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The moderating role of social distancing in mobile commerce adoption

Wei-Kang Kao, E. André L’Huillier

Harrisburg University of Science and Technology, Data Analytics program, Harrisburg 17057, United States

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ABSTRACT

The Covid-19 pandemic has pressured marketers and consumers adapt their purchasing habits. Known literature on mobile commerce (MC) highlights its advantage on convenience, which now is accompanied by health safety. Although MC has been outgrowing other online sectors, the early stages of the pandemic provided a new scenario. We study the relationship between consumer’s attitudes about Covid-19 public health restrictions and the behavioral intention for MC adoption. Previous research on technology acceptance of online and mobile shopping have focused on aspects like safety and behavioral intention as key factors. Thus, we examine how attitude towards social distancing practices during the pandemic has affected consumers intentions to adopt of mobile commerce. We aim to study the degree on which this attitude affects previous intentions on purchasing or subscribing to services via mobile devices. For this, we present a Theory of Planned Behavior (TPB) model of consumer MC adoption using social distance as a moderator. An empirical analysis using a survey of attitude and beliefs over mobile commerce and social distancing is presented, confirming the factors underlying using structural equation modeling. Results show that the attitudes toward social distancing are a significant moderator of purchasing through mobile devices; indicating that an individual’s adherence to recommended practices during the pandemic does positively influence the adoption. MC is known for being a potential advantage to facilitate customer experience. According to our results, we believe marketers should reconsider or further develop MC infrastructure, highlighting its convenience and health safety role.

1. Introduction

Online shopping is far from a new habit for consumers in information societies. Since the beginning of internet penetration into consumer’s households, the advantage of electronic commerce (EC) has been demonstrated by early adopters like Amazon and Alibaba (Mellahi and Johnson, 2000; Havinga et al., 2016). Today, implementation of digital access has become a necessity to many companies. In the United States, the adoption of EC has seen a constant increment related to retail sales. From around 4% of total retail purchases by 2010 to an 11.8% on the first quarter of 2020. This growth poses an expectation of an approximately 15% yearly increase of the EC sector (U.S. Department of Commerce, 2020). Among with the rise of EC implementations in the early 2000’s, academics gave serious attention to the shift towards digital purchases and the factors underlying its adoption (Limayem et al., 2000; Zhou et al., 2007). As with any other technology, attention has been put over acceptance models and the consumer attitudes related to digital technology, highlighting aspects like perception of benefit and risk (Pavlou, 2003; Miyazaki and Fernandez, 2001; Zhou et al., 2007).

Regular experiences with secure commercial platforms appear to decrease the perceived risk, although the widespread adoption of these platform depend on national economies that go hand in hand with cultural differences (Brosdahl and Almousa, 2013). The penetration of mobile devices has been another technology that has reached high levels of saturation. As such, commercial activity via these devices has proliferated. Mobile shopping is an instance of EC, known as mobile commerce (MC), where consumers engage in digital purchases using mobile devices (e.g., smartphones or tablets). Known for being mostly a platform for window shopping or browsing products, the use of mobile devices for purchasing has shown even a higher growth compared to EC during the last decade. This has been exceptionally the case after the breakout of the Covid-19 pandemic. MC stands out under the current pandemic crisis as a facilitator for consumers and business owners. Delivery platform systems such as Uber Eats or Grubhub have relieved many businesses from the additional costs of the pandemic. A good example is the rise of MC associated with delivery on retail and service in developing countries in Latin America or the growth in Food Delivery Application (FDA), most of them based largely in mobile

* Corresponding author.
E-mail address: elhuillier@harrisburgu.edu (E. André L’Huillier).

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technologies (Zhao & Bacao, 2020). Naturally, FDAs where largely affected by the Covid19 pandemic, showing an increment and academic traction to understand the phenomena (Zhao & Bacao, 2020; Kumar & Shah, 2021). This is not limited to the hospitality sector, since the last months of 2019, the digital commerce sector provided a substantial relief to widespread companies and individuals that struggled with the fears and measures related to counter the spread of the virus (UNCTAD, 2021). For many consumers, especially those within communities during lockdown or with a vulnerable population, digital services have provided a safe alternative for essential purchases. The overall risk associated with the virus has made an impact on how consumers engage on their shopping activities (Eger et al., 2021). The restrictions based on Covid19 have also taken individuals to try for the first time such services and adopt them at least temporarily. With evidence of a sale increase of 14.5% in Q1 of 2020, the same year ended with a total year-over-year growth over 40% (Ali, 2021).

The work presented contributes mostly to the understanding of mobile commerce behavior during the early stages of the Covid-19 pandemic. Particularly, the behavior and perception of consumers, along with attitudes regarding mobile shopping when under social distancing procedures before the availability of vaccines. As the data was collected in the early stages of the pandemic, there were no vaccines, and the only alternatives were social distancing and use of masks. Thus, the study here presents a unique understanding of how and how much did positive attitudes towards social distancing affect MC use. We believe this is valuable insights for marketers that currently have or plan to develop MC operations; particularly on how to adapt their offerings towards customer’s most sensitive concerns.

Our objective was to test the distinct effects that each of the influences presented in the Theory of Planned Behavior (TPB) framework (Ajzen, 1991) have over intention to use MC and how attitudes related to social distance modifies them. Across the literature, the main factors that explain mobile commerce adoption are performance expectancy and behavioral intention (Tarhini et al., 2019). To test our model, we present an empirical analysis based on survey responses and structural equation modeling. As stated above, our interest relies on the definitive effect of consumer acceptance and distancing measures on adopting mobile commerce. We consider the distinction between retail and electronic commerce, having mobile purchases as a subset of the latter. Thus, the behavior we expect to model is the use of mobile commerce, in contrast to retail or non-mobile electronic purchases. With this in consideration, our leading research question is:

- How does mobile shopping behavior relate to the adherence of social distancing?

Consistent with the literature, our results using a traditional TPB model also support the positive relationship between behavioral intention and adoption of MC. We evaluate the effect that social distancing policies have over customer’s perception about peer’s beliefs and their own capacity to use MC’s technologies.

2. Literature review

2.1. The response to Covid-19

Covid-19 erupted as a serious global pandemic from the end of 2019 and progressively expanded worldwide. To date, there are over 250 million confirmed cases and over 5 million deaths (World Health Organization, 2021). Its regrettable effects don’t appear to decrease as new variants like Omicron and vaccination hesitancy maintain a high hazard for public health. Along the many healthcare recommendations, the use of masks, isolation or quarantine, and basic social distancing have been elemental ways to diffusion of contagious diseases (Smolinski et al., 2003).

The effects of the pandemic to habits and economies have been substantial; in some respects, it is already observing proposed long-term changes. One of them is the shift towards working from home, where many companies are testing their capabilities to operate online, and others have already decided to permanently change to remote work, a trend most clear on higher-educated labor (Bick et al., 2020). Similarly, the circumstances during the pandemic may have a long-term effect on mobile commerce. Thus, it is crucial to assess the current changes over MC adoption based on the effects of the pandemic. Understanding the underlying factors that lead to this adoption is important to recognize coming trends and to adequately improve mobile interfaces and retail operations.

2.2. Mobile commerce during the Covid19 pandemic

Since the advent of smart phones, mobile devices have been largely adopted as a means for electronic commerce. Business Insider estimates this to maintain a 25.5% compound annual growth rate in the U.S., where smartphones are the leading force behind this increase (Meola, 2019). Such penetration stands behind its adoption in China, where by 2016 mobile commerce already consisted of 66% of all digital purchases (Evans, 2017). Along the decreasing production costs of mobile devices, it is reasonable to expect their use worldwide adoption in the short-term, making it an ever increasingly relevant platform for commerce and other regular activities like socialization.

Among all the negative aspects of the pandemic, there has been a positive effect on mobile commerce adoption. The last report from the Global Association of Mobile Operators estimates a total of over 4 billion mobile internet users in 2020, expecting a vast growth from 51% of penetration rate today to a 60% by 2025 (GSMA, 2021). Various mobile services are significantly developed and implemented in different industries. Several reports indicate that, at least in China (with over 1.2 billion subscribers to mobile services (GSMA, 2021)), consumers preferences changed drastically (Osiob, 2020). As mentioned above, Food delivery apps (FDAs) as online-to-offline mobile services have recently gained popularity offering two-way benefits for catering enterprises and customers by providing convenient and efficient online order and offline delivery services (Zhao & Bacao, 2020).

2.3. Modeling the adoption of mobile commerce

The commercial complex system of mobile technology evidently affects the transactions between customers and businesses. The phenomena we would like to focus our attention on B2C, modeling and understanding the adoption process for individuals. Alhinai et al. (2007) and Zhang et al. (2012) present a meta-analysis that appropriately summarizes and surveys the efforts of mobile commerce adoption from its beginnings. Since the first incursions to model MC use, we found the use of technology adoption studies under the line of representing an individual customer or a systemic diffusion. Among many theoretical frameworks, works show a strong theoretical focus on Technology Acceptance Model (TAM), Theory of Reasoned Action (TRA), Theory of Planned Behavior (TPB), Expectation-Confirmation Model (ECM), Social Cognition Theory, and Diffusion of Innovations (DOI) (Rogers, 1931; Fishbein and Ajzen, 1975; Davis et al., 1989; Hong et al., 2006; Bhatti, 2007; Rayen et al., 2016; Tarhini et al., 2019). Current approaches vary from the extended models of mobile adoption (Zhang et al., 2012) to a comprehensive integration of models, like the work by Zhao and Bacao (2020) on food delivery apps during Covid19. These models have referred to the major factors attributed to individual’s MC adoption. Among the most cited we find social influence, ease of use, overall cost, and overall safety (Alhinai et al., 2007; Yadav et al., 2016). The TPB literature addresses at least two of these main factors. Social influence is categorized as subjective norm, which would consider peer influence by measuring the individuals’ perception of others. Having in consideration how they relate to the technology under examination. While considering peer influence, a TPB model would also address the ease of use by
surveying the dimension of Self Efficacy, which addresses the beliefs over the individual’s own capacity to control and interact with the new technology. To further explore our implementation of mobile adoption modeling, it is appropriate to expand on the TPB framework.

3. Research model and hypotheses

3.1. Theory of planned behavior

The Theory of Planned Behavior (TPB) was proposed by Ajzen (1991) based on previous work of the theory of reasoned action (Fishbein and Ajzen, 1975) and the consequent development of the technology acceptance model (Davis, 1989; Zhang et al., 2012). The new theory gave additional emphasis to external factors beside the fundamental influences of previous models (i.e., attitudes, perceived subjective norms, and behavioral control). Considering our objective to evaluate the external effect of current events (i.e., social distancing), the theory presented by Ajzen is appropriate for our modeling purposes as it provides proper major factors to address our study purpose. Thus, following the basic framework of TPB, the model presented includes the related attitudes, norms, and behavioral control towards MC and their influence over intention of mobile purchasing of good and services. In this context, attitudes refer to a person’s evaluations of performing a behavior (Ajzen et al., 1980), which is defined as consumers’ attitudes toward mobile commerce in the current study (i.e., disposition towards mobile device use for purchase and services). Secondly, subjective norm, as known as an individual’s perception about the specific behavior, refer to a “person’s perception of the social pressures put on [him/her] to perform or not perform the behavior in question” (Ajzen et al., 1980), is defined as perceived subjective norms (i.e., perception of what significant peers believe about MC). Behavioral control suggests an individual’s perceived level of difficulty to perform in a such behavior (Ajzen, 1991) which is defined as the perception of self-efficacy and overall capacity to use MC in our study. These factors influence the intention to purchase using mobile devices, which in turn is a mediator toward actual behavior of using MC. Thus, using the TPB we pursue to model how intentions of using MC are influenced by a) the three factors over the use this technology and service, together with b) the attitude and adherence to the recommended social distancing during the pandemic.

3.2. Proposed model

Consistent with TPB, the proposed model (Fig. 1) includes attitudes toward mobile shopping, subjective norms related to mobile commerce, and the perceived behavioral control as the independent variables, while the expressed intended behavior over adopting mobile commerce is defined as our dependent variable. The proposed model considers the mediator role of behavioral intention between our IVs and the actual mobile shopping behavior (which is the basic framework for TPB). Thus, the attitudes and adherence to social distancing are included as a moderator between the IVs and the behavioral intention. Our interest is to measure the expected influence of the typical components of the TPB model, while particularly addressing how the moderator promotes or inhibits consumers intention to use mobile shopping. After analyzing the effect of the three basic factors over intention, we aim to evaluate how the added moderator factor of social distancing raises or reduces their influence over intention of MC use (See Fig. 2).

As previously mentioned, we address our question by testing a TPB model of consumer’s intention to purchase via mobile devices. To appropriately test the model based on the TPB, we present several hypotheses to be tested for each of the influence factors. Regarding the fundamental influences of the planned behavior model, we stipulate three basal hypotheses to evaluate their presence. To confirm the TPB model, we test if there is a positive effect on the behavioral intention for attitudes, perceived subjective norms, and behavioral control. Specifically, for attitude over mobile devices and MC and perceived behavioral control influences we test a direct positive effect on intention; this includes hypothesis H1 and H2. The rationale behind the positive relationship is based on the typical, thus expected, correlation between the attitude over a particular technology and the magnitude of the intention to utilize it. We believe that this naturally applies to technology associated with mobile devices and mobile commercial services. Given our selection of the survey scale for perceived subjective norms over MC, the test for this influence evaluates a negative relation to behavioral intention. Consequently, H3 hypothesis states that consumer’s perceived subject norms toward mobile shopping exert a negative effect on their behavioral intention towards mobile. Finally, the mediator role of behavioral intention is also tested over the fourth hypothesis (H4); which presents that customer’s intention has a positive effect over purchase behavior as the null.

3.3. Moderator role of consumer attitudes toward social distancing measures

The effect of countermeasures for Covid-19 propagation have been drastic and evident. Since the novel virus did not have an immunization vaccine or antiviral cure during 2020, reducing contact between individuals was and is still one of the most effective methods against its propagation and minimizing the mortality rate. The implementation of
social distancing (either by authority or voluntary) had an abrupt effect on the economy at large; simultaneously affecting different like fear in the stock market, halting labor and educational activities, hindering international travel and tourism, and the dropping activity of local retail-based commerce.

From these sudden changes over the short-term function of economies, there is speculation about other changes like adopting the work-from-home policy permanently for compatible professions. As a result, the online shopping behaviors and company plans are changed (Anupam & Deepika, 2020), which leads us to suspect that consumer perception and intention towards engaging in other online activities has also been affected. Furthermore, the social distancing policy has proven to have an impact to consumers to choose contactless channel, such as online shopping and delivery (Wang et al., 2021a,b). Therefore, our hypothesis for the purpose of this study relate to the potential effect that the distancing measures had specifically over the intention to use MC either for purchase or acquiring services. We evaluate how attitude toward these measures may affect their behavioral intention, for which we suspect customers’ attitudes toward social distancing exerts negative effects on their behavioral intention (H5).

Similarly, as social distancing may become the new norm of consumers’ shopping behavior and can potentially evolve into a longer trend of marketing behavior (Wang et al., 2021a,b), we tested how this attitude on social distancing may have a moderator role over general attitudes on mobile shopping (i.e., attitude component of our TPB model) and their effect on behavioral intention. Our initial belief is that the positive effect of attitudes towards mobile shopping will be reduced by acceptance of distancing measures (H6).

4. Methods
4.1. Sample

To examine customers’ reactions to mobile shopping during a pandemic, we recruited 170 participants using the online research panel (M–Turk) to participate in our study in exchange for a $1 compensation. The data were collected in the United States in July 2020. To ensure the quality of the responses, participants who had missed over 50% of the questions were removed from the final sample. As a result, the final sample contained 165 subjects. The sample included 114 males (69%), 48 females (29%), and three transgender females (1%). Age ranges from 18 to over 65, with 45% of the participants’ age from 21 to 30, 30% of the participants’ age from 31 to 40, 18% of the participants’ age from 41 to 50, and 14% of the participants’ age over 50. Furthermore, 54% of the participants are White, 28% of the participants are Asian, 11% of the participants are Black or African American, 4% of the participants are American Indian or Alaska Native, 3% of the participants are Latino or Hispanic, and there is one participant reported as Native Hawaiian or Pacific Islander. The range of annual income starts from below $10,000 to above $20,000, with 11% of the participants have incomes less than $10,000, 29% of the participants have incomes ranging from $10,000 to $29,999, 38% of the participants have incomes ranging from $30,000 to $59,999, 18% of the participants have incomes ranging from $60,000 to $99,999, and 4% of the participants have incomes ranging from $100,000 to $199,999.

4.2. Procedure

An online survey was developed for the purpose of the study. The survey included two parts a) demographic information questionnaires, such as age, self-identified gender, self-identified ethnicity, annual income, and educational level; and b) attitudinal and belief scales that included: a scale of attitude toward social distancing (Bansal and Taylor, 2002), the modified scale of participants’ attitudes toward mobile shopping (mobile commerce) (Hung et al., 2012), the modified scale of perceived ease of use of mobile shopping (Kim and Niehm, 2009), the modified scale of website service interaction (Ahmad and Khan, 2017), the modified scale of behavioral intention (Hung et al., 2012), and a modified scale of intention on online shopping (Limayem et al., 2000).

Prior to data collection, participants’ consent was obtained. Before the survey was taken, participants were asked to read the consent form acknowledging their understanding of involved responsibilities and rights regarding the survey. After this, participants completed the survey that took approximately 10 min. First, demographic information questionnaires were filled by the participants. After this, they were requested to answer the presented items related to the measures specified in Section 3.3.

Once results were obtained, we proceeded to analyze the data. First, we used confirmatory factor analysis (CFA) to evaluate the consistency of the modeled factors with the results of the survey scales. Thus, the CFA was performed on participants’ attitudes toward social distancing, attitudes toward MC, perceived subjective norm, participants’ perceived behavioral control, participants’ preferred intention on mobile shopping, and participants’ behavior of mobile devices for purchasing. After the factor model was built and considered adequate based on the TPB framework, a structural equation model was then developed to test the presented hypothesis.

A structural equation model (SEM) was used to model developmental relationships within the presented factors. First, SEM is a good indicator of testing and confirming causal relationships within existing models.
(McCoach, 2003). Second, SEM has been applied to extend the theory of planned behavior model in studies (Zhang et al., 2015; Heidari et al., 2018). Three goodness-of-fit indices were used to allow for comprehensive evaluations of all tested models: the comparative fit index (CFI), the root-mean-square error of approximation (RMSEA), and the standardized root mean square residual (SRMR). This decision was made considering that each index operates on different assumptions.

Three steps were established to lead to the final best-fitting model. In step 1, the paths between participants’ attitudes toward mobile commerce, perceived subject norm, and their perceived behavioral control on their purchase intentions with MC were built. Next, step 2 related to building participants’ preferred intentions over mobile shopping and their perceived behavioral control influence over their intentions on MC. In step 3, participant’s attitude toward social distancing was added as a moderator. This is done to determine whether an individual’s perceived behavioral control and their preferred intention on MC was significantly moderated by social distancing attitudes.

4.3. Measures

To assess participants’ attitude toward social distancing, the Bansal and Taylors (2002) measures was adapted. These include seven items assessing the degree in which an individual likes the idea of social distancing. Sample items include: “A bad idea — A good idea,” and “Unpleasant … Pleasant”. Mobile commerce was measured by asking subjects to indicate the degree to which a person has a favorable or unfavorable evaluation of the toward mobile shopping (Hung et al., 2012). Other sample items include: “My experience of doing mobile shopping is better than I expected” or “Mobile shopping approach can support more shopping activities for me”. To measure subjective norm, the scale of perceived ease of use of mobile shopping was used (Kim and Niehm, 2009). The study asked subjects to indicate the belief about whether they approve or disapprove of new technologies. Items in this category would include statements like: ‘I am generally cautious about accepting new ideas’. To measure individuals’ perceived behavioral control, the modified website service interaction (Ahmad and Khan, 2017) was adapted. The scale asked subjects to indicate the degree to which their perception of the ease or difficulty of utilizing mobile online shopping (e.g., “Mobile shopping makes me feel it is customized to me”). Behavioral intention was measured using the modified behavioral intention (Hung et al., 2012) measure, which asked subjects to indicate the degree of how likely mobile shopping influence whether they perform that behavior. Sample items include: “When using mobile shopping, I find sites and applications easy to navigate”. For measuring the dependent variable, the modified measure of intention on online shopping was adapted (Limayem et al., 2000). The questionnaires asked respondents to indicate the degree to which subjects would perform mobile online shopping. Sample items include: “Shopping through mobile is more convenient than regular shopping, as I can do it anytime and anywhere”. Please see Table 1 on Appendix B for details on measurement items.

5. Empirical result analysis

5.1. Measurement quality assessment

The correlation coefficient and Cronbach’s alpha of all variables are shown in Table 1. Cronbach’s coefficient alpha for each item and scales were tested, for the purpose of assessing the internal consistency and reliability of the studied measures. The result indicated an adequate internal consistency, the Cronbach’s coefficient alpha ranged from 0.70 to 0.90 across the scales (Nunnally and Bernstein, 1994). To further test the expected factor structure of all three latent variables, a confirmatory factor analysis (CFA) using maximum likelihood estimation in R version 3.6.1 was performed to examine the degree to which the model fit the data. The hypothesized five-factor model fit

| Construct                  | Cronbach’s alphas | Composite Reliability | Average Variance Extract | Standardized Loading |
|----------------------------|--------------------|-----------------------|--------------------------|----------------------|
| Attitude                   | 0.90               | 0.96                  | 0.79                     |                      |
| Toward Mobile Commerce     |                    |                       |                          |                      |
| The service level provided by shopping mobile applications and websites is better than I expected. | 0.66*               |                       |                          |                      |
| My experience when shopping with mobile devices is usually better than expected. | 0.63*               |                       |                          |                      |
| Overall, most of my expectations of mobile shopping approach are confirmed. | 0.77*               |                       |                          |                      |
| Shopping on mobile devices provide more options for me. | 0.74*               |                       |                          |                      |
| Doing mobile shopping reduces the time spent on those useless shopping activities. | 0.62*               |                       |                          |                      |
| Doing mobile shopping enhances my shopping effectiveness. | 0.75*               |                       |                          |                      |
| Doing mobile shopping increases my shopping productivity. | 0.70*               |                       |                          |                      |
| Using mobile devices makes shopping easier. | 0.79*               |                       |                          |                      |
| Overall, mobile shopping is useful to personal shopping activities. | 0.71*               |                       |                          |                      |
| Perceived                  | 0.70               | 0.64                  | 0.40                     |                      |
| Subject Norms              |                    |                       |                          |                      |
| I am generally cautious about accepting new ideas. | 0.53*               |                       |                          |                      |
| I find it stimulating to be original in my thinking and behavior | 0.61*               |                       |                          |                      |
| I am challenged by ambiguities and unsolved problems | 0.61*               |                       |                          |                      |
| I must see other people using innovations before I will consider them | 0.54*               |                       |                          |                      |
| Perceived                  | 0.85               | 0.87                  | 0.68                     |                      |
| Behavioral Intention       |                    |                       |                          |                      |
| Mobile shopping has a good reputation | 0.73*               |                       |                          |                      |
| It feels safe to complete transactions using mobile shopping | 0.66*               |                       |                          |                      |
| My personal information feels secure while doing mobile shopping | 0.67*               |                       |                          |                      |
| Mobile shopping makes me feel it is customized for me | 0.71*               |                       |                          |                      |
| Mobile shopping conveys a sense of community | 0.64*               |                       |                          |                      |
| Mobile shopping makes it easy to communicate with the organization | 0.57*               |                       |                          |                      |
| I feel confident that goods/services will be delivered as promised | 0.71*               |                       |                          |                      |
| Behavioral Intention       | 0.82               | 0.87                  | 0.45                     |                      |
| My choice to continue doing mobile shopping is wise | 0.74               |                       |                          |                      |
| I intend to continue doing mobile shopping rather than discontinue it | 0.74               |                       |                          |                      |
| My intentions are to continue doing mobile shopping than other approach | 0.75               |                       |                          |                      |
| Mobile shopping             |                    |                       |                          |                      |
| Purchasing through mobile allows me to save money, as I can buy the same or similar products at cheaper prices than regular stores | 0.72*               |                       |                          |                      |
| Shopping through mobile is more convenient than regular shopping, as I can do it anytime and anywhere | 0.65*               |                       |                          |                      |
| Buying on the Internet facilitates comparative shopping, as I can easily compare products and their attributes | 0.63*               |                       |                          |                      |
| Security breach is a major problem for purchasing through the mobile | 0.49*               |                       |                          |                      |
| I can get a better service (pre-sale, sale and post-sale) from Internet stores than from regular stores | 0.65*               |                       |                          |                      |
| I can save time by shopping through mobile. | 0.60*               |                       |                          |                      |
| Privacy violation is a major problem for purchasing through mobile | 0.40*               |                       |                          |                      |
| Attitude                   | 0.89               | 0.93                  | 0.76                     |                      |
| Toward Social Distancing   |                    |                       |                          |                      |
| For me, practicing social distancing during pandemic would be: |                    |                       |                          |                      |
| A Bad Idea … A Good Idea | 0.87*               |                       |                          |                      |
| For me, practicing social distancing during pandemic would be: |                    |                       |                          |                      |
| Useless … Useful | 0.75*               |                       |                          |                      |
| For me, practicing social distancing during pandemic would be: |                    |                       |                          |                      |
| Harmful … Beneficial | 0.79*               |                       |                          |                      |

(continued on next page)
the data adequately ($\chi^2 = 2708.57$, df = 703, $p < 0.01$); root mean square error of approximation (RMSEA) = 0.10; (90% confidence interval: 0.09–0.11); comparative fit index (CFI) = 0.70; standardized root mean residual (SRMR) = 0.09. (Bollen and Long, 1993). Indicator loadings for each factor were statistically significant and high (0.40 $\leq \lambda \leq 0.87$, $p < 0.01$). The result of factor correlation showed a good discriminant validity between factors (Appendix B, Table 2). To further examine common method variance, a Harman’s Single Factor Test was used. The result suggested that the largest total variance extracted by one factor was 17% ($<50\%$), which indicated a good discriminant validity.

We used average variance extracted (AVE) to assess convergent validity (Fornell and Larcker, 1981). All constructs had AVE greater than 0.4, suggesting satisfactory convergent validity. Furthermore, all constructs showed adequate discriminant validity with their respective constructs.

5.2. Hypotheses testing

A structural equation model (SEM) was built to test the proposed hypotheses. The fit of the model was adequate, $\chi^2 (1 6 5) = 1955.43$, $p < 0.01$, CFI = 0.70, RMSEA = 0.10 (90% confidence interval: 0.9–0.11), SRMR = 0.15. The result of the model is presented above in Table 1 and in Appendix B.

To understand the relationship between an individual’s positive attitude toward mobile shopping and perceived behavioral control in their behavioral intention, H1 and H2 were tested.

The results of the model suggested that both attitude toward mobile commerce and perceived behavioral control significantly predicted both individuals’ behavioral intention ($\beta = 0.61, SE = 0.13$, $p < 0.01$) and ($\beta = 0.55, SE = 0.15$, $p < 0.01$), which matched with both of the hypotheses: 1) customers’ positive attitude toward mobile commerce exerts a positive effect on their behavioral intention, and 2) customers’ perceived behavioral control toward mobile commerce exerts a positive effect on their behavioral intention.

Second, an individual’s perceived subjective norm significantly predicted their behavioral intention ($\beta = -0.52, SE = 0.19$, $p < 0.01$), in which H3 was supported: customers’ perceived subjective norm on mobile shopping exerts a negative effect on their behavioral intention. For H4, the path between an individual’s behavioral intention toward participants’ behavior on mobile online shopping was significant ($\beta = 0.53, SE = 0.15$, $p < 0.01$), which suggested that customers’ behavioral intention exerts positive effects on their behaviors. The results of the model also indicated that individual’s attitude toward social distancing ($\beta = -0.04, SE = 0.04$, $p < 0.01$) can significantly predict behavioral intention. The findings support the effects proposed in H5: customers’ attitudes toward social distancing exerts a negative effect on their behavioral intention.

Furthermore, attitude toward social distancing was found to significantly moderate the effects of customers’ attitude toward mobile shopping on their behavioral intention ($\beta = -0.03, SE = 0.01$, $p < 0.01$). The result indicated the positive effect of customers’ attitude toward mobile shopping on behavioral intention is weakened by the effect of social distancing. Based on this finding, H6 was supported.

6. Conclusions, implications, limitations, and further research

To deal with the outbreak of the COVID 19 pandemic, understanding the “new normal” market activity becomes critical. We have seen how electronic commerce has taken an important role as economies adapt to the situation. Consequently, mobile commerce has gained even more traction than before. Understanding how consumers adapt to this new technology, and its direct effect on companies’ business models, is of crucial importance. Thus, recognizing how social distancing plays a role in influencing individuals’ behaviors on their online shopping behavior becomes essential. In the current study, we studied customers’ intention and behavior of using mobile commerce and how social distancing moderates them. According to the theory of planned behavior, consumers’ intention over a target subject is influenced by three key factors, their attitude toward the subject, their perceived subjective norm of the subject, and their perceived behavioral control of the subject. Results indicate that there is a strong relationship between these factors and use of mobile commerce among participants. Furthermore, the consideration of attitudes over social distancing show that they have an impact on the potential adoption of MC. Wu (2003) suggested that there is a significant positive relationship between attitude and intention on online shopping, and our study demonstrates a similar result: individuals’ attitudes toward mobile shopping exerts a positive effect on their intention of mobile commerce. Additionally, we found that individuals’ perceived subjective norm exerts a negative effect on their intention of mobile commerce, indicating individuals with a lower level of technology acceptance are less likely to have a higher degree of intention to perform the behavior of mobile shopping and, perceived behavioral control exerts a positive effect on customers’ intention via mobile online shopping.

Following the framework of TPB we have given emphasis on how the discussed factors affect intention of using MC. Similarly, to understand the indirect effect from the three factors to customers’ behaviors, intention was served as a mediator. Findings suggest that intention significantly mediates the effect from the three factors on customers’ behavior. Interestingly, social distancing was found to significantly

### Table 1 (continued)

| Construct | Cronbach’s alphas | Composite Reliability | Average Variance Extract | Standardized Loading |
|-----------|--------------------|-----------------------|--------------------------|----------------------|

#### Table 2

| Factor                  | Behavioral intention | Attitude toward social distancing | Attitude toward mobile commerce | Perceived subject norms | Mobile shopping behavior | Perceived behavioral control |
|-------------------------|----------------------|----------------------------------|---------------------------------|-------------------------|--------------------------|-------------------------------|
| Behavioral Intention    | 1.00                 |                                  |                                 |                         |                          |                               |
| Attitude Toward Social  | -0.35                | 1.00                             |                                 |                         |                          |                               |
| Distancing              | 0.52                 | -0.26                            | 1.00                            |                         |                          |                               |
| Attitude Toward Mobile  |                      |                                  |                                 |                         |                          |                               |
| Commerce                |                      |                                  |                                 |                         |                          |                               |
| Perceived Subject Norms | 0.11                 | -0.05                            | 0.27                            | 1.00                    |                          |                               |
| Mobile shopping         | 0.18                 | -0.06                            | 0.32                            | 0.27                    | 1.00                     |                               |
| Behavioral              | 0.20                 | -0.09                            | 0.22                            | 0.09                    | 0.10                     | 1.00                          |
weaken the effect of attitude toward the behavioral intention of engaging in mobile shopping. This finding suggests that when individuals have positive attitudes toward adopting social distancing measures, they tend to show a lower intention over using MC. This unique phenomenon can be explained by the positive relationship between attitude toward social distancing and trust (Brodeur et al., 2021): when individuals have a higher degree of a positive attitude toward social distancing, they tend to believe this policy can keep them safe and help them get back to a healthy life. Therefore, individuals feel less need to shop online.

Having this in consideration, the current situation enables an opportunity for growth on the mobile commerce sector, under the condition that attitudes toward MC appear to be positive overall. Considering that people sometimes hold a negative opinion on social distancing (Williams et al., 2020), it is important to understand that presence and positive attitude of these measures is limited to a specific time and segment of the market. Nevertheless, the temporal effect of such measures may lead to new adoptions of this commercial platforms.

6.1. Theoretical contribution

Our research contributes to the current literature in several ways. As a newly emerged shopping behavior, mobile commerce has been widely studied with the theory of technology acceptance (Agrebi & Jallais, 2015; Natarajan et al., 2017). However, the needs of examining the behavioral intent elements have not been met yet. Our study seeks to fill the gap and extends the theory of planned behavior. We adapt the m-commerce behavior to the contemporary theory. Our results illustrate the behavioral intent elements play critical roles in terms of determining consumer’s intention and behavior in mobile commerce. In addition, our research broadens the theory of planned behavior by showing the moderating influence by addressing how social distancing promotes or inhibits consumers’ intention to use mobile shopping.

Second, the current research contributes to the literature on how a pandemic can influence individuals’ behavior. Prior studies have hugely focused on examining the related impacts of personal factors, such as attitudes toward social distancing (Williams et al., 2020) and the ability to self-isolate (Chiou and Tucker, 2020). The attention on the impact of social distancing on customers is little. We study how the level of respect on social distancing can serve as an external factor that influences consumers’ intention and behavior on mobile commerce.

Lastly, we enrich the literature on mobile shopping. Prior research in the literature has focused on examining how consumers’ attitude, attention, and perception of benefit and risk influence their MC experience (Pavlou, 2003; Miyazaki and Fernandez, 2001; Zhou et al., 2007). Our research broadens the stream of literature by illustrating that subjective norm and perceived behavior control can also affect their desire to make purchases. Furthermore, studies have shown that the impact of COVID 19 on the world economy and the landscape of marketing will change (Sheth, 2020; He & Harris, 2020), suggesting new marketing behavior should be adapted. Our research adds to this literature by identifying consumers’ intention and usage of mobile commerce to fit in with one of the newest marketing trends.

6.2. Practical implication

The current study suggests many critical practical implications. First, our research provides government authorities to understand how social distancing policies lead to individuals’ behavioral and attitude changes. In turn, when further policies are designed to compensate for the consequences of social distancing, consumers’ reactions regarding their marking behaviors can be considered. Second, service providers interested in adopting an online mobile-shopping platform to alleviate customers’ concerns and facilitate their business efficiency during a pandemic will benefit from identifying customers’ attitudes and preferences. Therefore, business firms are able to stay competitive by applying virtual services to interact with their customers to fit with the potential marketing trends during the post-pandemic era.

Third, our study reveals the causal relationships between essential factors in TPB, such as attitude, intention, and behavior in the m-commerce domain. These findings provide benefits to service organizations a consideration that employs mobile shopping platforms and interfaces for customers considering service technologies because of the pandemic. Our findings also suggest the importance of social distancing on customers’ behavioral intention on mobile shopping and how it impacts participants’ attitudes on mobile shopping. Specifically, based on the level of respect for social distancing from customers, business firms should respond with different marketing strategies. For example, mobile-shopping services can be pushed harder in certain areas, and some are not.”

6.3. Limitations and future study

Not all products or services are perceived in the same way when planning and purchasing. Thus, a survey over different sectors and categories could address the changes on mobile shopping related to them. Along with different categories, we would suggest the inclusion of any relevant demographic feature that could be addressed for appropriate segmentation of MC use compared to physical retail or its distinction over non-mobile electronic commerce; simple demographics like age of participants could lead to important differences on their use of digital technology for non-traditional activities. On another hand, the implementation of a field study over shopping style and behavior could benefit the discussion on adoption of new technologies.

The relevance of long-term impacts of social isolations are to be considered as well. A longitudinal approach would help to establish how robust and permanent is the effect triggered by the current pandemic counter measure. In addition to the sector or product category, this would bring new insights on which markets will have a stronger reorganization of their business model and operations.

Finally, we believe that exploration over other potential moderators will have a significant contribution to understanding what factors impact MC adoption. The literature has focused on how known key factors (i.e., attitude and subjective beliefs) directly relate to adoption of digital commerce. The study of other external factors should be included to evaluate their relative weight over the use of these technologies.

CRediT authorship contribution statement

Wei-Kang Kao: Conceptualization, Methodology, Software, Formal analysis, Investigation, Visualization. E. André L’Huillier: Conceptualization, Investigation, Methodology.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Appendix

A. Hypothesis

TPB: Influences

a) Attitude, Norms, Behavioral Control (H1, H2, H3)

- The effect of attitude toward mobile on behavioral intention.
- H1: Customers’ positive attitude toward mobile shopping exerts a positive effect on their behavioral intention.
- The effect of perceived behavior control on behavioral intention.
- The effect of perceived subject norms toward mobile shopping on behavioral intention.
- The effect of perceived subject norms toward mobile shopping exerts a negative effect on their behavioral intention.
- The effect of behavioral intention on participants’ purchase behavior.

2. Social distancing.

a) Attitude (H5)
- The effect of social distancing on behavioral intention.

b) Moderator on intention (H6)
- The moderating effect of social distancing on behavioral intention.
  - H6: The positive effect of customers’ attitude toward mobile shopping on behavioral intention is weakened by the effect of social distancing.

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