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**Article**

## The role of user adaptation and trust in understanding continuance intention towards mobile shopping: An extended expectation-confirmation model

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## OPERATIONS, INFORMATION & TECHNOLOGY | RESEARCH ARTICLE

# The role of user adaptation and trust in understanding continuance intention towards mobile shopping: An extended expectation-confirmation model

Giang-Do Nguyen<sup>1,2</sup> and Minh-Tri Ha<sup>1\*</sup>

**Abstract:** With the rapid growth and intense competition of the mobile commerce market, mobile vendors consider retaining current users and facilitating them to continue shopping as vital to sustain profitability and development. This study investigates the influence of trust and perceived usefulness on continuance intention to use mobile shopping, mediated by user adaptation. This study was based on an extended expectation-confirmation model (ECM) by incorporating trust and user adaptation. A questionnaire-based survey was designed to gather data from 445 mobile shoppers in Vietnam using face-to-face interview. Structural equation modelling analysis was applied to validate the hypothesised model. Our results revealed that all relationships, except for the direct relationship between trust and continuance intention significantly affect continuance intention. In addition, user adaptation is verified to mediate fully the relationship between trust and continuance intention. Our work is the first study to extend ECM by integrating trust and user adaptation in an integral way to advance our understanding of how mobile

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### PUBLIC INTEREST STATEMENT

Mobile commerce is currently booming in Vietnam, leading to competition between service providers by keeping users to continue shopping on their application platform. We investigate the influence of two factors including adaptive behaviour and user trust to make users continue to use mobile shopping services. The study findings reveal that user adaptation has a strong direct impact on users' continued intention towards mobile shopping. In addition, for users who have trust in mobile commerce, the user adaptation makes them decide to continue shopping via mobile devices. Mobile commerce firms' managers are recommended effectively retaining users by promoting factors including user satisfaction, trust and especially adaptation.

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shoppers continue to use mobile shopping services. Finally, our study offers insightful theoretical and practical implications for academicians and firm managers to retain users effectively by promoting the factors that motivate the continuance intention.

**Subjects: Management of IT; Business, Management and Accounting; Information Technology**

**Keywords: mobile shopping; mobile commerce; user adaptation; continuance intention; trust; expectation-confirmation model; Vietnam**

## 1. Introduction

It is without doubt that smartphones and internet-enabled mobile devices have become inseparable for many users to shop online. Mobile shopping applications (m-apps) allow users to conduct a convenient information search for a product, purchase and payment anywhere and anytime (Groß, 2016; Ko et al., 2009; Tam et al., 2018). Users tend to use mobile shopping (m-shopping) as an alternative to electronic commerce (e-commerce) and traditional shopping practices. According to Statista, mobile shopping is projected to account for 72.9 percent of worldwide retail online commerce in 2021, an increase up from the 67.2 percent in 2019. The volume in the US market was \$339 billion in 2020, an increase from the \$207 billion in 2018 (Coppola, 2020). For the Southeast Asia (ASEAN) region, the world's fastest growing Internet mobile commerce (m-commerce), Google and Temasek, estimated that its volume will jump from \$100 billion in 2019 to \$300 billion by 2025 (Hoppe & Bajjal, 2019). For the Vietnamese market alone, m-commerce has outpaced traditional e-commerce with a growth rate of 18.6 percent annually; the volume has increased from \$5.1 billion in 2019 to a predicted \$10.2 billion in 2023, accounting for 57% of the overall e-commerce and (JPMorgan, 2020). This impressive emerging potential of the m-shopping business has attracted much attention from managers and researchers (Gao et al., 2015). For example, after attaining remarkable success in the ride hailing service in the Vietnamese market, Grab launched a multi-applications platform to enter delivery (Grab Express) and online payment market (Grab Pay) while Tiki, a successful m-shopping local provider, launched Tiki Card for banking and Tiki Now for e-entertainment. The topic related to mobile shopping soon attracted many researchers in the information technology (IT) system, marketing and user behaviour. For instance, Hung et al. (2012) applied ECM in Taiwan, combining it with trust to explain the users' behaviour in m-shopping. Lu and Yu-Jen (2009) investigated how innovativeness and social influence impact user intention to continue using m-commerce in the USA.

Despite the growing attention, mobile shopping definitions remain ambiguous. On the one hand, researchers referred to m-shopping as a subset of m-commerce and defined it as any payment or monetary transaction for buying a good or service via mobile devices (Hung et al., 2012; Ko et al., 2009; Yang, 2010). On the other hand, m-shopping was defined as being not just restricted to buying and payment, but it was also seen as having broader uses including pre-shopping and post-shopping activities such as communicating with relevant parties, searching product and price, ordering, paying and after purchasing activities (Holmes et al., 2014; R. J.-H. Wang et al., 2015; Lu & Yu-Jen, 2009). This study refers to m-shopping in a broad sense, as being any shopping-related activity conducted by users using mobile internet devices (or smartphones, for short). These activities include planning their pre-shopping behaviours (e.g., activating m-apps to browse websites for comparing the prices, or finding the producer's and retailer's store location), purchasing (e.g., negotiating, arranging and placing orders) and conducting payment transactions using the user smartphone regardless of time and place (Gao et al., 2015; Holmes et al., 2014). While they are shopping, mobile shoppers (m-shoppers) may repetitively communicate online with the relevant parties (e.g., m-vendors, producers, payment platform providers, other m-shoppers) for

checking information and to be sure about the target product and the delivery, and to make sure of the online payment transaction.

Compared to traditional online shopping, mobile commerce shoppers may have to adapt gradually to this way of mobile shopping. The m-shopping issues encountered by users can be technical attributes (smartphone's small screen or a complex mobile navigation), unsecured mobile payments and trust in m-apps (Bhattacharjee & Harris, 2009; Cao et al., 2018; Groß, 2016; Ozok & Wei, 2010). These limitations are considered to be the cause of growth not being as fast as expected by the industry (Jocevski et al., 2020; Nafea & Younas, 2014). The Vietnam E-Commerce and Digital Economy Agency (IDEA, 2020) reported that, while 60% of mobile users have accessed the Internet for entertainment (e.g., music and movies) and 57% for social networking, only 45% have ever searched for shopping information. The Deloitte Vietnam claimed that non-store-based sales (including e-commerce) account for only about 3%, while conventional store-based sales remain at 97% of total retail sales of the country (Duc, 2020). Thus, these statistics imply that Vietnam's m-commerce is just at its infancy stage, with users remaining wary of participating in m-shopping, even though it has benefited them in multiple ways. Furthermore, the market has witnessed intense competition among domestic retailers and also with the dominant multinational providers (Coppola, 2020; Duc, 2020; Hoppe & Bajjal, 2019). In particular, when m-shopping sites or m-apps are comparably similar in terms of functionality and user interface, m-shoppers can promptly switch to another provider with their smartphone at almost no cost. Previous studies have shown that acquiring a new user costs much more than maintaining an existing user (Lin & Wang, 2006; Rosenberg & Czepiel, 1984). For mobile commerce service providers, attracting potential m-shopping apps users to make a first purchase is just the beginning, and retaining existing users in the m-shopping apps to continue shopping makes the providers sustainable and successful (Bhattacharjee, 2001b; Chen et al., 2012; Hsiao et al., 2016).

Presently, despite intensive research on user continuance usage (e.g., Bhattacharjee & Lin, 2015; Bölen & Özen, 2020; Marinković et al., 2020), only a few studies take into account the user's adaptation perspective (e.g., Jaspersen et al., 2005). Although the significance of user adaptation and its motivating effect on continued use have been noticed (Beaudry & Pinsonneault, 2005; Bhattacharjee & Harris, 2009; Cooper & Zmud, 1990; Karahanna et al., 1999), surprisingly, however, there has been no empirical evidence of the relationship of the adaptation with user intention to continue as reported (Ambalov, 2018; Nabavi et al., 2016; Shaikh & Karjaluo, 2015). Also, while using an IT-based service system (i.e., mobile-shopping) user adaptation is essential, some adaptive behaviours are unavoidable as an IT platform will never fit effortlessly into a user situation (Leonard-Barton, 1988; Schmitz et al., 2016). Furthermore, while the influence between user trust and initial adoption of m-commerce has largely been focused (e.g., Chong et al., 2012; Liébana-Cabanillas et al., 2017), the relationship between trust and post-adoptive factor, continuance intention (CI), is insufficient and inconsistent (Hung et al., 2012; Qureshi et al., 2009; Sarkar et al., 2020). Moreover, there has been no empirical research on the relationships between trust with user adaptation and CI to date. The present study fills this gap by examining the effects of user adaptation and trust on CI in m-shopping setting. Our study is among the first to bring adaptation and trust into an integrated model to uncover new motivations for users to decide to continue using the m-shopping service.

Considering the importance of maintaining users and the continued usage motivation of users, this study investigates the impacts of two determinants, adaptation and trust, and on the CI of users for the mobile shopping service. More specifically, the main research question this work attempts to answer is: "How do trust and adaptation affect CI to use m-shopping?" To answer this question, we employed an expectation confirmation model (ECM, Bhattacharjee, 2001a) in conjunction with the perspectives of user adaptation and trust to derive an extended continuance model, and then empirically confirmed the proposed research model in the context of m-shopping service in Vietnam.

## 2. Theoretical backgrounds

### 2.1. IT Continuance

Using an IT system in the current digital age benefits individuals and businesses practically in their daily efforts. IT literature often judges IT continuance as a form of behavioural post-adoption (e.g., Bhattacharjee & Lin, 2015; Hong et al., 2006; Karahanna et al., 1999). The term “continuance” relates to a user’s behavioural consequence of the post-adoption stage which includes both CI and continuance use of an IT (Nabavi et al., 2016). IT continuance refers to a user’s commitment to continue using a certain IS continuously, and the final success of the IT is conditional on the user’s continuance (Bhattacharjee & Lin, 2015; Gao et al., 2015). Agarwal and Prasad (1997) distinguishes between “current use” and “future use”, and describes “future use” intention as the intention to “use the innovation in the future” (p. 568) in a Web service context. Bhattacharjee (2001b) posited IT continuance as “users’ decisions to continue using an IT in the long run, contrary to IT acceptance which focuses on the user’s initial adoption or first-time decision to use” (pp.351–352). Lu (2014) defined CI as “a mental state reflecting an individual’s decision to repeat her current behaviour” (p. 138) and regarded it as “the intention to repurchase in marketing.” In our study, CI refers to the user’s intention to continue using m-shopping.

### 2.2. Expectation-Confirmation Model (ECM)

Rooted in Expectation-Confirmation Theory (ECT, Oliver, 1980), Bhattacharjee (2001b) introduced ECM and validated in online banking setting. While Oliver’s ECT framework was applied to investigate the user’s satisfaction (SA) and how it influences one’s decision to repurchase a good or service, ECM examines the CI using a user’s satisfaction with the IT that one has been adopting, confirmation of expectations and perceived usefulness (PU) of an adopted IT (i.e., post-adoptive beliefs). The main difference between the two is that the Oliver’s ECT addressed both two stages of users’ expectations and Bhattacharjee’s ECM explicated only post-usage expectations. Different from pre-adoptive acceptance models, for example, the TAM (technology acceptance model) (Davis et al., 1989) and the UTAUT (unified theory of acceptance and use of technology) (Venkatesh & Davis, 2000), the post-adoptive ECM views perceived ease of use (PEOU) as a negligible element, whereas users get more experience while adapting to the IT at a later stage (Karahanna et al., 1999).

### 2.3. Continuance in m-shopping

Based on distinguishing pre- and post- adoptive stages of acceptance, ECM enlightens the formation of the continued use of IT by new variables, appropriate in multiple settings, including e-learning, online services, mobile banking, e-commerce and social network usage (Shaikh & Karjaluoto, 2015). Research on continuance has widely applied solely ECM or integrated with other theories and frameworks such as TAM (e.g., Boakye et al., 2014; Joia & Altieri, 2018; Nan et al., 2020), theory of reasoned action (TRA) and theory of planned behaviour (TPB) (e.g., Cenfetelli et al., 2008; Liang et al., 2013), UTAUT and UTAUT2 (e.g., Lu, 2014; Venkatesh et al., 2003, 2011; Zhao & Bacao, 2020), diffusion of innovation theory (DIT) (e.g., Joia & Altieri, 2018; Lin, 2013), self-determination theory (SDT) (e.g., Roca & Gagné, 2008; Wang & Wang, 2019), effort-accuracy model (EAM) (Ashraf et al., 2020) and Information system (IS) success model (Gao et al., 2015; L. Wang et al., 2019; Zhou, 2013). Besides, a plethora of factors influencing IS continuance have been investigated such as perceived value, experience, habit, network size and risk, to name a few. Moreover, Bhattacharjee and Barfar (2011) argued that initial or pre-adoptive and post-adoptive concepts are distinctive, and users may change their expectations behaviours while experiencing and accepting the IT. Despite such an intensive research on IT continuance, there has been no empirical evidence reported to date on the relationship with user adaptation, which is a well-established post-adoptive factor affecting continuance usage (Bhattacharjee & Barfar, 2011; Faber & de Reuver, 2019; Nabavi et al., 2016). Scholars have argued that, after the initial or pre-adoptive use, the CI becomes an attentive issue which maintains the long-run success and productivity (Tam et al., 2018). Thus, the fact that the ECM model is applied and integrated with the factors influencing post-adoptive stage outcomes means that it is the most suitable for this study.

#### **2.4. User Adaptation**

Adaptation (ADP) of innovation and new technology (e.g., IT) has been studied for decades (e.g., DeSanctis & Poole, 1994; Kwon & Zmud, 1987; Rice & Rogers, 1980). Tyre and Orlikowski (1994) claimed that technological adaptation “refers to adjustments and changes following installation of a new technology in a given setting” and regarded “users’ procedures, assumptions, knowledge, or relationships” with IT in an organisational context. IT implementation literature (e.g., Cooper & Zmud, 1990; Jaspersen et al., 2005) described adaptation as the third of six phases of an IT implementation process. Leonard-Barton (1988) also described adaptation is as the “mutual adaptation” of both technology attributes and users’ activities to improve the productivity. According to the DIT (Rogers, 1983), once the diffusion of an IT achieves the “confirmation” stage as the IT is adapted, users may continue using that IT. Both adaptive structuration theory (AST, DeSanctis & Poole, 1994) with group level analysis and AST for individual (ASTI, Schmitz et al., 2016) considered the adaptation process as “structuration”, in which users obtain, adapt and change the IT (i.e., IT functions), their practice in workplace (i.e., procedures) to achieve outputs (i.e., performance expectation), user’s decision outcomes (i.e., continuance or discontinuances). The coping model for user adaptation (CMUA, Beaudry & Pinsonneault, 2005) posited user adaptation as “coping” acts (p. 494), and related a user’s adaptation to an individual’s effort to act on the technology (i.e., IT features), the task (i.e., work procedures) and oneself (i.e., belief). Likewise, Information system use-related activity model (ISURA, Barki et al., 2007), which relied on task-technology fit (TTF, Goodhue & Thompson, 1995), operationalised IS use behaviours as a collective construct of users’ behaviours including IT interaction (i.e., IT-predefined task performing), task-technology adaptation (i.e., changing functions or interface of an IT) and self-adaptation (i.e., learning an IT). As such, according to existing frameworks and models on IT adaptation, adaptation is empirically observed as individuals’ usage behaviours, leading to decision outcomes, better performance and whether one stays or exits from the IT (Barki et al., 2007; Beaudry & Pinsonneault, 2005; Muhammad et al., 2020). Based on prior works, this study refers user adaptation as the actions performed by users to adjust IT application attributes and shopping practice to fit their preferences, needs and situations. Thus, adaptation behaviours with an IT service system may lead to user post-adoptive or continuance use and to bring about satisfaction while using the IT. Although the understanding of user adaptation is quite obvious, this perspective was, however, surprisingly scarce in IT usage studies and the application of adaptation into ECM may fill this gap.

#### **2.5. Trust**

As mobile commerce takes shape and expands rapidly in emerging markets, many users may feel that online shopping using mobile commerce is unsafe and unprotected. Unlike in-person interactive shopping, users may have different perceptions of parties including online vendors, mobile platforms and online payment transactions are vulnerable. Trust (TR) has long been regarded as an important factor in online interactivity, including mobile commerce and the lack of trust prevents consumers from purchasing online (Gefen et al., 2003; Qureshi et al., 2009; Shao et al., 2019; K. Wu et al., 2011).

Prior studies have used different definitions of trust (Susanto et al., 2016; K. Wu et al., 2011). In m-commerce, the differences between the definitions of trust are explained by its complex nature and the fast-developing m-commerce context (Chen & Dhillon, 2003). Morgan and Hunt (1994) contended that trust occurs once a party believes in a partner’s integrity and reliability. Mayer et al. (1995) refers trust as “the willingness of a party to be vulnerable to the actions of another party based on the expectation that the other will perform a particular action important to the trustor, irrespective of the ability to monitor or control that other party.” Researchers explained trust by three beliefs including integrity, ability and benevolence. Integrity implies that online vendors keep their promises and do not mislead the users. Ability implies that online vendors possess the competence, knowledge and skills necessary to deliver their service. Benevolence means that vendors care for the users’ interests and benefits. Pavlou (2003) argued that trust is the belief which allows buyers to willingly become vulnerable to the online vendors after learning about the characteristics of the vendors from which they are purchasing. Wei et al. (2009) refers

“trust as the extent to which an individual believes that using m-commerce is secure and has no privacy threats” (p. 376). Recently, Qalati et al. (2021) refer to trust as an essential factor of purchase intention as it mitigates “perceived risk” in online shopping context (p. 4). Drawing on the previous studies, trust is the belief in our study which enables users to participate in m-commerce service willingly, while taking into account its vulnerable interactive characteristics. Given the m-commerce nature (e.g., online-offline interactions, ubiquity and payment patterns) users may experience risk or dissatisfaction caused by m-commerce vendors, online payment systems and other involved parties including mobile telecom networks and the shippers. Trust likely reduces perceived uncertainty, facilitates user initial adoption, enables users to utilise m-shopping and leads to m-shopping continuance (Gao et al., 2015). Prior research studied the relationship between trust and initial adoption of m-commerce (e.g., Chong et al., 2012; Liébana-Cabanillas et al., 2017), but studies on the associations between trust and post-adoptive factors (i.e., continuance intention) were insufficient and empirically inconsistent (Hung et al., 2012; Qureshi et al., 2009; Sarkar et al., 2020). Our work aims to bridge this research gap by integrating trust into ECM to examine how trust influences CI.

### 3. Research model and hypotheses development

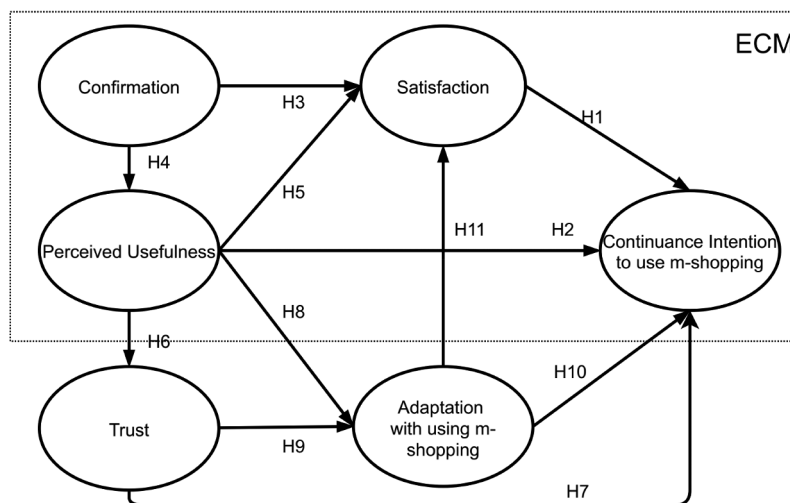
Based on the above review of existing theoretical perspectives, a hypothesised model is proposed to investigate the CI to use m-shopping and how it is influenced by user adaptation and trust. Figure 1 depicts the hypothesised model.

#### 3.1. ECM based hypotheses

Our work applies the ECM as its basic research framework. Based on a variety of previous empirical studies using original ECM in different contexts (Ambalov, 2018; Nabavi et al., 2016; Shaikh & Karjaluo, 2015), we formulate the hypotheses as follows:

- H1. User satisfaction is significantly associated with CI to use m-shopping.
- H2. User perceived usefulness is significantly associated with CI to use m-shopping.
- H3. Confirmation of user expectations is significantly associated with satisfaction with m-shopping.
- H4. Confirmation of user expectations is significantly associated with perceived usefulness.
- H5. Perceived usefulness is significantly associated with satisfaction.
- H6. Perceived usefulness is significantly associated with trust.
- H7. Adaptation with using m-shopping is significantly associated with CI to use m-shopping.
- H8. Perceived usefulness is significantly associated with adaptation with using m-shopping.
- H9. Trust is significantly associated with adaptation with using m-shopping.
- H10. Adaptation with using m-shopping is significantly associated with satisfaction.
- H11. Adaptation with using m-shopping is significantly associated with perceived usefulness.

Figure 1. Hypothesised model.





H5. User perceived usefulness is significantly associated with user satisfaction with m-shopping.

### **3.2. Trust in m-shopping**

User trust has been identified as one of the most important factors influencing the use of mobile commerce in previous research. Previous research has also looked at trust as a variable that influences both behavioural intention and actual use in both the pre-adoptive and post-adoptive phases of the adoption process (Venkatesh et al., 2011). However, the empirical research that has been conducted on trust in the context of m-commerce has largely produced conflicting results in terms of its relationships with antecedents and consequences (Sarkar et al., 2020; K. Wu et al., 2011). M-commerce benefits users in saving time and having flexibility, which further enhances users' effectiveness in shopping (Afshan & Sharif, 2016; Hung et al., 2012). Given such advantages delivered by m-commerce, users turn to develop trust, and we believe that users' assessments of usefulness significantly influence trust, which in turn impacts on adoption (i.e., the initial use) and CI to use mobile shopping (Marinković et al., 2020; Susanto et al., 2016; Venkatesh et al., 2011). Thus, we propose the following hypotheses:

H6: User perceived usefulness is significantly associated with trust.

H7: Trust is significantly associated with CI to use m-shopping.

### **3.3. Adaptation with m-shopping**

Previous research has mostly focused on studying CI, continuance usage and the ultimate success of the IT based service system. Although user adaptation has been suggested as being a post-adoptive behaviour leading to a continuance decision and extended use (Barki et al., 2007; Bhattacharjee & Barfar, 2011; Jaspersen et al., 2005), the prior researches on the IT-based system (i.e., m-commerce) hardly ever investigated the interdependence of adaptation on CI or behaviour in an integrated model. Additionally, whereas the links between adaptation behaviours performed by a user on the certain system and user satisfaction, future usage and repurchase with the IS have also been proposed (Agarwal & Prasad, 1997; Barki et al., 2007; DeLone & McLean, 2003, 2016), these associations between user adaptation and satisfaction are yet to be confirmed in an m-commerce context. Also, previous research has established the link between a user's perception about usefulness with their initial use. This is because the more useful the system is, the more it is adopted to use (Saeed & Abdinnour-Helm, 2008; Venkatesh et al., 2003).

Thus, based on the original ECM, our theoretical model aims to delve into the relationships of users' adaptation with user perceived usefulness, satisfaction and CI by proposing the following hypotheses:

H8. User perceived usefulness is significantly associated with user adaptation with m-shopping.

H9: Trust is significantly associated with user adaptation with m-shopping.

H10. User adaptation is significantly associated with CI to use m-shopping.

H11. User adaptation is significantly associated with user satisfaction with m-shopping.

## **4. Research methodology**

### **4.1. Data Collection and Sampling**

Data were gathered to provide empirical evidence to validate the hypothesised model. The questionnaire was first established in English and then translated into Vietnamese utilising

Brislin's back-translation approach (Brislin, 1970) to eliminate the impact of cultural and verbal discrepancies. The Vietnamese version was verified by a panel of senior lecturers and professionals working in the areas of mobile commerce. A pretest was also performed with a group of 30 m-shopping users who are students and academic staff members of business administration faculties at different universities. All participants reported that the words and expressions used for observable items were plain and understandable. To ensure high response rates, a group of senior business administration students who are part-time online shopping shippers are trained to undertake interviews. During the four-month sample period from September to December 2020, the study gathered data from 445 respondents who are users of one of the m-shopping platforms (e.g., Lazada, Tiki, Sendo, Shopee, Thegioididong and Grab) and made at least two online purchases or transactions during the previous month using convenient sampling and using direct interviews. The respondents were approached in the six cities/provinces across Vietnam including Ho Chi Minh City, Hanoi, Quang Ninh, Da Nang, Long An and Binh Duong. These locations were randomly selected from all three regions to ensure that people from various socioeconomic backgrounds were included in the sample. On the day of the interview, some respondents who wanted to answer questionnaires later via emails received a link to the questionnaire by interviewers with a deadline of one week to response. In total, 445 valid responses were obtained from 600 contacted respondents (74.2%).

All of the respondents were between the ages of 18 and 58, with the younger users (those between the ages of 18 and 30) accounting for 65 percent of the sample and the older users (those between the ages of 31 and 58) accounting for the remaining (35 percent). The level of education includes primarily respondents with a high school education or a college degree (60 percent) and university degree (28 percent). The sample respondents with less than 12 years of schooling account for only 12 percent.

#### **4.2. Measures**

All items were measured using a seven-point Likert scale. The scale ranged from 1 "strongly disagree" to 7 "strongly agree". Six latent variables were examined, and latent variables were measured through measured variables. Our study used measurement scales adapted from previous validated literature to fit our study. All latent variables, measured variables and supporting references are presented in Appendix A.

#### **4.3. Data analysis**

IBM SPSS AMOS 24 was used in the analysis. Data analysis employed two-step approach recommended by Anderson and Gerbing (1988). First, once a measurement model was formed, the confirmatory factor analysis (CFA) procedure was completed to calculate model fit indices ( $\chi^2/df$ ; NFI—normed fit index; CFI—comparative fit; GFI—goodness of fit; NFI—normed fit; RMSEA—root mean square error of approximation; RMR—standardised root mean square residual). Additionally, reliability, convergent validity and discriminant validity were also assessed using thresholds recommended by Bagozzi and Yi (1988), Anderson and Gerbing (1988), and Fornell and Larcker (1981). Next, a structural model was established, and the significance of the hypothetical paths was checked.

### **5. Results**

#### **5.1. Measurement Model Evaluation**

Initially, the data were checked to ensure no outliers and normality assumption (Byrne, 2010; Hair et al., 2010; Kline, 2015). Data screening detected no outliers. Normality was assessed using the skewness and kurtosis indexes. The absolute values of skew were shown to be less than 3 and the values of kurtosis were less than 7, indicating a normal distribution of the dataset (Kline, 2015). Next, conducting Cronbach's alpha of the constructs proved that the measured items secured the scale reliability. All values, starting from 0.754 (CON) to 0.842 (ADP), with the removal of an item of PU3 (Perceived Usefulness), were above the threshold of 0.70 (Nunnally & Bernstein, 1994).

**Table 1. CFA analysis with reliability and validity**

Constructs	Items	SFL	Cronbach's alpha	AVE	CR
Perceived Usefulness	PU1	0.708***	0.764	0.547	0.782
	PU2	0.814***			
	PU4	0.690***			
Trust	TR1	0.798***	0.829	0.554	0.832
	TR2	0.700***			
	TR3	0.749***			
	TR4	0.727***			
Confirmation	CON1	0.735***	0.754	0.505	0.754
	CON2	0.712***			
	CON3	0.684***			
Adaptation	ADP1	0.646***	0.842	0.595	0.852
	ADP2	0.718***			
	ADP3	0.914***			
	ADP4	0.782***			
Satisfaction	SA1	0.706***	0.764	0.451	0.766
	SA2	0.696***			
	SA3	0.676***			
	SA4	0.604***			
Continuance Intention	CI1	0.703***	0.763	0.532	0.772
	CI2	0.819***			
	CI3	0.657***			

Model fits: \*\*\*p < 0.001;  $\chi^2 = 304.535$ ; CMIN/df = 1.750; CFI = 0.961; GFI = 0.938; TLI = 0.953; RMSEA = 0.041

Model fits: \*\*\*p < 0.001;  $\chi^2 = 304.535$ ; CMIN/df = 1.750; CFI = 0.961; GFI = 0.938; TLI = 0.953; RMSEA = 0.041

Table 1 shows that the relevant fit measures, such as standardised factor loading (SFL), the composite reliability (CR) and the average variance extracted (AVE) were checked against the recommended thresholds. All SFLs, ranging from 0.604 to 0.914, were acceptable and significant at the 0.001 level (Anderson & Gerbing, 1988). The CRs ranged between 0.754 (CON) and 0.852 (ADP) which are well above the cut-off value of 0.70 (Bagozzi & Yi, 1988). All AVEs were between 0.505 (CON) and 0.595 (ADP), except for the AVE of SA, which was 0.451. Fornell and Larcker (1981) suggested that if the AVE is smaller than 0.5, while the CR is more than 0.60, the construct convergent validity is adequate. Since the CR of SA was 0.766 (i.e., greater than 0.7), this indicates that the convergent criteria were satisfactory. The test results verified good reliability of the research tool confirming the convergent validity of the research data (Bagozzi & Yi, 1988; Fornell & Larcker, 1981; Hair et al., 2010). Additionally, the discriminant validity of the measurement model was sufficient thanks to the square root of the AVE for each factor exceeding the correlation between that factor and others, as presented in Table 2. As demonstrated in Table 2, chi-square  $\chi^2$  was 304.535 (df = 174, p = 0.000), CMIN/df was 1.750 (less than 2), CFI was 0.961 (greater than 0.95), GFI was 0.938 (greater than 0.9) and RMSEA was 0.041, (less than 0.06), and all fit results proved the very good fitness of the measurement model (Anderson & Gerbing, 1988; Hair et al., 2010).

The hypothesised relationships were evaluated using a path analysis. The structural model also revealed a good fit with GFI = 0.930, AGFI = 0.909, NFI = 0.899, CFI = 0.946 and RMSEA = 0.047 (Hair et al., 2010; Hu & Bentler, 1999).

All hypothesised relationships were significantly supported between trust and CI, except for H7. Confirmation has significant associations with perceived usefulness ( $\beta = 0.384$ , p < 0.001) and user satisfaction ( $\beta = 0.332$ , p < 0.001). Perceived usefulness has positive associations with the following connected constructs: satisfaction ( $\beta = 0.170$ , p < 0.05), adaptation ( $\beta = 0.208$ , p < 0.001), trust ( $\beta = 0.233$ , p < 0.001) and CI ( $\beta = 0.244$ , p < 0.001). Satisfaction, in turn, has significantly influenced CI ( $\beta = 0.224$ , p < 0.001) and is affected by adaptation with p < 0.001 and  $\beta = 0.226$ . Trust positively

**Table 2. Correlation and discriminant validity**

Construct	ADP	SA	TR	CON	PU	CI
ADP	<b>0.771</b>					
SA	0.337	<b>0.672</b>				
TR	0.381	0.251	<b>0.744</b>			
CON	0.229	0.445	0.467	<b>0.711</b>		
PU	0.274	0.351	0.200	0.363	<b>0.739</b>	
CI	0.283	0.360	0.198	0.262	0.361	<b>0.730</b>

Note: The diagonal and bolded values describe the square root of AVEs 5.2. *Structural Model Evaluation*

influences adaptation with  $\beta = 0.333$  and  $p < 0.001$ . Specially, user adaptation with m-shopping has the significant relationship with CI ( $\beta = 0.123$ ,  $p < 0.05$ ), uncovering that our new hypothesis is empirically verified at first-hand. Table 3 depicts that ten out of the eleven hypothesised associations were statistically supported.

## 6. Discussion and implications

As our obtained results have shown, all of the proposed hypotheses are supported in the m-shopping setting, except for the H7 link between trust and CI. The study results affirm all five essential associations of Bhattacharjee’s ECM, and then reveal the significant relationships between user adaptation and perceived usefulness, satisfaction and CI. Additionally, the impact of trust on adaptation has also been explored and is positively significant. It is noteworthy that, for the first time in IT continuance study, the results of an investigation uncover a causal relationship between user adaptation and CI towards mobile shopping. Thus, with the inclusion of user adaptation as a new factor, this extended ECM shows that CI is driven not only by user perception about usefulness and satisfaction, but also by one’s adaptation behaviour performances by users with m-shopping.

As observed in previous studies on CI (Bhattacharjee, 2001b; Oliver, 1980; Weng et al., 2017), confirmation as a post-adoptive judgment influencing positively on user perceptual experience such as perceived usefulness and satisfaction. Our results reveal that confirmation is a significant element in the m-shopping context and users realise their satisfaction and expected benefits through the actual experience. The findings also confirm that perceived usefulness and satisfaction are two factors that motivate users’ intentions to continue using m-shopping, in line with reported investigations in a similar context (e.g., Bhattacharjee, 2001b; Lee & Kwon, 2011; Li & Liu, 2014; Sreelakshmi & Prathap, 2020). This study finding is expectedly meaningful for practitioners and researchers to explore further how users accommodate and utilise m-shopping. Moreover, the findings also indicate that trust is driven by perceived usefulness. While previous studies on the link of trust and perceived usefulness demonstrate varied and mixed results (e.g., Gefen et al., 2003; Y. Wang et al., 2016; K. Wu et al., 2011) in online contexts, our findings confirm the significant effect of perceived usefulness on users’ trust, which is in agreement with most of the studies on mobile commerce continuance (Afshan & Sharif, 2016; Sarkar et al., 2020; Susanto et al., 2016).

Contrary to expectations, our survey data has not confirmed a direct association between trust and the intention to continue using m-shopping. Although this insignificant association is in conflict with some prior research (e.g., Shao et al., 2019; K. Wu et al., 2011), it reinforces the results of numerous reported empirical investigations in m-commerce settings (Bölen & Özen, 2020; Cao et al., 2018; Susanto et al., 2016). Instead, trust indirectly affects CI via users’ adaptation, by which they accommodate a mobile platform, adjust how to perform mobile transactions, and interact with online vendors and related parties. The explanation for these findings is that, as users believe and feel confident with m-shopping, they would actively

**Table 3. Results of hypothesis testing**

		<b>Hypotheses</b>	<b>Standardised path estimate</b>	<b>p</b>	<b>Supported</b>
H1	SA-CI	Satisfaction is significantly associated with CI	0.224	0.000	Yes
H2	PU-CI	Perceived usefulness is significantly associated with CI	0.244	0.000	Yes
H3	CON-SA	Confirmation is significantly associated with satisfaction	0.332	0.000	Yes
H4	CON-PU	Confirmation is significantly associated with perceived usefulness	0.384	0.000	Yes
H5	PU-SA	Perceived usefulness is significantly associated with satisfaction	0.170	0.011	Yes
H6	PU-TR	Perceived usefulness is significantly associated with trust	0.233	0.000	Yes
H7	TR-CI	Trust is positively related to CI	0.039	0.524	No
H8	PU-ADP	Perceived usefulness is positively related to adaptation	0.208	0.000	Yes
H9	TR-ADP	Trust positively relates to adaptation	0.333	0.000	Yes
H10	ADP-CI	Adaptation is positively related to CI	0.123	0.049	Yes
H11	ADP-SA	Adaptation is positively related to satisfaction	0.226	0.000	Yes

participate and perform behaviours that make themselves and m-shopping fit with each other, so that users decide to continue using it. These results substantiate the results in prior research which claim that trust cannot always have a significant impact on service use, although it can only affect it in the short term rather than during the long-term continuation of service use (Grayson & Ambler, 1999).

Additionally, our study finds that the influences of perceived usefulness and trust on adaptation are positive. These results are consistent with prior research which report that user actual use is influenced by trust (Corbitt et al., 2003) and usefulness (Saeed & Abdinnour-Helm, 2008). In particular, our results highlight the significant link between adaptation with satisfaction and CI. This outcome is consistent with the ISS model (DeLone & McLean, 2003, 2016) which proves the link of use and satisfaction and asserts that “intention to reuse” is contextually aligned to the purpose of the IS usage and the measure of the IS success outcome. The most significant finding is that user adaptation is empirically observed as a major driving force of intention to continue using m-shopping, along with satisfaction and perceived usefulness of original ECM model. In our view of m-shopping, because users are adapting and experiencing with the emerged service, their experience and adaptation will lead from an initial phase of usage to the CI in the long-term, as reported by prior seminal works (Davis & Venkatesh, 2004; Mou et al., 2017). Thus, user perception of usefulness, satisfaction and adaptation are critical before users decide to continue using m-shopping services.

### **6.1. Theoretical contributions**

Our work provides four theoretical contributions. First, realising several limitations of the original ECM model, Bhattacharjee (Bhattacharjee, 2001a; Bhattacharjee & Barfar, 2011) calls for extending the model by incorporating post-adoptive factors such as user adaptation, resistance and switching behaviours to further advance IT continuance research without abandoning its roots of the original expectation-confirmation theory (Oliver, 1980). For such a motivation, our work is the first to include user adaptation and trust into ECM to study CI in the context of m-commerce. While user adaptation and trust have been introduced as significant influencers to post-adoptive behaviours (Bhattacharjee & Harris, 2009; Groß, 2016; Tam et al., 2018), previous studies have not been able to provide robust evidence for how these two factors influence CI, and prior research of IT continuance have hardly ever examined the interdependence among adaptation, trust and CI in an integrated model. Our empirical results confirmed all the relationships in the model but not the direct relationship between trust and CI. As a result, our model can be used as a theoretical one for future studies to understand the dynamics of ECM, trust and user adaptation on CI in other settings.

Second, although IT literature has largely studied user adaptation (Beaudry & Pinsonneault, 2005; Bhattacharjee & Harris, 2009; Jaspersen et al., 2005), very few research has examined trust and user adaptation as drivers of long-term continued usage (DeLone & McLean, 2016). In a similar vein, no prior research has ever studied ECM in combination with trust and adaptation in an integral way. For such a motivation, our study can be considered among the pioneering studies to fill a research gap in IT continuance literature by examining the importance of trust and user adaptation on CI in the m-commerce setting. Our work extends and advances our understanding of ECM extension, including trust and adaptation as post adoptive variables.

Third, this study provides significant insights into the relationship between trust, user adaptation and CI in the perspective of ECM extension. Although trust has caused much concern among researchers in m-commerce settings (Kim & Peterson, 2017; Sarkar et al., 2020) the research involving trust has mostly ignored the relationship between trust and adaptation (Sarkar et al., 2020; K. Wu et al., 2011). This inadequacy may result in an insufficient assessment of the role of user trust, including its role on how users adapt steadily to m-shopping and to what extent they are experienced to it (Rousseau et al., 1998; Susanto et al., 2016). The results from our work will unravel and shed light on the understanding of how trust influences CI through the adaptation

process, along which users perform to adapt with the m-shopping service. Thus, due to the impact of trust, adaptation will motivate users to decide to continue m-shopping.

Finally, very rare or no research has ever studied the mediating role of adaptation in the relationship between trust and CI in the context of m-commerce. For such a motivation, our work is the first to conceptualise adaptation as a mediator to advance our understanding of the relationship between trust and CI. Our findings reveal that the relationship between trust and CI is fully mediated by adaptation. In other words, it is the user adaptation mechanism that strengthens the effect of trust (i.e., trust in m-shopping) on the intention to continue and motivates users to decide to continue using m-shopping.

### **6.2. Practical implications**

This study addresses more than a few issues of potential applicability for management to foster users' continuance usage of the mobile commerce service. In the first sense, the study supported the findings that confirmation is a strong determinant of users' perceptions of usefulness and satisfaction, which in turn promote continued use. In fact, confirmation is the realisation of users' expectations of a technology (i.e., a product or service) that derives from actually experiencing that technology beforehand. In order for the marketing campaigns by m-commerce providers to persuade customers to participate in m-shopping, they must communicate its benefits and advantages compared to traditional forms of commerce to users, which is crucial for users to realise the expectation, increase satisfaction and perception about the benefits of m-commerce, leading to the decision to continue using it. On the other hand, the effect of users' adaptation and their satisfaction with the adaptation are confirmed to be positive factors resulting in CI to use m-shopping. This suggests that business management should certainly guide the users of their m-apps on how to adapt to the settings of a new form of online commerce at the start, and make sure that users are appreciating the adaptation. As users perform more adaptation actions, they tend to adapt with the new m-shopping service, engage and will continue to enjoy shopping with it. Moreover, m-commerce managers should figure out that the ultimate success of user adaptation is only realised when users conduct the adaptation in both m-shopping platform (seller side) as well as their own shopping procedures (buyer side). Managers must encourage such practices to use interactive feedback systems for the success of the business, improvement of customer support to facilitate more users to adapt to the service. Finally, the influence of trust on CI via user satisfaction and adaptation will persuade m-commerce managers to focus on improving user trust to promote continuance usage. Management should consider providing sophisticated intelligent systems (such as access protection and data encryption), employing reliable compulsory procedures for financial data and personal identification provision in conjunction with other advanced tools to maintain the risk-free transactions and responsible relationships among all parties. These measures are constructive in providing more trustworthy m-commerce transactions in the users' minds.

### **7. Conclusions**

This study extends the ECM model by providing evidence on the factors that lead to users' CI to use mobile shopping, which has appeared as one of the top business models in a fast-changing online economy. The findings show that perceived usefulness, satisfaction and adaptation are the three eminent factors influencing the intention to continue using their purchases. Confirmation significantly affects usefulness and satisfaction. Trust contributes to adaptation while perceived usefulness impacts on satisfaction, adaptation, trust and CI. To secure a market advantage, managers must learn ways of retaining users on their platform; in other words, they need to ensure that users will continue to use their services after experiencing and adapting to the services. The empirical result of this study would certainly guide mobile commerce businesses in the country as well as other emerging economies maintaining users in the competitive online market.

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**Appendix A**  
**Measurement scales and items**

Constructs	Measured items	Sources
Continuance intention	CI1: I intend to continue using mobile shopping applications for my shopping needs.	(Bhattacharjee, 2001b; Bhattacharjee & Lin, 2015; Gao et al., 2015)
	CI2: My intention is to continue to use m-commerce rather than any other means of shopping in the future.	
	CI3: I intend to continue to use the mobile shopping service.	
Trust	TR1: I believe that m-shopping providers keep customers' interests in mind.	(Gefen et al., 2003; Susanto et al., 2016)
	TR2: The information provided by the m-shopping apps is reliable.	
	TR3: The other parties involved in m-shopping are completely honest in their dealings with one another.	
	TR4: Overall, I believe that m-shopping is trustworthy.	
Satisfaction	SA1: I feel that it was a wise decision to choose to use m-shopping.	(Bhattacharjee, 2001b; Zhou, 2013)
	SA2: M-shopping provides me with a satisfactory experience.	
	SA3: The method of m-shopping meets my expectations.	
	SA4: Overall, I am satisfied when using m-shopping.	
Perceived Usefulness	PU1: I am able to complete my shopping more quickly because I am using mobile shopping.	(Davis et al., 1989; Liébana-Cabanillas et al., 2017)
	PU2: Using m-commerce increases the benefits I receive.	
	PU3: Merely using my mobile phone to shop improves my efficiency in the store.	
	PU4: When it comes to my shopping needs, I find that m-shopping is extremely convenient.	
Confirmation	CON1: M-shopping exceeded my expectations in terms of ease of use and convenience for me.	(Bhattacharjee, 2001b; Susanto et al., 2016)
	CON2: Service provided by the m-commerce provider exceeded my expectations in terms of both quality and timeliness.	

(Continued)

Constructs	Measured items	Sources
	CON3: Overall, the majority of my expectations regarding the use of m-commerce were met.	
Adaptation to m-shopping	ADP1: I spent time and energy attempting to use functions of m-shopping apps to do shopping.	(Barki et al., 2007; Y. Wu et al., 2017)
	ADP2: I suggested modifications for m-shopping to fit my shopping style.	
	ADP3: I have adjusted my shopping style to accommodate m-shopping.	
	ADP4: Overall, I have adapted to m-shopping so that my shopping process is in harmony with how the m-shopping works.	



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