0.243	0.622	SMUa has a almost similar positive impact on ATU in both countries
H7b: SMUb \rightarrow ITOS	Lebanon: -0.032 * Kingdom of Bahrain: -0.027 *	0.488	0.485	SMUb has nearly a similar negative impact on ITOS in both countries
H8a: PRCNa \rightarrow ATU	Lebanon: 0.041 * Kingdom of Bahrain: 0.044 *	4.867	0.027	PRCNa has nearly a more positive impact on ATU in the Kingdom of Bahrain
H8b: PRCNb \rightarrow ITOS	Lebanon: -0.026 * Kingdom of Bahrain: -0.027 *	4.248	0.039	PRCNb has approximately a more negative impact on ITOS in the Kingdom of Bahrain

Significant at the level *** $p < 0.001$, ** $p < 0.01$, and * $p < 0.05$.

5. Discussion

Prior the start of the discussion part, it is noteworthy to summarize the profiles of participants and be considered in the discussions' reasoning. All 778 participants from Lebanon and the Kingdom of Bahrain had been principally engaged in online shopping because of the COVID-19 lockdowns. As per the obtained data, more than 87% of respondents from both countries spend at least one hour on social media per day. Additionally, more than 80% shop at least once per month through social media platforms. The majority, about 80%, of respondents in both countries belong to generations Y and Z. According to [Reisenwitz \(2021\)](#), no significant difference was noticed between these 2 generations when it comes to social media usage even though Gen Z is less pleased than Gen Y when associated with online shopping. It is also noticed that shopping preferences differ between the study countries where Lebanese respondents are more in favor for apparel and shoes, as well as beauty, personal care, and healthcare products. In the Kingdom of Bahrain, food and beverage in addition to electronics are the primary purchased categories.

The attitude toward online shopping (ATU) for online shopping post COVID-19 is positively affected by perceived usefulness (PU) in the two countries. This result supports the outcomes of previous studies, such as [Rahmiati and Yuannita 2019](#), among others including the technology acceptance model (TAM). The effectiveness that most of online including social media platforms provide today to users has played a large role in enhancing shoppers' attitudes. As stated earlier, Lebanon's e-commerce sector has for instance faced a remarkable increase since the start of the pandemic ([Nahas 2021](#)). The several lockdown periods that took place in the country have contributed to the rising number of online shopping activities. The global shopping trends have also today influenced the

daily shopping routines of Lebanese people (Zaiter et al. 2021). Similarly, as mentioned earlier, in the Kingdom of Bahrain, 86% of consumers switched to e-commerce (The Daily Tribune 2021), adding the establishment of several online shopping platforms because of the pandemic (International Trade Administration 2021). This has therefore made the ideas and attitudes concerning online shopping more plausible.

PU is found to not have a noteworthy impact on intention toward online shopping (ITOS) post COVID-19 in both countries. Results here do not match TAM and other previous studies such as (Tarhini et al. 2015) in addition to others. The slow internet connection, electricity problems, and banks' limitations on payments through cards have in a way influenced social media user's intentions towards shopping. In the Kingdom of Bahrain, and despite the development of the e-commerce sector, people in general still aspire to be physically present in shopping malls. As per Mr. Heather Longden, the Director of Advisory and Transaction Services in Bahrain, "The role of bricks and mortar retail continues to be important; however, global trends indicate the use of these spaces will evolve—focusing on the experiential element." (Cityscape-intelligence 2020).

In its turn, the ATU for online shopping post COVID-19 is positively affected by perceived ease of use (PEOU) in Lebanon and the Kingdom of Bahrain. PU is also positively affected by PEOU in both countries. This is in concomitance with TAM as well as previous studies, such as Mostafa and Hannouf (2022) and Al-Ani et al. (2013), respectively. Most people today have at least one social media account, such as Meta, Instagram and so on. No remarkable efforts therefore need to be invested to use them for shopping. In Lebanon for instance, the literacy rate of adults is nearly higher than 95% according to the UNESCO Institute of Statistics (2018a, 2018b). In the Kingdom of Bahrain, this rate in its turn increases to nearly 97.5% for adults. This guarantees the presence of more than one person per household who will form a positive attitude toward shopping though social media and its usefulness.

A positive association is proven to take place between ATU and ITOS post COVID-19 in Lebanon and the Kingdom of Bahrain. This is found to be in conjunction with TAM and earlier studies, such as Eksail (2021), Mostafa and Hannouf (2022), and others. In general, consumers' intentions to shop online increase in the presence of positive attitudes. During the pandemic, a wide range people in Lebanon and the Kingdom of Bahrain who shopped online and through social media have formed over the time positive habits and attitudes. As per Boustani et al. (2022), who investigated the Lebanese consumers' attitudes toward online shopping in Lebanon during pandemics, the use of digital technologies tends to exercise a positive influence on consumers, namely the ones who have been subject to a prolonged lockdown period. In the Kingdom of Bahrain, the country's 2030 economic vision considers digital transformation as one of its main pillars (Bahrain.bh n.d.). The steps taken at this level are therefore considered among the main reasons behind the strong impact of ATU on ITOS.

Contactless payment modes (CPM) are found to not have a strong positive influence on consumers' ATU in Lebanon and the Kingdom of Bahrain whereas a more positive impact was noticed when it comes to the impact of CPM on ITOS in both countries. This validates the possibility of the presence of external variables in the TAM such as CPM to affect ITOS more than ATU. This result is also in alignment with the statements of ReportLinker (2021) and the Gulf Digital News (2020) that noted a tendency of using less cash for payments since the pandemic in Lebanon and the Kingdom of Bahrain correspondingly. The lower degree of noted positive influence of CPM on ATU can be associated with the restrictions put by Lebanese banks on card holders' payments. In the Kingdom of Bahrain, contactless payments increased to 75% as per the Al Hilal Publishing and Marketing Group (2022). This proves the occurrence of a non-remarkable positive impact of CPM on ATU as consumers today perceive it as normal and a regular part of their daily payment habits.

Until the beginning of 2022, there was around 5.06 million social media users in Lebanon with an approximate increase of 16% from the previous year. In its turn, nearly 1.55 million social media users were reported in the Kingdom of Bahrain with an increase

of roughly 3.3% (Kemp 2022a, 2022b). Social media usage (SMU) is found to have a positive influence on ATU in contrast to the impact of SMU on ITOS that revealed a slim negative association in both countries. This then validates the possibility of the presence of external variables in the TAM such as SMU to affect both ATU and ITOS. When it comes to ATU, results match the statement of the increase in “conversational commerce” in MENA countries as per Wamda (2020). The ability of directly buying through the social media platform itself is also another reason (T. Nguyen 2021). In general, a positive attitude is derived from the activity of surfing on social media due to the hedonic benefits that it generates. Moving to the impact on consumers’ ITOS. The slight negative association is the reason for an increase in the number of retailers and stores that have integrated a delivery service, which many started because of the pandemic. Adding to this is the rise in the number of shopping apps since the beginning of the pandemic in both Lebanon and the Kingdom of Bahrain.

As positive association is confirmed between price consciousness (PRCN) and ATU, in contrast to the link between PRCN and ITOS, where a negative impact is found in both countries. This validates the possibility of the presence of external variables in the TAM such as PRCN to affect ATU and ITOS. This is also seen to not be in conjunction with the former studies such as Hobbs (2020). The Lebanese culture in general tends to be in favor for prestige and is influenced by the expectations of others. This is also seen but to a lesser degree in Lebanon than among people in the Kingdom of Bahrain. When it comes to PRCN and ITOS, the result is in alignment with previous studies, such as Khalek and Eid (2020) and Al-Khalifa et al. (2021), among others. The economic recession that Lebanon has been passing through since fall 2019 has made shoppers seek less expensive products, adding to the economic difficulties that resulted from the impact of the pandemic, as stated earlier by Abdo et al. (2020). In addition, 57% of Middle Eastern consumers have become more price oriented because of the epidemic, as per PwC Middle East region findings of the Global Consumer Insights Survey (PwC Middle East 2021).

6. Conclusions

The purpose of this study is to explore the intention of Lebanese and Bahraini consumers toward online shopping post pandemic. Overall, this study confirms that people who initiated the experience of online shopping during the pandemic will continue in a way to shop for certain products online in the future. More specifically, contactless payment modes, price consciousness, and social media usage were the three emerging shopping trends that were extensively analyzed in this research relying on the technology acceptance model.

The study findings have remarkable theoretical, practical, and social implications.

For the theoretical implications, a contemporary literature review is now at the disposal of researchers interested in the subject in general, and more precisely in the emerging online shopping factors in the post COVID-19 era. This is therefore considered an actuality for various contexts, including Lebanon and the Kingdom of Bahrain. The study also presents an extension of the Technology Acceptance Model when it comes to the emerging factors that may affect shoppers’ attitudes and intentions.

Concerning the practical implications, the e-commerce sector should focus on the effectiveness of the shopping experience related to mindset and not only the technical aspect. Retailers and stores’ web pages should be made easily reachable through major social media platforms in parallel to apps. User friendly web page interferences, including the ability to easily identify the best deal, are recommended. Various non-cash payment options should be put at the disposal of buyers especially in Lebanon. To overcome the bank card issues, other innovation payment options should be offered, such as a private shopping card that can be charged and affiliated to a particular shop. The advancement in technology and the 2030 vision in the Kingdom of Bahrain are expected to be perfectly pursued, positively affecting the e-commerce sector.

As for the social implications, people have today started to form different shopping patterns where new online shopping trends have been set out to emerge. Claims for contactless payment options are on the increase, and shoppers in general are considered vulnerable to social media posts. Price will always remain a point of interest for people and is influenced by factors, such as economy and culture. Online platforms in general are nowadays contributing to the easiness of price comparison with deal offers. Overall, the new shopping trends may lead to less time and effort being invested, but in contrast, also lead to a reduced amount of socialization. The changes in peoples' shopping habits also offer some environmental advantages, such as relatively lower fuel consumption and traffic congestion.

Similar to any study, this research features some limitations which merit undertaking in future research. First, although the study takes into consideration the most three emerging shopping trends because of COVID-19, future studies could explore the impact of other trends on shoppers' attitudes and intentions. Second, the study takes into consideration the contexts of Lebanon and the Kingdom of Bahrain. Future research can replicate the study in other contexts and generate comparative results in this regard. Third, the study brings together multiple product and age categories to be assessed. Further studies can focus on one product category and age group as online shopping may be more favored by a certain age group when it comes to a particular product category. Finally, the study uses the quantitative method to collect the data. Future studies could also use the qualitative approach or the triangulation to obtain richer understandings on the reasons behind the changes of consumers' shopping trends and habits.

To end up, the future of online shopping in the post pandemic era seems to be subject to steady evolution in both Lebanon and the Kingdom of Bahrain. People in both countries have thus demonstrated the intention to continue buying products online despite the presence of some of the variations in the levels of impacts of the suggested emerging shopping trends.

Author Contributions: Conceptualization, C.M.E.K.; Methodology, C.M.E.K.; Software, A.F.A.A.; Validation, C.M.E.K.; Investigation, C.M.E.K. and M.C.; Data curation, A.F.A.A.; Writing—original draft, C.M.E.K. and A.F.A.A.; Writing—review & editing, C.M.E.K. and M.C.; Project administration, C.M.E.K.; Funding acquisition, M.C. All authors have read and agreed to the published version of the manuscript.

Funding: This research received no external funding. The APC was funded by the Royal University for Women, Bahrain.

Institutional Review Board Statement: The study was conducted in accordance with the Declaration of Helsinki, and approved by the Research Ethics Board of Saint Joseph University of Beirut (protocol code USJ-2022-188).

Informed Consent Statement: Informed consent was obtained from all subjects involved in the study.

Data Availability Statement: Data are available from the corresponding author upon request.

Conflicts of Interest: The authors declare no conflict of interest.

References

- Abdelrhim, Mansour, and Abdullah Elsayed. 2020. The Effect of COVID-19 Spread on the E-Commerce Market: The Case of the 5 Largest e-Commerce Companies in the World. Available online: <https://ssrn.com/abstract=3621166> (accessed on 2 February 2022).
- Abdo, Nabil, Dana Abed, and Bachir Ayoub. 2020. The IMF and Lebanon: The Long Road Ahead—An Assessment of How Lebanon's Economy May be Stabilized While Battling a Triple Crisis and Recovering from a Deadly Blast. Available online: <https://www.oxfam.org/en/research/imf-and-lebanon-long-road-ahead> (accessed on 2 February 2022).
- Aggarwal, Bharti, and Deepa Kapoor. 2020. A Study on Influence of COVID-19 pandemic on customer's online buying behavior. *MDIM Business Review* 1: 41–47.
- Ait Youssef, Asmaa, Mouna Jaafari, and Lhacen Belhacen. 2020. Factors Affecting the Online Purchase Intention during COVID-19 Crisis: The Case of Morocco. Available online: <https://ssrn.com/abstract=3734389> (accessed on 8 January 2022). [[CrossRef](#)]

- Akroush, Mamnoun N., and Mutaz M. Al-Debei. 2015. An integrated model of factors affecting consumer attitudes towards online shopping. *Business Process Management Journal* 21: 1353–76. [CrossRef]
- Al-Ammary, Jaflah. 2011. The Acceptance and use of Educational Technology in Kingdom of Bahrain. Paper presented at International Conference on Information Management & Evaluation, Shenzhen, China, November 26–27; pp. 9–17.
- Al-Ani, Mayyadah F., Sarab M. Hameed, and Lekaa Faisal. 2013. Students' perspectives in adopting mobile learning at university of bahrain. Paper presented at 2013 Fourth International Conference on e-Learning "Best Practices in Management, Design and Development of e-Courses: Standards of Excellence and Creativity", Manama, Bahrain, May 7–9; pp. 86–89.
- Al-Gahtani, Said S. 2001. The applicability of the technology acceptance model outside North America: An empirical test in the Arab World. Paper presented at BITWorld 2001 Conference Proceedings, Cairo, Egypt, June 4–6; pp. 4–6.
- Al-Gahtani, Said S. 2008. Testing for the applicability of the TAM model in the Arabic context: Exploring an extended TAM with three moderating factors. *Information Resources Management Journal (IRMJ)* 21: 1–26. [CrossRef]
- Al Hilal Publishing and Marketing Group Provided by SyndiGate Media Inc. 2022. Contactless Payments Surge 75% in Bahrain. Available online: <https://www.zawya.com/en/world/middle-east/contactless-payments-surge-75-in-bahrain-jp9bi19f> (accessed on 15 November 2022).
- Alhaimer, Rashed. 2021. Fluctuating Attitudes and Behaviors of Customers toward Online Shopping in Times of Emergency: The Case of Kuwait during the COVID-19 Pandemic. *Journal of Internet Commerce*, 1–26. [CrossRef]
- Ali Taha, Viktória, Tonino Pencarelli, Veronika Škerháková, Richard Fedorko, and Martina Košíková. 2021. The use of social media and its impact on shopping behavior of Slovak and Italian consumers during COVID-19 pandemic. *Sustainability* 13: 1710. [CrossRef]
- Al-Khalifa, Mohamed Khalifa, Muhammad Rizky Prima Sakti, and Abdullah Alhadrami. 2021. Assessing the Online Purchasing Behavior during the Covid-19 Pandemic: A Case Study in the Kingdom of Bahrain. *Global Review of Islamic Economics and Business* 9: 109–17. [CrossRef]
- Almajali, Dmaithan Abdelkarim, and Qais Hammouri. 2021. Predictors of Online Shopping During Covid-19 Pandemic in Developing Country: Qualitative Analysis. *Annals of the Romanian Society for Cell Biology* 25: 12970–77.
- Bahrain.bh. n.d. Emerging Technologies. Available online: https://www.bahrain.bh/new/en/tech_en.html (accessed on 15 November 2022).
- Berytech. 2021. 10 Questions to Ask Yourself When Starting an Online Business in Lebanon. Available online: <https://berytch.org/10-questions-to-ask-yourself-when-starting-an-online-business-in-lebanon/> (accessed on 4 February 2022).
- Boustani, Nada Mallah, May Merhej Sayegh, and Zaher Boustany. 2022. Attitude towards Online Shopping during Pandemics: Do Gender, Social Factors and Platform Quality Matter? *Journal of Risk and Financial Management* 15: 474. [CrossRef]
- Bruner, Gordon C., II, and Anand Kumar. 2005. Explaining consumer acceptance of handheld Internet devices. *Journal of Business Research* 58: 553–58. [CrossRef]
- Burton, Scot, Donald R. Lichtenstein, Richard G. Netemeyer, and Judith A. Garretson. 1998. A scale for measuring attitude toward private label products and an examination of its psychological and Mindset matters in purchasing online food deliveries during the pandemic: The application of construal level and regulatory focus theories behavioral correlates. *Journal of the Academy of Marketing Science* 26: 293–306.
- Cai, Ruiying, and Xi Y. Leung. 2020. Mindset matters in purchasing online food deliveries during the pandemic: The application of construal level and regulatory focus theories. *International Journal of Hospitality Management* 91: 102677. [CrossRef]
- Chaudhuri, Arjun, and Morris B. Holbrook. 2001. The chain of effects from brand trust and brand affect to brand performance: The role of brand loyalty. *Journal of Marketing* 65: 81–93. [CrossRef]
- Cityscape-intelligence. 2020. Bahrain's In-Store Retail Experience Still in Demand. Available online: <https://www.cityscape-intelligence.com/bahrain-commercial/bahrain-store-retail-experience-still-demand> (accessed on 25 November 2022).
- Crespo, Angel Herrero, and Ignacio Rodríguez del Bosque. 2008. The effect of innovativeness on the adoption of B2C e-commerce: A model based on the Theory of Planned Behaviour. *Computers in Human Behavior* 24: 2830–47. [CrossRef]
- Davis, Fred D. 1985. A Technology Acceptance Model for Empirically Testing New End-User Information Systems: Theory and Results. Doctoral dissertation, Massachusetts Institute of Technology, Cambridge, MA, USA.
- Davis, Fred D. 1989. Perceived usefulness, perceived ease of use, and user acceptance of information technology. *MIS Quarterly* 13: 319–40. [CrossRef]
- Deng, Jieru, Canjun Xiao, Mengzhou Zhou, and Xiyang Zhou. 2020. Research on the Influence of the Change of Consumption Concept on the Development of Digital Products in the Post Epidemic Era. *E3S Web of Conferences* 179: 02072.
- Easa, Nasser Fuad, and Soumaya Mounir Kaakour. 2021. A Study of Online Purchasing Intention During the COVID-19 Pandemic in the Lebanese Context. *International Journal of Online Marketing (IJOM)* 11: 15–33. [CrossRef]
- Eksail, Fuad Ali. 2021. Exploring the Structural Relationship of Bahraini Pre-Service Teachers' Attitudes towards the Use of Technology in Education: A Test of the Technology Acceptance Model. *Journal of Educational & Psychological Sciences* 22: 3.
- Elias, Steven M., William L. Smith, and Chet E. Barney. 2012. Age as a moderator of attitude towards technology in the workplace: Work motivation and overall job satisfaction. *Behaviour & Information Technology* 31: 453–67.
- Fenech, Tino. 1998. Using perceived ease of use and perceived usefulness to predict acceptance of the World Wide Web. *Computer Networks and ISDN Systems* 30: 629–30. [CrossRef]
- Fishbein, Martin, and Icek Ajzen. 1975. *Attitude, Intentions and Behavior: An Introduction to Theory and Research*. Boston: Addison-Wesley.

- Forbes Magazine. 2020. COVID-19 Accelerated E-Commerce Adoption: What Does It Mean for The Future? Available online: <https://www.forbes.com/sites/forbesbusinesscouncil/2021/12/29/covid-19-accelerated-e-commerce-adoption-what-does-it-mean-for-the-future/?sh=59028fe1449d> (accessed on 24 January 2022).
- Galluccio, Angelo, Giovanna Caparello, Ennio Avolio, Emanuele Manes, Simona Ferraro, Cinzia Giordano, Diego Sisci, and Daniela Bonofiglio. 2021. Self-perceived physical activity and adherence to the Mediterranean diet in healthy adolescents during COVID-19: Findings from the DIMENU pilot study. *Healthcare* 9: 622. [\[CrossRef\]](#)
- Gefen, David, Elena Karahanna, and Detmar W. Straub. 2003. Inexperience and experience with online stores: The importance of TAM and trust. *IEEE Transactions on Engineering Management* 50: 307–21. [\[CrossRef\]](#)
- Ghani, Mohammad Taufiq Abdul, Mahizer Hamzah, Saipolbarin Ramli, Wan AbAziz Wan Daud, and Taj Rijal MMuhamad Romli. 2019. A questionnaire-based approach on technology acceptance model for mobile digital game-based learning. *Journal of Global Business and Social Entrepreneurship (GBSE)* 5: 11–21.
- Gu, Shengyu, Beata Ślusarczyk, Seyda Hajizada, Irina Kovalyova, and Amina Sakhbieva. 2021. Impact of the covid-19 pandemic on online consumer purchasing behavior. *Journal of Theoretical and Applied Electronic Commerce Research* 16: 2263–81. [\[CrossRef\]](#)
- Gulf Digital News. 2020. Contactless Payments in Bahrain Rise for Sixth Straight Month. Available online: https://www.zawya.com/mena/en/business/story/Contactless_payments_in_Bahrain_rise_for_sixth_straight_month-SNG_225087438/ (accessed on 3 February 2022).
- Hidayanto, Achmad Nizar, Lugman Syaugi Hidayat, Puspa Indahati Sandhyaduhita, and Putu Wuri Handayani. 2015. Examining the relationship of payment system characteristics and behavioural intention in e-payment adoption: A case of Indonesia. *International Journal of Business Information Systems* 19: 58–86. [\[CrossRef\]](#)
- Hobbs, Jill E. 2020. Food supply chains during the COVID-19 pandemic. *Canadian Journal of Agricultural Economics/Revue canadienne d'agroeconomie* 68: 171–76. [\[CrossRef\]](#)
- Hsieh, Ting Chu, Sing Liang Chen, and Ming Chien Hung. 2015. Longitudinal test of ePortfolio continuous use: An empirical study on the change of students' beliefs. *Behaviour & Information Technology* 34: 838–53.
- International Trade Administration. 2021. Bahrain—Country Commercial Guide. Available online: <https://www.trade.gov/country-commercial-guides/bahrain-ecommerce> (accessed on 24 January 2022).
- Jo, Hanghun, Eunha Shin, and Heungsoon Kim. 2021. Changes in Consumer Behaviour in the Post-COVID-19 Era in Seoul, South Korea. *Sustainability* 13: 136. [\[CrossRef\]](#)
- Johanson, George A., and Gordon P. Brooks. 2010. Initial scale development: Sample size for pilot studies. *Educational and Psychological Measurement* 70: 394–400. [\[CrossRef\]](#)
- Kayyali, Abdul-Wahab. 2021. Digital Media Usage During Times of Distress. Arab Barometer. Available online: <https://www.arabbarometer.org/2021/02/digital-media-usage-during-times-of-distress/> (accessed on 4 February 2022).
- Kearney. 2020. GCC e-Commerce Unleashed: A Path to Retail Revival or a Fleeting Mirage? Available online: <https://www.middleeast.kearney.com/consumer-retail/article/?/a/gcc-e-commerceunleashed-a-path-to-retail-revival-or-a-fleeting-mirage> (accessed on 24 January 2022).
- Kemp, Simon. 2022a. Digital 2022: Bahrain. Available online: <https://datareportal.com/reports/digital-2022-bahrain> (accessed on 13 November 2022).
- Kemp, Simon. 2022b. Digital 2022: Lebanon. Available online: <https://datareportal.com/reports/digital-2022-lebanon> (accessed on 12 November 2022).
- Kempf, DeAnna S. 1999. Attitude formation from product trial: Distinct roles of cognition and affect for hedonic and functional products. *Psychology & Marketing* 16: 35–50.
- Khalek, Rasha Abdul, and Maged Eid. 2020. Effect of Corona Virus on the Shopping Criteria of Lebanese Consumers. *International Journal of Business Marketing and Management* 5: 1–11.
- Kim, Rae Yule. 2020. The impact of COVID-19 on consumers: Preparing for digital sales. *IEEE Engineering Management Review* 48: 212–18. [\[CrossRef\]](#)
- Kong, Fanchang, Xiaoyao Li, Yujuan Xia, Meiru Wang, and Xiaojun Sun. 2021. Technology acceptance model of mobile social media among Chinese college students. *Journal of Technology in Behavioral Science* 6: 365–69. [\[CrossRef\]](#)
- Kraft, Pål, Jostein Rise, Stephen Sutton, and Espen Røysamb. 2005. Perceived difficulty in the theory of planned behaviour: Perceived behavioural control or affective attitude? *British Journal of Social Psychology* 44: 479–96. [\[CrossRef\]](#) [\[PubMed\]](#)
- Krejcie, Robert V., and Daryle W. Morgan. 1970. Determining sample size for research activities. *Educational and Psychological Measurement* 30: 607–10. [\[CrossRef\]](#)
- Le Tan, Trinh, Phan Thanh Hieu, Nguyen Thi Thao Van, and Nguyen Nguyen Phuc Hung. 2021. Research on Factors Affecting Customers' Shopping Behavior on E-Commerce Exchanges during the Covid-19 Pandemic. *International Journal of Business, Management and Economics* 2: 251–69. [\[CrossRef\]](#)
- Lee, Suck Won, Hye Jin Sung, and Hyeon Mo Jeon. 2019. Determinants of continuous intention on food delivery apps: Extending UTAUT2 with information quality. *Sustainability* 11: 3141. [\[CrossRef\]](#)
- Lee, Yi-Hsuan, Yi-Chuan Hsieh, and Yen-Hsun Chen. 2013. An investigation of employees' use of e-learning systems: Applying the technology acceptance model. *Behaviour & Information Technology* 32: 173–89.
- Mason, Andrew N., John Narcum, and Kevin Mason. 2021. Social media marketing gains importance after Covid-19. *Cogent Business & Management* 8: 1870797.

- MasterCard. 2020. 73% of Consumers in Middle East and Africa are Shopping More Online Since the Start of Pandemic, Reveals Mastercard Study. Available online: <https://newsroom.mastercard.com/mea/press-releases/73-of-consumers-in-middle-east-and-africa-are-shopping-more-online-since-the-start-of-pandemic-reveals-mastercard-study/> (accessed on 8 January 2022).
- McKinsey and Company. 2021a. Solving the Paradox of Growth and Profitability in e-Commerce. Available online: <https://www.mckinsey.com/industries/retail/our-insights/solving-the-paradox-of-growth-and-profitability-in-e-commerce> (accessed on 24 January 2022).
- McKinsey and Company. 2021b. The Future of Payments in the Middle East. Available online: <https://www.mckinsey.com/industries/financial-services/our-insights/the-future-of-payments-in-the-middle-east> (accessed on 2 February 2022).
- Middle East Payment Models Market Report 2021–Cash-On-Delivery: Another Casualty of the Pandemic? 2021. Available online: <https://rb.gy/t327xk> (accessed on 2 February 2022).
- Mostafa, Rania B., and Hassan Naim Hannouf. 2022. Determinants of Online Purchase Intention of Apparel Products in Lebanon. *International Journal of Online Marketing (IJOM)* 12: 1–18. [CrossRef]
- Nahas, Ayad. 2021. E-Commerce Experts: Make Your Shift to E-Commerce Now or Quit. *Executive Magazine*. Available online: <https://www.executive-magazine.com/business/e-commerce-experts-make-your-shift-to-e-commerce-now-or-quit> (accessed on 24 January 2022).
- Netcomm Suisse eCommerce Association. 2020. Available online: https://unctad.org/system/files/official-document/dtlstictinf2020d1_en.pdf (accessed on 24 January 2022).
- Nguyen, Oanh Thi. 2020. Factors affecting the intention to use digital banking in Vietnam. *The Journal of Asian Finance, Economics, and Business* 7: 303–10. [CrossRef]
- Nguyen, Terry. 2021. Online Shopping Changed, and We Barely Noticed. Available online: <https://www.vox.com/the-goods/22412098/social-commerce-explainer> (accessed on 4 February 2022).
- Oentario, Yudianto, Agung Harianto, and Jenny Irawati. 2017. Pengaruh Usefulness, Ease of Use, Risk Terhadap Intention to Buy Online patisserie Melalui Consumer Attitude Berbasis Media Sosial Di Surabaya. *Jurnal Manajemen Pemasaran* 11: 26–31. [CrossRef]
- Ofori, Daniel, and Christina Appiah-Nimo. 2019. Determinants of online shopping among tertiary students in Ghana: An extended technology acceptance model. *Cogent Business & Management* 6: 1644715.
- Osman, Syuhaily, Benjamin Chan Yin-Fah, and Bei Hooi-Choo. 2010. Undergraduates and online purchasing behavior. *Asian Social Science* 6: 133–46. [CrossRef]
- Pikkarainen, Tero, Kari Pikkarainen, Heikki Karjaluo, and Seppo Pahnla. 2004. Consumer acceptance of online banking: An extension of the technology acceptance model. *Internet Research* 14: 224–35. [CrossRef]
- Prasetyo, Yogi Tri, Ardivin Kester S. Ong, Giero Krissianne Frances Concepcion, Francheska Mikaela B. Navata, Raphael Andrei V. Robles, Isaiah Jeremy Tomagos Tomagos, Michael Nayat Young, John Francis T. Diaz, Reny Nadlifatin, and Anak Agung Ngurah Perwira Redi. 2021. Determining factors Affecting acceptance of e-learning platforms during the COVID-19 pandemic: Integrating Extended technology Acceptance model and DeLone & Mclean is success model. *Sustainability* 13: 8365.
- PwC Middle East. 2020. New PwC Survey Reveals That Middle East Consumers Are Increasingly Shopping Online and Staying Connected during the COVID-19 Pandemic. Available online: <https://www.pwc.com/m1/en/media-centre/2020/new-pwc-survey-reveals-middle-east-consumers-increasingly-shopping-online-staying-connected-during-covid-19-pandemic.html> (accessed on 3 February 2022).
- PwC Middle East. 2021. Global Consumer Insights Survey 2021—Middle East findings. Available online: <https://www.pwc.com/m1/en/publications/global-consumer-insights-survey-2021-middle-east-findings.html> (accessed on 3 February 2022).
- Rahi, Samar, and Mazuri Abd Ghani. 2019. Integration of expectation confirmation theory and self-determination theory in internet banking continuance intention. *Journal of Science and Technology Policy Management* 10: 533–50. [CrossRef]
- Rahmiati, Rahmiati, and Indri Ilma Yuannita. 2019. The influence of trust, perceived usefulness, perceived ease of use, and attitude on purchase intention. *Jurnal Kajian Manajemen Bisnis* 8: 27–34. [CrossRef]
- Raksadigiri, Mohammad Wimbo, and Sri Wahyuni. 2020. Perceived Ease of Use Effect on Perceived Usefulness and Attitude Towards Use and Its Impact on Behavioural Intention to Use. *International Journal of Advanced Research* 8: 439–44. [CrossRef]
- Reisenwitz, Timothy H. 2021. Differences in Generation Y and Generation Z: Implications For Marketers. *Marketing Management Journal* 31: 2.
- ReportLinker. 2021. Lebanon Cards and Payments—Opportunities and Risks to 2025. Available online: <https://www.reportlinker.com/p05816806/Lebanon-Cards-Payments-Opportunities-and-Risks-to.html> (accessed on 2 February 2022).
- Salem, Mohamed Ahmed, and Khalil Md Nor. 2020. The effect of COVID-19 on consumer behaviour in Saudi Arabia: Switching from brick and mortar stores to E-Commerce. *International Journal of Scientific & Technology Research* 9: 15–28.
- Scherer, Ronny, Fazilat Siddiq, and Jo Tondeur. 2019. The technology acceptance model (TAM): A meta-analytic structural equation modeling approach to explaining teachers' adoption of digital technology in education. *Computers & Education* 128: 13–35.
- Shereen, Muhammad Adnan, Suliman Khan, Abeer Kazmi, Nadia Bashir, and Rabeea Siddique. 2020. COVID-19 infection: Emergence, transmission, and characteristics of human coronaviruses. *Journal of Advanced Research* 24: 91–98. [CrossRef] [PubMed]
- Shek, Daniel T. L., and Lu Yu. 2014. Confirmatory factor analysis using AMOS: A demonstration. *International Journal on Disability and Human Development* 13: 191–204. [CrossRef]

- Sheth, Jagdish. 2020. Impact of Covid-19 on consumer behavior: Will the old habits return or die? *Journal of Business Research* 117: 280–83. [CrossRef] [PubMed]
- Shih, Hung-Pin. 2004. An empirical study on predicting user acceptance of e-shopping on the Web. *Information & Management* 41: 351–68.
- Sinha, Indrajit, and Rajeev Batra. 1999. The effect of consumer price consciousness on private label purchase. *International Journal of Research in Marketing* 16: 237–51. [CrossRef]
- Smith, Scott M. 2013. Determining Sample Size: How to Ensure You Get the Correct Sample Size. E-Book (c) Qualtrics Online Sample. Available online: <https://www.qualtrics.com/experience-management/research/determine-sample-size/> (accessed on 12 November 2022).
- Statista Research Department. 2021. *Online Shopping Behavior in the Middle East and North Africa—Statistics & Facts*. Statista Research Department. Available online: <https://www.statista.com/topics/8159/online-shopping-in-the-middle-east-and-north-africa/#dossierKeyfigures> (accessed on 24 January 2022).
- Tarhini, Ali, Mahmoud Hassouna, Muhammad Sharif Abbasi, and Jorge Orozco. 2015. Towards the Acceptance of RSS to Support Learning: An empirical study to validate the Technology Acceptance Model in Lebanon. *Electronic Journal of e-Learning* 13: 30–41.
- Taylor, Shirley, and Peter A. Todd. 1995. Understanding information technology usage: A test of competing models. *Information Systems Research* 6: 144–76. [CrossRef]
- The Bulletin. 2021. 91% of Middle East and North Africa Customers Are Digital Converts to E-Commerce. Available online: https://executive-bulletin.com/retail/91-of-middle-east-and-north-africa-customers-are-digital-converts-to-e-commerce#_ftn1 (accessed on 24 January 2022).
- The Daily Tribune. 2021. 86% of Consumers in Bahrain Switch to E-Commerce. Available online: <https://www.newsofbahrain.com/bahrain/74854.html> (accessed on 24 January 2022).
- UNESCO Institute of Statistics. 2018a. Available online: <https://countryeconomy.com/demography/literacy-rate/lebanon> (accessed on 12 November 2022).
- UNESCO Institute of Statistics. 2018b. Available online: <https://countryeconomy.com/demography/literacy-rate/bahrain> (accessed on 15 November 2022).
- Vejačka, Martin. 2015. Consumer acceptance of contactless payments in Slovakia. *Journal of Applied Economic Sciences (JAES)* 10: 760–65.
- Wamda. 2020. Forty per Cent of Arab Youth Plan to Start Own Business. Wamda. Available online: <https://www.wamda.com/2020/10/cent-arab-youth-plan-start-business-says-arab-youth-survey> (accessed on 3 February 2022).
- Wu, Bing, and Xiaohui Chen. 2017. Continuance intention to use MOOCs: Integrating the technology acceptance model (TAM) and task technology fit (TTF) model. *Computers in Human Behavior* 67: 221–32. [CrossRef]
- Wu, Jen-Her, and Shu-Ching Wang. 2005. What drives mobile commerce?: An empirical evaluation of the revised technology acceptance model. *Information & Management* 42: 719–29.
- YouGov PLC. 2021. UAE Residents Willing to Adopt Augmented Reality for Retail Shopping. Available online: <https://mena.yougov.com/en/news/2021/05/25/uae-residents-willing-adopt-augmented-reality-retail/> (accessed on 24 January 2022).
- Zaiter, Rushdi, Hassan Jabak, Mahmoud Koabaz, Joumana Younis, and Jalal Dweik. 2021. Lebanese Attitudes toward Using Mobile Applications for Home Delivery Services. *European Journal of Business and Management Research* 6: 176–82. [CrossRef]
- Zidane, Othman. 2021. Global E-Commerce and the Impact of COVID-19. Available online: <https://infomineo.com/global-e-commerce-and-the-impact-of-covid-19/> (accessed on 17 January 2022).

Disclaimer/Publisher’s Note: The statements, opinions and data contained in all publications are solely those of the individual author(s) and contributor(s) and not of MDPI and/or the editor(s). MDPI and/or the editor(s) disclaim responsibility for any injury to people or property resulting from any ideas, methods, instructions or products referred to in the content.