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Defining the determinants of online impulse buying through a shopping process of integrating perceived risk, expectation-confirmation model, and flow theory issues

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ABSTRACT

Since much online shopping is attributed to online impulse buying, it is important to define this particular shopping process. This process has three important issues, perceived risk for virtual stores as well as e-store design and psychological state for online shopping. This is because consumers are both system users and impulse buyers when shopping on e-stores. E-store design is based on the interaction of customers with e-stores and the expectation-confirmation model supports examination of this issue with a wide familiarity in IT use. Psychological state is emotional responses to the stimulus of products in e-stores and flow theory, with task skill and task challenge as precursors, is suitable for exploring this issue. Grounding on the three issues, this study proposes a new research model with these considerations to thoroughly examine the determinants of online impulse buying. Flow state and customer satisfaction also interact with each other. Empirical research shows an important link for the three defined issues of online impulse buying.

1. Introduction

Customers often make unplanned and sudden purchases in an intuitive manner when exposed to stimulating cues. These purchases are often associated with strong desire and a feeling of pleasure (Chan, Cheung, & Lee, 2017; Rook & Fisher, 1995). This behavior is referred to as impulse buying. Online impulse buying mainly concerns consumers who have spontaneous behavior due to lack of control when exposed to online stimuli of e-stores (Amos, Holmes, & Keneson, 2014; Parboteeah, Valacich, & Wells, 2009). More than 50 % of online shopping has been classified as impulse buying (Liu, Li, & Hu, 2013; Zheng, Men, Yang, & Gong, 2019). As a new business model for consumer behavior, much attention has been given to research on deeply understanding this behavior (Fu, Yan, & Feng, 2018).

Impulse buying involves a particular and complex shopping process, as described below. First, a belief for the potential risks of shopping online is an initial motivation to further affect staying with online stores (Chen, Feng, Liu, & Tian, 2019; Pee, Jiang, & Klein, 2018). Next, online customers may play the roles of both system users and impulse buyers in the further shopping stages (Verhagen & van Dolen, 2011; Wu, Chen, & Chiu, 2016). Accordingly, this shopping process can be defined as three phases: evaluation of e-store risk, system use, and unplanned purchase. Few studies have defined the shopping process with a unique set of components for impulse buying. Most studies are based on general theoretical bases to define this process, such as stimulus-organism-response (SOR) and theory of planned behavior (TPB) (Kim & Kim, 2018; Zheng et al., 2019).

Online customers must evaluate potential risks as buying from e-stores, so a perceived image of e-stores enables further impulse buying (Chen & Zhang, 2015; Wells, Parboteeah, & Valacich, 2011). We refer to this as the perceived risk of e-stores. When acting as system users, online consumers use e-stores for an interaction to search for various product-related information, such as product features, order placement, payment, and delivery. They are also affected by website attributes, such as visual appeal, communication styles, and security (Aladwani, 2018; Wang & Carolina, 2019). This issue focuses on a well-designed e-store for supporting shopping tasks to motivate customers for impulse buying. Impulse buyers essentially involve a psychological state that allows unplanned purchases since these decisions are hard for them to control (Zheng et al., 2019). This issue focuses on the difference of personal traits in terms of experiencing immersion to successfully perform a shopping task (Kim & Hall, 2019).

Prior studies have focused on either e-store design or psychological state for the importance to impulse buying. For example, several studies have considered website attributes and a pleasurable experience as the important drivers of impulse buying (Floh & Madlberger, 2013; Zhang,

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Xu, Zhao, & Yu, 2018). Moreover, researchers have not defined perceived risk as a key concern for impulse buying though it was well considered in online shopping (Chen et al., 2019; Pee et al., 2018). To address these research gaps, we propose a novel research model to integrate three issues to analyze impulse buying. This model provides a complete and unique view of impulse buying for contributing to extant literature.

Specifically, the research constructs for these issues are defined based on the particular theories. First, the expectation-confirmation model (ECM) has been widely applied to examine how design features affect e-store use (Bhattacherjee, 2001b; Wu, 2013). Flow theory was often used to capture consumers' emotional states regarding the balance of task skill and task challenge for online experience (Bilgihan, Okumus, Nusair, & Bujisic, 2014; Chan et al., 2017). Moreover, many studies have indicated that a recursive relationship between flow state and satisfaction as using e-stores may arise for online shopping (Foroudi, Gupta, Sivarajah, & Broderick, 2018; Sharma & Sharma, 2019). Next, a negative link for perceived risk to satisfaction has been reported on online experience (Martin, Mortimer, & Andrews, 2015). In addition, researchers have shown gender as an important control variable for impulse buying (Wells et al., 2011).

In sum, this study addresses the following research problems: (1) perceived risk proposes a link to ECM-related constructs, such as customer satisfaction, and in turn, impulse buying; (2) ECM-related constructs are tested first and find a further link to impulse buying; (3) flow theory related constructs are examined first and propose a further link to impulse buying.

2. Literature review

According to the above discussion, Fig. 1 depicts a picture of the research model. We refer to it as “Determination model for online impulse buying.” It includes three major issues, perceived risk, e-store design with ECM-based constructs, and psychological state with flow construct. This research model is well grounded on an overarching theoretical basis, i.e., a particular impulse buying process with three aspects, perceived risk, system users, and impulse buyers. The following discusses the theoretical foundations and hypotheses.

2.1. Online impulse buying

Impulse buying is generally considered a consumer behavior stimulated by a sudden, often powerful and persistent urge to buy something immediately (Rook & Fisher, 1995). The internet is an integral part of daily life as customers can freely find information on products or services. Compared to traditional shopping, online shopping has more potential for impulse buying. In particular, the viability of social media is a new approach for greatly enabling marketing effort and may play a key role in affecting consumer’s purchase decisions, such as impulse buying (Alalwan, Rana, Dwivedi, & Algharabat, 2017; Dwivedi, Kapoor, & Chen, 2015; Kapoor et al., 2018). However, online impulse buying is still not well understood for the complexity of a particular shopping process with various viewpoints, such as psychological and risk. Similar studies have proposed numerous analytical methods for finding the core factors from social media related information (Shiau, Dwivedi, & Yang, 2017; Stieglitz, Mirbabaie, Ross, & Neuberger, 2018). A higher emotional state of impulse buyers is more likely to bring spontaneous buying experience and their shopping lists are not clearly known in advance as opposed to lower emotional state (Fu et al., 2018). An understanding of impulse consumers is particularly important for business purpose.

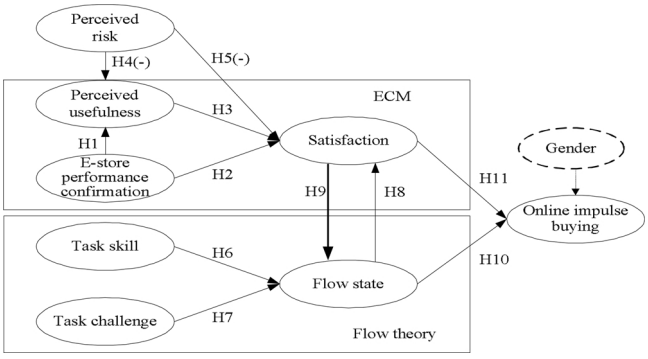

Fig. 1. Determination model for online impulse buying.

2.2. ECM

The expectation confirmation model (ECM) proposed by Bhattacherjee (2001b) integrates expectation confirmation theory (ECT) (Oliver, 1980) and a technology-based feature, perceived usefulness, to examine intention of continued use in the IS context. ECT indicates a customer’s repurchase intention from their satisfaction in terms of a confirmation for expected and perceived performance of products/services. Bhattacherjee (2001b) argued that a user’s continued intention to use an IS is generally similar to the logic of a consumer’s repurchase decision in ECT. ECM has been widely applied to examine e-store use for guiding design features (Lu, Wu, & Hsiao, 2019).

Specifically, ECM proposes the two main drivers of performance confirmation and perceived usefulness, which are jointly linked to customer satisfaction and in turn, continued intention to use IS. In addition, performance confirmation also indicates a link to perceived usefulness. Performance confirmation (an initial-adoption belief) shows a confirmation between expected and perceived performance of using IS in general and e-stores in particular, such as product description and navigation (Halilovic & Cicic, 2013; Wu, 2013). Specifically, online customers identify it as an important motivation for shopping intention on e-stores. Perceived usefulness (a post-adoption belief) refers to the extent to which a particular object or tool is very helpful for individuals to finish tasks. Online customers would expect to raise their shopping performance for a usefulness of e-stores (Elwalda et al., 2016). Customer satisfaction is defined as the satisfaction of using e-stores for online shopping (Guo & Poole, 2009; Lu et al., 2019), and it is an important determinant for willingness to participate in online shopping.

2.3. Perceived risk

The concept of perceived risk is an important concern for online commerce since customers are dealing with virtual stores that have greater uncertainty than with traditional stores (Shiau, Dwivedi, & Lai, 2018). Online commerce has less verification and control for a simultaneous exchange of products and money (Horst et al., 2007). With a high level of perceived risk, consumers can adopt risk reduction strategies such as relying on warranties, reliable recommendations, good reputation, and supporting information (Chen & Chang, 2013). Without a system-based approach to mitigate transactional risk from undesirable behaviors of e-vendors, consumers would be reluctant to use online shopping. Thus, perceived risk is a conspicuous barrier for online consumers with purchase decisions. Perceived risk is here defined as a consumer’s belief about uncertain negative outcomes from an online transaction (Kim, Ferrin, & Rao, 2008).

Perceived risk was defined widely in marketing literature. An early definition indicates seven types of risk: financial, performance (product), physical, psychological, social, time, and opportunity cost (Kaplan, Szybillo, & Jacoby, 1974). There are two major types of risk, financial and product, which dominate traditional shopping (Bhatnagar, Misra, & Rao, 2000). In online shopping, information-based risk is a particular concern in terms of uncertainties associated with e-vendors, such as recommendation, security, and privacy, since these are

critical issues in internet-based communications (Chiu, Wang, Fang, & Huang, 2014). This study summarizes perceived risk as a single construct with the four attributes, financial, product, recommendation, and security, when privacy being part of security, in online stores. Many studies have similarly defined it as a single construct with a multi-dimensional nature (Fastoso, Whitelock, Bianchi, & Andrews, 2012; Kim et al., 2008; Martin et al., 2015). Specifically, one study developed a consumer's decision-making model in e-commerce with a factor of perceived risk as a single construct with three attributes, financial, product, and information (Kim et al., 2008). This is reflected in the measurement design with the associated items.

2.4. Flow state

Flow experience is a psychological state regarding an individual sensation in reaction to environmental stimuli (Huang, 2016). In particular, when a person is in full concentration on an activity and under loss of self-consciousness of doing the activity, resulting in perception of enjoyment state, it is referred to flow experience (Lee & Joshi, 2007). From a consumer's point of view, a high attention on shopping experience can be so intense that self-consciousness seems to disappear at this time and therefore, a consumer's sense of time becomes distorted and the state of mind is extremely pleasurable (Tamilmani, Rana, Prakasam, & Dwivedi, 2019; Trevinal & Stenger, 2014). Flow experience seems to follow a sequential procedure to reach the target, that is, attention, self-control, and enjoyment. The flow state is complex in terms of an individual's feeling and needs to be further elaborated for its originality.

In essence, personal traits indicate an individual's psychological state and explain how a flow state is motivated as involved in an activity. Several researchers have argued for two personal traits regarding a flow state with a task, task skill and task challenge (Hausman & Siekpe, 2009; Kamis, Koufaris, & Stern, 2008). In an online setting, task skill refers to a consumer's feeling of IT self-efficacy for purchasing on an e-store. Task challenge indicates a consumer's psychological experience for a response to the action action. Thus, task skill and task challenge both reveal concerns of an individual's emotional state.

In general, the occurrence of flow state underlies a precondition for a balance between a self-feeling of task skill and an experience of task challenge in executing an activity (Csikszentmihalyi, 2008). Specifically, online consumers may find a positive feeling of task skill to be able to search/navigate e-stores for finding their needs in a shopping activity and further, they would experience a positive state of task challenge from the activity, in particular for an unfamiliar e-store (Teng, 2011). Further, flow state has been well defined in the context of online impulse buying, including three dimensions, enjoyment, control, and concentration (Jiang & Benbasat, 2005; Wu et al., 2016).

3. Hypotheses development

3.1. Hypotheses for ECM

E-store performance confirmation is an initial-adoption belief that indicates a driving force to induce a user's post-adoption belief, perceived usefulness (Bhattacherjee, 2001a; Venkatesh et al., 2002). Bhattacherjee (2001b) further argued that e-store performance confirmation may play a critical role in determining perceived usefulness for exploring continued use of IS. Many studies have used ECM as a theoretical basis to examine the use of online services or paid mobile apps, finding that online-technology performance confirmation positively influences perceived usefulness/value (Hsu & Lin, 2015; Kang, Hong, & Lee, 2009). Similar studies have claimed the relationship of performance confirmation and perceived usefulness for exploring online technologies, such as impulse buying and mobile advertising (Lu et al., 2019; Tsao, 2013). In particular, Lu et al. (2019) defined a relationship structure to examine customer loyalty for mobile advertising based on ECM. In that, an interactivity feature for the importance of using mobile advertising was defined as e-store performance confirmation with the finding of a positive effect on perceived usefulness. Therefore, a hypothesis is defined.

H1. E-store performance confirmation is positively related to perceived usefulness in using online stores.

ECT indicates a relationship structure that product performance confirmation has a positive effect on customer satisfaction and in turn, repurchase intention in consumer behavior (Oliver, 1980). Accordingly, a link for product performance confirmation and customer satisfaction can be defined based on the theoretical basis. Next, ECM proposes a link between of IT-use performance confirmation and user satisfaction for examining intention of continued IT-use, such as ERP use (Bhattacherjee, 2001b). Specifically, many studies have used ECM as a theoretical basis for examining this link for online contexts, including impulse buying, mobile commerce, and social commerce (Li & Ku, 2018; Lu et al., 2019; Wu et al., 2016). In particular, one study proposed a research model by integrating ECM with trust and a moderator of habit to determine the factors affecting repeat purchase intention in online group-buying (Hsu, Chang, & Chuang, 2015). They found that online services, due to an evaluation for confirmation, positively affect consumer satisfaction and in turn, repurchase intention. Accordingly, the following hypothesis is proposed.

H2. E-store performance confirmation is positively related to customer satisfaction in using online stores.

Perceived usefulness is defined as a post-adoption belief in IT use and indicates an important link to user satisfaction (Bhattacherjee, 2001a). For online shopping, customers are more likely to develop a positive feeling for their shopping process with e-vendors, such as satisfaction, since online services are perceived to be useful in their interaction to search and find product information (Lu and Chea, 2018; Panigrahi, Srivastava, & Sharma, 2018). Another study sought to determine the drivers of purchase intention for paid mobile apps in terms of using ECM as a theoretical basis to define perceived usefulness as a precursor of customer satisfaction (Hsu & Lin, 2015). In that study, perceived usefulness was defined to include multiple attributes: performance on mobile apps, price, social influence, and others. The findings reported a positive influence for perceived usefulness and consumer satisfaction and in turn, purchase intention. Thus, we argue a hypothesis.

H3. Perceived usefulness is positively related to customer satisfaction in using online stores.

3.2. Hypotheses for perceived risk

Extant studies have discussed the importance of perceived risk for a negative cognition of shopping in e-stores (Shaw & Sergueeva, 2019). A research model integrating the technology acceptance model (TAM) and perceived risk has been proposed to understand the adoption of e-services, such as online banking and portfolio management (Mauricio et al., 2003). In that study, perceived risk is defined with several attributes, such as financial, performance, psychological, social, and so on. The results showed a negative influence for perceived risk to perceived usefulness. Another study identified the role of perceived risk in the intention to adopt e-government services with perceived usefulness as a mediator of that relationship (Horst et al., 2007). Accordingly, the following hypothesis is proposed.

H4. Perceived risk is negatively related to perceived usefulness in using e-stores.

In a study for using online financial services, it indicates that the higher consumers have a feeling of less confidence, the more they hesitate to reach a decision in online shopping, (Karjaluoto, Shaikh,

Saarijärvi, & Saraniemi, 2019). Perceived risk showed an important role in enhancing confidence to further increase consumer satisfaction with online financial services. A research model is proposed for examining the online customer experience with a relationship structure for the variables, perceived risk, consumer satisfaction, and repurchase intention (Marin et al., 2015). Here, they found a negative link for perceived risk to customer satisfaction. Further, in a study to understand the e-shopping experience, it proposes a research model with a relationship structure, perceived benefits and risk as antecedents, customer satisfaction, and repurchase intention (Khan et al., 2015). Further, perceived risk was found for a negative effect on customer satisfaction. Thus, we propose a hypothesis.

H5. Perceived risk is negatively related to customer satisfaction in using e-stores.

3.3. Hypotheses for flow state

Several studies have shown that task skill and task challenge for experiencing an e-store are critical in encouraging customers to remain with the e-store for online shopping (Engeser and Rheinberg, 2008; Guo & Poole, 2009). This is because both issues are the determinants of shopping enjoyment and a means to avoid boredom. Specifically, TAM and flow theory are a theoretical basis to identify several drivers for examining online unplanned purchases through flow state, with flow state defined as a multi-dimensional nature, enjoyment, control, and concentration (Koufaris, 2002). These drivers include task skill, task challenge, value-added search mechanism, and product involvement. The findings reported that two personal traits, task skill and task challenge, have an important effect on a consumer's flow state.

For the role of task skill, one study proposed a research mode with flow state as a major mediator to examine online impulse buying through the multiple sets of drivers (Wu et al., 2016). These drivers comprise task, website design, and trust related attributes for linking to flow state. The results reported that task skill, one of task attributes, indicates a significant effect on flow state. Hoffman and Novak (1996) argued a number of sets of the major concerns to relate to flow state, including task, interactivity, telepresence, and focused attention related attributes, in a computer-mediated communication channel. Their findings showed that task challenge, one of task attributes, is an important factor in determining flow state. Accordingly, a hypothesis is proposed as below.

H6. Task skill is positively related to flow state in online shopping.

For the role of task challenge, one study discussed the importance of flow state in using a computer-mediated system through the mediator of task component from web technology related drivers, such as website design and interactive speed (Finneran & Zhang, 2005). This study designed an experimental scenario in using web sites to find how task challenge influences the degree of flow experience. Further study attempted to develop a research model for investigating flow state in online hotel booking operations in terms of defining the antecedents and consequences (Bilgihan et al., 2014). These drivers include clear goal, task challenge, web design (interactivity, vividness, perceived usefulness), and media richness when consequences indicate user satisfaction, intention to use, brand equity, and purchase intent. The findings reported that task challenge is a key precursor to foster flow state in the process. Thus, we argue the hypothetical link below.

H7. Task challenge is positively related to flow state in online shopping.

3.4. Links for flow and satisfaction

To link flow state to satisfaction, online customers may be enjoying a sudden purchase decision and then may see something relating to e-stores that would give greater satisfaction (Ali, 2016). That is, online customers may tend to reduce complexity of the decision process in order to develop a positive attitude toward using e-stores. Many studies have shown a positive link for flow state to customer satisfaction in using online stores (Hsu, Chang, & Chen, 2012; Sharma & Sharma, 2019). One study proposed a research framework with three stages of influence based on the Stimulus-Organism-Response concept to examine online purchase intention (Hsu et al., 2014). The research model comprises the drivers of e-store features for an effect on the mediator of flow state with the targets of customer satisfaction and purchase intention. A link between flow state and satisfaction was found with positive significance.

Another study developed a research model to examine online purchase intention in the hotel industry in terms of defining a relationship structure with the drivers of website quality through the mediators of flow state and customer satisfaction for the purchase purpose (Ali, 2106). Flow state was found to be an important precursor of customer satisfaction. There is also a relationship structure for indicating shopping enjoyment (a type of flow experience) and rational responses as two mediators to the target of customer satisfaction from personal and technological drivers (Rose, Clark, Samouel, & Hair, 2012). Shopping enjoyment has a positive effect on customer satisfaction. A link for flow state and satisfaction can be hypothesized.

H8. Flow state is positively related to customer satisfaction in online shopping.

Several studies have shown customer satisfaction to be linked to flow state with a robust relationship for a consumer's impulse buying behavior (Parboteeah et al., 2009; Verhagen & van Dolen, 2011). A research model has defined tour guide performance as the driver for the mediators of credibility trust, benevolence trust, and tourist satisfaction, in examining the target of a tourist's shopping behavior as well as a moderator of flow state for the relationship between satisfaction and shopping behavior (Chang, 2014). The moderating relationship implies a potential link for tourist satisfaction to flow state. The results reported a positive significance for their moderation relationship.

A similar study attempted to explore acceptance-discontinuance abnormality phenomenon for using social network-site games (SNG) (Chang, 2013). It proposed a research model with interaction and value as the antecedents of user satisfaction and flow state for their effects on SNG continuance when user satisfaction also indicates a link to flow state. The results revealed the importance of flow state with a link from user satisfaction and to SNG continuance. An integrated model with task and mood-relevant environmental cues (i.e., web characteristics and product information) has examined online impulse buying as considering shopping enjoyment (a type of flow state) and perceive usefulness for two mediators (Parboteeah et al. (2009). As defined in ECM, perceived usefulness is a well-known determinant of customer satisfaction. We may argue for an indirect link for customer satisfaction to flow state. Accordingly, a hypothetical link is defined.

H9. Customer satisfaction is positively related to flow state in online shopping.

3.5. Links with impulse buying

A study proposed a research model for examining online impulse buying in terms of considering three drivers, antecedents of flow state, technology use, and trust, and flow state as a mediator to the target of impulse buying (Wu et al., 2016). That study reported an important effect for the link of flow state to impulse buying. Another study examined online unplanned purchase behavior in terms of a relationship structure of relevant factors, including antecedents (e.g. product involvement and web skills), mediators (e.g. flow state and perceived usefulness) (Koufaris, 2002). An important effect was found for a link of flow state to online impulse buying. Further research integrated two main drivers, task-relevant cues and mood-relevant cues, with two key

mediators, perceive usefulness and perceived enjoyment, for considering urge to buy impulsively as a research structure (Parboteeah et al., 2009). Task-relevant cues are of a cognitive nature as mood-related cues indicating an affective nature for evaluating the execution of online activities. In that study, they showed an important link between perceived enjoyment (a type of flow state) and online impulse buying. Thus, a hypothesis is proposed.

H10. Flow state is positively related to impulse buying in online shopping.

Customer satisfaction with online stores is critical in determining shopping on e-stores in addition to product quality and other product information. Thus, if customers have a positive experience using an e-store, they will be more likely to make an online purchase (Wells et al., 2011; Zheng et al., 2019). There is a relationship structure for how website cues, such as product availability and visual appeal, influence mediating factors, such as user gratification or satisfaction and normative evaluation, and thereby influence the target of online impulse buying (Liu et al., 2013). Those results showed user satisfaction having a positive and significant influence to online impulse buying. In addition, a conceptual model has been proposed for investigating online impulse buying according to the driver of e-service quality and mediator of customer satisfaction (Bressolles, Durrieu, & Giraud, 2007). In that study, e-service quality includes information, ease of use, website design, reliability, security/privacy, and interactivity/personalization. The results showed an important link between customer satisfaction and online impulse buying. Accordingly, we propose the following hypothesis.

H11. Consumer satisfaction is positively related to impulse buying in online shopping.

4. Research design

4.1. Instrument design

The instrument contains five parts, as indicated in Appendix A. The first part, using a nominal scale, collects the basic information about consumer characteristics related to online impulse shopping, including gender, age, education, occupation, online shopping experience, and online impulse buying experience. The others, using a 7-point Likert scale. For ECM, e-store performance confirmation, perceived usefulness, and satisfaction are adapted from the scales developed by Bhattacherjee (2001b) and Koufaris (2002), each including four items. For perceived risk, it is defined with four attributes, finance, product, recommendation, and security, and are adapted from the scales defined from Kim et al. (2008) and Chiu et al. (2014), including 4 items. For flow theory, task skill and challenge are measured by scales adapted from Koufaris (2002), with 4 items for each. Flow state is defined as a second-order formative structure, including enjoyment, control, and concentration. It is adapted from the instruments developed by Koufaris (2002) and Guo and Poole (2009), with three items for each. For online impulse buying, it is measured from the definitions adapted by both Rook and Fisher (1995) and Parboteeah et al. (2009), with 3 items. In addition, gender is a control variable.

4.2. Sample design

Since this study examines consumer behavior in online impulse buying, qualified subjects ae defined in the particular context. Subjects may be defined as relating to recent impulsive purchases in online stores. Their shopping experience is limited to the past three months, so subjects clearly recall a recent shopping experience as a basis to complete questionnaires. This manipulation guarantees that all subjects can consistently reflect their online shopping experience for research constructs. Without this manipulation, subjects may lose their focus for clearly reflecting perceived experience from a number of impulse buying, that is, a mixed manner. Therefore, this manipulation avoid bias in data collection. Pizzutti and Fernandes (2010) took a similar approach to report subjects' perception of experience with online shopping.

An online survey is used to collect empirical data. It has several advantages for our use since it is consistent with the context, not limited by location and time, and has lower cost and quicker response time (Denscombe, 2006). However, random sampling is difficult in an online survey since most sampling procedures are self-selected for a non-probability sampling, such as convenience sampling. To reduce the impact of data collection procedure, this questionnaire is posted on several larger online communities simultaneously, such as Youthwant and Facebook. In addition, a sampling design is proposed for improving sample representativeness. A total of 24 slots are defined in time intervals of one hour on a daily basis for each community and all customers in a time slot were potential subjects in this survey. Data collection lasted for three weeks, after which, subjects were randomly drawn from 24 time slots on a daily basis for a better variety of online community sources.

This procedure covers a wider variety of data sources and allows the response sample to be more representative for its population. Public notice of this survey was published in a number of popular forums and social communities. To motivate online users with impulse buying experience participating in this survey, 30 participants were drawn randomly from the response sample for a reward of 5 US dollars after this survey. The rewards were selected from e-mail addresses collected during the online survey.

4.3. Data collection

Initially, a pretest for the scale was conducted by selected practitioners and academicians, including translation, wording, structure, and content. Their comments are used to improve the scale for warranting content reliability and validity to an acceptable level. After that, this online survey was conducted for a period of November and December, 2018. All participants are voluntary for this survey and 405 responses are received in total. Of these, 53 were deleted due to lack of impulse buying experience, resulting in a valid sample size of 352. Table 1 shows the demographics. Most of the respondents are female, under 30 years of age, and with higher education. This is consistent with our common knowledge that online consumers are generally younger and higher education than conventional consumers. Moreover, students are recognized to be a good representativeness of online shoppers.

4.4. CMV and sample representative

Common method variance (CMV) is a cause of bias in a survey and it may occur due to subjective judgement provided by using the same rater for both predicting and target variables (Podsakoff, MacKenzie, Lee, & Podsakoff, 2003). CMV is tested by the correlation marker technique, with a confirmatory factor analysis (Sharma et al. 2009, Williams et al. 2010). The AMOS tool, as described below, is used for further data analysis. This approach creates a marker variable linked to all indicators of substantive variables. CMV information is found from a comparison of the variances of all indicators of substantive variables (R_1^2) and the marker variable (R_2^2) as R_1 and R_2 are the factor loadings of the two types of variables. The findings show a contrast for average variances of all indicators of substantive variables (0.927) and all indicator of the marker variable (0.015). The ratio for their average variances is approximately 62 and all factor loadings of the marker variable indicate no statistical significance. Thus, in terms of both results of the marker variable, CMV is not a concern.

Although this study uses a particular sampling design to improve sample representativeness, however, a non-parametric test, the Mann-

Table 1
Demographics with sample size = 352.

Characteristics	Frequency	Percent (%)
Gender		
Male	110	31.25
Female	242	68.75
Age (Years)		
< 20	118	33.52
20–30 (less than)	164	46.59
30–40 (less than)	53	15.05
40–50 (less than)	12	3.40
≧50	5	1.44
Education level		
High school	141	40.15
College	187	53.01
Graduate	24	6.84
Occupation		
Student	130	37.13
Service	74	20.95
Manufacturing	38	10.74
Government	34	9.89
Teaching	36	10.17
Soldier	16	4.55
Others	24	6.57
Online impulse experience (Years)		
< 1	59	16.82
1–3 (less than)	141	40.25
3–5 (less than)	102	28.87
5–7 (less than)	36	10.39
≧7	12	3.67
Online impulse experience		
Yes	352	85.43
No	60	14.57

Whitney rank-sum test, can be used for a further confirmation. This study splits the response sample into two independent sub-samples according to a random sampling procedure with ordinal data (Hair, Black, Babin, & Anderson, 2010). The two sub-samples were tested for their correlation in terms of several individual properties, including age, education, and occupation. All the correlations show no significant difference, indicating independence, so the response sample is well representative of its population.

5. Measurement model

This study uses structural equation modelling (SEM) with AMOS 22.0 tool to assess the measurement model. AMOS-SEM is a covariance-based rather than a component-based approach (i.e., PLS-SEM), using maximum likelihood estimation (MLE) to analyze a model with multi-level structural equations (Qureshi & Compeau, 2009). It is also preferable for meeting some statistical assumptions, such as sample size, multivariate normality and multicollinearity. Further, with a new version of AMOS-SEM (Version 22.0), it can be used to handle both formative and reflective structures. This study defines flow state as a second-order formative structure. Therefore, it has higher accuracy of parameter estimation than PLS-SEM.

For the assumption of multivariate normality, when there are four endogenous variables in the research model, a plot-based analytical procedure may not be easily identified with multiple dimensions. We adopt the Royston's H test with combining the Shapiro-Wilk univariate test for each of the four variables (Looney, 1995). The testing results show a conclusion of accepting multivariate normality for the four variables. For multicollinearity, the variance inflation factor (VIF) is the criteria for finding the connection of four exogenous variables (Diamantopoulos & Siguaw, 2006). The VIF of 1.52 is well below the threshold of 3.33 for a non-multicollinearity. For sample size, MLE theoretically requires at least 5 times of the total number of measurement items (Hair et al., 2010). Thus, 352 valid responses in this study are sufficient for executing MLE analysis.

Afterwards, the measurement model is examined by two steps, model-fit and scale validation. First, the criteria for a good model-fit include: chi-square/degrees of freedom ($\chi 2$/df) less than 5, Tucker-Lewis index (TLI) and comparative fit index (CFI) greater than 0.9, and root mean square error (RMSE) less than 0.10 (Hair et al., 2010). Further, scale validation considers reliability and validity. Construct reliability uses Cronbach's α larger than 0.8. Validity includes convergent and discriminant validity. The former is assessed by three criteria: item loading (λ) larger than 0.7, composite reliability larger than 0.8, and average variance extracted (AVE) larger than 0.5 (Chin, 1998). The latter is confirmed when the square root of AVE for each construct is larger than its correlations with other constructs.

The testing results show a good model-fit for the indices of $\chi 2$/df (3.22), TLI (0.92), CFI (0.94), and RMSE (0.07). For reliability and convergent validity, Cronbach's α are all larger than 0.8. Item loadings range from 0.74 to 0.92, composite reliabilities range from 0.81 to 0.90, and AVEs range from 0.66 to 0.83, as indicated in Table 2. Table 3 reports the correlation matrix for discriminant validity. Each construct's square root of AVE is greater than its correlations with other constructs. These results indicate both reliability and validity in a highly acceptable level. The detailed information for factor loading analysis is reported in Appendix B.

6. Hypotheses testing

The structural model is analyzed by AMOS tool. First, a model-fit for this model is examined and found to have good model-fit, as discussed in the measurement model. Then, path coefficients for this model and coefficients of determination for endogenous variables are found. When there is a recursive relationship for two variables, consumer satisfaction and flow state, the testing procedure is performed twice for each of the two direction separately. The two path coefficients for the recursive relationship are slightly different ($\beta = 0.37$ vs. 0.30 with $p < 0.01$) as the rest of path coefficients are similar with their sizes for the two executions. The results are reported in Fig. 2.

Table 2
Descriptive statistics, reliability and convergent validity.

Construct	Items	Mean	S.D.	Item loading	Cronbach'α	Composite Reliability	AVE
E-store performance (EP)	4	5.63	1.22	.80-.89	.87	.86	.79
Perceived usefulness (PU)	4	4.60	1.35	.79-.88	.84	.84	.76
Satisfaction (SF)	4	5.67	1.29	.78-.87	.86	.85	.79
Perceived risk (PR)	4	5.25	1.30	.77-.89	.83	.81	.66
Task skill (TS)	4	5.39	1.23	.81-.87	.88	.86	.78
Task challenge (TC)	4	5.51	1.26	.78-.89	.86	.84	.76
Enjoyment (EJ)	3	5.86	1.19	.86-.91	.90	.89	.81
Control (CT)	3	5.06	1.35	.74-.85	.83	.82	.73
Concentration (CC)	3	4.85	1.32	.84-.92	.91	.90	.83
Impulse buying (IB)	3	4.72	1.45	.77-.89	.87	.84	.76

Table 3
Discriminant validity.

Construct	EP	PU	SF	PR	TS	TC	EJ	CT	CC	IB
EP	**.89**									
PU	.41	**.87**								
SF	.21	.49	**.89**							
PR	.16	−.43	−.36	**.81**						
TS	.09	.23	.23	−.18	**.88**					
TC	.11	.25	.22	−.16	.23	**.87**				
EJ	.14	.24	.17	−.19	.38	.43	**.90**			
CT	.15	.23	.20	−.10	.37	.41	.23	**.85**		
CC	.13	.22	.19	−.17	.37	.40	.25	.20	**.94**	
IB	.18	.28	.47	−.20	.19	.21	.45	.44	.45	**.87**

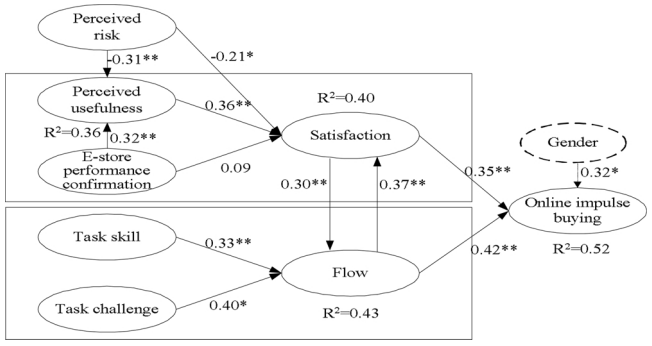

Fig. 2. Results of the structural model.
*: $p < 0.05$, **:$p < 0.01$.

For ECM issue, e-store performance conformation has a positive and significant effect on perceived usefulness and not on consumer satisfaction ($\beta = 0.32$ at $p < 0.01$ and 0.10), supporting H1 and not supporting H2. Perceived usefulness indicates an important determinant to consumer satisfaction, supporting H3 ($\beta = 0.36$ at $p < 0.01$). For perceived risk issue, it has a negative and significant impact on perceived usefulness and consumer satisfaction ($\beta = -0.31$ at $p < 0.01$ and -0.22 at $p < 0.05$), supporting H4 and H5. For flow state issue, task skill strongly affects flow state ($\beta = 0.33$ at $p < 0.01$). Task challenge also shows the same degree of influence ($\beta = 0.40$ at $p < 0.01$). Thus, both H6 and H7 are supported. For flow state and satisfaction, flow state has a positive and significant effect on consumer satisfaction ($\beta = 0.37$ at $p < 0.01$) and the opposite link has similar degree of influence ($\beta = 0.30$ at $p < 0.01$). Thus, both H8 and H9 are supported. Further, flow state shows a positive and significant effect on online impulse buying ($\beta = 0.42$ at $p < 0.01$) and consumer satisfaction has same degree of influence on online impulse buying ($\beta = 0.35$ at $p < 0.01$). Thus, both H10 and H11 are supported. In addition, gender as a control variable is significant in making distinction of online impulse buying. Finally, flow state is defined as a second-order structure with three sub-constructs, enjoyment, control, and concentration, all reporting significant path weights (W = 0.82, 0.78 and 0.81 at $p < 0.01$).

7. Results

As online impulse buying is an unplanned individual behavior having a strong interaction with e-stores for spontaneous purchases, we therefore identify a particular shopping process for the purpose. This process comprises three important components in this context, perceived risk, e-store design, and psychological state. Further, e-store design is defined according to ECM and psychological state according to flow state. The overall results show a high predictive power of 52 % for online impulse buying behavior ($R^2 = 0.52$). The following discusses the possible reasons behind these findings.

For ECM issue, e-store performance confirmation has an important link to perceived usefulness (H1), but it is opposite to consumer satisfaction with e-stores (H2). Further, perceived usefulness is a significant precursor for consumer satisfaction (H3). The reasons for these may be discussed below. For H1 and H3, since online purchases are through a complex interaction with e-stores, performance confirmation (initial-adoption belief), such as product information and visual appeal, is important for indicating the usefulness of e-stores (post-adoption belief) for finding favorite products. A customer's subsequent positive belief in the usefulness of an e-store can lead to a positive attitude toward an improved shopping experience, thereby increasing consumer satisfaction for that e-store. For H2, a direct link with statistical significance has not been reported for e-store performance confirmation and consumer satisfaction, though an indirect link with statistical significance occurs through the mediator of perceived usefulness. This may be due to the following reasons. E-store performance confirmation is more complex for an impulse buying than for a general online shopping. Further, the design of e-stores may be mainly focused on general online shopping and pay little attention to the particular requirements of impulse buying. Online customers may not clearly find satisfaction with e-stores directly and instead, need first to carefully evaluate e-stores to recognize perceived usefulness for a further creation of satisfaction.

For perceived risk issue, perceived risk is important because it negatively influences perceived usefulness and consumer satisfaction (H4 and H5) with e-stores for online impulse buying. For H4 and H5, shopping with e-stores in general and impulse buying in particular are generally associated with more risk than shopping with physical stores. This perception of risk reduction can lead to a perception of e-stores as useful and satisfactory for online shopping. This finding is particularly important in online impulse buying since there is a greater uncertainty for customer's perception than with general online shopping.

For flow state issue, task skill and task challenge (H6 and H7) are both important for the occurrence of flow state, as explained below. For H6 and H7, although online impulse buying is an unplanned behavior that occurs during browsing, an important purpose is also to search for appropriate products from a spontaneous need to match some purchase conditions, such as quality and cost. Basically, this is a challenge for the shopping task, which can further create a positive emotional response (a flow state) from the task challenge. The more confident that consumers feel with a task challenge, the more likely it is for them to enjoy the shopping experience. Next, if online consumers enjoy a shopping challenge in terms of a match with a self-confidence of website/task skill to perform the shopping task well, this would lead to a positive emotional reaction (a flow state) from task skill.

For H8 and H9, there is an important recursive relationship for flow state and customer satisfaction, as discussed below. It is reasonable that an emotional state (a flow state) may first arise for the potential effect on a further normative evaluation (satisfaction), in this case, for the context of online impulse buying. When consumers have a sudden intention for an emotional response to an online purchase, impulse buying is always associated with a certain degree of uncertainty toward shopping decisions. At the same, consumers may also intend to reduce uncertainty of a decision with a normative evaluation of online stores in a rational manner. The normative evaluation of the decision may provide helpful information for a motivation to further fine-tune the emotional response. This process therefore indicates a dynamic nature for flow state and satisfaction.

The reasons for H10 and H11 are as follows. Online customers intend to be within the roles of a system user and an impulse buyer for a shopping on e-stores. Thus, an evaluation of e-store use with satisfaction and an involvement of sudden compulsion of purchases with enjoyment can be considered two important precursors for online impulse buying. The link of customer satisfaction to online impulse buying has not been defined in the literature. Further, gender is important in distinguishing online impulse buying. Male or female consumers have different interactional approaches, such as in finding a favorite product.

Finally, the flow state for online impulse buying is a complex concept that is difficult to measure. This study defines it as a second-order formative structure, including three indicators, which is appropriate to better understand its role in online impulse buying.

8. Discussions

The findings of this research indicate several particular views in general and in particular which are quite different from existing literature. The general views are mainly from both the relationship structure of the research model, integrating three issues of perceived risk, ECM, and flow theory for a complete consumer's concern of different issues and the research context for defining a unique purchase process in online impulse buying. Part of the three issues, ECM or flow state, may have been widely discussed for their effect on general online shopping, but not many on particular online impulse buying. Their findings reported that ECM with technological aspect or flow state with individual aspect generally is an important concern for general online shopping or impulse buying (Floh & Madlberger, 2013; Hsu et al., 2015; Tsao, 2013). Further, perceive risk has not been found for the importance in determining online impulse buying when being popular in online shopping (Chen et al., 2019; Pee et al., 2018).

In particular, the relationships for ECM related variables, such as performance confirmation with both perceived usefulness and user satisfaction, were well reported on previous studies in online shopping with the target of repeat purchase when few studies were found on impulse buying (Hsu et al., 2015; Lu et al., 2019). Their findings deviated from the current studies in impulse buying when performance confirmation indicates an insignificant link to user satisfaction. Perceived risk in online shopping was often found for the importance of its role when the current study also showed importantly in impulse buying (Marin et al., 2015; Lu et al., 2019). For flow state related variables, few studies have reported the relationships of task skill and task challenge with flow state in terms of the goal of reaching a balance of executing a shopping task (Wu et al., 2016). Existing research may consider other issues, such as interactivity and telepresence, for their effect on flow state in computer-mediated communication (Finneran & Zhang, 2005; Hoffman & Novak, 1996).

For flow state and satisfaction, they were defined as emotional and cognitive views of consumers in impulse buying respectively. There is a recursive relationship between them with a finding of significance. Extant literature has lacked a discussion of such a particular relationship and found only a one-way influential direction (Parboteeah et al., 2009; Rose et al., 2012). For the antecedents of impulse buying, several studies have shown similar findings with the current study for a significant link of flow state to impulse buying (Parboteeah et al., 2009; Wu et al., 2016). Further, there are few studies for indicating the link between satisfaction and impulse buying as similarly defined in the current study. Most studies for the link were only found in regular online shopping and their results are consistent with the current study in impulse buying (De Silva & Yan, 2016).

8.1. Academic implications

We propose three key issues, e-store design, perceived risk, and psychological state, for determining online impulse buying when this behavior mainly underlies a consumer's interaction with e-stores. Then, ECM and perceived risk as well as flow theory are particularly applied to define the three particular issues. To the best of our knowledge, this research model is new and particularly applicable to online impulse buying issue. In particular, this mode is founded on a particularly defined purchase process for including three sequential stages. The first is for an evaluation of perceive risk for shopping in e-stores. The next is a willingness for being able to use e-stores for shopping. Finally, a shopping enjoyment is perceived from the challenge of impulse buying. It may be recognized as a new theoretical basis for defining relevant studies in the future. This study also proposes a recursive relationship between consumer satisfaction (a type of rational reaction) and flow state (a type of emotional response) when previous studies considered their relationship only in a single direction. This provides a new approach for concerning both types of reactions to online impulse buying. In sum, both concerns are important for this type of shopping research.

8.2. Managerial implications

There are several important practical implications. The dyadic nature of online impulse buying is defined particularly in this study, indicating the importance of both e-store design and flow state issues for effectively enhancing the motivation of impulse purchase behavior. Although online impulse buying is essentially a customer's behavior for an emotional response to a stimulus by preferred products from e-stores, a rational response to an e-store with matching IT self-efficacy arises from a normative evaluation of these features. The findings would provide practitioners for a guide to design an e-store to be effective and preferable to their customers.

Specifically, a design for a high e-store performance comprises a variety of system features, such as a rich and helpful information for products, a powerful navigation mechanism, appealing e-store appearance, and a prompt feedback mechanism. This would greatly improve customer's perception of the usefulness of e-stores for a better shopping. One particularly important finding is that current performance of e-store design cannot satisfy customers since the design may mainly focus on a general online shopping perspective, overlooking an online impulse buying. This provides an important contribution for practitioners to improve e-store design. From a perceived risk perspective, customers may need to find reliable information from e-stores, such as recommendations and brand image, to reduce shopping risk. E-store design may be able to support finding richer information for the verification purpose.

From an emotional perspective, a shopping task may closely relate to the content design of an e-store, such as finding appropriate products for a sudden need, which can be a great challenge for online consumers. Content design with task challenge may relate to a large variety of product finding mechanisms to support matching constant or spontaneous needs in order to raise the motivation of impulse buying. Next, matching shopping challenge entails the requirements of skills/knowledge, such as product profiles, product values or market responses, and computer self-efficacy, when these skills can be supported by content design of e-stores. These skills could greatly increase continuous staying with online shopping activities despite increased shopping challenge. In sum, the three issues proposed in this study with their empirical results provide deep insight for creating a well-designed e-store that can motivate online impulse buying. To best of our knowledge, these findings and managerial implications for e-store design are new and important in practice.

8.3. Limitations and future research directions

Although there are important findings for this research, however, several limitations to this study should be noted. The first is the randomness of the online sampling procedure. However, we have improved the sampling procedure with a particular approach and further conducted a representative test for the response sample to its population with a high improvement. Further, 68.75 % of subjects are female, which differs from the general population distribution and may bias the findings. However, if women are indeed more likely to shop online than men, this would, in essence, reflect the actual phenomenon.

Future research, in general, can be extended to include other perspectives, such as fashion style for product, media communication, and culture to better understand impulse buying behavior (Xiang, Zheng, Lee, & Zhao, 2016). In particular, when being an extension of e-store design issue in the current study, several technology-use models for this

issue can be considered as alternatives to identify different important concerns for impulse buying behavior, such as the uses and gratifications theory, IS success model (Delone and McLean, 2003), and theory of planned behavior (Ajzen, 1991) and their extensions. Flow state can be extended by a hedonic model with internal and external motivation.

9. Conclusions

This research for impulse buying focuses on an individual perspective with a general shopping platform for three major issues to define a particular purchase process, risk evaluation, e-store design with ECM for technological concern, and psychological state with flow state. A mixed perspective with personal and social influences, can be proposed for relevant issues to define a similar purchase process. A well-known theory, decomposed theory of planned behavior (DTPB) is a theory to define these issues in a combination, such as computer self-efficiency with perceived behavioral control, technology concerns with attitude, and peer or social influence with subjective norm (Shih & Fang, 2004). Next, a product related perspective, may be extended for an inclusion with the above perspectives. This perspective can be widely to include, brand related attributes, such as brand image and brand equity or product related attributes, such as product quality and product experience.

The shopping platforms also indicate a uniqueness for customers to interact different communication channels as doing online shopping, such as social media and mobile device. For social media platform, the determinants for consumer purchase behavior are most likely to be defined based on socialization process. The socialization process is developed from a procedure of accumulating expertise and knowledge from receiving arguments, advertisement, recommendations and so on (Sabermajidi, Valaei, Balaji, & Goh, 2019). This process would play a key role for motivating impulse buying except for the concerns of individual and product related perspectives.

In general, the proposed perspectives for determining influential issues can be classified as two types, affective and cognitive. We argue a recursive relationship for the particularity of consumer user satisfaction and flow state. It also shows a great enhancement of the predictive power in impulse buying. Few studies have proposed this relationship structure since impulse buying is often recognized as an unplanned and spontaneous buying experience. In other words, vendors may know consumers better for their shopping attitudes and intentions in advance as opposed to only considering emotional state. The findings provide a new thinking for considering the importance of rational concerns to be able to help vendors design effective promotional activities. The relationship structure is a new direction for the research of impulse buying. Further, this study proposes a particular sampling method to improve the randomness of convenience sampling by an online survey. Most online survey is inherent in lacking a sampling procedure to improve sample representativeness to the population. This procedure is a contribution for providing a new direction of data collection from online survey.

Next, managers and designers of e-stores should consider these concerns of consumers, including ECM related features, perceived risk for products or referrals in online media, and flow experience, to effectively guide the design of e-stores, such as navigation mechanisms, procedures for product certification or clarification of online referrals, and mechanisms for raising the challenge of shopping tasks. These findings would provide a complete and concrete directions for practitioners. Accordingly, a more attractive design for e-stores would increase online impulse buying. Moreover, a strategy for effectively managing e-stores could be developed in terms of both rational and emotional concerns, such as e-store credibility, product image, and marketing effort.

CRediT authorship contribution statement

Ing-Long Wu: Conceptualization, Methodology, Supervision, Project administration, Validation. **Mai-Lun Chiu:** Writing - review & editing, Data curation, Formal analysis. **Kuei-Wan Chen:** Writing - original draft, Investigation, Visualization.

Appendix A. Questionnaire

Part I: Basic information

Gender: ☐Male ☐Female
Age (year): ☐ < 20 ☐20–30 (less than) ☐30–40 (less than) ☐40–50 (less than) ☐≧50
Education level: ☐High school ☐College ☐Graduate
Occupation: ☐Student ☐Service ☐Manufacturing ☐Government ☐Teaching ☐Military service ☐ Others
Online impulsive experience (year): ☐ < 1 ☐1–3 (less than) ☐3–5 (less than) ☐5–7 (less than) ☐≧7
Online impulsive experience: ☐Yes ☐No

Part 2: Perceived risk (PR 1-4)

1 Purchasing on e-stores would involve more financial risks (e.g., fraud).
2 Purchasing on e-stores would involve more product risks (e.g., defective product).
3 Purchasing on e-stores would involve more inaccurate referrals from online media.
4 Purchasing on e-stores would involve more security problems in communications.

Part 3: E-store design

Perceived usefulness (PU 1-4)

1 E-stores enable me to find the products easily that I am looking for.
2 E-stores enable me to access a rich product information for my comparison.
3 E-stores enable me to access useful product information for my decision.
4 E-stores enable me to accomplish transactions quickly for my purpose.

Performance confirmation (EP 1-4)

1 My experience on using e-stores is better than what I expected

2 My experience for navigating e-stores is better than what I expected
3 The product information provided by e-stores is better than what I expected
4 The feedback for my queries provided by e-stores is faster than what I expected.

Satisfaction (SF 1-4)

1 I feel gratified with using e-stores for shopping.
2 I feel contented with using e-stores for shopping.
3 I feel delighted with using e-stores for shopping.
4 I feel comfortable with using e-stores for shopping.

Part 4: Psychological state

Task skill (TS 1-4)

1 I know how to find what I want for shopping on e-stores.
2 I know how to solve it when I have a problem about using e-stores for shopping.
3 I am very skilled at using e-stores for shopping.
4 I know more with product profile about using e-stores for shopping.

Task Challenge (TC 1-4)

1 Using e-stores for shopping challenges me for my competence.
2 Using e-stores for shopping challenges me to perform the best of my ability.
3 Using e-stores for shopping provides a good test of my skill.
4 Using e-stores for shopping stretches my capability to the limit.

Flow state

Enjoyment (EJ 1-3)

1 Browsing e-stores for shopping is fun to me.
2 Browsing e-stores for shopping is my favorite activity.
3 Browsing e-stores for shopping is much to entertainment of me.

Control (CT 1-3)

1 When I browse e-stores for shopping, I don't feel complicated for what to do.
2 When I browse e-stores for shopping, I feel encouraged for what to do.
3 When I browse-stores for shopping, I feel calm for what to do.

Concentration (CC 1-3)

1 When I browse e-stores for shopping, I am not aware of distractions.
2 When I browse e-stores for shopping, I don't think about other things.
3 When I browse e-stores for shopping, my attention is focused on activity.

Part 5: Impulse buying (IB 1-3)

Online impulse buying

1 When shopping on e-stores, I often have the idea "buy now and think about it later".
2 When shopping on e-stores, I often buy things according to how I feel at the moment.
3 When shopping on e-stores, I often buy things without thinking.

Appendix B. Factor loading analysis

Results of factor loading analysis

Latent constructs										
Items	PR	PU	EP	SF	TS	TC	EJ	CT	CC	IB
PR1	**0.79**	0.42	0.19	0.39	0.21	0.29	0.28	0.26	0.22	0.12
PR2	**0.83**	0.31	0.30	0.42	0.31	0.26	0.15	0.28	0.25	0.19
PR3	**0.89**	0.45	0.25	0.37	0.24	0.23	0.21	0.32	0.23	0.20

PR4	**0.80**	0.39	0.13	0.40	0.18	0.31	0.29	0.30	0.311	0.23
PU1	0.25	**0.83**	0.28	0.26	0.28	0.32	0.38	0.31	0.35	0.23
PU2	0.37	**0.78**	0.35	0.28	0.31	0.30	0.39	0.28	0.29	0.18
PU3	0.32	**0.74**	0.34	0.38	0.28	0.31	0.32	0.33	0.30	0.21
PU4	0.31	**0.88**	0.39	0.33	0.31	0.36	0.32	0.25	0.27	0.27
EP1	0.21	0.37	**0.82**	0.30	0.28	0.31	0.29	0.32	0.31	0.14
EP2	0.35	0.29	**0.83**	0.29	0.31	0.38	0.31	0.28	0.31	0.20
EP3	0.37	0.35	**0.80**	0.33	0.30	0.32	0.29	0.26	0.30	0.25
EP4	0.30	0.36	**0.89**	0.37	0.19	0.26	0.33	0.35	0.29	0.18
SF1	0.31	0.28	0.27	**0.78**	0.23	0.31	0.31	0.38	0.32	0.38
SF2	0.28	0.22	0.29	**0.83**	0.25	0.29	0.42	0.29	0.27	0.42
SF3	0.29	0.21	0.30	**0.87**	0.18	0.27	0.39	0.32	0.41	0.32
SF4	0.33	0.26	0.30	**0.81**	0.31	0.28	0.41	0.35	0.36	0.41
TS1	0.35	0.29	0.29	0.23	**0.81**	0.27	0.29	0.34	0.40	0.15
TS2	0.28	0.30	0.32	0.25	**0.87**	0.32	0.27	0.37	0.41	0.21
TS3	0.21	0.35	0.35	0.31	**0.83**	0.31	0.36	0.38	0.42	0.23
TS4	0.27	0.32	0.38	0.29	**0.84**	0.21	0.35	0.42	0.39	0.30
TC1	0.22	0.30	0.36	0.28	0.29	**0.83**	0.35	0.39	0.43	0.31
TC2	0.26	0.29	0.31	0.32	0.28	**0.78**	0.25	0.45	0.23	0.26
TC3	0.34	0.36	0.32	0.29	0.29	**0.89**	0.32	0.35	0.44	0.19
TC4	0.31	0.38	0.30	0.31	0.33	**0.80**	0.41	0.34	0.35	0.31
EJ1	0.33	0.36	0.29	0.33	0.42	0.33	**0.88**	0.31	0.29	0.43
EJ2	0.30	0.29	0.29	0.30	0.29	0.36	**0.86**	0.22	0.34	0.39
EJ3	0.33	0.27	0.30	0.35	0.36	0.39	**0.91**	0.19	0.32	0.38
CT1	0.29	0.30	0.27	0.32	0.33	0.31	0.37	**0.79**	0.30	0.41
CT2	0.24	0.33	0.33	0.28	0.40	0.29	0.32	**0.74**	0.28	0.32
CT3	0.21	0.34	0.31	0.27	0.46	0.42	0.25	**0.85**	0.31	0.39
CC1	0.25	0.29	0.29	0.30	0.39	0.43	0.27	0.28	**0.84**	0.45
CC2	0.26	0.31	0.27	0.21	0.36	0.34	0.42	0.50	**0.86**	0.39
CC3	0.31	0.21	0.18	0.18	0.43	0.36	0.21	.28	**0.92**	0.42
IB1	0.19	0.31	0.25	0.41	0.33	0.23	0.51	0.46	0.41	**0.84**
IB2	0.29	0.33	0.24	0.34	0.25	0.28	0.47	0.53	0.42	**0.77**
IB3	0.28	0.19	0.34	0.40	0.29	0.32	0.40	0.43	0.39	**0.89**

References

Ajzen, I. (1991). The theory of planned behavior. *Organizational Behavior and Human Decision Processes, 50*(2), 179–211.

Aladwani, A. M. (2018). A quality-facilitated socialization model of social commerce decisions. *International Journal of Information Management, 40*, 1–7.

Alalwan, A. A., Rana, N. P., Dwivedi, Y. K., & Algharabat, R. (2017). Social media in marketing: A review and analysis of the existing literature. *Telematics and Informatics, 34*(7), 1177–1190.

Amos, C., Holmes, G. R., & Keneson, W. C. (2014). A meta-analysis of consumer impulse buying. *Journal of Retailing and Consumer Services, 21*(2), 86–97.

Bhatnagar, A., Misra, S., & Rao, H. R. (2000). On risk, convenience, and internet shopping behavior. *Communications of the ACM, 43*(11), 98–105.

Bhattacherjee, A. (2001a). An empirical analysis of the antecedents of electronic commerce service continuance. *Decision Support Systems, 32*(2), 201–214.

Bhattacherjee, A. (2001b). Understanding information systems continuance: An expectation confirmation model. *MIS Quarterly, 25*(3), 351–370.

Bilgihan, A., Okumus, F., Nusair, K., & Bujisic, M. (2014). Online experiences: Flow theory, measuring online customer experience in e-commerce and managerial implications for the lodging industry. *Information Technology & Tourism, 14*(1), 49–71.

Bressolles, G., Durrieu, F., & Giraud, M. (2007). The impact of electronic service quality's dimensions on customer satisfaction and buying impulse. *Journal of Customer Behaviour, 6*(1), 37–56.

Chan, T. K., Cheung, C. M., & Lee, Z. W. (2017). The state of online impulse-buying research: A literature analysis. *Information & Management, 54*(2), 204–217.

Chang, C. C. (2013). Examining users' intention to continue using social network games: A flow experience perspective. *Telematics and Informatics, 30*(4), 311–321.

Chang, K. C. (2014). Examining the effect of tour guide performance, tourist trust, tourist satisfaction, and flow experience on tourists' shopping behavior. *Asia Pacific Journal of Tourism Research, 19*(2), 219–247.

Chen, Y. S., & Chang, C. H. (2013). Towards green trust: The influences of green perceived quality, green perceived risk, and green satisfaction. *Management Decision, 51*(1), 63–82.

Chen, Q., Feng, Y., Liu, L., & Tian, X. (2019). Understanding consumers' reactance of online personalized advertising: A new scheme of rational choice from a perspective of negative effects. *International Journal of Information Management, 44*, 53–64.

Chen, Y., & Zhang, L. (2015). Influential factors for online impulse buying in China: A model and its empirical analysis. *International Management Review, 11*(2), 57.

Chin, W. W. (1998). The partial least squares approach to structural equation modeling. *Modern Methods for Business Research, 295*(2), 295–336.

Chiu, C. M., Wang, E. T., Fang, Y. H., & Huang, H. Y. (2014). Understanding customers' repeat purchase intentions in B2C e-commerce: The roles of utilitarian value, hedonic value and perceived risk. *Information Systems Journal, 24*(1), 85–114.

Csikszentmihalyi, M. (2008). *Flow: The psychology of optimal experience.* New York: HarperCollins Publishers.

De Silva, V., & Yan, J. (2016). Predictors of attitudinal outcomes in mobile advertising in Sri Lanka: An emerging market. *International Journal of Marketing Studies, 8*(3), 129.

Denscombe, M. (2006). Web-based questionnaires and the model effect: An evaluation based on completion rates and data contents of near-identical questionnaires delivered in different modes. *Social Science Computer Review, 24*(2), 246–254.

Delone, W. H., & McLean, E. R. (2003). The DeLone and McLean model of information systems success: a ten-year update. *Journal of management information systems, 19*(4), 9–30.

Dwivedi, Y. K., Kapoor, K. K., & Chen, H. (2015). Social media marketing and advertising. *The Marketing Review, 15*(3), 289–309.

Engeser, S., & Rheinberg, F. (2008). Flow, performance and moderators of challenge-skill balance. *Motivation and Emotion, 32*(3), 158–172.

Fastoso, F., Whitelock, J., Bianchi, C., & Andrews, L. (2012). Risk, trust, and consumer online purchasing behaviour: A Chilean perspective. *International Marketing Review, 29*(3), 253–275.

Finneran, C. M., & Zhang, P. (2005). Flow in computer-mediated environments: Promises and challenges. *Communications of the Association for Information Systems, 15*(1), 82–101.

Floh, A., & Madlberger, M. (2013). The role of atmospheric cues in online impulse-buying behavior. *Electronic Commerce Research and Applications, 12*(6), 425–439.

Foroudi, P., Gupta, S., Sivarajah, U., & Broderick, A. (2018). Investigating the effects of smart technology on customer dynamics and customer experience. *Computers in Human Behavior, 80*, 271–282.

Fu, S., Yan, Q., & Feng, G. C. (2018). Who will attract you? Similarity effect among users on online purchase intention of movie tickets in the social shopping context. *International Journal of Information Management, 40*, 88–102.

Guo, Y. M., & Poole, M. S. (2009). Antecedents of flow in online shopping: A test of alternative models. *Information Systems Journal, 19*(4), 369–390.

Hair, J. F., Black, W. C., Babin, B. J., & Anderson, R. E. (2010). *Multivariate data analysis.* Upper Saddle River, New Jersey: Pearson Education Inc.

Halilovic, S., & Cicic, M. (2013). Antecedents of information systems user behavior-extended expectation-confirmation model. *Behaviour & Information Technology, 32*(4), 359–370.

Hausman, A., & Siekpe, J. S. (2009). The effect of web interface feature on consumer online purchase intentions. *Journal of Business Research, 62*(1), 5–13.

Hoffman, D. L., & Novak, T. P. (1996). Marketing in hypermedia computer-mediated environments: Conceptual foundations. *Journal of Marketing, 60*, 50–68.

Hsu, C. L., & Lin, J. C. C. (2015). What drives purchase intention for paid mobile apps?: An expectation confirmation model with perceived value. *Electronic Commerce Research and Applications, 14*(1), 46–57.

Hsu, C. L., Chang, K. C., & Chen, M. C. (2012). The impact of website quality on customer satisfaction and purchase intention: Perceived playfulness and perceived flow as mediators. *Information Systems and e-Business Management, 10*(4), 549–570.

Hsu, M. H., Chang, C. M., & Chuang, L. W. (2015). Understanding the determinants of online repeat purchase intention and moderating role of habit: The case of online group-buying in Taiwan. *International Journal of Information Management, 35*(1), 45–56.

Huang, L. T. (2016). Flow and social capital theory in online impulse buying. *Journal of*

Business Research, 69(6), 2277–2283.
Jiang, Z., & Benbasat, I. (2005). Virtual product experience: Effects of visual and functional control of products on perceived diagnosticity and flow in electronic shopping. *Journal of Management Information Systems, 21*(3), 111–147.
Kamis, A., Koufaris, M., & Stern, T. (2008). Using an attribute-based decision support system for user-customized products online: An experimental investigation. *MIS Quarterly, 32*(1), 159–177.
Kang, Y. K., Hong, S., & Lee, H. (2009). Exploring continued online service usage behavior: The roles of self-image congruity and regret. *Computers in Human Behavior, 25*(1), 111–122.
Kaplan, L. B., Szybillo, G. J., & Jacoby, J. (1974). Components of perceived risk in product purchase: A cross-validation. *The Journal of Applied Psychology, 59*(3), 287.
Kapoor, K. K., Tamilmani, K., Rana, N. P., Patil, P., Dwivedi, Y. K., & Nerur, S. (2018). Advances in social media research: Past, present and future. *Information Systems Frontiers, 20*(3), 531–558.
Karjaluoto, H., Shaikh, A. A., Saarijärvi, H., & Saraniemi, S. (2019). How perceived value drives the use of mobile financial services apps. *International Journal of Information Management, 47*, 252–261.
Kim, M. J., & Hall, C. M. (2019). A hedonic motivation model in virtual reality tourism: Comparing visitors and non-visitors. *International Journal of Information Management, 46*, 236–249.
Kim, N., & Kim, W. (2018). Do your social media lead you to make social deal purchases? Consumer-generated social referrals for sales via social commerce. *International Journal of Information Management, 39*, 38–48.
Kim, D. J., Ferrin, D. L., & Rao, H. R. (2008). A trust-based consumer decision-making model in electronic commerce: The role of trust, perceived risk, and their antecedents. *Decision Support Systems, 44*(2), 544–564.
Koufaris, M. (2002). Applying the technology acceptance model and flow theory to online consumer behavior. *Information Systems Research, 13*(2), 205–223.
Lee, K., & Joshi, K. (2007). Customer satisfaction with technology mediated service encounters in the context of online shopping. *Journal of Information Technology Management, 18*(2), 18–37.
Li, C. Y., & Ku, Y. C. (2018). The power of a thumbs-up: Will e-commerce switch to social commerce? *Information & Management, 55*(3), 340–357.
Liu, Y., Li, H., & Hu, F. (2013). Website attributes in urging online impulse purchase: An empirical investigation on consumer perceptions. *Decision Support Systems, 55*(3), 829–837.
Looney, S. W. (1995). How to use tests for univariate normality to assess multivariate normality. *The American Statistician, 49*(1), 64–70.
Lu, C. C., Wu, I. L., & Hsiao, W. H. (2019). Developing customer product loyalty through mobile advertising: Affective and cognitive perspectives. *International Journal of Information Management, 47*, 101–111.
Luo, M. M., & Chea, S. (2018). Cognitive appraisal of incident handling, affects, and post-adoption behaviors: A test of affective events theory. *International Journal of Information Management, 40*, 120–131.
Martin, J., Mortimer, G., & Andrews, L. (2015). Re-examining online customer experience to include purchase frequency and perceived risk. *Journal of Retailing and Consumer Services, 25*, 81–95.
Oliver, R. L. (1980). A cognitive model of the antecedents and consequences of satisfaction decisions. *Journal of Marketing Research, 17*(4), 460–469.
Panigrahi, R., Srivastava, P. R., & Sharma, D. (2018). Online learning: Adoption, continuance, and learning outcome-a review of literature. *International Journal of Information Management, 43*, 1–14.
Parboteeah, D. V., Valacich, J. S., & Wells, J. D. (2009). The influence of website characteristics on a consumer's urge to buy impulsively. *Information Systems Research, 20*(1), 60–78.
Pee, L. G., Jiang, J., & Klein, G. (2018). Signaling effect of website usability on repurchase intention. *International Journal of Information Management, 39*, 228–241.
Pizzutti, C., & Fernandes, D. (2010). Effect of recovery efforts on consumer trust and loyalty in e-Tail: A contingency model. *International Journal of Electronic Commerce, 14*(4), 127–160.
Podsakoff, P. M., MacKenzie, S. B., Lee, J. Y., & Podsakoff, N. P. (2003). Common method biases in behavioral research: A critical review of the literature and recommended remedies. *Journal of Applied Psychology, 88*(5), 879–903.
Qureshi, I., & Compeau, D. (2009). Assessing between-group differences in information systems research: A comparison of covariance-and component-based SEM. *MIS Quarterly, 33*(1), 197–214.
Rook, D. W., & Fisher, R. J. (1995). Normative influences on impulsive buying behavior. *Journal of Consumer Research, 22*(3), 305–313.
Rose, S., Clark, M., Samouel, P., & Hair, N. (2012). Online customer experience in e-retailing: An empirical model of antecedents and outcomes. *Journal of Retailing, 88*(2), 308–322.
Sabermajidi, N., Valaei, N., Balaji, M. S., & Goh, S. K. (2019). Measuring brand-related content in social media: A socialization theory perspective. *Information Technology & People*. https://doi.org/10.1108/ITP-10-2018-0497.
Sharma, S. K., & Sharma, M. (2019). Examining the role of trust and quality dimensions in the actual usage of mobile banking services: An empirical investigation. *International Journal of Information Management, 44*, 65–75.
Shaw, N., & Sergueeva, K. (2019). The non-monetary benefits of mobile commerce: Extending UTAUT2 with perceived value. *International Journal of Information Management, 45*, 44–55.
Shiau, W. L., Dwivedi, Y. K., & Yang, H. S. (2017). Co-citation and cluster analyses of extant literature on social networks. *International Journal of Information Management, 37*(5), 390–399.
Shiau, W. L., Dwivedi, Y. K., & Lai, H. H. (2018). Examining the core knowledge on facebook. *International Journal of Information Management, 43*, 52–63.
Shih, Y. Y., & Fang, K. (2004). The use of a decomposed theory of planned behavior to study Internet banking in Taiwan. *Internet Research, 14*(3), 213–223.
Stieglitz, S., Mirbabaie, M., Ross, B., & Neuberger, C. (2018). Social media analytics–Challenges in topic discovery, data collection, and data preparation. *International Journal of Information Management, 39*, 156–168.
Tamilmani, K., Rana, N. P., Prakasam, N., & Dwivedi, Y. K. (2019). The battle of brain vs. heart: A literature review and meta-analysis of "hedonic motivation" use in UTAUT2. *International Journal of Information Management, 46*, 222–235.
Teng, C. I. (2011). Who are likely to experience flow? Impact of temperament and character flow. *Personality and Individual Differences, 43*(3), 983–990.
Trevinal, A. M., & Stenger, T. (2014). Toward a conceptualization of the online shopping experience. *Journal of Retailing and Consumer Services, 21*(3), 314–326.
Tsao, W. Y. (2013). Application of expectation confirmation theory to consumers' impulsive purchase behavior for products promoted by showgirls in exhibits. *Journal of Promotion Management, 19*(3), 283–298.
Verhagen, T., & van Dolen, W. (2011). The influence of online store beliefs on consumer online impulse buying: A model and empirical application. *Information & Management, 48*(8), 320–327.
Wang, Y., & Carolina, H. (2019). Does privacy assurance on social commerce sites matter to millennials? *International Journal of Information Management, 44*, 164–177.
Wells, J. D., Parboteeah, V., & Valacich, J. S. (2011). Online impulse buying: Understanding the interplay between consumer impulsiveness and website quality. *Journal of the Association for Information Systems, 12*(1), 32.
Wu, I. L. (2013). The antecedents of customer satisfaction and its link to complaint intentions in online shopping: An integration of justice, technology, and trust. *International Journal of Information Management, 33*(1), 166–176.
Wu, I. L., Chen, K. W., & Chiu, M. L. (2016). Defining key drivers of online impulse purchasing: A perspective of both impulse shoppers and system users. *International Journal of Information Management, 36*(3), 284–296.
Xiang, L., Zheng, X., Lee, M. K., & Zhao, D. (2016). Exploring consumers' impulse buying behavior on social commerce platform: The role of parasocial interaction. *International Journal of Information Management, 36*(3), 333–347.
Zhang, K. Z., Xu, H., Zhao, S., & Yu, Y. (2018). Online reviews and impulse buying behavior: The role of browsing and impulsiveness. *Internet Research, 28*(3), 522–543.
Zheng, X., Men, J., Yang, F., & Gong, X. (2019). Understanding impulse buying in mobile commerce: An investigation into hedonic and utilitarian browsing. *International Journal of Information Management, 48*, 151–160.

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