Mobile Shopping Should be Useful, Convenient and Fun!

Norman Shaw(✉) and Ksenia Sergueeva

Ryerson University, Toronto, Canada
{norman.shaw,sergueeva.ksenia}@ryerson.ca

Abstract. Consumers engage in mobile commerce via their smartphones. They are able to search for product information, compare prices and finalize their purchase without having to enter a physical store. With the choice of many apps, they are motivated by the convenience of shopping any place any time. The Unified Theory of Acceptance and Use of Technology (UTAUT2) is a well-tested theory that explains consumer adoption of a technology innovation. In this study, UTAUT2 is the foundational theory, but instead of specifying the antecedent 'performance expectancy' as reflective, it is specified as formative. In addition, perceived convenience is added and the resultant research model is empirically tested. Using PLS to analyze the data from a questionnaire sent to Canadian owners of smartphones, the results show that performance expectancy, hedonic motivation and perceived convenience are the main significant factors that influence consumers' intention to use an app for mobile commerce.

Keywords: UTAUT2 · Perceived convenience · Hedonic motivation · PLS

1 Introduction

Eight out of ten consumers in North America have engaged in online retailing, with fifteen percent of them making a purchase at least once per week [2]. Seventy seven percent of the population enjoy connectivity 'while on the go' and fifty one percent have used their mobile phone to help them with their purchase [3]. Consumers desire functionality where they can compare prices, receive product advice, follow reviews and make payments. The use of mobile devices for mobile commerce allows consumers the convenience of shopping anywhere at anytime [4, 5].

The capabilities of smartphones are improving each year: screens are larger, app design makes it easy and fun to use and more functionality is packed into an app [6]. Thirty four percent of consumers foresee that their smartphone will be their primary connection for mobile commerce in the future [7]. Recognizing the growing ubiquity of smartphone ownership, various organizations, such as Apple and Google, have developed mobile wallets that enable the smartphone to store payment cards that can then be used in the physical store without the need to produce a plastic card [8, 9]. With consumers having the choice of so many apps, app designers desire to understand what is the motivation to adopt a particular app.

Adoption research has progressed through a number of theories, such as the Theory of Planned Behavior [10], the Theory of Reasoned Action [11] and the Technology

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Adoption Model (TAM) [12]. In 2003, Venkatesh et al. [13] introduced the Unified Theory of Adoption and Use of Technology, UTAUT, from the synthesis of eight technology models. In 2012, they further extended this theory to UTAUT2 to explain voluntary use [1] which can be applied to consumers, for whom there is no mandate to deploy a specific smartphone app. Adoption is voluntary and UTAUT2 has been applied to, for example, the acceptance of mobile payments [14].

Past studies on technology adoption have empirically shown that perceived usefulness is a key influencing factor on the intention to use an IT artifact [15, 16]. UTAUT and UTAUT2 name this variable 'performance expectancy'. The majority of studies have specified this construct as reflective [17]. Diamantopoulos [18] has argued that the specification between reflective and formative can impact the validity of the theoretical approach. For mobile shopping apps, consumers perceive some features to be more useful than others. The reflective approach of measuring performance expectancy, common in studies of adoption, asks whether the app improves productivity. This tends to ignore the different features within the app. As a simple example, consumers who only wish to use their device to compare prices are using less functionality than those who have activated their mobile wallet. Reflectively, both types of consumers may feel that they are more productive. By specifying the performance expectancy as formative, consumers who deploy more functionality will be measured as more productive. In this study, we specify performance expectancy as a formative construct, where the indicators describe and define the construct, rather than vice versa [19].

Using a smartphone for mobile commerce adds convenience, as it allows the consumer to engage anytime and anyplace [20]. Convenience is not the same as usefulness: the mobile wallet may be perceived as useful, but when it involves opening an app on a smartphone, keying in a security code and attempting to tap it on a payment terminal which may not be tap-enabled, the lack of convenience is a barrier to usefulness. The specification of performance expectancy as a formative construct further ensures that it is differentiated from perceived convenience.

The context of this study is to investigate the factors that influence consumers' intention to use their mobile devices for mobile shopping. Our research question is:

- What factors motivate consumers to adopt a mobile shopping app?

Our supplementary questions are:

- What is the role of hedonic motivation?
- What is the role of perceived convenience?

The contribution of our research is the creation of new theory by extending UTAUT2 with perceived convenience and specifying performance expectancy as a formative construct.

This paper is organized as follows. The next section is the literature review, where we develop our hypotheses and illustrate them with our research model. The third section is the research methods. The fourth section is the analysis of the results. In the fifth section we discus the results and include the limitations of the current research and offer suggestions for future research. We present our conclusions in the final section.

2 Literature Review and Development of Hypotheses

2.1 UTAUT2 as the Foundational Model

Many studies of technology adoption have empirically tested TAM in many contexts [21, 22]. It has been cited 32,977 times (Google Scholar as of 28 January 2017). With its two influencing variables, perceived usefulness (PU) and perceived ease of use (PEOU), its influence and success has been attributed to its parsimony [23]. Many studies added antecedents in order to enrich the findings and in 2003, Venkatesh et al. [13] evaluated the findings of eight common theories of adoption, including TAM, unifying them into UTAUT. PU and PEOU were incorporated into the model, and were named performance expectancy (PE) and effort expectancy (EE) respectively. In addition to PE and EE, there are two other independent variables: social influence (SI) and facilitating conditions (FC).

When TAM was first proposed, systems were deployed in organizations where use was mandatory. With the advent of smaller and cheaper computing devices, innovations became available for consumers whose choice of adoption was voluntary. Venkatesh et al. created UTAUT2 [1] by extending UTAUT with the constructs of habit, price value (PV) and hedonic motivation (HM). UTAUT2 has received wide acceptance [24] and is selected as our theoretical foundation. It has explained behavioral intention with a variance between 56% to 74% [1]. The following paragraphs describe our hypotheses based on the constructs of UTAUT2.

2.2 Performance Expectancy (PE)

Venkatesh et al. [1] empirically tested UTAUT2 in the context of mobile Internet. PE was measured by asking the reflective questions shown in Table 1.

Table 1. Survey items for PE [1]

PE1: I find mobile Internet useful in my daily life
PE2: Using mobile Internet help me accomplish things more quickly
PE3: Using mobile Internet increases my chances of achieving things that are important to me (dropped)
PE4: Using mobile Internet increases my productivity

These questions, like many questions in IT research, are specified as reflective constructs, where any change in the construct changes the indicators [25]. In Table 1, the four items are measuring the concept of usefulness. If a particular respondent were to believe that the app was not useful, then all indicators would be expected to change, as they are each measuring the same thing. The responses are expected to converge. Standard statistical tests, such as Cronbach's alpha [26] are applied. In the study by Venkatesh et al. [1], PE2 had a low correlation coefficient, it was therefore dropped (see Table 1). The indicators are interchangeable and other similar indicators could be added and would be valid so long as they converged.

The concept of a formative construct is different. The composition of the indicators makes up the construct. Each indicator is measuring a different aspect of the latent variable and therefore the indicators are not interchangeable. The resultant score can be considered as an index [27]. Dropping an indicator changes what the construct is measuring. As an example, a stock index, such as the Standard & Poor's 500, is comprised of the value of 500 stocks. Removing even just one of those stocks will certainly change the value of the index, but it also changes the meaning of the index, as we would then have the S&P 499!

In this study, we specify performance expectancy as formative, and measure it in terms of consumers' use of such features as collecting loyalty points, researching products and paying with the mobile wallet.

Hypothesis 1: Performance expectancy, specified as a formative construct, positively influences intention to use apps for mobile shopping.

2.3 Effort Expectancy

Effort Expectancy (EE) is defined as the 'degree of ease associated with the use of the system' [13]. Apps for consumers are aimed, by definition, at large audiences who are able to choose from a large selection. Once an app is downloaded, the expectation is that it will be easy to use with minimal instructions. App designers make use of buttons on the touch screen, colors and sound effects to guide the user. Meta-analysis of the adoption literature has validated the relationship between EE and intention to use (ITU) [28], but the influence of EE has been less conclusive than that between PE and ITU [29]. With the growth of smartphone apps [30], consumers are willing to try new apps, but they must be easy to use. Therefore:

Hypothesis 2: Effort expectancy positively influences the intention to use smartphone apps for mobile commerce.

2.4 Hedonic Motivation

Hedonic motivation is similar to perceived enjoyment, which is defined as 'the extent to which the activity of using the computer system is perceived to be personally enjoyable in its own right' [31]. In the workplace, the primary purpose of the system is to deliver functionality, yet adoption was influenced not only by functionality but by enjoyment too [31]. The purpose of mobile shopping apps is to assist consumers with their shopping needs. Consumers have a large number of apps from which to choose, many of which are offering very similar functionality. They too may be influenced by the enjoyment when using the app.

Hypothesis 3: Hedonic motivation positively influences the intention to use smartphone apps for mobile commerce.

2.5 Social Influence

The Theory of Reasoned Action [11] postulates that users are influenced by 'referent' others who are important to them. Within an organization, a worker is influenced by how his manager perceives his adoption of the system. The worker would also be influenced by his co-workers with whom there is co-dependence. Extant literature has validated this relationship within a mandatory context [28]. In a voluntary setting, 'referent others' would be friends, family and colleagues. They may recommend an app because it is useful or fun. Depending upon the relationship, the individual may decide to use the app based on the influence of 'others'. We propose:

> Hypothesis 4: Social influence positively influences the intention to use smartphone apps for mobile commerce.

2.6 Facilitating Conditions

When using a plastic credit card in the store, the infrastructure is in place to ensure that the transaction is completed accurately and securely. In the unlikely event that there are problems, the credit card providers and the retailers have help desks to resolve any issues speedily. These conditions have facilitated the adoption of credit card payments via a physical card. Similar infrastructure and support needs to be in place for mobile shopping apps so that consumers have confidence that the system will work as intended. They need to be assured that facilitating conditions (FC) are in place [32, 33]. Our next hypothesis is:

> Hypothesis 5: Facilitating conditions positively influence the intention to use smartphone apps for mobile commerce.

2.7 Habit

Habit is conceptualized as the extent to which people tend to perform behaviors automatically because of learning [1]. Although the sphere of mobile commerce is growing, it is still a fairly new phenomenon specifically in the use of mobile applications to aid the shopping experience. The proportion of consumers using mobile application to make purchases is relatively low with few people accustomed to shopping via mobile applications. Thus, in this paper, the construct habit is dropped.

2.8 Perceived Convenience

We buy from a convenience store because it is typically open longer hours than the supermarket, it is closer to home with less effort required than driving to the shopping centre, and it is fast, because we only buy a few items and there are not many people in the queue in front of us [34]. Similarly we can compare the convenience of mobile shopping. It can decrease the effort required when shopping. For example, prices can be compared across multiple retailers within a few seconds. There is no need to drive to different stores in order to see who has the lowest price. Mobile shopping can eliminate the temporal dimension. Internet sites are open 24/7, such that at any time of the day

products can be purchased. And mobile shopping addresses the spatial dimension. Shopping can take place anywhere – at home, at work, or while watching a football game. Mobile shopping is therefore convenient [35] offering the consumer the ability to shop anyplace and at anytime.

Depending upon how they are measured, convenience and usefulness may be confounded. A consumer may perceive that a mobile wallet is useful, but they may perceive it to be inconvenient because the phone has to be available, a security code has to be entered and the payment terminal has to be tap-enabled to accept payment. Although the mobile wallet is useful, it is more convenient to produce the physical card because payment will always function.

Poon [36] suggested that when time and effort are saved, then convenience is being measured. For example, using an app to seek information about a product while in a store is convenient because the app saves the effort of having to find a sales person and saves time because detailed information is readily available over the Internet delivered to the smartphone. The app is also useful because it delivers information about the product, which helps the consumer make a purchasing decision. Convenience can lead to the improvement of productivity by saving time and effort and in order not to confound perceived convenience with performance expectancy, we have specified performance expectancy as a formative construct in this study.

We define perceived convenience (PC) as 'the consumers' belief that the use of the IT artifact will enable them to complete the task in a speedy manner, at a time and place of their choosing' [4]. We therefore propose that:

Hypothesis 6: Perceived convenience positively influences the intention to use smartphone apps for mobile commerce.

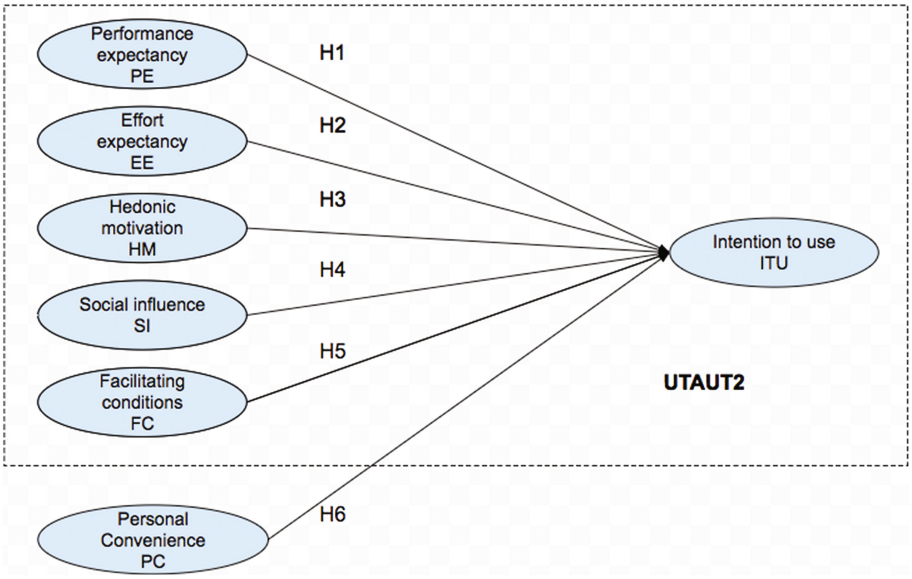

Fig. 1. Research model

2.9 Research Model

The research model is shown in Fig. 1.

3 Research Methods

3.1 Design

The reflective constructs in the model have been used in past questionnaires and their scales were adapted from extant literature. In order to define the formative construct, performance expectancy, subject matter experts were interviewed, with the result that the items to be measured represented the most common features desired by mobile shoppers. See Table 2.

Table 2. Formative indicators of performance expectancy

• Searching information about products
• Comparing prices of products
• Receiving e-coupons
• Buying products over the Internet
• Paying with loyalty points
• Receiving loyalty points
• Receiving digital receipts
• Paying in store with smartphone

The scales were incorporated into a questionnaire. Ten graduate students were recruited to review this questionnaire for clarity. After making some minor modifications, the survey was distributed by a marketing company to a panel of Canadian adults. Returned surveys were checked and those that were incomplete, completed too fast or failed the attention filters built into the questionnaire were discarded. The valid responses were analyzed with Partial Least Squares.

3.2 Data Analysis

The data was analyzed with SmartPLS version 3.2.6 [37]. PLS is suitable for predictive applications and theory building and is also able to handle formative constructs [38]. We followed the methodology set out by Hair et al. [39], first analyzing the validity of the outer model and then evaluating the path relationships of the structural model and their significance. The standard test for the internal consistency of the reflective indicators is the calculation of Cronbach's alpha [40]. Discriminant validity was tested via the Fornell-Larcker criterion [41]. The structural model was analyzed with the PLS algorithm.

4 Results

4.1 Descriptive Statistics

In the sample, there were 189 males (53.7%) and 163 females (46.3%). There were 107 participants aged between 18 to 29, 124 between 30 and 49 and 121 from 50 and older, with the oldest participant being 81. The age and gender are shown in Table 3.

The median length of ownership of smartphones was 4.6 years. The majority of participants had owned a phone for six years or longer. See Table 4.

Table 3. Age groups of sample

Ages	Male	Female	Total
18–29	41	66	107
30–49	73	51	124
50–69	69	41	110
70+	6	5	11
Totals	**189**	**163**	**100%**
Total as %	**53.7%**	**46.3%**	

Table 4. Phone ownership

Years of ownership	No.	%
1	15	0.9%
2	29	3.5%
2	34	6.2%
4	63	15.4%
5	56	17.1%
6+	155	56.8%

4.2 The Measurement Model

The cross loadings of the measurement model were calculated by SmartPLS. The indicators of all reflective constructs were tested for collinearity. The correlation coefficients measuring each construct were greater than 0.708 [42] indicating that they were convergent and reflected the same latent variable. Because performance expectancy was specified as formative, its indicators are not required to converge. Instead its indicators had been selected via interviews with subject matter experts, thereby following recommended practice of content validity [43].

The bootstrap function in SmartPLS was executed with 5,000 samples using the replacement method. The t statistic for each cross loading was calculated and in every case, the significance was $p < 0.001$ validating that the indicators converged and were significant.

Discriminant validity was tested using the Fornell-Larcker score, where the AVE must be greater than the square of the correlations [41]. The results satisfied these

Table 5. Values for Fornell Larcker test

Construct	EE	FC	HM	ITU	PC	PE	SI
Effort expectancy EE	**0.919**						
Facilitating conditions FC	0.486	**0.82**					
Hedonic motivation HM	0.62	0.307	**0.889**				
Intention to use ITU	0.568	0.312	0.707	**0.892**			
Perceived convenience PC	0.55	0.346	0.595	0.611	**0.905**		
Perceived expectancy PE	0.551	0.352	0.687	0.751	0.581		
Social influence SI	0.342	0.243	0.537	0.502	0.442	0.474	**0.951**

Note: the bold value along the diagonal is the square root of the AVE

criteria. Table 5 compares the correlations with the square root of AVE (shown in italic bold along the diagonal). Values for performance expectancy are not calculated as the construct has been specified as formative and therefore the indicators are not expected to be convergent.

The internal consistency of each construct was assessed via Cronbach's alpha [40], where values above 0.8 indicate reliability. The Average Variance Extracted (AVE) for each construct further confirmed the reliability of the model, where the AVE was above the guideline of 0.5 with the exception of the higher order construct, word of mouth. In addition, the Composite Reliability was above the guideline of 0.6 [42].

4.3 The Structural Model

The coefficient of determination R^2 measures the percentage of the response that is explained by our model. SmartPLS calculated R^2 to be 0.660, which is considered moderate [44]. Bootstrapping was conducted with samples of 5,000 in order to test the significance of each path with the model. All hypotheses were supported with $p < 0.001$, with the exception of hypothesis 2. Table 6 summarizes the results. All paths were significant, except for facilitating conditions to intention to use.

Table 6. Path significance

Path	t statistic	p value	Supported
Effort expectancy to ITU	1.992	0.046	$p < 0.05$
Facilitating conditions to ITU	0.692	0.489	
Hedonic motivation to ITU	4.047	0	$p < 0.001$
Perceived convenience to ITU	3.259	0.001	$p < 0.001$
Performance Expectancy to ITU	8.88	0	$p < 0.001$
Social influence to ITU	2.074	0.038	$p < 0.05$

5 Discussion

PE was one of the main factors that influenced consumers' intentions to use smartphone apps for mobile shopping. Meta-analyses of papers of adoption have corroborated that the common influencing factor is usefulness [22, 45], represented by perceived expectancy (PE) in our model. Lee et al. [46] interviewed researchers about TAM and the consensus was that usefulness alone is not enough. Alan Dennis, the Senior Editor of MIS Quarterly at the time, replied that usefulness is self-evident and that the more important question is what makes the innovation useful [46]. In order to answer this question, we followed the suggestion of Cenfetelli [43] and specified PE as a formative construct rather than ask the more general reflective questions about productivity. The significance of the path for PE to intention to use and its relatively large value for its path coefficient suggests that individuals value the usefulness of the formative features measured by the model, features such as searching for information about products, buying products over the Internet and paying in store with their mobile device.

HM was also a significant influencing factor. Davis had found that workers in organizations were more productive when they recognized that the innovation was both useful and enjoyable [31]. Intrinsic motivation was added as a construct to TAM by Venkatesh et al. [47] who investigated determinants of ease of use. Because adoption by consumers is voluntary, UTAUT2 included hedonic motivation to capture intrinsic motivation [1]. The results of our empirical analysis show that HM is significant. In order to engage in mobile shopping, individuals wish to have an enjoyable experience.

Shopping with the help of a mobile app adds convenience. Smartphone owners are able to shop at any time and at any place. They are no longer dependent upon store hours and there is no need to visit the physical store. Browsing to learn about different products and searching for the best price can be conducted from the comfort of home or while on public transportation. When they visit a physical store, consumers can access more detailed product information by scanning the bar code and, at time of payment, their mobile wallet speeds up the payment processing. Our results show that convenience is important to consumers.

Consumers are still influenced by others who they deem to be important. In the workplace, their performance is measured by their manager. In a voluntary situation, there is no manager, but they may perceive that friends and family expect them to use the app. When in a store, they may perceive that the staff anticipates they will have a shopping app. The significance of the relationship between SI and ITU is less than that for PE and HM. An explanation may be that in many instances use of the mobile app may be conducted alone. In such circumstances, social influence is less important.

Many studies have shown that effort expectancy, or ease of use, has less influence than performance expectancy, or usefulness [48]. Our results are similar. Smartphone apps are designed for the small colour screen which is touch enabled. Interfaces are intuitive and there is typically very little learning required. The majority of the participants had owned smartphones for more than six years, so they would be very familiar with apps. When asked if they would find the mobile shopping app easy to use,

the majority of them answered yes based on their familiarity with apps in general and their ability to learn new apps with a short learning curve.

The influence of facilitating conditions on intention to use was not significant. Smartphone manufacturers have joined with Internet providers and cell network companies to provide a seamless experience. Today, connectivity is reliable. If something does go wrong, there are support desks operating 24/7. Retail websites have online chat and support. Consequently, facilitating conditions were not significant because of the assumption that the network is reliable.

5.1 Limitations and Future Research

As with all surveys, the sample may not be representative of the general population. We used the services of a marketing company that recruits individuals on to panels. These individuals are rewarded for participation. The survey did include attention filters to ensure that participants were reading the question. In addition, participants who had answered too many questions in a 'straight line' were also eliminated. Nevertheless, the sample consists of a random population from a subset of individuals who are willing to take surveys for a small reward. The survey was only sent to Canadians and therefor their answers about mobile shopping pertain mostly to the Canadian and US marketplace.

Future research could validate the model across other cultures. The theoretical framework lays the foundation for further extension of UTAUT2. Further investigation could test the content validity of the formative specification of performance expectancy.

6 Conclusion

Smartphone ownership continues to grow with more shoppers turning to their smartphone for assistance. Mobile shopping apps allow consumers to search for products from the convenience of their home at a time of their choosing. We have added the construct of perceived convenience to our foundational theory, UTAUT2. In order to ensure that convenience is not confounded with performance expectancy, we have specified PE as a formative construct to ensure that construct specification is consistent with our proposed theory [49].

From a survey of over 300 participants, our results show that hedonic motivation, performance expectancy and perceived convenience are the most significant factors that influence intention to use. PE had a stronger influence than EE, which is consistent with past studies [22, 48]. Because smartphone owners are familiar with many apps, EE has a minor influence on intention to use. Consumers appreciated the convenience of being able to shop at any time and any place, thereby saving time of going to the store.

Our theoretical contribution is the development of a theoretical foundation based on extending UTAUT2. We have added perceived convenience and have differentiated it from performance expectancy by specifying PE as formative, where specific features of mobile shopping have been defined and included in the survey questionnaire. Our results support the theory in the context of mobile shopping. The approach is applicable

to the adoption of other technical innovations in other contexts and we suggest that future researchers evaluate the specification of some of their constructs as formative in order to support their theory.

Practitioners should ensure that their app has useful functionality, offers convenience and is engaging. Consumers value the capability to research products, compare prices and purchase via the Internet from their mobile phone. They also value the convenience of using apps in store in order to find more details about a product and to pay with a mobile wallet, obviating the need to carry payment cards. In short, mobile shopping apps should be useful, convenient and fun.

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