Mobile Commerce: An Analysis of Key Success Factors

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The purpose of the study is to understand characteristics of potential m-commerce users and examine the factors that influence the intention to use m-commerce. A Web survey was conducted among a sample of 3,500 current mobile users in the U.S.; a total of 492 respondents completed the survey. Appropriate statistical analyses (descriptive analysis, χ2, ANOVA, factor analysis, cluster analysis, and structural equation modeling) were used to analyze the data. Consumer groups were segmented into three clusters based on their perceived benefits and risks of m-commerce: *Risk-averse doubters, Mobile confidents,* and *Reserved mobile seekers.* A profile of each segment was developed in terms of demographics, shopping motivations, mobile involvement and usage patterns, and future intentions. This study also provides a systematic view of m-commerce with a structural equation model to predict consumer intention to use m-commerce. Mobile involvement positively predicts perceived benefits, but not perceived risks. Perceived benefits of m-commerce have a positive impact on the willingness to pay more money to use m-commerce and intention to use m-commerce, while perceived risks of m-commerce have a significant negative impact. Mobile involvement is the significant mediating variable in the model to predict willingness to pay more money to use m-commerce and intention to use m-commerce. Managerial implications for the practitioner and academia are also discussed.

Introduction

The number of global mobile phone owners in 2003 reached 1.3 billion (Kumar, 2004) with the highest rates of growth occurring in China (Minomo and Masamura, 2004). According to the Nielsen Media Research survey ("Hong Kong mobile phone," 2006), the highest mobile phone penetration rate was found in Hong Kong (96%), followed by South Korea (93%), the UK (92%), Singapore (89%), and Australia (87%). The U.S. market for mobile phones includes 185 million users (Smith, 2005) and is predicted to reach 75% of the population, or about 236 million users, by 2010 (Wallace, 2005). The dramatic increase in mobile phone usage has produced a new avenue for marketing applications and services (Tsang et al., 2004). Mobile commerce (m-commerce) is "the involvement of the delivery of products and services via wireless technologies to enable e-commerce activities at any time and location." (Yeo and Huang, 2003). It consists of business and consumer transactions that use mobile phones and can be recognized as a complement to e-commerce (Kumar, 2004). The global m-commerce revenues are expected to increase to 88 billion dollars by 2009 (Mort and Drennan, 2004).

The future of m-commerce has great potential as the mobile phone market remains a great untapped marketing medium (Jackson, 2004). To succeed with m-commerce, however, it is critical for marketers to understand the characteristics of mobile users and their perceptions of m-commerce. Little is known about what drives consumers to use m-commerce, and how retailers can optimize consumers' mobile experiences. To that end, this research examines key success factors of m-commerce

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by characterizing potential m-commerce users and identifying factors that influence their intention to use m-commerce.

Literature Review

The mobile world opens up numerous possibilities beyond the typical realm of communication activities (Gorlenko and Merrick, 2003). U.S. mobile users are increasingly accepting phones as multipurpose devices, which can be used to send text messages, take pictures, surf the web, download ring-tones, and play games (Smith, 2005). Some marketers are starting to see the mobile phone as a potential marketing medium and consequently are seeking ways to tap into this burgeoning opportunity. For example, Samsung and Nokia will provide digital video broadcast handheld (DVB-H) by mobile phones which can deliver up to 50 TV channels (Colleen, 2007). British Telecom sent Short Message Service (SMS) text messages to their individual customers announcing a sale at a specific store, which created a "mad rush" to the store (Swartz, 2001). AOL created a mobile search service that includes yellow pages and a shopping search ("AOL Rolls Out New AOL Mobile Search Services," 2005). McDonald's and Dunkin Donuts have sent text message coupons to mobile users (Freedman, 2005). Various current applications for m-commerce include ubiquitous communication (e.g. e-mail, short message service), content deliveries (e.g. health-related to messages, pill reminders), entertainment services (e.g. music download, gaming, gambling, sports scores), location-based services (e.g., finding nearby facilities/services, transportation information, tour guides), movie and concert ticketing, sending store and restaurant discount coupons, shipment tracking, comparison shopping, banking, and payments (Palenchar, 2004; Xu and Gutierrex, 2006; Yuan and Zhang, 2003).

One of the more popular categories of services currently under heavy demand is location-based services (LBS), which relate spatial and temporal information that describe moving objects (Lee, 2007). It tracks the location information of moving objects per time unit, stores them into databases, and handles users' queries based on the stored location information. For example, by utilizing GPS capabilities, the LBS allows customers to find optimal routes to their destinations. They can obtain detailed maps and real-time alerts on traffic conditions, and information about highway services like gas, food, and lodging. (Rao and Minakakis, 2003). Other LBS examples include the E911 service, which allows for tracking the location of mobile users in an emergency (Frenzel, 2006); and Dodgeball and Twitter, social networking systems that send text messages to the mobile users about where their friends are located (DeJean, 2007; Gibbs, 2007). The value customer place on mobile services would increase if customers could retrieve time and location specific information (Mort and Drennan, 2004).

The increased use of mobile phones has increased the use of advertisements, especially through short messaging services (SMS). This has come to be known as mobile advertising (Tsang et al., 2004). Procter & Gamble has made an agreement with cell phone carriers such as Cingular, Verizon, Sprint, and T-Mobile to market their products and develop marketing campaigns for cell phones (Smith, 2005). Companies like Sony, Disney, Coca-Cola, Heineken, and Ford are also beginning to invest in

mobile advertising (Kilby, 2006). They are hiring mobile marketing partners to assist in promotion of their products via mobile phones ("Britvic plots expansion of mobile marketing activity," 2006).

The mobile-assisted shopping application is another growing area in m-commerce. Consumers can obtain marketing information about different products and their relative costs via their mobile phones in order to make informed decisions in real time (Mort and Drennan, 2002). A report by the Japanese economy, trade, and industry ministry and ECOM found that m-shopping is popular among young Japanese women and was worth 5 billion in 2004, a 25% increase from 2003 (McCurry, 2006). Mobile payment services promote m-shopping. For example, mobile users can register their credit card numbers, and these numbers are saved in their mobile phones to be used for purchases ("Phone me the money," 2003). In 2005, Mastercard International announced that it would be providing its issuing banks with the technology needed for "payment enabled phones," and Motorola conducted a pilot test using Mastercard-enabled phones with its employees ("Phone payments advance," 2005). Various other mobile services include m-learning, which uses the mobile phone to facilitate learning for young adults and teens ("Mobile phones switch young people on to learning," 2003), and mobile banking, which allows mobile users to make bank payments or withdrawals (Kumar, 2004). Mobile music services are also increasing in popularity, as are single- and multi-player game services (Srivastava, 2005).

The literature suggests that individual differences play an important role in how technology is used and perceived by consumers (Agarwal and Prasad, 1999; Kwon and Chidambaram, 2000; Venkatesh and Davis, 2000). Mobile users' perceptions and intention to use m-commerce will be differentiated by variability of the users' demographics, shopping motivations, and media dependency. Usage statistics on cell phones reveal that women are more likely to be cell phone owners, as well as those who are between the age of 25-54, married, or homeowners (Totten et al., 2005). In addition, research indicates that teens and young adults are the heaviest users of mobile phones (Charlton et al., 2002; Ozcan and Kocak, 2003; Totten et al., 2005). The cell phone market for college students can be considered "saturated and mature," as 90% of students have owned a cell phone for more than one year (Totten et al, 2005). Young adults between the ages of 16-24 are found to be the most "content savvy," as they frequently use the high-end and multimedia functions of their phones ("Mobile Marketing," 2006). Thirty percent of children ages eight to fourteen already have mobile phones and this percentage is expected to double in three years, and members of this age cohort are expected to become more sophisticated users compared to the adults (Benderoff, 2007).

Few American consumers access the Internet via their mobile phones. According to the ComScore Networks' Wireless Industry Report, 17 % of U.S. mobile owners have a connection to the Internet ("More than one-quarter of," 2007). The Pew Internet and American Life project reveals that 34% of the Internet users are using wireless devices like personal digital assistants (PDAs) or cell phones to log on the Internet ("One third of Internet user," 2006). Fifty-six percent of those accessing the Internet via PDAs or cell phones are male, 79% are between the ages of 18 and 49

years, and 52% have an annual income greater than $50,000 ("One third of Internet user," 2006).

Consumer experiences evoked with mobile phones may differ by shopping motivations, as m-commerce can provide both hedonic (entertainment) and utilitarian (efficiency and time-critical) features (Anckar and D'Incau, 2002). According to Babin, Darden, and Griffin (1994), consumers with a hedonic shopping motivation seek experiential value (i.e., fun, arousal, or leisure), whereas consumers with a utilitarian shopping motivation seek instrumental value (such as saving time or effort, or completing tasks). Hedonic shoppers may want to use the entertainment, music services, and innovative services by m-commerce, as they enjoy the stimulation offered by product newness and the exploration of new and interesting shopping experiences (Gehrt and Carter, 1992). On the other hand, utilitarian shoppers may prefer to use services that are timely, decisive, and task-oriented (e.g. payment services, location-based) via m-commerce, as they attempt to minimize time and effort, and maximize convenience (Bellenger and Korgaonkar, 1980).

Media dependency is defined as "the overall degree to which an individual relies on a medium to fulfill personal goals" (Grant, Guthrie, and Ball-Rokeah, 1991, p.780). This concept has been used to identify how consumers use different channels of mass media (TV, newspaper, radio, magazines, etc.) for obtaining knowledge, expressing opinions, and making decisions (Grant et al, 1991; Lee and Perry, 2004; Loges and Ball-Rokeach, 1993; Shapiro and Chock, 2004; Skumanich and Kintsfather, 1998). Research indicates that mobile users are more physically and emotionally attached to their mobile devices than to any other type of information or communication technology (Srivastava, 2005). In addition, some studies indicate that most mobile users are afraid of leaving home without their phone and are uneasy when others listened to them or read their text messages (Srivastava, 2005). Moreover, young adult mobile users in one study were panicked and afraid when they were asked to shut off their cell phones for three days, and only three of 220 complied with this request (Hubert, 2005). We applied this notion of involvement to the concept of the mobile phone dependency, as product involvement refers to "an unobservable state reflecting the amount of interest, arousal, or emotional attachment a consumer has with a product" (Bloch, 1986, p. 52), and is related to the personal relevance of a product to a consumer (Celsi and Olson, 1988; Engel and Blackwell, 1982; Greenwald and Leavitt, 1984; Petty, Cacioppo, and Schumann, 1983; Zaichkowsky, 1985). Depending on this degree of mobile involvement, consumers will undoubtedly have different patterns of mobile phone usages and perceptions of m-commerce (both benefits and risks).

As users' involvement with mobile phones increases, significant benefits can realized by the marketers as well as consumers. M-commerce can benefit by providing customized, relationship-based, timely, and location-specific services (Anckar and D'Incau, 2002; Chiu, 2003; Kumar, 2004; Mort and Drennan, 2002; Yeo and Huang, 2003). Compared to other marketing channels such as the Internet, catalogs, TV, and in-store marketing, m-commerce can provide hyper-connectivity between marketers and consumers and easy access for consumers (Anckar and D'Incau, 2002; Chiu et al, 2003; Kumar, 2004; Yeo and Huang, 2003). However, many risks must be overcome to ensure the success of mobile commerce; these include inefficiencies within the

device and the system, security and privacy concerns, high user costs from time-usage charges, the possible abuse of advertising, user comfort levels, and fulfillment issues caused by absence of incentives to use m-commerce (Chae and Kim, 2004; Chiu et al, 2003; Ding and Hampe, 2003; Herb, 2001; Srivastava, 2005; Yeo and Huang, 2003).

Purpose of the Study

The purpose of the study is to identify potential target consumer groups for m-commerce and to categorize each segment based on their demographics, shopping motivations, current usage patterns of m-commerce, and intention to use the m-commerce in the near future. This study also examines the factors that affect the intentions towards future use m-commerce.

Therefore, this proposed study has two specific objectives:

- *Objective 1: Segment mobile users based on their perceptions of m-commerce (benefits and risks) and develop a profile of each segment in terms of demographics, shopping motivations, mobile involvement, usage patterns, and future intentions.* It is crucial to recognize that not all consumers can be assumed to have the same preferences. Using perceptions of m-commerce for segmentation allows consumers to be grouped in terms of the similar preferences and barriers they have for using m-commerce. Figure 1 shows a conceptual view of this process.

- *Objective 2: Provide a systematic view of m-commerce by estimating a structural equation model to predict consumer intention to use m-commerce.* Figure 2 depicts a structural equation model that we propose to identify factors that influence consumer intention to use m-commerce. We suggest that U.S. consumers' intentions to use mobile marketing will vary on the basis of: 1) their shopping motivations, 2) their mobile involvement, 3) their perceived benefits of m-commerce, and 4) their perceived risks of m-commerce.

Methods

Data Collection Procedure

We employed an online survey to collect the data for the present study. By using the web survey, subjects were limited to people who are comfortable using the Internet. A random sample of e-mail addresses of current mobile phone users was obtained from Survey Sampling Incorporated. A pretest was conducted with ten current mobile users from this list. Based on the results of the pretest and comments from participants, necessary corrections in the questionnaires were made before the sample data collection commenced.

For the actual survey, individuals from the sample were invited by e-mail to participate in the Web survey. The e-mail invitation letter described the purpose

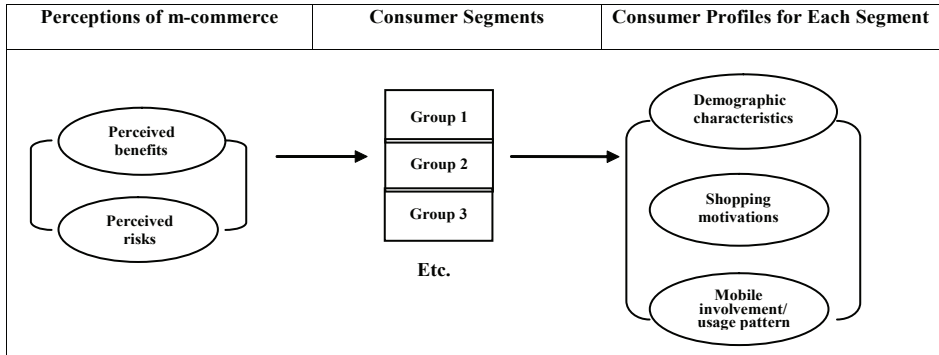| Perceptions of m-commerce	Consumer Segments	Consumer Profiles for Each Segment

Figure 1.
Segmenting Mobile Consumers.

of the study and assured the confidentiality of information provided by respondents. Participants were asked to continue the survey only if they currently use the mobile phone. Then, participants were directed to a Web site by clicking on a URL in the email to reach the survey webpage. About four days later, a second reminder e-mail was sent to the people who did not respond to the Web survey. A week after, a third reminder e-mail was sent to the people who had not responded to the Web survey.

The Survey Instrument

The questionnaire consists of items from the following seven constructs: 1) shopping motivations, 2) mobile involvement, 3) current m-commerce usage patterns, 4) future intentions to use m-commerce, 5) perceived benefits of m-commerce, 6) perceived risks of m-commerce, 7) global intentions to use m-commerce, and 8) demographic information.

Shopping motivations are measured using twenty-seven items on a 7-point Likert-type scale, ranging from *Strongly Disagree* (1) to *Strongly Agree* (7). Twenty-three items were adopted from Arnold and Reynolds (2003) to measure hedonic shopping motivations. Four items were adopted from a study by Babin et al. (1994) to tap utilitarian shopping motivation. To measure mobile involvement, twenty involvement scales based on Zaichkowsky (1985) were included which ask respondents feelings about mobile phone on bi-polar scales.

To assess mobile phone usage patterns, survey questions ask when participants started using mobile phone services, what type of mobile phone plan the respondents currently use, how often they upgrade or purchase mobile phones, and how much time they spend using their mobile phone each day and each month.. To assess the respondents' current usage pattern of m-commerce, we developed twenty items providing various examples of the m-commerce based on previous literature (Gibson, 2005, 2006; Goode, 2006; Kaul, 2006; Harris, Rettie, and Kwan, 2005; Holden, 2005a, 2005b, 2005c, 2005d; Houston, 2005, 2006; Nysveen, Pedersen,
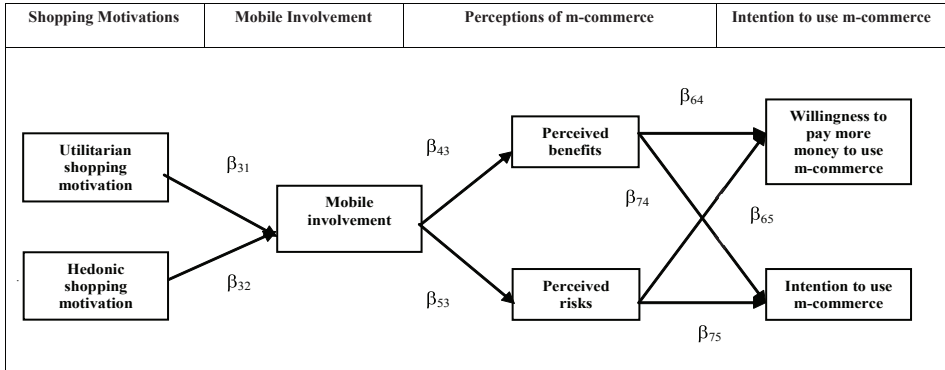
Figure 2.
Proposed Model to Predict Intention to Use M-commerce.

and Helge, 2005). Types of mobile commerce in this section included sending and receiving text messages; checking e-mail; watching movies, videos, and television; shipment tracking; health information services; entertainment information services; travel/transportation information services; business and financial information services; shopping information services; location-based services; and payment/billing services. The participants were asked whether or not they used each service in their current usage patterns. Future intentions to use m-commerce were also measured for these same twenty items, asking how likely respondents would be willing to use these mobile services within the next few years. Participants were again asked to rate their responses on a seven-point Likert-type scale, from *Strongly Disagree* (1) to *Strongly Agree* (7).

Perceived benefits of m-commerce were measured using fourteen items based on previous research (Anckar and D'Incau, 2002; Chiu, 2003; Kumar, 2004; Mort and Drennan, 2002; Yeo and Huang, 2003). Respondents rated their agreement with statements that began, "I will be interested in using some of the mobile services because...." The perceived benefits of m-commerce in the questionnaire include: "I can use it anywhere," "I can use it anytime," "I can have immediate access," "it is convenient," "I feel secure using my own mobile phone," and "it is enjoyable."

To measure the risks of m-commerce perceived by respondents, we developed fourteen survey items based on previous research (Anckar and D'Incau, 2002; Chiu, 2003; Herb, 2001; Kumar, 2004; Mort and Drennan, 2002; Srivastava, 2005; Yeo and Huang, 2003). These questions ask respondents to rate their agreement about the risks of m-commerce with statements starting with, "I will be reluctant to use some of the mobile services because…." Perceived risk items include: "it is expensive," "it provides too small screen sizes," "it gives me continued technology constraints," "it has low quality of the service," it is difficult to use," "it is too advanced for me to use," "it gives too slow response," and "it is uncertain to protect my privacy."

To determine the global intentions of m-commerce, two items in the survey inquire about participants' willingness to pay more money for m-services, and their intention to use m-services in the future (Nysveen et al., 2005). Finally, information

about respondents' demographic characteristics, age, gender, income, and ethnicity was also gathered.

Sample Characteristics

The survey was sent to 3500 current mobile users who were in the panel of the Survey Sampling Incorporated. A total of 492 participants responded to the Web survey, a response rate of 14%. Seventy-two percent of the respondents used the mobile phone for more than four years. While 90% of the respondents (n = 443) completed the whole survey without any missing responses, 10% (n = 49) of participants failed to complete one ore more items in the survey. We did not discard these incomplete survey responses because: 1) the number of missing responses was insignificant compared to the number of items answered in the survey; and 2) there was no consistent pattern identified in missing responses. Therefore, no response bias was suspected.

The respondents for the study represented 46 states. Among them, 50.1% of the respondents were female and 199 (40.4%) were male. The respondents were between 20 and 62 years old with the mean age of 41.1. Forty-five percent of the respondents indicated that they had an education level higher than a Bachelor's degree.

The respondents of the study also indicated that they were employed in many different occupations. 28.7% of the respondents had a job related to the professional, technical, and related occupations, and about 13.9% had a job related to executive, administrative, and managerial occupations, as well as administrative support occupations.

The participants also represented various ethnicities: White or European American (31.5%), Asian Americans (24.4%), Black or African American (23.2%), and Hispanic or Latino American (16.3%). There were a few Native American and Native Hawaiian or Pacific Islander participants (1% each).

Data Analysis

Data analysis consisted of a descriptive analysis, factor analysis, χ^2 test, ANOVA, and cluster analysis. The Statistical Package for Social Sciences (SPSS) version 14.0 and LISREL version 8.72 were used to conduct data analysis and to test the proposed model.

Preliminary Analysis

Construct validity was assessed using exploratory factor analysis (Cronbach and Meehl, 1955). Factor loadings above 0.55 (Nunnally, 1967) and not higher than 0.30 (Kline, 1994) on other factors were considered as evidence of construct validity. One factor was obtained from three of the constructs: mobile involvement, perceived benefits of m-commerce, and perceived risks of m-commerce. Shopping motivations, however, were extracted into six different factors: *utilitarian*, *adventure*, *value*, *role*, *idea*, and *social*. Table 1 shows the factor loadings and Cronbach's α of the items. Internal consistencies of all constructs were estimated with Cronbach's α

Table 1.

Factor Analysis Results for Mobile Involvement, Perceived Benefits of M-commerce, Perceived Risks of M-commerce, and Shopping Motivations.

Factor Title and Items	Factor Loading
Mobile involvement (*Cronbach's* $\alpha = 0.98$)	
Unimportant - Important	0.84
Of no concern - Of concern to me	0.80
Irrelevant - Relevant	0.83
Means nothing to me - Means a lot to me	0.84
Useless - Useful	0.78
Worthless - Valuable	0.83
Trivial - Fundamental	0.83
Not beneficial - Beneficial	0.84
Doesn't matter - Matter to me	0.91
Uninterested - Interested	0.90
Insignificant - Significant	0.92
Superfluous - Vital	0.88
Boring - Interesting	0.83
Unexciting - Exciting	0.76
Unappealing - Appealing	0.83
Mundane - Fascinating	0.75
Undesirable - Desirable	0.83
Nonessential - Essential	0.87
Unwanted - Wanted	0.84
Not needed - Needed	0.84
Perceived benefits of m-commerce (*Cronbach's* $\alpha = 0.96$)	
I can use it anywhere	0.85
I can use it anytime	0.87
I can have immediate access	0.88
It is convenient	0.88
I feel secure using my own mobile phone	0.82
It is enjoyable	0.79
I can keep my privacy	0.79
It gives me good quality graphics	0.65
It provides me rapid response	0.87
It is useful as it provides information based on location	0.79
It is efficient	0.92
It is easy to use	0.86
It is inexpensive	0.71
It is beneficial	0.89

Table 1. *(continued)*

Factor Title and Items	Factor Loading
Perceived risks of m-commerce (*Cronbach's* α = 0.93)	
it provides too small screen sizes	0.61
it gives me continued technology constraints	0.72
it has low quality of the service	0.85
it gives me poor functionality	0.85
it is difficult to use	0.82
it is too advanced for me to use	0.58
it gives too slow response	0.80
it is difficult to see the benefits	0.80
it has the roaming problems	0.72
there is lack of standardization for interfaces	0.82
it is uncertain to protect my privacy	0.80
it is uncertain to keep my security	0.79
Shopping Motivations	
Utilitarian (*Cronbach's* α = 0.87)	
While shopping, I usually accomplish just what I want to	0.87
I usually go shopping to buy what I need	0.83
While shopping, I usually find items I'm looking for	0.86
Adventure (*Cronbach's* α = 0.91)	
To me, shopping is an adventure	0.78
I find shopping stimulating	0.83
Shopping is a thrill to me	0.85
Shopping makes me feel like I am in my own universe	0.76
Value (*Cronbach's* α = 0.83)	
For the most part, I go shopping when there are sales	0.84
I enjoy looking for discounts when I shop	0.81
I enjoy hunting for bargains when I shop	0.83
I go shopping to take advantage of sales	0.84

Table 1. *(continued)*

Factor Title and Items	Factor Loading
Role (*Cronbach's* α = 0.93)	
I like shopping for others because when they feel good I feel good	0.74
I feel good when I buy things for the special people in my life	0.75
I enjoy shopping for my friends and family	0.77
I enjoy shopping around to find the perfect gift for someone	0.74
Idea (*Cronbach's* α = 0.92)	
I go shopping to keep up with the trends	0.90
I go shopping to keep up with the new fashions	0.90
I go shopping to see what new products are available	0.68
I go shopping to experience new things	0.64
Social (*Cronbach's* α = 0.94)	
I go shopping with my friends or family to socialize	0.83
I enjoy socializing with others when I shop	0.82
To me, shopping with friends for family is a social occasion	0.87
Shopping with other is a bonding experience	0.79

for all multi-item scales. The α's for each of all the scales were above 0.83 and the minimally acceptable level of 0.70. The sums of the multi-items were used for the further analysis.

Results

Segmenting and Profiling Consumer Group

We used a cluster analysis to segment mobile users on the basis of their perceptions of the risks and benefits of m-commerce, and profiles were developed for these consumer segments. Following recommendations made by Punj and Steward (1983), a non-hierarchical *k*-means clustering approach was used to take advantage of the large sample. Based on two criteria—ease of interpretability and distance level coefficients represented by the final culture centers—a three-cluster solution appeared appropriate for analysis (Hair et al., 1998). As shown in Table 2, the cluster analysis is adequate and the variables used to group the respondents are all significantly different between the clusters obtained.

The demographic characteristics of the groups are provided in Table 3. The characteristics of each cluster were evaluated based on the cluster means, and the following labels were developed:

Table 2.
Perceived Benefits and Risks of Cluster Groups.

Variable	Cluster 1 (n=188)		Cluster 2 (n=123)		Cluster 3 (n=112)		F	Scheffe post hoc (α = .05)
	M	SD	M	SD	M	SD		
Perceived benefits	4.03	0.96	5.86	0.64	6.24	0.68	329.86***	1 < 2, 3 2 < 3
Perceived risks	4.51	0.73	3.34	0.93	5.88	0.76	297.84***	1 < 2, 3 2 < 3

*** p < 0.001
Cluster 1: Risk-averse doubters
Cluster 2: Mobile confidents
Cluster 3: Reserved mobile seekers

- *Cluster 1: Risk-averse doubters. Risk-averse doubters* are the largest group, with 188 (44.4%) of the respondents. With regards to the clustering variables, this group exhibits the lowest perception of benefits ($M = 4.03$) and a relatively high perception of risks ($M = 4.51$) with m-commerce when compared to the other clusters.

- *Cluster 2: Mobile confidents. Mobile confidents* contain 123 respondents, or 29.1% of the total sample. The people in this cluster show a relatively high perception of benefits ($M = 5.86$) and the lowest perception of risks ($M = 3.34$) with m-commerce.

- *Cluster 3: Reserved mobile seekers. Reserved mobile seekers* consist of 112 (26.5%) of the respondents. This group shows the highest scores for both the perceptions of benefits ($M = 6.24$) and risks ($M = 5.88$) with m-commerce.

With respect to demographic variables, the identified consumer clusters are only significantly different from each other by ethnicity; there are no significant differences in age, gender, education, occupation, income, and geography. European American dominate *risk-averse doubters* (42.5%), while African and Hispanic Americans represent a significantly smaller proportion. *Mobile confidents* have a similar proportion of all ethnic groups, but there is a larger proportion of African Americans (32.2%). The largest ethnic group represented in *reserved mobile seekers* is Asian American (34.9%) while the smallest proportion is Hispanic American (15.1%).

The shopping motivation and mobile service perception scores for each cluster are provided in Table 4. In terms of shopping motivations, *mobile confidents* and *reserved mobile seekers* are distinct from risk-averse doubters, with strong scores for all utilitarian and hedonic shopping dimensions. No significant differences exist between *mobile confidents* and *reserved mobile seekers*. In addition, *mobile confidents*

and *reserved mobile seekers* show more positive mobile involvement than *risk-averse doubters*, again with no significant differences between *mobile confidents* and *reserved mobile seekers*.

The mobile phone usage patterns for each cluster are provided in Table 5. With respect to mobile phone usage pattern, there is a significant difference in average hours of mobile phone usage among the consumer clusters. Compared to *mobile confidents* (29.5%) and *reserved mobile seekers* (34.8%), more than half (54.3%) of *risk-averse doubters* spend less than 30 minutes using a mobile phone each day. *Mobile confidents* are the heaviest users of mobile phones, with about 43% spending more than 1 hour each day using the mobile phone. Overall, a majority of the respondents in all categories started using the mobile phone over 4 years ago, upgrade or purchase a new mobile phone every 2-3 years, and spend between $30 and $100 per month on mobile phone usage, with no significant differences between the groups.

The current services used by respondents from each cluster are described in Table 6. In terms of the current usages of the mobile services, the most used mobile service by all groups is text messaging. Other highly-used mobile services include picture messaging, listening to and downloading music, playing games, and multimedia messaging. The least-used mobile services by all clusters are gambling and educational services. The differences between the clusters are significant in most of mobile services except for listening to and downloading music; watching movies, video and TV; gambling; shipment tracking; educational services; health information services; and business and financial information services.

Overall, *mobile confidents* and *reserved mobile seekers* are distinct from *risk-averse doubters* for having higher levels of use for all mobile services. *Risk-averse doubters* are associated with lower use of even the simplest mobile services such as text (47.7%) and picture (22.2%) messaging, and usage rates of less than 20% for other mobile services. *Mobile confidents* are distinguished among the others by having the highest use of multimedia messaging (40.8%), games (42.1%), and email (24.1%) with their mobile phone. *Reserved mobile seekers* are distinct from other clusters in that they have the highest likelihood to use payment/billing services (11.0%), purchasing products (14.8%), and banking services (13.9%).

Overall, there is a low use rate for mobile informational services in all clusters. Of these services, travel and transportation information services are used by more respondents than other information services, followed by entertainment information services. While there are no differences between the clusters in terms of health information services and business and financial information services, significant differences exist between other categories of informational services. Travel and transportation information services are most likely to be used by *mobile confidents* (15.4%). A similar proportion of *mobile confidents* (11.9%) and *reserved mobile seekers* (12.0%) use entertainment information services. *Reserved mobile seekers* (8.3%) use shopping information services more than any other group.

The intention to use mobile services by cluster is given in Table 7. With regard to the intention to use mobile services within the next few years, the patterns are similar to existing use patterns. For all groups, the highest levels of intention are for text messaging, followed by picture messaging, while the lowest levels of intention are

Table 3.
Demographic Characteristics of Cluster Groups.

Variable	Cluster 1 (188)		Cluster 2 (123)		Cluster 3 (112)		Chi-Square	Sig.
	n	*%*	*n*	*%*	*n*	*%*		
Age								
18-25	21	11.9	10	8.8	10	9.5		
26-35	43	24.4	25	21.9	29	27.6		
36-45	44	25.0	35	30.7	33	31.4		
46-55	45	25.6	30	26.3	28	26.7		
56-65	23	13.1	24	12.3	5	4.8	7.47	0.469
Gender								
Male	88	47.3	44	35.8	41	36.6		
Female	98	52.7	79	64.2	71	63.4	5.34	0.069
Education								
Some high school	2	1.1	1	0.8	1	0.9		
Completed high school or equivalent	25	13.3	12	10.0	15	13.4		
Some college, vocational school	78	41.5	47	39.2	44	39.3		
Bachelor's degree	53	28.2	40	33.3	30	26.8		
Graduate degree	30	16.6	20	16.7	22	19.6	2.51	0.961
Occupation								
Professional, Technical and Related Occupations	53	28.3	39	32.0	31	27.9		
Executive, Administrative, and Managerial Occupations	22	11.8	16	13.1	18	16.2		
Sales Occupations	12	6.4	5	4.1	7	6.3		
Administrative Support Occupations	22	11.8	19	15.6	20	18.0		
Precision Production, Craft, and Repair Occupations	3	1.6	2	1.6	0	0.0		
Machine Operators, Assemblers, and Inspectors	5	2.7	2	1.6	4	3.6		
Transportation and Material Moving Occupations	7	3.7	3	2.5	1	0.9		
Handlers, Equipment Cleaners, Helpers, and Laborers	3	1.6	1	0.8	2	1.8		
Service Occupations, Except Private Household	12	6.4	7	5.7	8	7.2		
Retired	15	8.0	8	6.6	4	3.6		
Unemployed	33	17.6	20	16.4	16	14.4	12.31	0.905

Table 3. *(continued)*

Variable	Cluster 1 (188)		Cluster 2 (123)		Cluster 3 (112)		Chi-Square	Sig.
	n	*%*	*n*	*%*	*n*	*%*		
Income								
Less than $10,000	8	4.3	4	3.3	7	6.4		
$10,000 to $14,999	3	1.6	3	2.4	5	4.5		
$15,000 to $24,999	15	8.0	12	9.8	8	7.3		
$25,000 to $34,999	22	11.8	15	12.2	14	12.7		
$35,000 to $49,999	39	20.9	23	18.7	19	17.3		
$50,000 to $74,999	43	23.0	25	20.3	22	20.0		
$75,000 to $99,999	20	10.7	18	14.6	16	14.5		
$100,000 to $149,999	21	11.2	15	12.2	8	7.3		
$150,000 to $199,999	5	2.7	4	3.3	6	5.5		
$200,000 and over	5	2.7	2	1.6	5	4.5	14.89	0.783
Ethnicity								
White or European American	76	42.5	28	23.7	29	27.4		
Black or African American	31	17.3	38	32.2	24	22.6		
Hispanic or Latino American	25	14.0	27	22.9	16	15.1		
Asian American	45	26.3	27	21.2	37	34.9	23.37***	0.001
Geography								
Pacific	53	31.4	26	23.6	34	32.1		
Midwest	36	21.3	25	22.7	22	20.8		
South	51	30.2	36	32.7	35	33.0		
Northeast	29	17.2	23	20.9	15	14.2	3.45	0.747

*** $p < .001$
Cluster 1: Risk-averse doubters
Cluster 2: Mobile confidents
Cluster 3: Reserved mobile seekers

Table 4.
Shopping Motivations and Mobile Service Perceptions of Cluster Groups.

Variable	Cluster 1 (188)		Cluster 2 (123)		Cluster 3 (112)		F	Scheffe post hoc (α= .05)
	M	SD	M	SD	M	SD		
Shopping motivations								
Utilitarian	5.25	1.29	5.76	1.02	5.99	0.94	16.56***	1 < 2, 3
Adventure	3.66	1.49	4.41	1.55	4.53	1.58	14.37***	1 < 2, 3
Value	4.87	1.40	5.56	1.24	5.88	1.15	23.51***	1 < 2, 3
Role	4.46	1.26	5.01	1.25	5.20	1.40	13.44***	1 < 2, 3
Idea	3.29	1.42	3.75	1.52	4.15	1.71	11.07***	1 < 2, 3
Social	3.62	1.50	4.04	1.68	4.33	1.68	7.80***	1 < 2, 3
Mobile involvement	4.61	1.10	5.80	.82	5.74	0.94	66.31***	1 < 3, 2

*** $p \leq 0.001$
Cluster 1: Risk-averse doubters
Cluster 2: Mobile confidents
Cluster 3: Reserved mobile seekers

for gambling and educational services. Except for gambling and educational services, the differences between the intention levels for each cluster are significant for mobile services. *Mobile confidents* and *reserved mobile seekers* are distinct from *risk-averse doubters* for having higher levels of intention in all mobile services. No significant differences can be verified between *mobile confidents* and *reserved mobile seekers*.

Risk-averse doubters show low intention for most mobile services, as indicated by mean scores of less than 3.0 on the 7-point Likert-type scale. However, they have positive intentions towards future use of text messaging ($M = 3.88$), picture messaging ($M = 3.36$), and e-mail through the mobile phone ($M = 3.02$) within the next few years. Compared to *risk-averse doubters*, *mobile confidents* and *reserved mobile seekers* are distinguished by having more positive intentions towards other mobile services, including games; movies, video, and TV; entertainment information services; travel and transportation information services, location-based services, payment and billing services, banking services, and multimedia messaging. In addition, *reserved mobile seekers* show a higher intention to use shipment tracking and the health information services related to health than *risk-averse doubters*.

As the heaviest current users of multimedia messaging, games, and e-mail through the mobile phone, *mobile confidents* also exhibit the highest intention to use these services within the next few years. The use of informational services through the mobile phone is consistent with the current usage patterns as well. The relationship between the current usage and future intentions for use, however, is not consistent for location-based services and purchasing products through the mobile phone. While a few mobile users are currently associated with location-based services, a high intention to use this service appeared in all clusters, especially in *mobile confidents* and *reserved*

Table 5.
Mobile Phone Usage Patterns of Cluster Groups.

Variable	Cluster 1 (188)		Cluster 2 (123)		Cluster 3 (112)		Chi-Square	Sig.
	n	%	n	%	n	%		
When did you start using a mobile phone service?								
Less than 6 months ago	4	2.1	2	1.6	2	1.8		
6-12 months ago	7	3.7	3	2.5	5	4.5		
1-2 years ago	11	5.9	3	2.5	6	5.4		
2-3 years ago	13	7.0	4	3.3	8	7.2		
3-4 years ago	21	11.2	9	7.4	17	15.3		
Over 4 years ago	131	70.1	101	82.8	73	65.8	10.732	0.379
How often do you upgrade/purchase a new mobile phone?								
Every 6 moths	4	2.1	2	1.6	2	1.8		
Every 1 years	17	9.1	20	16.4	11	9.8		
Every 1.5 years	17	9.1	21	17.2	18	16.1		
Every 2-3 years	93	49.7	55	45.1	58	51.8		
Every 4-5 years	25	13.4	12	9.8	12	10.7		
Every 6-10 years	7	3.7	2	1.6	1	0.9		
Never	24	12.8	10	8.2	10	8.9	14.567	0.266
On average, how much time do you spend using your mobile phone each day?								
Less than 30 minutes	101	54.3	36	29.5	39	34.8		
30 min-1hour	43	23.1	34	27.9	37	33.0		
1-2 hours	13	7.0	20	16.4	16	14.3		
2 - 3 hours	16	8.6	14	11.5	6	5.4		
4-5 hours	9	4.8	8	6.6	8	7.1		
Over 5 hours	4	2.2	10	8.2	6	5.4	30.735	0.001
On average, how much money do you spend using mobile phone each month?								
Less than $30	25	13.4	8	6.6	10	8.9		
$30-$60	76	40.9	44	36.1	39	34.8		
$60-$100	54	29.0	47	38.5	36	32.1		
$100-$150	23	12.4	16	13.1	19	17.0		
$150-$200	7	3.8	3	2.5	4	3.6		
$200-$250	1	0.5	1	0.8	0	0.0		
Over $250	0	0	3	0.7	4	1.0	14.911	0.246

Table 6.
Current Usages of Mobile Services.

Variable	Cluster 1 (188)		Cluster 2 (123)		Cluster 3 (112)		Chi-Square	Sig.
	n	*%*	*n*	*%*	*n*	*%*		
Are you currently using this service through your mobile phone?								
Sending/receiving text messages	88	47.6	85	69.7	76	68.5	19.89	0.000
Sending/receiving picture messages	41	22.2	57	46.7	38	34.9	20.47	0.000
Checking e-mail	17	9.6	28	24.1	17	16.0	11.44	0.003
Listening to/downloading music (e.g., ringtones, personalized dialing, full-track download)	25	13.7	29	23.8	23	21.1	5.55	0.062
Playing games	32	17.5	51	42.1	32	29.1	22.21	0.000
Watching movies/video/TV	3	1.6	6	5.0	8	7.3	5.94	0.051
Gambling (e.g., lotteries, sport betting)	3	1.6	2	1.7	5	4.5	2.90	0.234
Ticketing (e.g., travel, game, concert)	3	1.6	3	2.5	8	7.3	7.06	0.029
Shipment tracking	3	1.7	6	5.1	7	6.5	4.81	0.090
Educational services (e.g., taking classes)	3	1.6	2	1.7	6	5.5	4.48	0.107
Informational services related to health (e.g. pill reminders)	6	3.3	6	5.0	7	6.5	1.58	0.454
Informational services related to entertainment (e.g. sports, movies)	4	2.2	14	11.9	13	12.0	13.65	0.001
Informational services related to travel/ transportation (e.g. traffic, travel, weather)	10	5.4	18	15.4	12	11.2	8.43	0.015
Informational services related to business/finance (e.g. checking share prices, auctions, bid alerts, stock alerts)	5	2.7	5	4.2	8	7.3	3.52	0.172
Informational services related to shopping (e.g. receiving product information, special offers, or coupons).	2	1.1	7	5.8	9	8.3	9.00	0.011
Location based services (e.g., location and map, direction services, personal locator services)	4	2.2	20	16.7	14	13.0	20.10	0.000
Payment/billing services (e.g. credit card, electricity etc.)	10	5.6	16	13.3	16	14.8	7.67	0.022
Purchasing products	5	2.8	5	4.3	12	11.0	9.42	0.009
Banking services (e,g, checking and saving accounts)	9	4.9	13	10.9	15	13.9	7.31	0.026
Sending/receiving Multimedia Messaging Services (MMS) (e.g. sending/receiving photos, sound, video, rich text, or interactive applications)	24	13.2	49	40.8	29	26.4	29.88	0.000

Cluster 1: Risk-averse doubters
Cluster 2: Mobile confidents
Cluster 3: Reserved mobile seekers

Table 7.
Intention to Use Mobile Services.

Variable	Cluster 1 (188)		Cluster 2 (123)		Cluster 3 (112)		F	Scheffe post hoc (α = .05)
	M	SD	M	SD	M	SD		
Sending/receiving text messages	3.88	2.07	5.52	1.91	5.13	2.14	27.53	1 <2, 3
Sending/receiving picture messages	3.36	1.91	5.20	1.95	4.78	2.18	36.41	1 <2, 3
Checking e-mail	3.02	1.86	4.43	2.21	4.14	2.23	20.02	1 <2, 3
Listening to/downloading music (e.g., ringtones, personalized dialing, full-track download)	2.81	1.75	3.98	2.26	3.86	2.26	15.43	1 <2, 3
Playing games	2.71	1.80	4.21	2.27	3.76	2.24	21.73	1 <2, 3
Watching movies/video/TV	2.21	1.50	3.34	2.14	3.29	2.21	17.54	1 <2, 3
Gambling (e.g., lotteries, sport betting)	1.86	1.35	1.96	1.62	2.24	1.99	2.01	
Ticketing (e.g., travel, game, concert)	2.31	1.61	2.89	2.00	2.86	2.22	4.59	1 < 2
Shipment tracking	2.40	1.54	2.94	2.00	3.28	2.28	8.01	1 < 3
Educational services (e.g., taking classes)	2.05	1.45	2.23	1.64	2.53	2.00	2.86	
Informational services related to health (e.g. pill reminders)	2.30	1.56	2.78	2.03	3.04	2.11	5.98	1 < 3
Informational services related to entertainment (e.g. sports, movies)	2.30	1.59	3.24	2.22	3.25	2.17	12.09	1 < 2, 3
Informational services related to travel/transportation (e.g. traffic, travel, weather)	2.88	1.75	3.79	2.17	3.91	2.29	11.89	1 < 2, 3
Informational services related to business/finance (e.g. checking share prices, auctions, bid alerts, stock alerts)	2.20	1.52	2.85	2.08	2.90	2.19	6.82	1 < 2, 3
Informational services related to shopping (e.g. receiving product information, special offers, or coupons).	2.21	1.45	2.90	2.05	2.93	2.17	7.67	1 < 2, 3
Location based services (e.g., location and map, direction services, personal locator services)	2.99	1.77	4.11	2.25	4.23	2.37	16.51	1 < 2, 3
Payment/billing services (e.g. credit card, electricity)	2.33	1.62	3.40	2.15	3.41	2.44	14.81	1 < 2, 3
Purchasing products	2.30	1.58	3.07	2.03	2.91	2.27	7.06	1 < 2, 3
Banking services (e,g, checking and saving accounts)	2.42	1.67	3.15	2.20	3.28	2.41	7.90	1 < 2, 3
Sending/receiving Multimedia Messaging Services (MMS) (e.g. sending/receiving photos, sound, video, rich text, or interactive applications)	2.74	1.83	4.11	2.25	3.64	2.36	16.62	1 < 2, 3

Cluster 1: Risk-averse doubters
Cluster 2: Mobile confidents
Cluster 3: Reserved mobile seekers

mobile seekers. However, in terms of purchasing products through the mobile phone, *reserved mobile seekers*, who have the highest current usage of this service, showed a slightly negative intention to use this service in the future ($M = 2.91$).

Model testing

A Structural Equation Model (SEM) was estimated to predict consumer intention to use m-commerce, to provide a systematic view of m-commerce. The causal model analyses were conducted using a maximum-likelihood estimation procedure in LISREL 8.72. For the model, a covariance matrix was used as the input into the data analysis. Preliminary runs of LISREL indicated significant correlation of measurement errors. Significant error terms of shopping motivations were correlated in the model.

The final structural model uses of seven latent variables: utilitarian shopping motivation, hedonic shopping motivation, mobile involvement, perceived benefit of m-commerce, perceived risk of m-commerce, willingness to pay more money to use m-commerce, and intention to use m-commerce. Descriptive statistics and the correlations between the constructs are shown in Table 8.

Figure 3 depicts the relationships in the SEM among the indices and latent variables. The overall fit of the model is adequate, with a χ^2 of 86.77 ($df = 28$) and fit statistics greater than or equal to 0.90 for GFI, NFI, CFI, and IFI, indicating a good model fit (Bagozzi and Yi, 1988; Hair et al., 1998). Based on confirmatory factor analysis, factor loadings for hedonic shopping motivation were estimated. The measurement factor loadings are all significant, giving evidence to convergent validity (*t*-values between 9.60 and 13.81).

All paths except one in the SEM are statistically supported; the path from mobile dependency to perceived risks is not significant ($\beta_{53} = 0.03$, $t = 0.63$). Both utilitarian and hedonic shopping motivations positively predict mobile involvement ($\beta_{31} = 0.27$, $t = 5.99$; $\beta_{32} = 0.32$, $t = 6.33$; respectively), and mobile involvement predicts the perceived benefits ($\beta_{43} = 0.55$, $t = 12.51$). The paths from the perceived benefits to the willingness to pay more to use m-commerce ($\beta_{64} = 0.33$, $t = 6.68$) and the intention to use m-commerce ($\beta_{74} = 0.68$, $t = 17.53$) are also positive and significant. Also, the paths from the perceived risks to the willingness to pay more money to use m-commerce ($\beta_{65} = -0.12$, $t = -2.39$) and the intention to use m-commerce ($\beta_{75} = -0.10$, $t = -2.71$) are negative and significant.

Decomposition of Direct, Indirect and Total Effect

To further assess the significance of indirect effects of predictor variables on the perception of benefits and risks, a decomposition of effects analysis was conducted to determine the willingness to pay more money to use m-commerce, and the intention to use m-commerce. The results are shown in Table 9. Our proposed conceptual model explains a substantial amount of the variance of mobile involvement ($R^2 = 0.17$), perceived benefits ($R^2 = 0.30$), willingness to pay more money to use m-commerce ($R^2 = 0.12$), and intention to use m-commerce ($R^2 = 0.47$). However, the perception of risks included in the model is not able to explain a significant amount of the variance.

Mobile involvement has the strongest total effects on perceived benefits (0.55, $t =$ 12.51). Perceived benefits had the strongest total effects on the willingness to pay more money to use m-commerce (.33, $t = 6.68$) and the intention to use m-commerce (0.68, $t = 17.53$).

The t-values of indirect effects from utilitarian and hedonic shopping motivations to perceived benefits mediated by mobile involvement are significant (0.15, $t = 5.40$; 0.18, $t = 5.65$; respectively). There is no significant indirect effect from any of the shopping motivations to perceived risks when mediated by mobile involvement. There are significant indirect effects of mobile involvement on willingness to pay to more money to use m-commerce and intention to use m-commerce (0.18, $t = 5.65$; 0.37, $t = 9.97$, respectively). Mobile involvement is the significant mediating variable in the model to predict willingness to pay more money to use m-commerce and intention to use m-commerce.

Mobile involvement also has a strong direct effect on the perceived benefits ($\beta_{43} = 0.55$, $t = 12.51$), and perceived benefits has a strong direct effect on the intentions to use m-commerce: willingness to use more money to use m-commerce ($\beta_{64} = 0.33$, $t = 6.68$) and intention to use m-commerce ($\beta_{74} = 0.68$, $t = 17.53$).

The model can be used to identify the factors that influence consumer intentions to use m-commerce. That is, those who are highly involved with their mobile phones have more of a tendency to perceive positive benefits toward m-commerce. Those who perceived the benefits of m-commerce as being more positive are more likely to have a higher intention to use m-commerce, yet those who perceive more risks to m-commerce are less likely to have the intention to use m-commerce in the future. Mobile involvement was the significant mediating variable in the model in predicting the willingness to pay more money to use m-commerce and intentions to use m-commerce. Both utilitarian and hedonic shopping motivations were mediated by mobile involvement to positively predict the willingness to pay more money to use m-commerce and intention to use m-commerce.

Discussion

The results of cluster analysis clarify and refine the picture of mobile users. This research identifies three segments of the current mobile users based on their perceived benefits and risks of m-commerce. The three mobile user segments are significantly different in terms of ethnicity, shopping motivations, and current usages and future intentions of m-commerce. The biggest segment of the current mobile users, *risk-averse doubters*, exhibits the lowest perception of benefits and a relatively high perception of the risks related to m-commerce. Compared to the other ethnic groups, *risk-averse doubters* are more dominated by European Americans. *Risk-averse doubters* are characterized by low levels of mobile involvement and shopping motivations, limited use of the simple features of mobile devices (such as text messaging), and the lowest level of intention to use m-commerce. They also do not perceive high benefits to the use of m-commerce. Therefore, this segment might be the least attractive target market for m-commerce applications.

Table 8.
Descriptive Statistics and Correlation Coefficients of Model Constructs.

Model constructs	Mean[a]	Std. Dev.	Correlations										
			1	2	3	4	5	6	7	8	9	10	11
1. Utilitarian shopping motivation	5.56	1.20	1.00										
2. Adventure shopping motivation	4.05	1.57	0.09	1.00									
3. Value shopping motivation	5.32	1.39	0.42***	0.40***	1.00								
4. Role shopping motivation	4.81	1.34	0.34***	0.52***	0.51***	1.00							
5. Idea shopping motivation	3.60	1.56	-0.03	0.62***	0.19***	0.37***	1.00						
6. Social shopping motivation	3.90	1.60	0.02	0.61***	0.27***	0.44***	0.60***	1.00					
7. Mobile involvement	5.21	1.14	0.29***	0.29***	0.27***	0.27***	0.27***	0.16**	1.00				
8. Perceived benefit	5.11	1.28	0.32***	0.33***	0.35***	0.30***	0.27***	0.20***	0.55***	1.00			
9. Perceived risk	4.55	1.22	0.11	0.03	0.14**	0.11	0.10	0.08	0.03	0.08	1.00		
10. Willingness to pay more money to use m-commerce	2.94	1.74	-0.03	0.23***	-0.00	0.12*	0.20***	0.21***	0.14*	0.32***	-0.09	1.00	
11. Intention to use m-commerce	4.66	1.81	0.19***	0.29***	0.24***	0.19***	0.27***	0.21***	0.42***	0.67***	-0.05	0.48***	1.00

[a] Measurement for construct 1 through 7 were based on a 7-point scale where 1 = "Strongly Disagree" and 7 = "Strongly Agree".

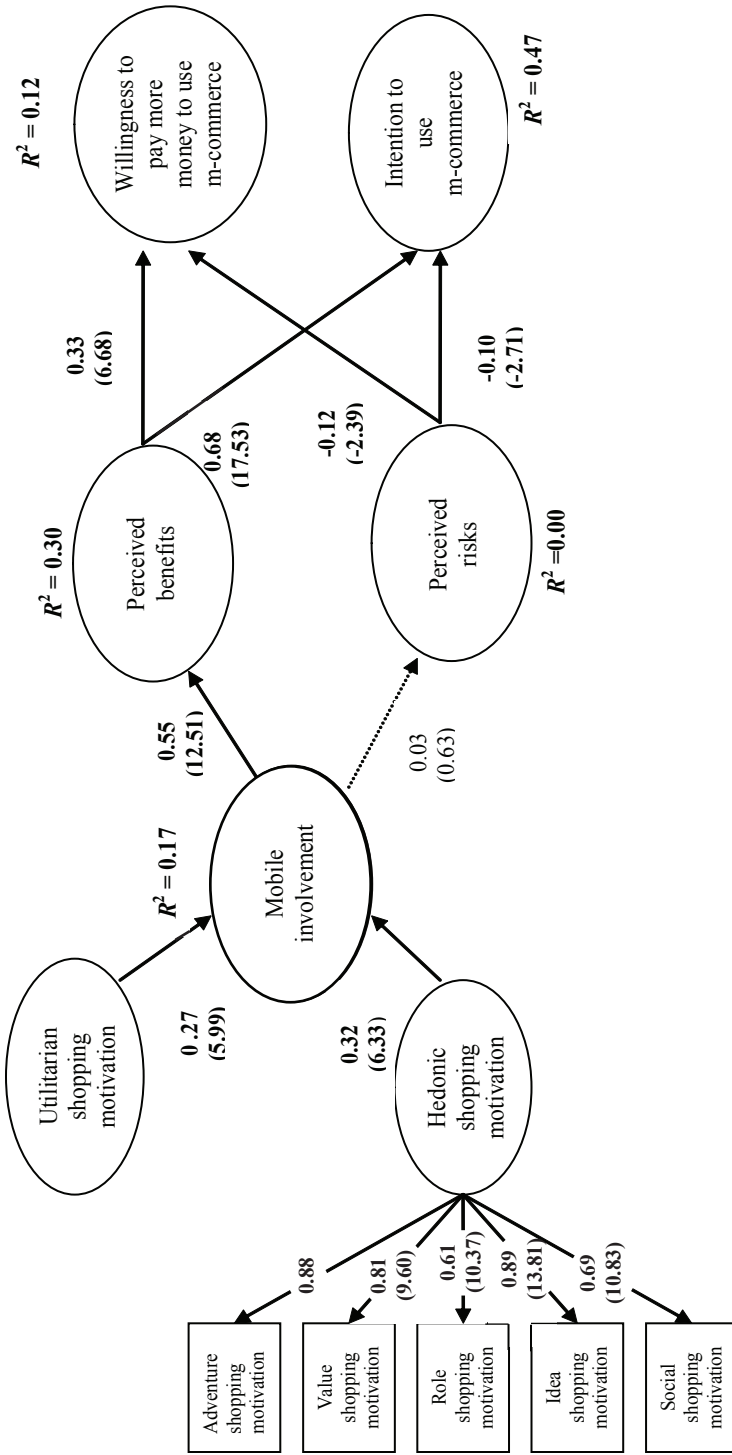* $p < 0.05$
** $p < 0.01$
*** $p \leq 0.001$

Table 9.
Decomposition of Direct, Indirect, and Total Effects for Model.

Dependent Variable	Independent Variable	Total Effects		Indirect Effects		Direct Effects	
Mobile involvement	Utilitarian shopping motivation	**0.27**	**(5.99)**	-	-	**0.27**	**(5.99)**
	Hedonic shopping motivation	**0.32**	**(6.33)**	-	-	**0.32**	**(6.33)**
Perceived benefits	Utilitarian shopping motivation	0.15	(5.40)	0.15	(5.40)	-	-
	Hedonic shopping motivation	0.18	(5.65)	0.18	(5.65)	-	-
	Mobile involvement	**0.55**	**(12.51)**	-	-	**0.55**	**(12.51)**
Perceived risks	Utilitarian shopping motivation	**0.01**	**(0.63)**	**0.01**	**(0.63)**	-	-
	Hedonic shopping motivation	0.01	(0.63)	0.01	(0.63)	-	-
	Mobile involvement	0.03	(0.63)	-	-	**0.03**	**(0.63)**
Willingness to pay more money to use m-commerce	Utilitarian shopping motivation	**0.05**	**(4.11)**	**0.05**	**(4.11)**	-	-
	Hedonic shopping motivation	**0.06**	**(4.22)**	**0.06**	**(4.22)**	-	-
	Mobile involvement	**0.18**	**(5.65)**	**0.18**	**(5.65)**	-	-
	Perceived benefits	**0.33**	**(6.68)**	-	-	**0.33**	**(6.68)**
	Perceived risks	**-0.12**	**(-2.39)**	-	-	**-0.12**	**(-2.39)**
Intention to use m-commerce	Utilitarian shopping motivation	**0.10**	**(5.13)**	**0.10**	**(5.13)**	-	-
	Hedonic shopping motivation	**0.12**	**(5.35)**	**0.12**	**(5.35)**	-	-
	Mobile involvement	**0.37**	**(9.97)**	**0.37**	**(9.97)**	-	-
	Perceived benefits	**0.68**	**(17.53)**	-	-	**0.68**	**(17.53)**
	Perceived risks	**-0.10**	**(-2.71)**	-	-	**-0.10**	**(-2.71)**

Note: *t*-values are in parentheses. Significant effects ($t > 2.00$) are shown in bold.

We suggest the other two segments, *mobile confidents* and *reserved mobile seekers*, are the potential target markets for m-commerce applications. Both mobile confidents and reserved mobile seekers are similar in terms of high levels of shopping motivations, mobile involvement, and perceptions of m-commerce, which indicates that m-commerce is of interest to these segments. *Mobile confidents* and *reserved mobile seekers* are distinct from *risk-averse doubters* as they have higher levels of usage in all mobile services as well as the intention to use them in the future, if they are not currently being used. The distinction from *risk-averse doubters* is also greater in that there is higher current use rates and greater future intentions to use complex m-commerce that requires the more sophisticated functions of mobile devices (e.g., checking e-mail, multimedia messaging).

Mobile confidents and *reserved mobile seekers* are differentiated by their levels of perceived risks of m-commerce. *Mobile confidents* have the lowest perceived risks, with a relatively high perception of the benefits of m-commerce, whereas *reserved mobile seekers* perceive that there is more risk, despite the high benefits of m-commerce. As these groups perceive benefits and risks of m-commerce differently, the use patterns and future intentions of mobile services are varied. For *mobile confidents*, the most demanded mobile services include multimedia messaging, games, and e-mail access.

$R^2 = 0.12$

Willingness to pay more money to use m-commerce

Intention to use m-commerce

$R^2 = 0.47$

0.33
(6.68)

0.68
(17.53)

-0.12
(-2.39)

-0.10
(-2.71)

$R^2 = 0.30$

Perceived benefits

Perceived risks

$R^2 = 0.00$

0.55
(12.51)

0.03
(0.63)

$R^2 = 0.17$

Mobile involvement

Utilitarian shopping motivation

0.27
(5.99)

0.32
(6.33)

Hedonic shopping motivation

Adventure shopping motivation

Value shopping motivation

Role shopping motivation

Idea shopping motivation

Social shopping motivation

0.88

0.81
(9.60)

0.61
(10.37)

0.89
(13.81)

0.69
(10.83)

$\chi^2 (df = 28) = 86.77$; $GFI = 0.95$; $AGFI = 0.91$; $CFI = 0.96$; $NFI = 0.95$
Note: t-values are in parentheses ($t > 2.00$); dotted lines indicate insignificant paths.

Figure 3.
A Model Predicting the Intention to Use M-commerce.

Reserved mobile seekers are associated with a high likelihood of using mobile-assisted shopping services such as product purchase and shopping information services. For marketers interested in mobile-assisted shopping applications, r*eserved mobile seekers are* the right target group. However, marketers should also be aware that this segment perceives a high risk to m-commerce, and issues such as security and technological compatibilities need to be considered.

Our research tends to support Malhotra and Segars (2005), who suggest that m-commerce adoption within the U.S. market will be on an evolutionary rather than revolutionary track. The majority of the mobile users in our study currently limit their use of the mobile phone to simple functions such as text and picture messaging. The intentions to use different mobile services in the future largely correspond with current usage patterns, however. For example, with information services, the highest current usage rates and intentions for future use are for travel and transportation information services. Location-based services were an exception, in that mobile users have high intentions to use this service in the future, despite the fact that current usage rates are so low.

In terms of the impact of demographics, previous research has had mixed findings with regards to the effects of demographics on the use of mobile services. Significant differences have been found on the basis of age (Bigne, Ruiz, and Sanz, 2005), gender (Mort and Drennan, 2005), education level (Lee, Chen, and Cheng, 2007), and social class (Bigne et al., 2005). Interestingly, the analyses of demographic characteristics in this study do not support these results. Except for ethnicity, all other demographic variables are not significantly different between the three clusters obtained in this study. This finding might reflect the current status of consumer adoption of mobile commerce in the U.S. in that U.S. consumers, regardless of demographic characteristics, are not actively engaged in various mobile services. Due to the limited adoption of m-commerce, consumers in any age or gender group might have the similar perceptions of benefits and risks of m-commerce. Rather, cultural, or ethnic differences among mobile users might exert more influence on their perception and use of m-commerce. While the consumer groups in our study were segmented based on their perceptions of benefits and risks of m-commerce, consumer groups segmented based on different criteria—such as future intention of using mobile services—might generate a different result. That is, demographics of consumers might be a critical factor in distinguishing whether or not to they adopt a particular mobile service in the future.

The structural equation model identifies factors that influence the intention to use m-commerce. This study empirically supports Hubert (2005) and Srivastava (2005) in that the mobile phone is very valuable and important to the current mobile users, which is reflected by a high mean value of mobile involvement in this study (*M* = 5.30). Mobile involvement is the strongest factor in the prediction of the perception of benefits, as well as a significant mediating variable in the prediction of willingness to pay more money to use m-commerce and the intention to use m-commerce. Those who are highly involved with their mobile phone have a higher tendency to perceive more benefits to m-commerce, yet mobile involvement does not predict the perception of risks with m-commerce in the present study. Consumers who are highly dependent

on their mobile phones would be the strongest potential target group that marketers should approach. However, just as not all Internet users have become Internet shoppers, a careful approach to introducing and educating potential consumer groups to m-commerce would be beneficial.

The findings from the model indicate that the perception of benefits is the most important factor to predict intentions to use m-commerce. Consumers' intentions to use m-commerce are positively related to the perception of benefits and negatively related to the perception of the risks of m-commerce. According to the model, consumers who grasp the benefits of m-commerce (e.g., convenience, immediate access, location-specific services, etc.) would have a higher interest in using m-commerce, and an even higher willingness to pay to use m-commerce. However, those who perceive that there are high risks to m-commerce (e.g. high cost, security and privacy issues, technology constraints, etc.) would have less intention to use m-commerce. We suggest that marketers need to focus on increasing the perceived benefits and lowering the perceived risks of m-commerce to the potential consumers.

In addition, there is a stronger relationship between perceived benefits of m-commerce and the intention to use m-commerce than between perceived benefits and the willingness to pay more money to use m-commerce. This finding supported the research of Khalifa and Shen (2006) indicating that the costs related to m-commerce seem to be important for potential m-commerce adopters. Therefore, marketers need to be careful with regards to cost issues when implementing m-commerce with consumers. Marketers might educate the consumers up front regarding the benefits of the m-commerce and make sure that consumers will clearly understand the benefits associated with the increased costs of m-commerce.

Conclusions

This study attempted to identify the key success factors of m-commerce by understanding characteristics of potential m-commerce users and examining the factors that influence the intention to use m-commerce. Current mobile users were segmented into three clusters based on their perceived benefits and risks of m-commerce: *Risk-averse doubters*, *Mobile confidents*, and *Reserved mobile seekers*. We suggested *mobile confidents* and *reserved mobile seekers* as the potential target markets for m-commerce applications. A profile of each segment was developed in terms of demographics, shopping motivations, mobile involvement and usage patterns, and future intentions. This study also provides a systematic view of m-commerce with a structural equation model to predict consumer intention to use m-commerce. Mobile involvement positively predicts perceived benefits, but not perceived risks. Perceived benefits of m-commerce have a positive impact on the willingness to pay more money to use m-commerce and intention to use m-commerce, while perceived risks of m-commerce have a significant negative impact. Mobile involvement is the significant mediating variable in the model to predict willingness to pay more money to use m-commerce and intention to use m-commerce.

There are several limitations to the present study. While the sample for this study was drawn from the current group of mobile users, the generalization of our

results might not be extended to the populations of all mobile users in the U.S. due to the use of nonrandom sampling. Another limitation is that the sample taken consisted of mobile users and not purely of m-commerce users; therefore, marketers need to be careful applying the information from the study to m-commerce. Since m-commerce is still a new concept to the consumers in the U.S., our participants' knowledge of m-commerce might be limited, and the participants' unawareness of m-commerce might have an impact on the results. Finally, our study does not examine the actual benefits and risks based on consumers' actual use of m-commerce.

There are several possible directions for future study. Once m-commerce has been established with the market and consumers, more research related to the perceived benefits and risks of m-commerce would be useful. More work is needed to explore the role of consumer demographics in segmenting consumer groups for mobile commerce. Furthermore, future research using other constructs and predictor variables (such as trust) and across different products (e.g. apparel, books), services (e.g. payment, ticketing, location-based service) and cultural settings (e.g., Japan vs. the U.S.) in m-commerce usage would be especially rewarding.

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