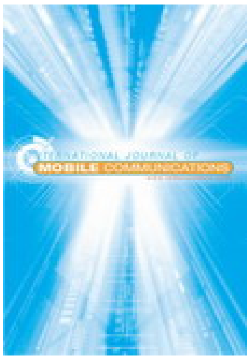

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Factors influencing utilitarian and hedonic mobile shopping experiences: Taobao as an example

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Factors influencing utilitarian and hedonic mobile shopping experiences: Taobao as an example

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Abstract: The past decade has witnessed the rapid growth of mobile shopping application usage. However, utilitarian and hedonic shopping experiences in the context of mobile shopping applications have seldom been studied. Drawing on the user experience (UX) design, this study establishes a research model to examine how the UX design factors, including visual design, interaction design, content design, and security design, influence utilitarian and hedonic shopping experiences on mobile shoppers. The results contribute to the existing limited knowledge of shopping experiences in the context of mobile shopping applications, elucidate the important implications for practice, and provide a fundamental framework for future research to conduct more comprehensive studies.

Keywords: user experience; hedonic shopping experience; utilitarian shopping experience; mobile shopping applications.

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1 Introduction

The past decade has witnessed the rapid growth of mobile shopping application usage, mainly due to the dramatic development in mobile shopping applications and the advancement of technology in smart devices (e.g., smartphones and tablets) (Baker-Eveleth and Stone, 2020; Chen and Koufaris, 2020; Zheng et al., 2019). A recent trend report in mobile shopping indicates that mobile shopping revenues in the USA continue to grow and have significantly increased every year from 41.71 billion in 2013 to 268.78 billion in 2019 (Clement, 2019). Indeed, shopping on mobile applications has gradually been an integral part of people's lives and has become one of the most prevalent commercial activities nowadays (Bilgihan et al., 2016; Zheng et al., 2019).

As the usage of mobile applications for shopping becomes widespread, it is essential to investigate and understand how the design features of these applications influence users' mobile shopping experiences. From user experience (UX) design point of view, prior studies on system and website development have identified four key successful UX design factors including visual design, content design, interaction design, and security design (Ganguly et al., 2010; Minge and Thüring, 2018; Yu and Kong, 2016). These four UX design factors may play an important role in influencing users' shopping experiences while using mobile shopping applications. However, little research on mobile shopping applications systematically considers all these factors into research models.

Mobile shopping applications are designed to be used on mobile devices which are different from desktop computers in terms of screen sizes, control methods, input types, and placing methods (Levin, 2014). For example, shoppers navigate mobile shopping applications and input data by swiping and touching the screens rather than by clicking a mouse or typing using physical keyboards. Moreover, since mobile shopping applications are designed for small screen devices, the small screen size limits the amount of content that can be displayed. As a result, the layout of mobile shopping applications is different from that of online shopping websites. Additionally, unlike desktop computers and laptop computers where users will put these devices on a desk, mobile devices are always used when users hold them.

Therefore, although prior studies have found that both utilitarian and hedonic shopping experiences are two primary shopping experiences that shoppers perceive while shopping physically or online (Chang and Chen, 2015; Kim and Hwang, 2012; Malik et al., 2017; Zheng et al., 2019), whether these shopping experiences can be applied to the context of mobile shopping applications remains unknown. Indeed, due to the differences in screen sizes, control methods, input types, and placing methods, the assumption that shopping experiences are the same for both online shopping websites and mobile shopping applications may be problematic and needs to be examined. Specifically, hedonic shopping experience is generated when shoppers feel fun and entertaining (Malik et al., 2017; Ozturk et al., 2016; Zheng et al., 2019). Can mobile shopping applications still increase hedonic shopping experience when shoppers hold the devices in hand and touch the screen to navigate the application? Moreover, utilitarian shopping experience is enhanced when information is available to make reasonable decisions. One of the most serious challenges for mobile shopping applications is how information can be displayed on the small screen devices. Therefore, can mobile shopping applications that contain limited information still make shoppers feel utilitarian shopping experience while shopping? Therefore, some critical questions need to be addressed. This study attempts to contribute knowledge on how the UX design factors (e.g., visual design, content design, interaction design, and security design) influence user mobile shopping experiences including hedonic and utilitarian shopping experiences while shopping on mobile applications.

This study proposes hypotheses, develops a research model that contains all UX designs and shopping experiences, and conducts a survey to examine the research model. Furthermore, on the basis of analysis results, this study discusses important conclusions, implications, and future research directions.

2 Theoretical background and hypotheses development

2.1 UX design

UX design, widely adopted in the field of human-computer interaction (Brade et al., 2017; Seckler et al., 2015), is a design practice that influences UX through usability, usefulness, and desirability while interacting with a product, website, or application (Brade et al., 2017; Schmidt and Etches, 2014). UX design provides a holistic evaluation to examine whether the system or application design can successfully influence users' shopping experience (Wani et al., 2017). Prior studies propose different factors to analyse UX design to determine the success factors of system design. For example, Kim and Lee (2002), focusing on e-commerce systems, suggest the architecture perspective of the UX design. This perspective consists of four UX design factors, including content, structure, interaction, and presentation. Content refers to the information included in a website or mobile app. Structure refers to how the information is arranged. Interaction refers to how easily users can surf the website or mobile app. Presentation refers to the visual attractiveness of a website (Kim and Lee, 2002).

The architecture perspective of UX design provides a comprehensive and concise theoretical framework for UX design taxonomy. Indeed, while several studies propose their own frameworks to analyse UX design, those frameworks are similar to the architecture perspective of UX design. For instance, Cyr (2008) proposes a similar taxonomy that contains information design (content and structure), navigation design (interaction), and visual design (presentation). Ganguly et al. (2010) adopted Cyr's (2008) UX design taxonomy to investigate the effects of website design on purchase intention (Ganguly et al., 2010). Karimov et al. (2011) consider visual design, social cue design, and content design as the critical factors that induce a user's initial trust toward an e-commerce website. Seckler et al. (2015) review prior studies and adopt the visual design, structure design, content design, and social-cue design to examine the relationship between the UX design and web characteristics review.

To develop the research model, this study applies the architecture perspective into the context of mobile shopping applications and adopt this perspective to classify mobile shopping application design characteristics. Furthermore, this study considers security design in mobile shopping application design because mobile shopping requires users to provide a variety of confidential information such as account, password, delivery address, email and credit card. As a result, security design is very important and is one of the major concerns while shopping online (Chou et al., 2015; Lee et al., 2012; Shukla, 2014). Therefore, system developers need to consider security design in UX design (Seckler et al., 2015; Tarafdar and Zhang, 2005) to make sure users feel safe while sharing information and making transactions. This study, hence, takes four UX design components into account including visual design, content design, interaction design, and security design.

2.2 Shopping experiences

Prior studies on online shopping experiences have found that when shopping online, shoppers may perceive two shopping experiences including utilitarian shopping experience and hedonic shopping experience, both of which are significant determinants of user intention to use a website or mobile app (Bilgihan et al., 2016; Chang and Chen, 2015; Zheng et al., 2019). The utilitarian shopping experience occurs when shoppers experience that online shopping website or mobile applications that they use are efficient and useful to complete their specific mission or task and to achieve their goals with a minimum of irritation (Kim and Hwang, 2012; Zheng et al., 2019). On the other hand, the hedonic shopping experience suggests that while shopping, shoppers seek to feel the emotional experience from using the systems, websites, or mobile applications. Thus, the hedonic shopping value is more personal and subjective. It focuses on fun, fantasy, multisensory, and emotional aspects of the shopping experience in the context of online shopping (Malik et al., 2017; Ozturk et al., 2016; Zheng et al., 2019).

In the context of mobile applications, both utilitarian and hedonic shopping experiences still exist and play an essential role in UXs (Kim and Hwang, 2012; Malik et al., 2017; Ozturk et al., 2016; Zheng et al., 2019). For instance, Malik et al. (2017) examined the factors that trigger the mobile app adoption and found that both hedonic and utilitarian shopping experiences are important mediators in determining the continuous usage of the applications after its adoption. However, although prior studies have suggested the importance of considering both utilitarian and hedonic experiences in the context of mobile applications, those studies mainly focus on general mobile applications rather than shopping-oriented mobile applications (Kim and Hwang, 2012; Malik et al., 2017; Ozturk et al., 2016; Zheng et al., 2019). Therefore, the knowledge about whether shopping experiences can be applied to mobile shopping applications is limited. While Zheng et al. (2019) apply utilitarian and hedonic shopping experiences to the context of mobile shopping applications, their study focuses on impulsive buying rather than UX design. Therefore, it is essential to understand how UX designs of mobile shopping applications influence utilitarian and hedonic shopping experiences.

3 Hypothesis development

3.1 Visual design and shopping experiences

Visual design is the use of visual elements (e.g., shapes, colours and shades) and principles (e.g., harmony, contrast, balance, and proportion) to improve the usability and presentation of a system and in turn enhance UXs (Cyr et al., 2006; Karimov et al., 2011; Seckler et al., 2015). Those visual elements and principles create emotional appeal, aesthetics, and uniformity of the system's overall graphical outlook (Bhandari et al., 2017; Cyr, 2008). Therefore, prior research has found that visual design has a significant influence on the users' perception of the system quality and emotions, both of which generate the utilitarian and hedonic shopping experiences (Bhandari et al., 2017; Malik et al., 2017; Minge and Thüring, 2018; Zheng et al., 2019).

The visual design has been identified as one of the key factors to increase the mobile app's usability and quality (Bhandari et al., 2017; Hoehle et al., 2016). A good visual design will make users feel a well-organised, clean, and symmetrically balanced interface (Kim and Hwang, 2012; Lavie and Tractinsky, 2004). Such feelings form users' perceptions of ease of use and usefulness (Baker-Eveleth and Stone, 2020; Hoehle et al., 2016; Minge and Thüring, 2018), resulting in better utilitarian shopping experience (Bhandari et al., 2017).

On the other hand, visual design is positively associated with hedonic shopping experience because a clean, clear, and symmetrical design could make users feel comfortable and create a pleasant experience for shoppers (Bhandari et al., 2017; Hoehle et al., 2016), leading to the positive hedonic shopping experience. Specifically, good visual design reduces the attentional resources needed to process the design and, in turn, makes the overall processing, resulting in inducing a more pleasant interaction with the design (Altaboli and Lin, 2011). Hence, a successful mobile app visual design can generate a better emotional UX. Prior studies suggest that aesthetically delightful layout design tends to increase user happiness, satisfaction, pleasure, and entertainment (Baker-Eveleth and Stone, 2020; Hoehle et al., 2016; Shukla, 2014), showing a positive relationship between visual design and hedonic shopping experience (Minge and Thüring, 2018). For example, Zheng et al. (2019) focus on impulsive buying in the context of mobile commerce and found that visual appeal increases hedonic browsing. Therefore, this study proposes the following hypotheses:

H_1 Visual design positively influences utilitarian shopping experience.

H_2 Visual design positively influences hedonic shopping experience.

3.2 Content design and shopping experiences

Content design refers to the informational components that convey useful and reliable content about products or services to a shopper (Seckler et al., 2015; Wang and Emurian, 2005). The content can be textual, visual, audio, or video formats. The purpose of the content design is to provide a solution to overcome the limitations of online shopping, such as lack of experiential information and, in turn, help shoppers receive more product or service information (Seckler et al., 2015). A good content design needs to contain comprehensive, up-to-date, and reliable information (Wang and Emurian, 2005). Therefore, the content design is considered an important prerequisite to utilitarian and hedonic shopping experiences. Specifically, utilitarian shopping experience is generated when shoppers can make rational purchase decisions based on accurate and trustable information (Babin et al., 1994). If shoppers perceive that content provided on mobile shopping applications is designed to help them easily form shopping plans and rational decisions, this perception will increase utilitarian shopping experience (Zheng et al., 2019).

On the other hand, hedonic shopping experience is generated when shoppers can enjoy shopping without worry about fake, out-of-date, and unreliable information for products or services (Babin et al., 1994). Therefore, providing accurate and up-to-date information in the content design is a key to create a joyful shopping environment that makes shoppers delighted and pleased, which enhances hedonic shopping experience

(Bilgihan et al., 2016; Zheng et al., 2019). Thus, this study proposes the following hypotheses:

H_3 Content design positively influences utilitarian shopping experience.

H_4 Content design positively influences hedonic shopping experience.

3.3 Interaction design and shopping values

Interaction design focuses on providing navigational schemes that help shoppers browse mobile shopping applications easily. The goal of the interaction design is to create mobile shopping applications with ease and without frustration (Yu and Kong, 2016). Therefore, a good interaction design increases the perceived interactivity and perceived ease of use of the system (Bhandari et al., 2017; Yu and Kong, 2016).

In the context of mobile shopping applications, since interaction design enhances mobile shopping applications' usefulness and easy-to-use, shoppers may feel comfortable while using mobile shopping applications in making purchase decisions. For example, Amazon.com allows shoppers to easily interact with Amazon's mobile shopping application by comparing different items and product reviews, helping shoppers make more rational decisions. Hence, mobile shoppers will have a better utilitarian shopping experience (Yu and Kong, 2016). Additionally, when mobile shoppers can easily interact with mobile shopping applications, it is easier for them to enjoy browsing mobile shopping applications without any difficulty. This enjoyment generated from the ease of use will make shoppers have better feelings of joyfulness and gratification (Bölen and Özen, 2020), leading to the hedonic shopping experience (Yu and Kong, 2016). Therefore, this study proposes the following hypotheses:

H_5 Interaction design positively influences utilitarian shopping experience.

H_6 Interaction design positively influences hedonic shopping experience.

3.4 Security design and shopping values

Although online security has been improved considerably over the years, it is still one of the major concerns for online shoppers (Chou et al., 2015; Lee et al., 2012; Shukla, 2014) and one of the key success factors of UX design (Lee et al., 2012; Tarafdar and Zhang, 2005). Security design is required in the whole mobile shopping process. For instance, mobile shoppers need to register as a member and provide personal information such as name, email, and password. When making the payment, they need to enter their confidential data such as home address and credit card information. Hence, the security design, such as data encryption and two-factor authentication, is critical and has been confirmed as a predictor of trust for online transactions (Aggarwal and Rahul, 2018; Alam et al., 2018; Chou et al., 2015, 2018).

A good security design makes shoppers feel secure, confident, or gratified while shopping (Salimon et al., 2017) because they do not need to worry about their personal data being stolen by hackers, resulting in less anxious and more pleasurable use of mobile shopping applications. Therefore, the feelings of joyfulness for shopping created by security design may lead to hedonic shopping experience (Kim et al., 2012; Salimon et al., 2017). Similarly, the high sense of security resulting from enhanced security design makes mobile shoppers feel protected and confident while browsing and shopping on mobile shopping applications. Such feeling increases their perceptions of usefulness about mobile shopping applications and, in turn, generates better utilitarian shopping experience (Kim et al., 2012; Salimon et al., 2017). Indeed, Kim et al. (2012), focusing on Internet shopping sites, have suggested that security design positively influences utilitarian shopping experience. Thus, this study proposes the following hypotheses:

H_7 Security design positively influences utilitarian shopping experience.

H_8 Security design positively influences hedonic shopping experience.

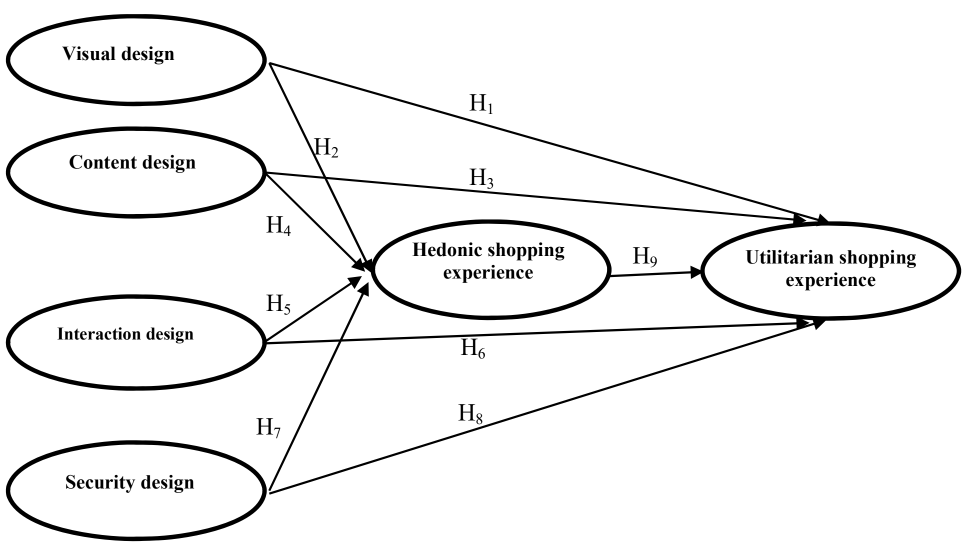
3.5 Hedonic shopping experience and utilitarian shopping experience

When shoppers feel joyful while shopping, this pleasure-shopping journey (hedonic) makes them want to spend more time on shopping activities (Stoel et al., 2004). The increasing time spent on shopping gives the shoppers an opportunity to view and check different items, such as comparing different items or reading product reviews, resulting in enhancing the utilitarian shopping experience. Therefore, prior studies have suggested the positive relationship between hedonic shopping experience and utilitarian shopping experience (Alnawas and Aburub, 2016; Vieira et al., 2018). For example, Vieira et al. (2018) conducted a meta-analytic review on hedonic and unitarian shopping experiences based on 190 studies. The result suggests that hedonic shopping experience and utilitarian shopping experience may exist at the same time as a complement (Vieira et al., 2018). Based on the above arguments, this study proposes that hedonic shopping experience has a positive effect on the utilitarian shopping experience.

H_9 Hedonic shopping experience positively influences utilitarian shopping experience.

On the basis of the preceding literature review and hypothesis development, we propose a research model in Figure 1.

Figure 1 Research model



4 Methodology

4.1 Measures

A survey instrument was designed to test the hypotheses proposed in the research model. The survey was conducted in China and was developed in five steps:

a measurement scales were adapted from existing scales in the prior studies

b the translation-back-translation method was used to ensure the accuracy and readability of the Chinese questionnaire and its consistency with the original survey instrument (Lee et al., 2008)

c two marketing scholars were invited to comment on the initial draft of the scales. Based on their comments, the wording of initial measure items was adjusted accordingly

d a small-scale pretest was conducted to make sure the wording of questions is understandable and readable. The modifications were made according to the results of the pretest

e the final version of the questionnaire was distributed to the target sample.

This study adopts all the survey items from previous studies, with appropriate modifications to fit the research context. All items are listed in Table 1. The scales for interaction design and content design were measured using seven items and six items, respectively, adapted from Karimov et al. (2011) and Cyr (2008). The scale for interaction design was measured using nine items adapted from Cyr (2008). The four-item security design scale was adapted from Tarafdar and Zhang (2005). The four-item utilitarian shopping experience and the five-item hedonic shopping experience were adapted from Babin et al. (1994).

4.2 Data collection

This study selects Taobao's mobile shopping application as the context to investigate the effect of UX design factors on shopping experiences. Taobao, founded by Alibaba Group in 2003, is a Chinese online shopping website that provides a variety of products for online shoppers from Chinese-speaking regions such as Mainland China, Hong Kong, Singapore and Taiwan. This study selects Taobao for two main reasons. First, Taobao is one of the biggest online shopping platforms in China (Chen et al., 2016; Richards and Li, 2018) in which the study is conducted. In 2019, Taobao had 299 million daily active users and general merchandise sales were $853 billion (Smith, 2021). Second, Taobao has a mobile shopping application, which is one of the most popular shopping applications in the world. In 2018, Taobao had 601 million mobile annual active shoppers (Smith, 2021). Thus, Taobao's mobile shopping application fits with this study's purpose (i.e., focusing on the mobile shopping applications) and is a suitable context for examining the research model of this study.

This study conducted a small-scale pretest. A total of 60 questionnaires were distributed to online shoppers in north-eastern China. The wording of the questions was revised to address the comments from respondents during the pretest.

The formal survey was conducted via an online survey platform. There are three reasons that this study used the online survey platform. First, it is easy to reach mobile shopping users with diverse backgrounds. Second, respondents who make invalid responses exceeding a certain threshold can be automatically excluded. Last, a respondent attempting to answer the questionnaire twice can be blocked.

The participants of the study were recruited by both convenience sampling and snowball sampling. For convenience sampling, this study created a questionnaire on an online survey platform. The questionnaire link was distributed to social media and online forums in China. People who clicked on the link were invited to the survey. For snowball sampling, the participants were selected using a snowball sampling technique, which is based on chain referrals to identify participants.

All participants are required to be active users of Taobao's mobile shopping applications. The first question on the survey asks whether the participant had ever used Taobao's mobile shopping applications before. If he or she answers no, a thank-you message will be given, and the questionnaire will be closed.

In the end, a total of 230 participants filled out the questionnaire. This study removed 23 data points that had either significantly incomplete responses, were extreme outliers, or had never used Taboao's mobile shopping application, resulting in a sample size of 207.

4.3 Sample profile analysis

The results of demographic data analysis are given below. The proportions of females (50.7%) and males (49.3%) are about the same. More than one-third of the respondents (36.7%) were in the age group of 26–30, followed by those in the age groups of 18–25 (25.6%), 31–35 (18.8%), 36 and above (17.4%), and below 18 (1.4%). Apparently, most mobile shopping application shoppers are young people between the ages of 18 and 35. In terms of educational level, almost half of the respondents have bachelor's degrees (49.3%), followed by those graduating from colleges (21.3%), high schools (17.9%), and graduate schools (11.6%). About 65% of the respondents use mobile shopping applications between 2–4 times (35.8%) and between 5–7 times (30.1%) a month.

4.4 Common method bias

Since all of the variables were measured through the self-administered survey, this study could suffer from common method bias issues, resulting in inflation or deflation of inter-correlations among research constructs (Podsakoff, 2003). Hence, a confirmatory factor model (CFM)-based single-factor test was performed to address the concern of the potential common method bias (Podsakoff, 2003). Firstly, a CFM model for the six constructs was fitted to the sample data. Then, a second CFM model with all measured items loading into a single factor was fitted to the sample data. If most of the fit indices of the six-factor model are not significantly better than that of the single-factor model, the common method bias will be a problem (Podsakoff, 2003). According to the model fitting results, the fit indices for the six-factor model were χ^2 = 1,041.10, d.f. = 545, $p < 0.000$, NFI = 0.804, NNFI = 0.883, RMR = 0.048, CFI = 0.89, GFI = 0.78, AGFI = 0.74 and RMSEA = 0.067, and the fit indices for the single-factor model were χ^2 = 1,715.94, d.f. = 560, $p < 0.000$, NFI = 0.71, NNFI = 0.77, RMR = 0.039, CFI = 0.79, GFI = 0.68, AGFI = 0.64 and RMSEA = 0.100. The chi-square test result rejected the equivalence of the two models. In addition, the model fit of the single-factor model was much worse than that of the six-factor model, suggesting that there was minimal evidence of common method bias in this study.

5 Results

To test the research mode, this study used the partial-least-square-based structural equation modelling (PLS-SEM) for two reasons. First, it is a structural equation modelling technique that simultaneously assesses the reliability and validity of the measures of constructs and estimates the relationships among all factors (Lohmöller, 1989). Since the research model consists of six factors, it is suitable for the research. Second, PLS-SEM does not require a large sample size (Barclay et al., 1995). It is a non-parametric estimation procedure for an SEM model. Therefore, the normality of the observed variables is not a concern. In addition, PLS-SEM can have high statistical testing power even with a small sample size of 100 (Reinartz et al., 2009). The R language and the PLSPM R package were used to conduct PLS-SEM analysis. 5,000 bootstrapping samples were randomly re-sampled from the original sample with the replacement for estimator testing purposes.

5.1 Measurement model assessment

Convergent validity of measurement scales is confirmed through the higher-than-threshold (0.5) average variance extracted (AVE) values in the fifth column of Table 1 (Hair et al., 2011). In Table 2, for the upper triangle part, every construct's square root of AVE in the diagonal is greater than other values in the same row and the same column, which are correlation coefficients of the construct with other constructs. Thus, the discriminant validity of measurement scales can be claimed (Hair et al., 2011).

Table 1 Summary measures of the PLS analysis

Construct	*Standardised factor loadings*	*Cronbach's* α	*CCR*[a]	*AVE*[b]
Visual design (VD)		0.898	0.920	0.622
I like the design style of this mobile shopping app.	0.801			
The mobile shopping app pages are clearly designed.	0.736			
Navigation buttons are visibly clear on the mobile shopping app pages.	0.816			
Mobile shopping app pages load quickly.	0.773			
The names of functional modules are easy to remember.	0.796			
The mobile shopping app shows a harmonious combination of colours.	0.743			
The pictures in the mobile shopping app are designed meaningfully.	0.849			

Notes: [a]composite construct reliability; [b]average variance extracted.

Table 1 Summary measures of the PLS analysis (continued)

Construct	*Standardised factor loadings*	*Cronbach's α*	*CCR*[a]	*AVE*[b]
Content design (CD)		0.892	0.918	0.651
The mobile shopping app shows a variety of products.	0.777			
Products are clearly classified.	0.778			
The mobile shopping app shows reliable product information.	0.809			
Product recommendations on the mobile shopping app are useful.	0.859			
Product review comments from other users are useful.	0.792			
Product information is updated validly in time.	0.821			
Interaction design (IxD)		0.908	0.925	0.577
The mobile shopping app performs a fast search with accurate results.	0.773			
I can interact with sellers through the mobile shopping app at any time.	0.727			
The mobile shopping app provides community forums that enhance communications among users.	0.755			
The mobile shopping app provides convenient forms for users.	0.819			
The mobile shopping app provides status awareness messages.	0.769			
The mobile shopping app shows attractive product discount campaigns.	0.755			
The operations of ordering related processes are convenient.	0.765			
The mobile shopping app provides convenient after-sales support.	0.761			
The mobile shopping app provides a well-designed customer complaint function.	0.708			
Security design (SD)		0.885	0.921	0.743
The mobile shopping app provides strict confidentiality of personal information.	0.878			
The mobile shopping app can guarantee transaction security.	0.825			
The mobile shopping app is secure.	0.867			
The security design of mobile shopping is great.	0.878			
Hedonic shopping experience (HSE)		0.853	0.895	0.630
While using the mobile shopping app, I feel pleasant.	0.808			

Notes: [a]composite construct reliability; [b]average variance extracted.

Table 1 Summary measures of the PLS analysis (continued)

Construct	*Standardised factor loadings*	*Cronbach's α*	*CCR*[a]	*AVE*[b]
While using the mobile shopping app, I have fun.	0.805			
While using the mobile shopping app, I feel joyful.	0.756			
While using the mobile shopping app, I feel enjoyable.	0.795			
While using the mobile shopping app, I feel gratified.	0.803			
Utilitarian shopping experience (USE)		0.843	0.895	0.681
I feel the mobile shopping app is useful.	0.838			
I feel the mobile shopping app is easy to use.	0.821			
I will continue to use the mobile shopping app.	0.790			
Overall, I feel the mobile shopping app is great.	0.850			

Notes: [a]composite construct reliability; [b]average variance extracted.

Discriminant validity can also be confirmed through examining heterotrait-monotrait (HTMT) ratio of correlations for each paired of research variables (Henseler et al., 2015; Benitez et al., 2020). In general, the HTMT value should not exceed 0.85 (more strict criteria) or 0.90 (more gentle criteria) or significantly less than 1 (Voorhees et al., 2016; Franke and Sarstedt, 2019). The lower triangle part shows HTMT ratios among variables for the research framework. Although the HTMT for security design and hedonic shopping experience is 0.85, all other HTMT ratios are smaller 0.85. Thus, the discriminant validity of the measurement model in this study can be further confirmed.

Table 2 Correlations between constructs, square roots of AVEs, and HTMTs

	VD	*CD*	*IxD*	*SD*	*HSE*	*USE*
VD	*0.787*	0.692	0.665	0.662	0.680	0.651
CD	(0.771)	*0.807*	0.722	0.708	0.726	0.728
IxD	(0.738)	(0.801)	*0.760*	0.743	0.740	0.697
SD	(0.740)	(0.797)	(0.826)	*0.862*	0.741	0.707
HSE	(0.777)	(0.830)	(0.839)	(0.850)	*0.794*	0.715
USE	(0.748)	(0.839)	(0.792)	(0.816)	(0.842)	*0.825*

Notes: 1 upper triangle elements are correlations
2 diagonal elements are squared roots of AVEs
3 lower triangle elements are HTMTs.

5.2 Assessment of the structural model and hypothesis testing

With an adequate measurement model, this study examined the research model by the bootstrapping technique in PLS-SEM. The results are shown in Figure 2. The overall fit of a structural model can be evaluated through measures such as standardised root mean square residuals (SRMR), geodesic discrepancy (d_G), and unweighted least squares discrepancy (d_{ULS}) by using the bootstrap-based test (Benitez et al., 2020). Referring to Table 3, though $d_{ULS} = 1.538$ and $d_G = 1.152$ are a little higher than the 99% quantiles, the SRMR = 0.049 is the same as the corresponding 99% quantile and below the preliminary suggested threshold of 0.08. Hence, the result still indicates a marginally acceptable model fit.

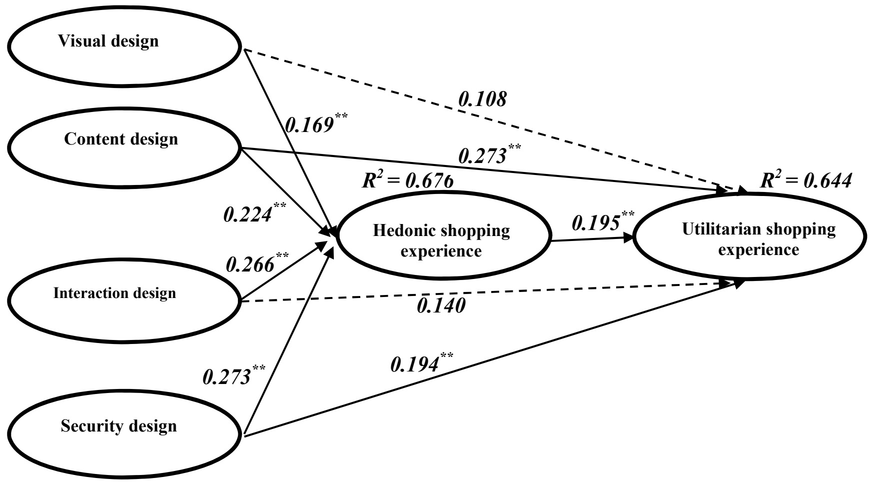
Table 3 Structural model evaluation

Path	*Path coefficient*	*Effect size f^2*
Hedonic shopping experience → utilitarian shopping experience (H_1)	0.195** (2.668) [0.032, 0.359]	0.037
Visual design → utilitarian shopping experience (H_2)	0.108 (1.667) [–0.020, 0.241]	0.014
Content design → utilitarian shopping experience (H_3)	0.273** (3.844) [0.110, 0.434]	0.076
Interaction design → utilitarian shopping experience (H_4)	0.140 (1.888) [–0.038, 0.319]	0.017
Security design → utilitarian shopping experience (H_5)	0.194** (2.669) [0.035, 0.358]	0.037
Visual design → hedonic shopping experience (H_6)	0.169** (2.786) [0.054, 0.283]	0.040
Content design → hedonic shopping experience (H_7)	0.224** (3.419) [0.058, 0.386]	0.059
Interaction design → hedonic shopping experience (H_8)	0.266** (3.854) [0.124, 0.417]	0.074
Security design → e-hedonic shopping experience (H_9)	0.273** (4.218) [0.120, 0.421]**	0.090
Endogenous variable	R^2	
Hedonic shopping experience	0.676	
Utilitarian shopping experience	0.644	
Over all fit of the estimated model	*Value*	H_{99}
SRMR	0.049	0.049
d_{ULS}	1.538	1.459
d_G	1.152	1.072

Notes: 1 **p-value < 0.05
2 *t*-values are presented in parentheses
3 95% bootstrap confidence intervals are presented in brackets.

The R^2 values of hedonic shopping experience and utilitarian shopping experience are 0.676 and 0.644, showing more than 60% of their variations are accounted for by other variables in the research model. The information contained in the 5,000 bootstrapping samples provides the basis for evaluating the statistical significance of path estimates, which, in turn, are used for testing the research hypotheses. Table 3 presents the results of hypothesis testing. All hypotheses are statistically significant at $\alpha = 0.05$, except H_1 and H_5. Table 3 also provides the effect sizes for all relationship paths in the structural model. An effect size, f^2, is a measure of the effect magnitude of an endogenous or exogenous variable on an exogenous variable. The f^2 values of significant paths in Table 3 range from 0.037 to 0.090, all falling into the weak effect size range, which is from 0.02 to 0.150 (Cohen, 2013).

Figure 2 Estimates of the PLS model



Notes: **p-value < 0.05; dashed-line: non-significant path.

H_1, H_3, H_5, and H_7 address the causal relationships between the four UX design factors and utilitarian shopping experience. Among the four hypotheses, H_1 (the effect of visual design on utilitarian shopping experience) and H_5 (the effect of interaction design on utilitarian shopping experience) were not supported. However, both UX design factors can still influence utilitarian shopping experience through the mediating effects of hedonic shopping experience. The support of H_3 suggests that perceived content design positively influences utilitarian shopping experience ($\gamma = 0.273$, $t = 3.31$, and $p < 0.05$). H_7 was also supported ($\gamma = 0.194$, $t = 2.36$, and $p < 0.05$), indicating that perceived higher security design would escalate utilitarian shopping experience.

H_2, H_4, H_6, and H_8 are concerned with the causal relationships between the four UX design factors and hedonic shopping experience. The support of H_2 shows that higher perceived visual design can incur higher hedonic shopping experience ($\gamma = 0.169$, $t = 2.94$, and $p < 0.05$). The support of H_4 reveals that perceived content design significantly increases hedonic shopping experience ($\gamma = 0.224$, $t = 2.66$, and $p < 0.05$). The support of H_6 suggests that perceived interaction design significantly raises hedonic shopping experience ($\gamma = 0.266$, $t = 3.49$, and $p < 0.05$). H_8 was also supported ($\gamma = 0.273$, $t = 3.50$, and $p < 0.05$), demonstrating that higher perceived security design generates positive hedonic shopping experience.

The support of H_9 indicates the positive relationship between hedonic shopping experience and utilitarian shopping experience ($\beta = 0.195$, $t = 2.32$, and $p < 0.05$), indicating that when a user feels that shopping using the mobile app is pleasant, this feeling will make the UXs the usefulness of the app.

6 Discussion

Drawing on the UX design and shopping experience, this study elucidates the relationships among UX design factors (visual design, content design, interaction design and security design) and hedonic and utilitarian shopping experiences. The findings proffer an integrated model to understand user shopping experience within the growing mobile shopping medium.

One of the major findings in this study is about how the utilitarian shopping experience is influenced by the four UX design factors and hedonic shopping experience. The support of the positive influence of content design on the utilitarian shopping experience (i.e., H_3) suggests that higher quality and richer information enhance users' perception of the benefits of a mobile shopping application and strengthen future use intention toward the app. Similarly, the support of the positive impact of security design on the utilitarian shopping experience (i.e., H_7) indicates that higher security design of the mobile shopping application can make users believe the app is useful and trustworthy.

Table 4 Effects analysis

Relationship	*Effects*		
	Direct	*Indirect*	*Total and 95% CI*
Hedonic shopping experience → utilitarian shopping experience (H_1)	0.195	n.a.	0.195 (0.0315, 0.3591)**
Visual design → utilitarian shopping experience (H_2)	0.169	n.a.	0.169 (0.0541, 0.2827)**
Content design → utilitarian shopping experience (H_3)	0.224	n.a.	0.224 (0.0578, 0.3858)**
Interaction design → utilitarian shopping experience (H_4)	0.266	n.a.	0.266 (0.1241, 0.4168)**
Security design → utilitarian shopping experience (H_5)	0.273	n.a.	0.273 (0.1201, 0.4205)**
Visual design → hedonic shopping experience (H_6)	0.108	0.033	0.141 (0.0088, 0.2773)**
Content design → hedonic shopping experience (H_7)	0.273	0.044	0.317 (0.1526, 0.4772)**
Interaction design → hedonic shopping experience (H_8)	0.160	0.033	0.193 (0.0189, 0.3694)**
Security design → hedonic shopping experience (H_9)	0.193	0.053	0.246 (0.0904, 0.4022)**

Notes: 95% CI for total effects are based on 5,000 bootstrapping samples; n.a. stands for not available.

The direct influences of visual design and interaction design on utilitarian shopping experience were not significantly supported (i.e., H_1 and H_5). However, interestingly, visual design and interaction design indirectly affect the utilitarian shopping experience. Specifically, the non-significant results of H_1 and H_5 do not mean that visual design and interaction design will not affect the utilitarian shopping experience. Instead, the support of the positive influence of hedonic shopping experience on utilitarian shopping experience (H_9) and the significant paths from visual design and interaction design to hedonic shopping experience (H_6 and H_8) build alternative paths for them to indirectly influence utilitarian shopping experience. The results of the effect analysis (see Table 4) show that both visual design and interaction design have significant total effects on the utilitarian shopping experience. Interaction design has a slightly higher total effect (0.193) than visual design (0.141). Therefore, both visual design and interaction design indirectly influence the utilitarian shopping experience.

Another important finding is on the relationships between mobile shopping app design and hedonic shopping experience. All four hypotheses (i.e., H_2, H_4, H_6, and H_8) were supported, suggesting that visual design, content design, interaction design, and security design all can lead to the better hedonic shopping experience. Importantly, hedonic shopping experience also plays an important mediating role between various mobile shopping app UX design factors and utilitarian shopping experience. Specifically, visual design and interaction design fully mediate their relationships with the utilitarian shopping experience, whereas, content design and security design partly mediate their relationships with the utilitarian shopping experience.

6.1 Theoretical implications

Our study has several important implications for theory. First, our study contributes to the literature stream centred on shopping experience. Prior studies on online shopping experiences focus on the context of online shopping websites (Malik et al., 2017; Ozturk et al., 2016; Zheng et al., 2019). This study extends online shopping experiences to the context of mobile shopping applications. It is important because online shopping websites are different from mobile shopping applications in terms of control methods, input types, screen sizes, and placing methods (Levin, 2014). For example, the ways to interact with mobile shopping applications are different. Mobile shoppers navigate mobile shopping applications and input data by swiping and touching the screens rather than by clicking a mouse or typing using physical keyboards. Indeed, with different control methods, input types, and placing methods, would shoppers still feel utilitarian and hedonic shopping experiences while using mobile applications? Thus, our study contributes to shopping experience literature in two ways. First, this study empirically examines hedonic and utilitarian shopping experiences in the context of mobile shopping applications, which fulfils the research gap in shopping experiences. Second, despite the differences in terms of control methods, input types, placing methods, and screen sizes, UX design factors including visual design, content design, interaction design, and security design all positively influence hedonic shopping experience, showing the importance of hedonic shopping experience in mobile shopping applications.

Second, while there is a wealth of research on the role of shopping experience, most of prior studies do not consider the impact of hedonic shopping experience on utilitarian shopping experience (Alnawas and Aburub, 2016; Vieira et al., 2018). It is a topic that deserves additional attention, since in the extensive literature on shopping experiences, there has been less attention paid to how hedonic shopping experience influences utilitarian shopping experience in the context of mobile shopping applications. This study believes that hedonic shopping experience is the important mediator in the relationship between UX design factors and utilitarian shopping experience. On the basis of our results, UX design factors increase hedonic shopping experience, which in turn would lead to a higher utilitarian shopping experience. This finding is meaningful because the small screen size on many mobile devices limits the amount of content that can be displayed on mobile shopping applications. As a result, it is critical to find out the essential mediator that is influenced by UX design factors and that can form users' perceptions of ease of use and usefulness, resulting in a better utilitarian shopping experience. The results of this study suggest that hedonic shopping experience is the key mediator. This finding extends our knowledge on the roles of hedonic shopping experience played in the context of mobile shopping.

Finally, our study also contributes to the theoretical discussion on the lack of support in our study for the role of visual design and interaction design in influencing utilitarian shopping experience. Specifically, there is a significant research stream on the importance of visual design and interaction design for improving utilitarian shopping experience (e.g., Bhandari et al., 2017; Yu and Kong, 2016). A good visual design will make users feel well-organised and clean (e.g., Bhandari et al., 2017). A good interaction design increases the perceived interactivity and perceived ease of use of the system (Kim and Hwang, 2012). Therefore, prior studies suggest the positive impacts of both visual design and interaction design on utilitarian shopping experience. Nevertheless, our results provide a different view. Utilitarian shopping experience requires information to make reasonable decisions. Our finding indicates that there is no significant relationship between interaction design, visual design, and utilitarian shopping experience in the context of mobile shopping applications. A possible reason for this difference is that mobile shopping applications are designed and used in smartphones, which have small screen size and require swiping and touching to navigate. As a result, the number of images that can be displayed on small screen devices is limited. The way to interact with the mobile shopping applications requires more operations (e.g., need to touch screen multiple times to see each image). As a result, a good interaction design and visual design in mobile shopping applications may not directly lead to positive utilitarian shopping experience. However, this study has found that while no direct relationship was found, visual design and interaction design still indirectly influence utilitarian shopping experience through hedonic shopping experience. In other words, a good visual design and interaction design make users feel comfortable and create a pleasant experience for shoppers, helping them easily form shopping plans and rational decisions, resulting in indirectly enhancing utilitarian shopping experience.

6.2 Managerial implications

Our findings offer several managerial implications for practitioners of mobile shopping application firms. First, although mobile shopping applications are different from online shopping websites in terms of control methods, input types, and placing methods, UX design factors including visual design, content design, interaction design, and security design can still increase both hedonic and utilitarian shopping experiences. Therefore, mobile shopping applications designers need to always keep in mind that when designing, updating, and/or revising the mobile shopping applications, those UX design factors are important to be considered. For instance, if a mobile shopping application designer wants to redesign the layout of the online payment page, it is important to make sure that the page is user-friendly to interact with the application and display the payment information and security information in a way that users can easily view.

Second, our results should act as a warning to the designers of the mobile shopping applications to be aware that both visual design and interaction design cannot directly increase shoppers' utilitarian shopping experience. To increase utilitarian shopping experience through visual design and interaction design, designers of the mobile shopping applications need to find a way to enhance hedonic shopping experience first (e.g., creating a pleasant experience for shoppers by using visually explaining content such as icons instead of text). When shoppers can feel comfortable and enjoyable while shopping on mobile applications, such feeling can, in turn, help them easily form shopping plans and rational decisions, resulting in a higher utilitarian shopping experience.

Finally, on the basis of our results, we would advise mobile shopping application companies to be careful of the potential negative impact of security design and content design on hedonic and utilitarian shopping experiences. Specifically, both security design and content design positively and directly influence hedonic and utilitarian shopping experience. In other words, if security design or content designs are not well delivered, it is likely that both shopping experiences will decrease. Therefore, mobile shopping application designers need to be aware of how to provide timely, useful, and reliable information to users. Also, providing strict confidentiality of personal information can make users feel secure. Both content design and security design play a critical role in influencing both hedonic and utilitarian shopping experiences.

6.3 Limitations and future research directions

There are few limitations to our study. First, this study focuses on only the context of mobile shopping applications. The results, therefore, have limited generalisability and would be problematic to extend our results to other contexts such as shopping in social networking applications or shopping in mobile gaming applications. Further research can apply this study's framework to different contexts and examine whether the UX design factors influence utilitarian and hedonic shopping experiences. Second, this study considers only two dependent variables, including utilitarian and hedonic shopping experiences. While these two variables are important, future studies can consider other interesting factors, such as recommendation and repeat purchase, and extend the proposed model by incorporating those factors to obtain a complete picture of the research topic. Finally, utilitarian and hedonic shopping experiences were measured at a static point rather than as it was developing, thus losing the time aspect of explanation. In other words, this study used a cross-sectional survey approach to collect data on all research variables, resulting in not being able to demonstrate the temporal sequence of the antecedents and consequences completely. Hence, further research can consider collecting longitudinal data that shows how utilitarian and hedonic shopping experiences change over time.

6.4 Conclusions

This study investigates how UX design on mobile shopping applications impacts utilitarian and hedonic shopping experiences. A conceptual model that involves casual relationships between mobile shopping applications UX design factors and the shopping experience is developed. The results contribute to the existing limited knowledge of shopping experiences in mobile shopping applications and provide a fundamental framework for future research to conduct more comprehensive studies.

References

Aggarwal, A. and Rahul, M. (2018) 'The effect of perceived security on consumer purchase intentions in electronic commerce', *International Journal of Public Sector Performance Management*, Vol. 4, No. 1, pp.1–20.

Alam, S., Nusari, M.S.S., Nazim, R. and Alrajawy, I. (2018) 'Analysing the impact of moral behaviour on consumer trust: an Indian e-retailing perspective', *International Journal of Management and Human Science*, Vol. 2, No. 1, pp.24–36.

Alnawas, I., and Aburub, F. (2016) 'The effect of benefits generated from interacting with branded mobile apps on consumer satisfaction and purchase intentions', *Journal of Retailing and Consumer Services*, Vol. 31, pp.313–322.

Altaboli, A. and Lin, Y. (2011) 'Investigating effects of screen layout elements on interface and screen design aesthetics', *Advances in Human-Computer Interaction*, Vol. 2011, No. 5, pp.1–10.

Babin, B.J., Darden, W.R. and Griffin, M. (1994) 'Work and/or fun: measuring hedonic and utilitarian shopping value', *Journal of Consumer Research*, Vol. 20, No. 4, pp.644–656.

Baker-Eveleth, L. and Stone, R.W. (2020) 'User's perceptions of perceived usefulness, satisfaction, and intentions of mobile application', *International Journal of Mobile Communications*, Vol. 18, No. 1, pp.1–18.

Barclay, D., Higgins, C. and Thompson, R. (1995) 'The partial least squares approach to causal modeling: personal computer adoption and use as illustration', *Technology Studies*, Vol. 2, No. 2, pp.285–309.

Benitez, J., Henseler, J., Castillo, A. and Schuberth, F. (2020) 'How to perform and report an impactful analysis using partial least squares: guidelines for confirmatory and explanatory IS research', *Information & Management*, Vol. 57, No. 2, pp.1–16.

Bhandari, U., Neben, T., Chang, K. and Chua, W.Y. (2017) 'Effects of interface design factors on affective responses and quality evaluations in mobile applications', *Computers in Human Behavior*, Vol. 72, pp.525–534.

Bilgihan, A., Kandampully, J. and Zhang, T.C. (2016) 'Towards a unified customer experience in online shopping environments', *International Journal of Quality and Service Sciences*, Vol. 8, No. 1, pp.102–119.

Bölen, M.C. and Özen, Ü. (2020) 'Understanding the factors affecting consumers' continuance intention in mobile shopping: the case of private shopping clubs', *International Journal of Mobile Communications*, Vol. 18, No. 1, pp.101–129.

Brade, J., Lorenz, M., Busch, M., Hammer, N., Tscheligi, M. and Klimant, P. (2017) 'Being there again–presence in real and virtual environments and its relation to usability and user experience using a mobile navigation task', *International Journal of Human-Computer Studies*, Vol. 101, pp.76–87.

Chang, C-C. and Chen, C-W. (2015) 'Examining hedonic and utilitarian bidding motivations in online auctions: impacts of time pressure and competition', *International Journal of Electronic Commerce*, Vol. 19, No. 2, pp.39–65.

Chen, C-W. and Koufaris, M. (2020) 'Multi-device use: understanding the motivations behind switching between multiple devices during a task', *International Journal of Human–Computer Interaction*, Vol. 36, No. 12, pp.1178–1193.

Chen, J., Fan, M. and Li, M. (2016) 'Advertising versus brokerage model for online trading platforms', *MIS Quarterly*, Vol. 40, No. 3, pp.575–596.

Chou, S., Chen, C-W. and Lin, J-Y. (2015) 'Female online shoppers: examining the mediating roles of e-satisfaction and e-trust on e-loyalty development', *Internet Research*, Vol. 25, No. 4, pp.542–561.

Chou, Y-H.D., Li, T-Y.D. and Ho, C-T.B. (2018) 'Factors influencing the adoption of mobile commerce in Taiwan', *International Journal of Mobile Communications*, Vol. 16, No. 2, pp.117–134.

Clement, J. (2019) *U.S. Mobile Retail Commerce Revenue 2013–2020* [online] https://www.statista.com/statistics/249855/mobile-retail-commerce-revenue-in-the-united-states/ (accessed 18 February 2021).

Cohen, J. (2013) *Statistical Power Analysis for the Behavioral Sciences*, Academic Press, Inc., New York, NY.

Cyr, D. (2008) 'Website design, trust and culture: an eight country investigation', *Electronic Commerce Research and Applications*, Vol. 12, No. 6, pp.373–385.

Cyr, D., Head, M. and Ivanov, A. (2006) 'Design aesthetics leading to m-loyalty in mobile commerce', *Information & Management*, Vol. 43, No. 8, pp.950–963.

Franke, G. and Sarstedt, M. (2019) 'Heuristics versus statistics in discriminant validity testing: a comparison of four procedures', *Internet Research*, Vol. 29, No. 3, pp.430–447.

Ganguly, B., Dash, S.B., Cyr, D. and Head, M. (2010) 'The effects of website design on purchase intention in online shopping: the mediating role of trust and the moderating role of culture', *International Journal of Electronic Business*, Vol. 8, Nos. 4/5, pp.302–330.

Hair, J.F., Ringle, C.M. and Sarstedt, M. (2011) 'PLS-SEM: indeed a silver bullet', *Journal of Marketing Theory and Practice*, Vol. 19, No. 2, pp.139–152.

Henseler, J., Ringle, C.M. and Sarstedt, M. (2015) 'A new criterion for assessing discriminant validity in variance-based structural equation modeling', *Journal of the Academy of Marketing Science*, Vol. 43, No. 1, pp.115–135.

Hoehle, H., Aljafari, R. and Venkatesh, V. (2016) 'Leveraging Microsoft's mobile usability guidelines: conceptualizing and developing scales for mobile application usability', *International Journal of Human-Computer Studies*, Vol. 89, pp.35–53.

Karimov, F.P., Brengman, M. and Van Hove, L. (2011) 'The effect of website design dimensions on initial trust: a synthesis of the empirical literature', *Journal of Electronic Commerce Research*, Vol. 12, No. 4, pp.272–301.

Kim, C., Galliers, R.D., Shin, N., Ryoo, J-H. and Kim, J. (2012) 'Factors influencing internet shopping value and customer repurchase intention', *Electronic Commerce Research and Applications*, Vol. 11, No. 4, pp.374–387.

Kim, D.J. and Hwang, Y. (2012) 'A study of mobile internet user's service quality perceptions from a user's utilitarian and hedonic value tendency perspectives', *Information Systems Frontiers*, Vol. 14, No. 2, pp.409–421.

Kim, J. and Lee, J. (2002) 'Critical design factors for successful e-commerce systems', *Behaviour & Information Technology*, Vol. 21, No. 3, pp.185–199.

Lavie, T. and Tractinsky, N. (2004) 'Assessing dimensions of perceived visual aesthetics of web sites', *International Journal of Human-Computer Studies*, Vol. 60, No. 3, pp.269–298.

Lee, C-C., Li, D., Arai, S. and Puntillo, K. (2008) 'Ensuring cross-cultural equivalence in translation of research consents and clinical documents a systematic process of translating English to Chinese', *Journal of Transcultural Nursing*, Vol. 20, No. 1, pp.77–82.

Lee, J-E.R., Rao, S., Nass, C., Forssell, K. and John, J.M. (2012) 'When do online shoppers appreciate security enhancement efforts? Effects of financial risk and security level on evaluations of customer authentication', *International Journal of Human-Computer Studies*, Vol. 70, No. 5, pp.364–376.

Levin, M. (2014) *Designing Multi-Device Experiences: An Ecosystem Approach to User Experiences Across Devices*, O'Reilly Media, Inc., Newton, MA.

Lohmöller, J-B. (1989) 'Predictive vs. structural modeling: PLS vs. ML', in *Latent Variable Path Modeling with Partial Least Squares*, pp.199–226, Physica, Heidelberg.

Malik, A., Suresh, S. and Sharma, S. (2017) 'Factors influencing consumers' attitude towards adoption and continuous use of mobile applications: a conceptual model', *Procedia Computer Science*, Vol. 122, pp.106–113.

Minge, M. and Thüring, M. (2018) 'Hedonic and pragmatic halo effects at early stages of user experience', *International Journal of Human-Computer Studies*, Vol. 109, pp.13–25.

Ozturk, A.B., Nusair, K., Okumus, F. and Hua, N. (2016) 'The role of utilitarian and hedonic values on users' continued usage intention in a mobile hotel booking environment', *International Journal of Hospitality Management*, Vol. 57, pp.106–115.

Podsakoff, N. (2003) 'Common method biases in behavioral research: a critical review of the literature and recommended remedies', *Journal of Applied Psychology*, Vol. 88, No. 5, pp.879–903.

Reinartz, W., Haenlein, M. and Henseler, J. (2009) 'An empirical comparison of the efficacy of covariance-based and variance-based SEM', *International Journal of Research in Marketing*, Vol. 26, No. 4, pp.332–344.

Richards, J. and Li, M. (2018) 'The Chinese e-commerce search advertising business: a case study of Taobao', *Contemporary Management Research*, Vol. 14, No. 2, pp.121–142.

Salimon, M.G., Yusoff, R.Z.B. and Mokhtar, S.S.M. (2017) 'The mediating role of hedonic motivation on the relationship between adoption of e-banking and its determinants', *International Journal of Bank Marketing*, Vol. 35, No. 4, pp.558–582.

Schmidt, A. and Etches, A. (2014) *Useful, Usable, Desirable*, ALA Editions, An Imprint of the American Library Association, Chicago.

Seckler, M., Heinz, S., Forde, S., Tuch, A.N. and Opwis, K. (2015) 'Trust and distrust on the web: user experiences and website characteristics', *Computers in Human Behavior*, Vol. 45, pp.39–50.

Shukla, P. (2014) 'The impact of organizational efforts on consumer concerns in an online context', *Information & Management*, Vol. 51, No. 1, pp.113–119.

Smith, C. (2021) *Taobao Statistics and Facts by the Numbers*, DRM [online] https://expandedramblings.com/index.php/taobao-statistics/ (accessed 21 November 2021).

Stoel, L., Wickliffe, V. and Lee, K.H. (2004) 'Attribute beliefs and spending as antecedents to shopping value', *Journal of Business Research*, Vol. 57, No. 10, pp.1067–1073.

Tarafdar, M. and Zhang, J. (2005) 'Analysis of critical website characteristics: a cross-category study of successful websites', *Journal of Computer Information Systems*, Vol. 46, No. 2, pp.14–24.

Vieira, V., Santini, F.O. and Araujo, C.F. (2018) 'A meta-analytic review of hedonic and utilitarian shopping values', *Journal of Consumer Marketing*, Vol. 35, No. 4, pp.426–437.

Voorhees, C.M., Brady, M.K., Calantone, R. and Ramirez, E. (2016) 'Discriminant validity testing in marketing: an analysis, causes for concern, and proposed remedies', *Journal of the Academy of Marketing Science*, Vol. 44, No. 1, pp.119–134.

Wang, Y.D. and Emurian, H.H. (2005) 'An overview of online trust: concepts, elements, and implications', *Computers in Human Behavior*, Vol. 21, No. 1, pp.105–125.

Wani, M., Raghavan, V., Abraham, D. and Kleist, V. (2017) 'Beyond utilitarian factors: user experience and travel company website successes', *Information Systems Frontiers*, Vol. 19, No. 4, pp.769–785.

Yu, N. and Kong, J. (2016) 'User experience with web browsing on small screens: experimental investigations of mobile-page interface design and homepage design for news websites', *Information Sciences*, Vol. 330, pp.427–443.

Zheng, X., Men, J., Yang, F. and Gong, X. (2019) 'Understanding impulse buying in mobile commerce: an investigation into hedonic and utilitarian browsing', *International Journal of Information Management*, Vol. 48, pp.151–160.