

THE MODERATING ROLE OF CONSUMER TECHNOLOGY ANXIETY IN MOBILE SHOPPING ADOPTION: DIFFERENTIAL EFFECTS OF FACILITATING CONDITIONS AND SOCIAL INFLUENCES

Kiseol Yang
The University of North Texas
College of Merchandising, Hospitality, & Tourism
1155 Union Circle # 311100
Denton, TX 76203-5017
Kiseol.Yang@unt.edu

Judith C. Forney
The University of North Texas
College of Merchandising, Hospitality, & Tourism
1155 Union Circle # 311100
Denton, TX 76203-5017
Judith.Forney@unt.edu

ABSTRACT

This study examined whether consumers' levels of technology anxiety moderate the causal relationships among determinants of mobile shopping adoption in a modified Unified Theory of User Acceptance and Use of Technology (UTAUT) model. With the moderating role of technology anxiety, facilitating conditions were examined as an antecedent driver of utilitarian and hedonic performance expectancies in determining mobile shopping adoption in the modified UTAUT model. A sample of 400 mobile services users drawn from a purchased consumer panel participated in an online survey. Structural equation modeling analysis was used to examine the hypothesized paths in the adoption of mobile shopping. Results indicated that the effect of facilitating conditions on both utilitarian and hedonic performance expectancies is stronger for consumers with a low level of technology anxiety than for consumers with a high level of technology anxiety. Moreover, consumers with a high level of technology anxiety rely more on social influence in the use of mobile shopping than consumers with a low level of technology anxiety. The modified UTAUT model reveals insightful results and provides a holistic framework for predicting emerging mobile shopping adoption behavior.

Keywords: Mobile shopping; Facilitating conditions; Social influences; Technology anxiety; UTAUT

1. Introduction

The ubiquitous characteristic of an Internet-enabled mobile phone is profoundly affecting the way people use services and information in their daily lives. This increased use of mobile internet and online services is enabling the creation of new services that promise alternative opportunities for companies [Yu 2012]. In the retail industry, the rapid adoption of mobile Internet and smartphones has retailers attempting to capitalize on the promise of technology-mediated mobile services as a new and important channel to serve and connect with consumers [Liesse 2007]. The mobile shopping channel has become a personal shopping assistant for consumers to enhance their shopping experiences and assist in making purchases across channels.

While mobile shopping services may promise better consumer shopping experiences, there are concerns about whether consumers will actually adopt technology-mediated services when available. This new technology-mediated mobile shopping channel is different from traditional (e.g., in-store, catalog) and online shopping channels and it is not yet validated across consumer segments. Further, with the extremely private and personal nature of the mobile phone device, mobile shopping services often involve security and privacy issues resulting from transacting financial and personal information. Therefore, consumers' concerns for security and privacy may be higher in the mobile shopping channel than in other shopping channels. Due to its newness and uniqueness in shopping encounters (e.g., small screen size, using 4G & 5G mobile technologies), mobile shopping may provoke user anxiety in its embryonic stage of mobile shopping adoption. In that regard, consumer anxiety may be a significant barrier facing consumers at the moment when mobile shopping is used. If this is the case, consumer mobile shopping

adoption might be leveraged by reducing consumer anxiety about using mobile shopping. Therefore, by understanding the relationships among consumers' underlying motivations to adopt mobile shopping and their associated anxieties, retailers may benefit by being proactive in designing mobile shopping services that help alleviate anxiety in the adoption stage.

This study examines determinants of consumer mobile shopping adoption using measures suggested by Venkatesh et al. [2003]'s Unified Theory of User Acceptance and Use of Technology (UTAUT). Although extant technology acceptance models and theories are well-established and validated in previous studies [e.g., Dabholkar and Bagozzi 2002; Davis 1989; Davis et al. 1989; Venkatesh 1999], testing that is based upon one technology acceptance model may bring skewed and blurred outcomes, particularly when examining a new technology phenomenon. With this concern in mind, Venkatesh et al. [2003] reviewed eight well-established information technology acceptance models, synthesized the theories, and ultimately proposed the Unified Theory of User Acceptance and Use of Technology model. The UTAUT model suggests there are several critical determinants that drive how consumers use technology. However, the UTAUT model focuses mainly on cognitive aspects of technology acceptance. Other determinants, such as affective aspects associated with social, psychological and technological influences on consumer behavior, might influence consumer technology acceptance as well. Thus, the lack of affective measures in the model may limit its ability to explain consumer mobile shopping adoption. Furthermore, considering that consumer anxiety about using mobile shopping may be a major obstacle to adopting this new shopping method, the present study proposes that consumer anxiety will moderate causal relationships among determinants in the UTAUT model. With that premise, this study aims to determine the drivers of consumer mobile shopping adoption related to the levels of consumer technology anxiety. The original measures and causal relationships of the UTAUT model were modified to be more relevant and coherent in the mobile shopping context. This study suggests implications for positioning mobile shopping for two consumer segments within the levels of technology anxiety presented in the modified UTAUT model.

1.1. Benefits of Mobile Shopping Services

In the retail industry, the online shopping experience is shifting to the Internet-enabled mobile phone which has widespread capabilities for serving customers. One rationale for this new channel migration is that the mobile channel enables relatively more personal and interactive communication between the retailer and consumer compared to traditional marketing communications. In addition, the mobile channel generates more abundant consumer information [Nohria and Leestma 2001; Rohm and Sultan 2006]. Moreover, unlike online shopping which is connected with a specific fixed local area network or location, mobile shopping provides services regardless of temporal and spatial constraints [Heinonen and Pura 2006]. This enables the consumer to shop when on the move with the always-on functionality of the mobile phone [Singh, Srivastava, and Srivastava 2010]. The ubiquitous characteristic of mobile shopping adds benefits such as convenience, localization, and personalization when shopping [Clarke and Flasherty 2003]. Furthermore, these benefits facilitate optimal customer contact points that can improve cross-channel shopping experiences in real-time interactions between the retailer and consumer.

Mobile shopping is both information-based and transaction-based. Information-based mobile shopping enables retailers to provide information related to a product purchase (e.g., map to a store, promotion information) or to facilitate an efficient consumer shopping process. For example, a mobile site might send a text message alert to customers regarding a product promotion or shopping information (e.g., product availability for pick up in-store). Another example is consumers using contact information from their phone address book to send e-gift cards with personalized text messages [Chain Store Age 2009]. Transaction-based mobile shopping enables consumers to shop, place an order, and make a purchase via the mobile phone. Mobile phones or a mobile phone account can be used as a digital wallet (e.g., Square, Google wallet) to pay for products via transaction-enabled mobile shopping sites. Mobile payment applications make in-store payment possible without carrying a wallet or purse. The Starbucks mobile app, considered one of the most successful payment apps, is a digital store card that can be reloaded and used in any Starbucks store [Berg Insight 2013]. The lack of widespread digital store cards and widely used mobile payment applications suggests that consumers still hesitate to use their mobile phones for direct monetary transactions. This hesitation may be due to concerns about security and privacy issues that are associated with transacting financial and personal information. For the sake of convenience, consumers may prefer to use mobile payment apps as an indirect payment method. With its unique characteristics and benefits, mobile shopping poses new technology challenges to retailers as they seek to manage mobile shopping experiences through seamless shopping transactions across channels. By developing and delivering optimal mobile shopping experiences to consumers, retailers will gain a competitive advantage over their competitors.

2. Theoretical Framework and Hypothesis Development

2.1. Adoption of Mobile Shopping Using a Modified UTAUT Model

The Unified Theory of User Acceptance and Use of Technology (UTAUT) [Venkatesh et al. 2003] suggests that performance expectancy, effort expectancy, social influences, and facilitating conditions are the critical direct determinants of behavioral intention to use technology. After the original UTAUT model was proposed, many studies extended and modified the measures of UTAUT across different contexts; however, a systematic investigation and theorizing of the model's salient factors in the context of consumer technology use remains [Venkatesh, Thong, and Xu, 2012]. Using Venkatesh et al.'s suggestion, this present study seeks to develop a more complete picture of consumer technology use by examining the UTAUT measures in the context of mobile shopping. The major differences between the model in this study and the original UTAUT model lie in the adding of two affective measures (i.e., hedonic performance expectancy and consumer anxiety) and in the positioning of the facilitating conditions as an antecedent driving factor for understanding consumer mobile shopping adoption.

The effort expectancy construct was removed to determine the effect of facilitating conditions on mobile shopping adoption. This modification was done because effort expectancy conflicted with the facilitating conditions construct in the UTAUT model. Without the effort expectancy construct in the model, facilitating conditions should become a predictor of intention [Venkatesh et al. 2003]. If having an Internet-enabled mobile device or knowledge of how to use mobile shopping was a precondition to use mobile shopping, then perception of technology ease of use may depend on the capability of the mobile device's functions and features. In addition, with rapidly advancing mobile technology and its adoption, consumers have gained experience using mobile technology, which may increase consumers' perception of ease of use of the mobile technology [Yu 2012]. While effort expectancy may be a necessary condition when using a technology, it may not be a significant driver for consumer technology adoption behavior [Wu, Tao, and Yang 2007]. Therefore, the functions and features of the mobile device itself would be more critical to a consumer's use of mobile shopping than the consumer's perception of ease of use of the services themselves. The present study rationalized that a facilitating condition construct (i.e., a device facilitating use of the services) would be a more critical construct than effort expectancy when examined in the context of mobile shopping. Therefore it is expected that testing the modified UTAUT model without effort-expectancy may reveal the genuine effect of facilitating conditions on consumer mobile shopping adoption behavior. This study proposes that facilitating conditions are an antecedent of utilitarian and hedonic performance expectancies and those performance expectancies and social influences affect consumer intention to use mobile shopping while those causal relationships are moderated by technology anxiety about using mobile shopping. The following section discusses each hypothesized relationship in the research model of this study.

2.2. Facilitating Conditions

Facilitating conditions are the degree to which an individual believes that a technical infrastructure exists to support technology use. It reflects perceptions of external constraints on behavior that encompass resource and technology facilitating conditions [Ajzen 1991; Taylor and Todd 1995a; 1995b]. Venkatesh et al.'s [2003] study identified support staff and guidance availability as facilitating users in overcoming technology difficulties. However, the facilitating conditions construct in this study focuses on a technological environment designed to remove barriers to technology use which then facilitate consumers' use of mobile shopping functions and features. Due to the on-the-go nature of mobile shopping, a shopping assistant may not be available all of the time; moreover, mobile phone technology could be considered as an assistant itself. Further, since mobile shopping is a voluntary activity for obtaining specific benefits or services, an advanced technology and well-designed interface can play a major role in facilitating mobile shopping. Thus, focusing on the mobile technology environment, the individual's knowledge of using the technology would be relevant in measuring the facilitating conditions construct in the mobile shopping context. Facilitating conditions of a mobile phone device (e.g., a better interface, speed, and data processing capabilities) and individual knowledge of using mobile shopping functions and features would enable consumers to access mobile shopping services with a minimal technological infrastructure barrier and could increase consumer performance expectancies using mobile shopping. Facilitating conditions are a motivating factor that results in consumer ease of use of technology in the purchasing of products and services [Triandis 1980]. High facilitating conditions would increase performance expectancies when using mobile shopping services. Thus:

H1a & b: Facilitating conditions are positively related to performance expectancies (a: utilitarian performance expectancy and b: hedonic performance expectancy) of mobile shopping.

2.3. Utilitarian and Hedonic Performance Expectancy

Performance expectancy refers to the degree of expected benefits consumers expect when using a technology for performing certain activities [Venkatesh et al. 2003; Venkatesh, Thong, and Xu 2012]. In the original UTAUT model, performance expectancy addresses only the utilitarian or functional aspects of performance expectancy. It does not include the hedonic aspect since the model was formulated based on the existing technology acceptance

theories derived from Theory of Reasoned Action and Theory of Planned Behavior, which both focus on the cognitive aspects of using technology [Brave and Nass 2002]. However, consumer technology adoption theories (e.g., extended TAM) emphasize the hedonic or entertainment aspect of using technology. Furthermore, the experiential aspect of technology use is mentioned as a significant determinant of behavioral intention to use the technology in previous studies [e.g., Dabholkar and Bagozzi 2002; Mano and Oliver 1993; Van der Heijden and Sorensen 2003; Venkatesh 1999]. The absence of a hedonic aspect of the performance expectancy measure could limit interpretations when predicting mobile shopping adoption. Thus, this study incorporates a hedonic performance expectancy construct into the UTAUT measures in order to generate a more coherent understanding of consumers' mobile shopping adoption behavior. Identifying the hedonic performance expectancy effect on behavioral intention to use mobile shopping will guide the design of the experiential aspects of mobile shopping. Thus, this study proposes that utilitarian and hedonic performance expectancy need to be measured as different dimensions of performance expectancy for mobile shopping adoption in the modified UTAUT model.

Utilitarian performance expectancy is defined as the degree to which an individual believes that using technology services will facilitate him/her in achieving task performance in the UTAUT measures. The utilitarian aspect of using technology services is derived from the economic concept in the information-processing paradigm where consumers expect to obtain useful, economically efficient and productive experiences when using services [Carpenter, Moore, and Fairhurst 2005]. Utilitarian performance expectancy is the strongest predictor of intention to use a technology in Venkatesh et al.'s [2003] study, implying that having an efficient and functional technology when accomplishing a task drives consumer intention to use the technology. In the context of mobile shopping, time efficiency, flexibility of use regardless of place, personalization, and shopping effectiveness reflect utilitarian performance expectancy in mobile shopping [Kleijnen, de Ruyter, and Wetzels 2007]. Personalization of mobile shopping based on individual preferences can help consumers obtain product information efficiently and effectively, resulting in increased utilitarian performance expectancy. For example, mobile shopping may help consumers reduce shopping time by offering appropriate product information (e.g., providing price comparison, promotional events, or product availability) based on customized and personalized settings on their mobile phone devices. When consumers perceive that mobile shopping enhances shopping effectiveness without constraining time and place, their positive attitude toward mobile shopping may be increased.

Hedonic performance expectancy is the degree to which an individual believes using technology-based services is fun [Davis et al. 1992]. Hedonic performance expectancy can be obtained through the experiences and emotions that are derived from the multisensory, emotive, and entertainment aspects associated with the experience of using a service [Babin et al. 1994; Holbrook 1999]. Communication functions that enable social interaction and entertainment-oriented shopping functions can provide enriched and enjoyable mobile shopping experiences. For example, when asking for a referent's opinion, the consumer can take and send a picture of the product or send the product's mobile site link to the referent. When consumers communicate and shop together via a mobile shopping site, regardless of time and place, the hedonic performance expectancy of mobile shopping can be increased. A mobile shopping site that provides a pleasurable shopping experience when searching for products or viewing product details can increase the hedonic aspect of mobile shopping. When the hedonic aspect of mobile shopping performance expectancy is increased for the consumer, his or her intention to use mobile shopping will be significant and positive. Thus:

H2: Utilitarian performance expectancy is positively related to intention to use mobile shopping.

H3: Hedonic performance expectancy is positively related to intention to use mobile shopping.

2.4. Social Influences

Social influences on mobile shopping are the degree to which an individual consumer perceives that important others believe he or she should use mobile shopping. Previous research in technology- based service supports social influences as strong determinants of using the services [Mathieson 1991; Taylor and Todd 1995b]. The expectations and perceptions of important others (e.g., friends, family, colleagues) contribute to the social factors that affect an individual consumer's decision making and perception towards a specific behavior [Limayem et al. 2004; Phau and Teah 2009]. Consumer adoption of a high technology product is influenced not only by one's attitude toward the product but also by socialization forces associated with the desire to follow referent group norms [Kulviwat et al. 2009]. Dickinger and Kleijnen [2008] found that when referents believed mobile coupons to be worthwhile and useful, consumers tended to conform to the referents' opinions. This suggests that a reference group's opinion significantly affects consumer decision making [Childers and Rao 1992]. Since mobile shopping offers new services and is a relatively new channel to serve customers, it is expected that consumers would be more interested in hearing about others' experiences and opinions of using this shopping method and would tend to be dependent on others' perceptions of using mobile shopping. Therefore, social influences would be a critical construct that drives consumer motivation to use mobile shopping. Further, others' positive opinions about using mobile shopping will increase a consumer's intention to shop by mobile phone. Thus:

H4: Social influences are positively related to intention to use mobile shopping.

2.5. Moderating Role of Consumer Technology Anxiety

Anxiety is a significant determinant of behavioral intention in social cognitive theory [Compeau and Higgins 1995]. Consumer anxiety about using technology specifically focuses on the individual consumer's state of mind regarding his or her ability and willingness to use technology-related tools [Meuter et al. 2003]. Considering that mobile shopping consists of innovative technology-mediated services that are not limited by temporal and spatial boundaries, consumer anxiety about using mobile shopping may be higher than anxiety about other shopping methods. While online shopping is accessed via web sites that are linked to a specific fixed local area network or a specific location, mobile shopping can be accessed on-the-go via data services [Heinonen and Pura 2006]. Consumers may perceive risks when transacting shopping information via unique technology infrastructures and mobile applications.

Furthermore, consumer anxiety about using services is particularly high in the mobile environment because the responsibility for a failure or loss (i.e., who is to blame) of a transaction may not be clear in this technology-mediated environment [Bahli and Benslimane 2004]. This anxiety may be increased since consumers are sensitive to services related to monetary transactions where they may lose both money and information with the click of a button on a mobile site [Hourahine and Howard 2004]. Newell and Katherine [2001] also reported that the diffusion of mobile transaction services depends primarily on whether consumers perceive it as a high risk. Furthermore, anxiety about using new technology-mediated shopping may be increased because the extremely personalized nature of mobile devices may increase consumer privacy and security concerns. In addition, a tiny screen and simple features or functions may provoke additional consumer concerns about a secure shopping transaction. Thus, anxiety about using mobile shopping might hinder consumers from adopting this shopping method and may have a negative direct effect on mobile shopping adoption.

Evidence indicates that providing facilitating conditions (e.g., technology resources) is critical in helping users overcome barriers and hurdles to technology use, especially during the early technology adoption stage (e.g., Bergeron et al. 1990). Since facilitating conditions are a factor in an environment that can hinder or make a technology easy to use [Triandis 1980], the extent and type of technology support for mobile shopping may influence the consumer's perception of the ease of technology use. In addition, positive perceptions regarding the use of functional devices or supporting infrastructures may lessen a consumer's fears about using technology-mediated services. Consumer anxiety about using mobile shopping may be a result of a lack of facilitating conditions where had these resources been present they would have reduced the complex processing of systems or features. While mobile payment and security/privacy issues are still concerns for consumers regardless of their levels of technology anxiety, it is expected that the extent of facilitating conditions in technology use will be perceived as higher for consumers with a low level of anxiety and lower for consumers with a high level of anxiety. Thus:

H5a & b: The positive relationship between facilitating conditions and performance expectancies (a: utilitarian performance expectancy and b: hedonic performance expectancy) of mobile shopping will be higher for consumers with a low level of anxiety than for consumers with a high level of anxiety.

Previous studies found that a high level of anxiety for using technology-mediated services reduces consumer behavioral intention to use the services [e.g., Hoffman and Novak 1996; Meuter et al. 2003]. Since consumers tend to avoid situations that are anxiety-producing [Compeau et al. 1999], consumers with a high level of anxiety will be less likely to use mobile shopping than consumers with a low level of anxiety. In addition, performance expectancies will be higher for consumers with a low level of anxiety due to the effect of facilitating conditions on using mobile shopping than for consumers with a high level of anxiety. Thus:

H5c & d: The positive relationship between performance expectancies (c: utilitarian performance expectancy and d: hedonic performance expectancy) and intention to use mobile shopping will be higher for consumers with a low level of anxiety than for consumers with a high level of anxiety.

The role of social influences in technology acceptance decisions is subject to a wide range of contingent influences in consumer decision making [Venkatesh et al. 2003]. Consumers with a high level of anxiety about using mobile shopping may be more likely to rely on peers' opinions and advice for using the services than consumers with a low level of anxiety. Since a high level of anxiety is related to a lack of confidence, consumers with a high level of anxiety may place more weight on referents' opinions in using mobile shopping than consumers with a low level of anxiety. It is expected that the extent to which consumers conform to other referents' opinions in using mobile shopping will be higher for consumers with a high level of anxiety than for consumers with a low level of anxiety. Thus:

H5e: The positive relationship between social influences and intention to use mobile shopping will be higher for consumers with a high level of anxiety about using mobile shopping than consumers with a low level of

anxiety. The hypothesized paths are depicted in Figure 1.

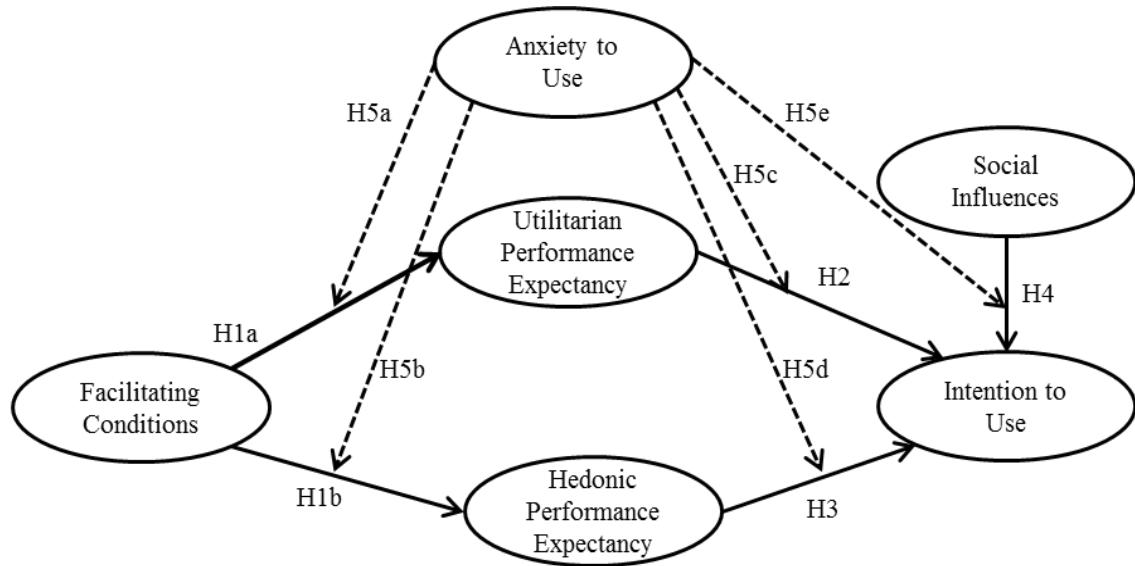


Figure 1. Hypothesized Research Model

Note: A perforated line indicates a moderating effect on the path.

3. Methods

3.1. Measures

Venkatesh et al.'s [2003] UTAUT measurement items were adapted to measure two constructs using a 7-point Likert scale where 1 = strongly disagree and 7 = strongly agree. Four items measured utilitarian performance expectancy and three items measured social influence. The instrument also included: three items on hedonic performance expectancy [Davis et al. 1992]; three items on facilitating conditions [Ajzen 1991; Taylor and Todd 1995a; 1995b]; four items on technology anxiety [Compeau and Higgins 1995]; and three items on behavioral intention to use mobile shopping [Lee et al. 2002; Pavlou and Chai 2002]. All scale items were modified for testing the theory by referencing to mobile shopping.

In validating measures and testing hypotheses, three-steps of the structural equation modeling were recommended in this study since it enables an evaluation of the performance of the model as a whole [Bagozzi, 1981; Ryan 1982] and allows direct comparisons among the selected path coefficients across groups [Lee and Green 1999]. First, confirmatory factor analysis evaluated the measurement model's quality. Next, structural equation modeling tested the hypothesized relationships in the model. Finally, multiple group structural equation modeling compared the differences among the three paths between the two groups using an Amos 20.0 program.

3.2. Sample

A national sample of mobile services users, drawn from a consumer panel purchased from the marketing research company (i.e., Research Now), participated in an online survey. Participants received monetary rewards when they provided completed responses. The survey instrument was placed on a web site where participants could access and respond to the survey. Randomly selected members of the consumer panel received an e-mail containing the survey link and 400 participants completed the survey. The sample of respondents was comprised of more women (59 percent) than men; most were between the ages of 19 and 30 years (78.8 percent); 40.2 percent had a college degree; 23.5 percent of respondents were in the mid income level (\$50,000-74,999); and 78.8 percent used a mobile phone for private purposes. As shown in the sample description (see Table 1), 26.3 percent of the respondents had previously shopped using their mobile devices. This sample reflects similar reported characteristics that 67% of Americans between the ages of 18-24 and 71 % of those ages 18-24 are smartphone users [Pew Internet

& American Life Project 2012], implying that the sample of this study is congruent with current mobile service subscribers.

Table1: Sample Description

Variables	Scale	Frequency	Percent of Total
Age	19-29	309	77.2
	30-39	33	8.3
	40-49	38	9.5
	50-59	18	4.5
	Over 60	2	.5
Gender	Female	236	59
	Male	164	41
Education	High School	53	13.3
	Some College	150	37.5
	College	161	40.3
	Graduate School	32	8.0
	Other	4	1.0
Income	Under \$ 25,000	68	17.0
	\$25,001-\$34,999	50	12.4
	\$35,000-\$49,999	64	16.0
	\$50,000-\$74,999	94	23.5
	\$75,000-\$99,999	59	14.8
	\$100,000-\$124,999	38	9.5
	Over \$125,000	27	6.8
Purpose of use a mobile phone	Exclusively for private	195	48.9
	More for private	120	30
	About 50/50 private & business	72	18
	More for business	12	3
	Exclusively for business	1	.3
Ever shop by a mobile phone	No	295	73.8
	Yes	105	26.3

4. Results

4.1. Measurement Model Evaluation

Confirmatory factor analysis validated the measurement model by assessing the reliability, convergent validity, and discriminant validity of the constructs. The fit statistics of the measurement model had good fit indices ($\chi^2 = 268.177$ with 94 df at p-value $<.001$, CFI of .970, and RMSEA of .068). Cronbach's alpha for each latent construct ranged from .75 to .96, exceeding the recommended level of .70. Convergent validity was assessed by the magnitude of the factor loadings of each indicator of the latent constructs [Anderson and Gerbing 1988]. All items loaded on the intended constructs at the p value $<.001$ and the standardized factor loadings ranged from .63 to .96. In addition, the composite reliabilities of each construct ranging from .75 to .97 exceeded the recommended level of .65 and the average variance extracted (AVE) ranged from .57 to .90 (see Table 2).

Discriminant validity among constructs was confirmed by comparing the squared root of the AVE for each construct, with the correlations between that construct and all other constructs. The squared roots of the AVEs for the constructs that were greater than the correlations between a given construct and others satisfied the discriminant validity [Fornell and Larcker 1981]. Exceptions were found among utilitarian performance expectancy, hedonic performance expectancy, and behavioral intention (see Table 3). The AVEs for utilitarian, hedonic performance expectancies, and behavioral intention are .54, .83, and. 90 respectively, indicating adequate discriminant validity. Thus, the discriminant validity among constructs was acceptable.

Table 2: Measurement Model Results

Latent Construct	Observed Indicators	N=400		
		Factor Loadings	AVE ^a	α^b
Utilitarian Performance Expectancy	If I do mobile shopping, I would find it useful for shopping.	.80	.54	.81
	If I do mobile shopping, it would enable me to spend less money on shopping.	.66		
	If I do mobile shopping, it would increase my chances of obtaining shopping promotion information.	.67		
	If I do mobile shopping, it would enable me to accomplish shopping more quickly.	.80		
Hedonic Performance Expectancy	I would have fun shopping by mobile phone.	.91	.83	.94
	The actual process of mobile shopping would be pleasant.	.90		
	I would find using mobile shopping to be enjoyable.	.93		
Social Influence	People who influence my behavior think that I should use mobile shopping.	.89	.80	.92
	I would shop by mobile phone because of the proportion of my friends who do mobile shopping.	.87		
	People who are important to me think that I should use mobile shopping.	.92		
Facilitating Conditions	I have an Internet-enabled mobile phone to access the shopping sites via mobile phone.	.63	.57	.75
	Given the resources, opportunities and knowledge it takes to use mobile shopping, it would be easy for me to use the system.	.89		
	I have the knowledge necessary for mobile shopping.	.72		
Intention	Given the chance, I intend to shop by mobile phone.	.94	.90	.96
	I expect my mobile shopping to continue in the future.	.95		
	I intend to purchase products or services via mobile phone.	.96		

Note: ^a Average Variance Extracted. ^b Cronbach's α

Table 3: Discriminant Validity

	FC	UE	HE	SI	BI
FC	.75				
UE	.67	.74			
HE	.72	.77	.91		
SI	.55	.63	.72	.89	
BI	.74	.76	.89	.74	.90

Note: Squared root of AVE estimates are presented on the diagonal and correlations are below the diagonal with constructs abbreviated as FC: Facilitating Conditions; UE: Utilitarian Expectancy; HE: Hedonic Expectancy, SI: Social Influence, BI: Behavioral Intention.

4.2. Hypotheses Testing

4.2.1. Test of the Core Model

Structural equation modeling tested the hypothesized paths of the core model. The model showed a good fit with the data ($\chi^2 = 383.251$ with 98 df at p-value <.001, CFI of .951, and RMSEA of .085). The results of the standardized path coefficients for each hypothesized path are provided in Table 4. All coefficient estimates were significant ($p<.05$) in line with the hypothesized directions. The effect of facilitating conditions on utilitarian performance expectancy (p-value <.001; $\Gamma = .827$, $t = 14.390$) and hedonic performance expectancy (p-value <.001; $\Gamma = .883$, $t = 18.888$) were positive, thus, supporting H1a & b. The effect of utilitarian performance expectancy on

behavioral intention to use mobile shopping ($p\text{-value} < .001$; $\beta = .165$, $t = 3.528$) had a positive effect, supporting H2. In addition, the effect of hedonic performance expectancy on behavioral intention to use mobile shopping ($p\text{-value} < .001$; $\beta = .638$, $t = 13.175$) had a positive effect, supporting H3. Social influences ($p\text{-value} < .001$; $\Gamma = .194$, $t = 5.178$) related positively with behavioral intention to use mobile shopping, thus, H4 was supported. Hypothesis testing confirmed that all hypothesized paths were significant and positively related with consumer intention to use mobile shopping. Among the determinants of behavioral intention to use mobile shopping, the effect of hedonic performance expectancy on intention had the strongest path coefficient. This suggests that hedonic performance expectancy of mobile shopping is the strongest determinant among those tested. Additionally, the mediating effect of utilitarian/hedonic performance expectancies on the relationship between facilitating conditions and behavioral intention was significant ($p\text{-value} = .010$; $\beta = .700$).

Table 4: Results of Hypothesis Testing

Paths	N=400	
	Standardized Coefficients	t-value
H1a: Facilitating Conditions → Utilitarian Performance Expectancy	.827*	14.390
H1b: Facilitating Conditions → Hedonic Performance Expectancy	.883*	18.888
H2: Utilitarian Performance Expectancy → Behavioral Intention	.165*	3.528
H3: Hedonic Performance Expectancy → Behavioral Intention	.638*	13.175
H5: Social Influences → Behavioral Intention	.194*	5.178

Note: * $p < 0.01$

4.2.2. Test of Moderating Effects.

To test the moderating effect of anxiety on the causal relationships in the core model, the sample was divided into two groups based on having either a high score (> 3.5) or low score (≤ 3.5) that was determined by a median split of the four-item anxiety scale. The four items of the anxiety scale are ‘Mobile shopping would be somewhat intimidating to me’; ‘It would scare me to know that I could lose a lot of information by hitting the wrong feature in the mobile shopping system’; ‘I would feel apprehensive about using mobile shopping’; and ‘I would hesitate to use mobile shopping for fear of making mistakes I cannot correct’. The lower 43% ($N = 173$) group of respondents was classified as the low anxiety group with the higher 57% ($N = 227$) group of respondents classified as the high anxiety group. The moderating effect of consumer anxiety on the five hypothesized paths was examined using the chi-square differences between the constrained model (equality constraints imposed on each path that was hypothesized to be moderated across two groups) and the unconstrained model (free parameter estimation). Table 5 presents the path coefficients for each group, the significance, and the chi-square differences to verify the moderating effect of consumer anxiety on the hypothesized paths. There were significant moderating effects on the relationships between facilitating conditions and utilitarian performance expectancy ($\Delta\chi^2 = 6.037$ at $p\text{-value} = .014$) and between facilitating conditions and hedonic performance expectancy ($\Delta\chi^2 = 5.862$ at $p\text{-value} = .015$). The effect of facilitating conditions on utilitarian performance expectancy was higher for the low level of anxiety group ($\Gamma = .874$ at $p\text{-value} < .001$) than for the high level of anxiety group ($\Gamma = .767$ at $p\text{-value} < .001$). In addition, the effect of facilitating conditions on hedonic performance expectancy was higher for the low level anxiety group ($\Gamma = .932$ at $p\text{-value} < .001$) than for the high level anxiety group ($\Gamma = .846$ at $p\text{-value} < .001$). The results confirm H5a & b, suggesting that the facilitating conditions are high for the low level anxiety consumer group and consequently have a stronger positive effect on utilitarian and hedonic performance expectancies than the high level anxiety group.

A significant difference was found in the relationship between social influences and behavioral intention to use mobile shopping ($\Delta\chi^2 = 4.803$ at $p\text{-value} = .028$). The path coefficients across groups for the high level of anxiety group ($\Gamma = .275$ at $p\text{-value} < .001$) demonstrated a stronger effect of social influences on behavioral intention to use mobile shopping than for the low level of anxiety group ($\Gamma = .094$ at $p\text{-value} = .086$) (see Table 5). This implies that consumers who have high anxiety about using mobile shopping are more significantly influenced by other referents’ opinions in adopting mobile shopping. Thus, H5e was supported. While consumer anxiety moderated the relationships in the effect of facilitating conditions on utilitarian/hedonic performance expectancy and the effect of social influence on behavioral intention to use mobile shopping, there were no significant differences in the relationships between utilitarian/hedonic performance expectancies and behavioral intention across groups (see Table 5). Thus H 5c & d were not supported in this study. Interestingly, the effect of hedonic performance expectancy on behavioral intention to use mobile shopping was significant and positive for both the high level of anxiety ($\beta = .582$ at $p\text{-value} < .001$) and the low level of anxiety groups ($\beta = .659$ at $p\text{-value} < .001$).

Table 5: Results on Moderating Effect of Consumer Anxiety

Paths			High Anxiety (N=227)	Low Anxiety (N=173)
	χ^2 (d.f.)	$\Delta\chi^2$	Standardized Coefficients	Standardized Coefficients
H5a: Facilitating Conditions				
→Utilitarian Performance Expectancy	489.298 (197)	6.037*	.767**	.874**
Constrained model	483.261 (196)			
Unconstrained model				
H5b: Facilitating Conditions				
→Hedonic Performance Expectancy	489.298 (197)	5.862*	.846**	.932**
Constrained model	483.261 (196)			
Unconstrained model				
H5c: Utilitarian Performance				
Expectancy → Behavioral Intention	483.446 (197)	.184	.146*	.227*
Constrained model	483.261 (196)			
Unconstrained model				
H5d: Hedonic Performance				
Expectancy → Behavioral Intention	483.274 (197)	.013	.582**	.659**
Constrained model	483.261 (196)			
Unconstrained model				
H5e: Social Influences →				
Behavioral Intention	488.064 (197)	4.803*	.275**	.094
Constrained model	483.261 (196)			
Unconstrained model				

Note: *p < 0.05, **p<0.01

5. Discussion

This study identifies critical determinants for consumer adoption behavior of emerging mobile shopping and the moderating effect of consumer anxiety on the modified UTAUT model. Performance expectancy was measured with two dimensions of utilitarian and hedonic performance expectancy while consumer anxiety about using mobile shopping served as a moderating role in leveraging the causal relationships in the model. Applying extended measures with different approaches from Venkatesh et al.'s [2003] study reveals insightful results and provides a holistic picture among structural causal relationships in consumer mobile shopping adoption.

5.1. Determinants of Consumer Mobile Shopping Adoption

Facilitating conditions, utilitarian performance expectancy, hedonic performance expectancy, and social influences are significant constructs for predicting consumer mobile shopping adoption behavior in this study. Although utilitarian performance expectancy was the strongest predictor in the original UTAUT model in Venkatesh et al.'s [2003] study, this study shows that hedonic performance expectancy is the strongest predictor of intention to use mobile shopping in the modified UTAUT model. The strong effect of hedonic performance expectancy on intention to use mobile shopping confirms that entertainment and experiential functions and features of mobile shopping reinforce the benefits of using mobile shopping and ultimately drives consumer's mobile shopping adoption. This study suggests that retailers and mobile marketers need to develop hedonic aspects of mobile shopping services such as emoticons for visual and emotional appeals, multi-dimensional product views, and various product or service presentation options supported by multisensory cues. Further, though technology-mediated mobile shopping may be designed to provide functional benefits to facilitate the shopping process for consumers on the move, consumers are more likely driven by the hedonic benefit that enhances the experience of using the mobile shopping functions and features. Thus, when retailers and mobile marketers design functions and features for mobile shopping services, the experiential/entertainment aspects of functions and features should be critical considerations for creating favorable user experiences. The results support the opinion that consumer shopping experiences tend to simultaneously involve both the utilitarian and hedonic motivations [Babin et al. 1994].

Further, this study supports facilitating conditions as a significant precondition to using mobile shopping along with increased performance expectancies of mobile shopping. Facilitating conditions in using mobile shopping may be influenced by mobile device capabilities and low fees for receiving services or for purchasing a mobile device. In order to make mobile shopping available to more consumers, retailers and mobile marketers need to provide mobile shopping experiences that are compatible across multiple mobile platforms. Moreover, a customer-centered mobile site interface that delivers effective and efficient shopping services based on user preferences can accelerate mobile shopping adoption. While mobile shopping services may vary depending on the unique capabilities of various mobile platforms and mobile devices, limiting the widespread use of mobile shopping, shopping via a computer or Tablet that is connected with a specific fixed local area network or location may present more interactive features and services that keep consumers engagement with retailers' websites. The recent trend of shopping using a Tablet PC may combine the advantages of both mobile shopping and online shopping using a PC. The Tablet PC is more portable and mobile apps can be installed into the device; its larger screen and more capabilities make it similar to a PC. Retailers should consider each shopping channel advantages and disadvantages and position services, functions, and features that are more appropriately suited in each shopping channel environment and individual consumer shopping situation.

5.2. Consumer Anxiety in Mobile Shopping Services: Differential Effects of Facilitating Conditions and Social Influences

The effect of facilitating conditions on utilitarian/hedonic performance expectancy is significantly higher among consumers with a low level of anxiety than for consumers with a high level of anxiety. This implies that consumers with low anxiety perceive higher facilitating conditions than consumers with a high level of anxiety. Better facilitating conditions may be a precondition to overcome consumer anxiety about using technology-mediated mobile shopping in the technology adoption stage. In addition, since a mobile phone is a personal device with various capabilities enabling consumers to shop by themselves, mobile sites or shopping applications need to offer a self-instruction option that facilitates mobile shopping for first-time mobile shoppers in the technology-mediated environment. Using multimedia content to demonstrate mobile shopping can replace the assistance of salespeople in traditional retail settings.

Moreover, consumers with a high level of anxiety are more inclined to be influenced by other referents' suggestions for using mobile shopping than are consumers with a low level of anxiety. The rapid growth and scope of social media is leading consumers to become co-producers of marketing, brands, products and services. Word of mouth through virtual community activities and consumer engaged marketing (e.g., customer reviews, blog contests) would be relevant marketing practices to promote mobile shopping for consumers with high levels of anxiety about using mobile shopping services. Further, facilitators to using mobile shopping for this consumer segment might include features such as social networking links or asking for expert advice on a mobile shopping site. Consumers with a high level of anxiety about using mobile shopping may become comfortable adopting mobile shopping after receiving substantial testimonials from referents. To promote mobile shopping to consumers with a high level of anxiety, positive word of mouth and consumer-generated content (e.g., mobile site or application review) may reduce consumer anxiety about using a highly personalized mobile device for shopping and monetary transactions.

6. Limitations of the Study

One limitation of this study is the age distribution of the sample. Since the largest group of respondents is age 19 to 30 years old (78.8 percent), the results may have limited applications to other age groups. Another limitation of this study lies in the measurement items. Due to the adoption stage of mobile shopping at the time of data collection in this study, mobile shopping associated with monetary transactions were not specifically addressed in the measurement items. Thus, detailed implications for monetary transactions in mobile shopping are limited in this study.

7. Conclusions

The technology aspect of facilitating conditions is the foremost driver motivating consumers to adopt mobile shopping. This further increases performance expectancy of mobile shopping while decreasing the level of technology anxiety when using mobile shopping. The growing phenomena of social influence through social media and social networking tools offers an opportunity to drive high anxiety consumers to adopt mobile shopping in the adoption stage of the services. In addition, designing mobile shopping services with utilitarian and hedonic performance is critical to enhance the consumer shopping experience and to increase retention of mobile shopping users. The adoption of high-tech innovations will depend on how well consumers gain knowledge and develop new patterns in their technology experience [Gatignon and Robertson 1985]. Thus, future research needs to test the moderating effect of prior experience of using technology services through observation over a longer period of time

[Huh and Kim 2008]. In addition, age and gender may be moderators for using technology-mediated services and need to be examined for consumer mobile shopping adoption behavior. Further, mobile shopping adoption that is specifically categorized as informational and transactional services needs to be examined with the shopping service characteristics, benefits, and risks issues (e.g., trust, privacy, security).

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