Internet Research

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The current issue and full text archive of this journal is available at
www.emeraldinsight.com/1066-2243.htm

Received 6 December 2010
Revised 18 September 2011
Accepted 22 September 2011

Factors influencing mobile services adoption: a brand-equity perspective

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Abstract

Purpose – The purpose of this study is to develop and validate empirically a research model that depicts the relationships between the identified key value proposition attributes of mobile value-added services and the core factors of brand equity.

Design/methodology/approach – Survey data collected from 497 mobile value-added service consumers were examined using structural equation modeling to validate the research model.

Findings – The results indicate that the mobile service attributes of personalization, identifiability, and perceived enjoyment have significant positive influences on the key brand equity factors, including brand loyalty, perceived quality, brand awareness, and brand associations. Additionally, the results confirm the significance of all four of the brand equity factors in interpreting consumer purchase intention in the context of mobile value-added service consumption.

Practical implications – The research results provide insights into how mobile value-added services may be better designed and delivered to enhance brand equity and, in turn, profits.

Originality/value – While the market potential of mobile value-added services and the importance of brand equity have both been widely recognized, the development and empirical validation of a model that specifically depicts the determinants of mobile value-added service consumption from a brand-equity perspective has not yet been undertaken. Consequently, this study investigates the relationships among key m-commerce attributes, core brand-equity components, and consumer behaviors. The research results have extended the application and advanced the understanding of previous mobile-commerce and brand-equity theories in the context of mobile value-added service consumption.

Keywords Mobile commerce, Mobile services, Brand equity, M-commerce attribute, Consumer behaviour, Brand management, Electronic commerce, Value chain

Paper type Research paper

1. Introduction

Mobile technology is increasingly attractive because it offers flexible, ubiquitous access to the internet, thus converting traditional electronic commerce (e-commerce) into mobile commerce (m-commerce) (Scharl *et al.*, 2005). At the end of the first decade

The authors thank the Editor and anonymous reviewers for their valuable feedback on this paper. The authors also thank the administrators of the online forums and web sites studied for their support and the survey respondents for providing valuable data.

Internet Research
Vol. 22 No. 2, 2012
pp. 142-179

1066-2243
DOI 10.1108/10662241211214548

of the twenty-first century, a number of encouraging forecasts indicate the continued growth of m-commerce activities (Ngai and Gunasekaran, 2007; Schierz *et al.*, 2010). M-commerce has distinctive attributes that provide consumers with values unavailable in conventional wired e-commerce, including usability, personalization, identifiability, and perceived enjoyment (Mahatanankoon *et al.*, 2005; Siau *et al.*, 2001).

Existing marketing studies have pointed out the importance of developing brand equity in aiding corporate success, as it can make points of differentiation that lead to competitive advantages based on nonprice competition (Aaker, 1991). Consequently, there have been calls for research that specifically explores the sources and development of brand equity, and how it affects consumer purchasing decisions (e.g. Shocker *et al.*, 1994; Voorveld *et al.*, 2009; Yoo *et al.*, 2000). Additionally, as the use of mobile technology has entered the lives of an increasing number of people, there have been a significant number of studies investigating issues related to m-commerce from various perspectives, including m-commerce theory and research, wireless network infrastructure, mobile middleware, wireless user infrastructure, and m-commerce applications and cases (Ngai and Gunasekaran, 2007).

Despite tremendous interest in both m-commerce and brand equity, there have been a limited number of studies that specifically explore m-commerce consumer behaviors from the perspective of brand equity. A noticeable exception is the work of Rondeau (2005), which explores challenges and strategies with regard to the branding of mobile applications and calls for research into the relationship between specific mobile application features and the success of branding initiatives. Additionally, three similar studies (Gill and Lei, 2009; He and Li, 2011; Qi *et al.*, 2009) empirically investigate the relationships among service quality, brand equity, and the behavioral intentions of consumers in the mobile service (m-service) contexts. Previous research has indicated that the proliferation of m-services and the intense global competition in the industry have resulted in decreasing prices and difficulties in maintaining relationships with customers (Baker *et al.*, 2010; Jurisic and Azevedo, 2011), and thus managers of m-service providers are constantly under pressure to differentiate their services from those of competitors in order to achieve revenue goals. Correspondingly, branding has been widely recognized to be important to adding value to products/services and, in turn, to affecting consumer behavior and organizational profits. However, the branding of m-services has raised new questions and challenges because of the diverse m-service experiences that arise as a result of the unique m-service features (Alamro and Rowley, 2011; Rondeau, 2005). Consequently, these authors point out the need to conduct research into the key features of m-services that make service differentiation possible by enhancing customer perceived value from a brand equity perspective, as brand equity is considered a key facilitator of price premium and consumer purchase intention.

Despite these calls for research, the specific links between key m-commerce features and brand equity have rarely been considered. Therefore, this study aims to investigate the relationships among key m-commerce attributes, core components of brand equity, and behaviors of m-commerce consumers to answer the following research question: what are the key m-commerce attributes that significantly influence the development of m-commerce brand equity and consumer purchase intention, and how do they do this?

Mobile value-added services are digital services added to mobile phone networks other than voice services, including short message service, games, entertainments, web surfing, software applications and functions for achieving specific purposes

(e.g. performing electronic transactions (Kuo *et al.*, 2009). Among all m-commerce applications, mobile value-added services have been recognized as having a remarkably promising future in the telecom service market because customer values, such as time-critical needs and arrangements, spontaneous needs and decisions, entertainment needs, and efficiency needs and ambitions, can be met by using these services (Anckar and D'Incau, 2002). Additionally, mobile value-added services contain the typical characteristics of services; they are intangible, difficult to evaluate, and inseparable in terms of production and consumption, which makes it more difficult to evaluate these services (Zeithaml, 1981). Because new services are being released all the time, their appeal to consumers via the application of key m-commerce attributes, their shaping of consumer attitudes via the development of key brand equity components and their ability to induce positive purchase intentions, which can significantly increase revenue and enable sustainable development for m-service providers, are all important issues. Consequently, mobile value-added services were chosen as an illustrative empirical setting in this study. Thus, the brands to be examined in this study include those of the software vendors and digital service providers who provide consumers with a variety of mobile value-added services, either via the mobile internet (e.g. the online mobile application stores for iPhones or Android-based smart phones) or in conjunction with the services provided by the cellular phone carriers. The research results provide insights into how m-services may be better designed and delivered to generate brand equity and profits.

This paper is organized as follows: section 2 presents a review of the literature concerning m-commerce attributes and brand equity. Section 3 presents the research model and hypotheses. Section 4 describes the research method, while section 5 presents the results analyzed by structural equation modeling (SEM). Section 6 concludes this paper by discussing the implications and limitations of this study, along with future research directions.

2. Literature review

2.1 Consumer adoption of mobile services

There have been many studies investigating the factors driving m-service adoption, which are represented by dependent variables including consumer satisfaction, loyalty, and behavioral intentions (e.g. the intention to use/reuse or intention to purchase/repurchase), from a variety of perspectives. A review of the literature on information management and e-commerce highlights a number of theories that are commonly used or extended with other variables for investigating the consumer adoption of m-services (see Table I), including Davis *et al.*'s (1989) technology acceptance model (TAM), the information system success model (ISSM) (DeLone and McLean, 2003), the expectancy disconfirmation model (EDM) (Oliver, 1980), the dimensions of trust (e.g. Kim *et al.*, 2009a), the cultural theories, such as Hofstede's (2001) cultural dimensions, and service quality evaluation models, such as the well-known SERVQUAL and E-QUAL (Kaynama and Black, 2000), and the European customer satisfaction index (ECSI) (Cassel and Eklof, 2001).

As indicated in Table I, the TAM has been the mostly constantly used or extended theory for the purpose of examining the issues of m-service adoption in the existing studies. Because TAM has its merits in terms of its parsimony and promising explanatory power in various contexts of technology adoption, it focuses more on the

Table I.
Summary of existing studies of m-service adoption

Theoretical base	Key construct	Adoption measure	Research context	Representative literature
TAM	Perceived usefulness; perceived ease of use; subjective norm; self-efficacy; enjoyment; network externality	Behavioral intention; adoption intention; intention to use; actual use behavior	Mobile-technology-enabled tasks; mobile data services; mobile shopping services; mobile short message services; mobile payment services; mobile healthcare services	Fang *et al.*, 2005-2006; Hong and Tam, 2006; Li and Yeh, 2010; Liu *et al.*, 2010; Lu and Su, 2009; Ko *et al.*, 2009; Scharl *et al.*, 2005; Schierz *et al.*, 2010; Shin, 2009; Thong *et al.*, 2006; Wang *et al.*, 2006; Wu *et al.*, 2011
ISSM	System quality/ease of use; information/content quality; service quality; trust	Satisfaction; actual use behavior	Mobile shopping services; mobile banking services; ubiquitous computing services	Kim *et al.*, 2009a; Lee and Chung, 2009; Wang and Liao, 2007
EDM	Confirmation	Satisfaction; continued usage intention	Mobile internet services	Thong *et al.*, 2006
Trust-related theories	Dimensions of trust; innovation measures; perceived value	Adoption intention; usage intention; mobile trust	Mobile shopping services; mobile banking services	Kim *et al.*, 2009b; Li and Yeh, 2010; Lin, 2011
Culture-related theories	Cultural characteristics/ dimensions	Satisfaction; continued usage intention	Mobile internet services	Kao, 2009; Lee *et al.*, 2007
Service quality perspective	Perceived value; trust service quality; enjoyment; risk; personalization	Adoption intention; purchase intention; post-purchase intention	Mobile value-added services; mobile shopping services; loyalty	Kuo *et al.*, 2009; Lin and Wang, 2006; Xu *et al.*, 2011

technological perspective, which makes it insufficient to incorporate the effects of individual or organizational factors on the adoption process (Wu *et al.*, 2011). In response to criticism of the TAM, many studies have extended the TAM by including individual or organizational factors for investigating m-service adoption. In a similar vein, the ISSM is also constantly used or extended by researchers for investigating technology adoption topics because it explicitly identifies three key quality components of information systems/technologies (IS/IT) and points out the important role of the net benefits in affecting IS/IT adoption.

Additionally, because the findings of the studies that primarily adopt approaches from both trust-building and culture perspectives are valuable to m-service professionals in terms of providing insights into the effects of a specific group of variables on consumer m-service adoption, they tend to be insufficient in predicting its variations. Because TAM- or ISSM-based studies have their merits in examining m-service adoption because they integrate the concepts of cognition (extrinsic measures) and affection (intrinsic measures) (Ko *et al.*, 2009), some m-service studies that embrace a trust-building or culture perspective include extrinsic measures, such as ease of use, system quality, and information quality, in their research models while considering trust-related or culture-related variables or perceived enjoyment as intrinsic measures (e.g. Lee *et al.*, 2007; Li and Yeh, 2010; Lin, 2011). Compared to the studies discussed previously, m-service studies that are adopted from a service quality or expectation disconfirmation perspective by using constructs such as confirmation/disconfirmation, perceived value, and other service quality constructs have their advantages in unraveling the intricate relationships among key service quality constructs, such as perceived value, personalization, consumer expectations, and disconfirmations of other author-subjective key constructs (e.g. perceived usefulness).

Nevertheless, the studies discussed previously share a deficiency. Because m-services are distinct from e-commerce services due to a number of distinguishable m-commerce features, such as ubiquity and location-based, examining the adoption of these m-services without explicitly considering key m-commerce features cannot provide us with a comprehensive understanding of what drives favorable consumer perception regarding performance measures such as satisfaction, trust, and service quality factors. Therefore, issues of m-service adoption must be examined considering key m-commerce attributes in order to help m-service providers better understand why a new m-service is accepted by the market. There have been a few studies that focus on examining the effects of key m-commerce attributes on the adoption of m-commerce (e.g. Ko *et al.*, 2009; Mahatanankoon *et al.*, 2005; Venkatesh *et al.*, 2003). However, to the best of the authors' knowledge, none of these studies were conducted using a brand equity perspective, and their contributions are thus limited in terms of providing an understanding of whether and how the specific efforts of m-service providers can generate sustainable competitive advantages (i.e. brand equity) that can support their long-term prosperity. Consequently, to investigate this under-addressed issue of m-service adoption, this study adopts a brand equity approach.

2.2 Attributes of mobile commerce

M-commerce is superior to e-commerce since it can provide location-, customer-, personalization-, and context-based services (Choi *et al.*, 2008) by taking advantage of its key attributes. In the following sections the key attributes of m-commerce

summarized from existing study, namely usability, personalization, identifiability, and perceived enjoyment, will be discussed.

2.2.1 Usability. Usability is defined as the extent to which a technology can ensure a positive user experience and, in turn, satisfy both their sensory and functional needs (Venkatesh *et al.*, 2003). Understanding the various aspects of the usability of m-commerce applications is important for businesses, since it can facilitate the creation of new business models and innovative new strategies for being successful in the m-commerce area (Tsalgatidou and Pitoura, 2001). There are three key features for the usability of m-commerce applications, as follows: ubiquity, location-awareness, and convenience (e.g. Clarke, 2001; Ko *et al.*, 2009; Tsalgatidou and Pitoura, 2001; Venkatesh *et al.*, 2003).

Ubiquity refers to the ability of m-commerce applications to enable users to receive information and perform transactions, such as information regarding stock price changes and bidding information in an ongoing auction, from anywhere on a real-time basis (Clarke, 2001). This feature has been considered the major advantage of m-commerce applications as opposed to e-commerce applications (Kim *et al.*, 2008b; Schierz *et al.*, 2010). Through mobile devices, such as cellular phones, users can be reached at anytime, regardless of their locations, and thus makes possible the delivery of time-sensitive information whose value depends on its timely use (Siau *et al.*, 2001; Tsalgatidou and Pitoura, 2001).

Location-awareness refers to the capability of m-commerce providers to recognize the geographical location of a particular user through his or her mobile device using mobile technologies, such as global positioning systems (Mahatanankoon *et al.*, 2005). Venkatesh *et al.* (2003) argue that goals to be achieved in an m-commerce context are constantly associated with location pressure. Consequently, location awareness, which is regarded as a new dimension for value creation in m-commerce, enables the delivery of location-sensitive information relevant to the current geographic position of a particular m-commerce consumer, such as road conditions, tour guides, and weather information (Clarke, 2001; Yuan and Zhang, 2003).

Finally, convenience refers to the way in which the agility and accessibility provided by mobile devices further eliminate the constraints caused by time and place in conducting social and/or business activities (Mahatanankoon *et al.*, 2005). Additionally, m-commerce could be accessed in a manner which may eliminate some of the drudgery associated with certain activities, and thus resulting in consumer recognition of an improved quality of life (Clarke, 2001).

2.2.2 Personalization. Personalization refers to a vendor providing individual customers with tailored products/services based on an understanding of their interests and preferences (Mulvenna *et al.*, 2000). In other words, personalization is to provide customers with a tailored product/service without receiving explicit instructions from them (Nunes and Kambil, 2001). Consequently, in this study personalization is defined as the use of mobile technologies with reference to the user, context, and content information, to provide personalized products/services in order to meet the specific needs of a particular customer (Ko *et al.*, 2009).

In m-commerce, personalization has been considered an effective means to better meet customers' expectations, and, in turn, to enhance customer trust in m-commerce vendors, and lift both customer satisfaction and organizational profits (Li and Yeh, 2010; Venkatesh *et al.*, 2003). For example, from a technical perspective, a number of

studies have stressed the importance of providing customers with personalized user interfaces in order to enhance customer intention and efficiency with regard to using mobile devices to perform m-commerce activities, which are sometimes constrained because of the limitations of mobile devices in terms of screen size, resolution, and surfability (e.g. Clarke, 2001; Lee and Park, 2006; Tsalgatidou and Pitoura, 2001). From a marketing perspective, the characteristic of mobile devices being seen as very personal devices has made possible the achievement of individual/one-to-one marketing in m-commerce, which can better fulfill the needs of individual customers (e.g. Clarke, 2001; Ko *et al.*, 2009; Mahatanankoon *et al.*, 2005).

2.2.3 Identifiability. Identifiability refers to the ability to recognize the identity of a user through a mobile device. Since a mobile device, particularly a cell phone, is registered by one unique subscriber and is normally carried by that person, it becomes possible to identify a particular user, perform individual-based marketing, and deliver personalized services (Mahatanankoon *et al.*, 2005; Prykop and Heitmann, 2006). For example, Yuan and Zhang (2003) argue that by means of this attribute individuals can benefit from a variety of valuable services which are not available in e-commerce, including mobile payment services (e.g. paying for buses, taxis, and highway fares) and emergency/time-critical information services (e.g. notification of airline flight schedule changes and fast retrieval of personal information in medical or criminal emergency situations). Roussos *et al.* (2003) argue that identifiability enables a corporate employee, such as a sales representative, to access corporate systems to acquire the information needed according to his or her role and credentials at different locations using different mobile devices.

2.2.4 Perceived enjoyment. Perceived enjoyment refers to the extent to which the activity of using a technology is perceived to be enjoyable in its own right, regardless of any performance consequences resulting from its use (Ko *et al.*, 2009; Venkatesh, 2000). In contrast to perceived usefulness and perceived ease of use in the technology acceptance model (TAM), which are dependent on the extrinsic, physical benefits generated by the use of the technology, perceived enjoyment represents the intrinsic benefits customers acquire from the experience of using the technology, aside from its instrumental value (Davis *et al.*, 1992; Kim *et al.*, 2007).

In the area of m-commerce, Mahatanankoon (2007) argues that consumers are more likely to be motivated by their own enjoyment and other stimuli instead of by the perceived usefulness of mobile applications. Additionally, in Kulviwat *et al.*'s (2007) study of consumer acceptance of technology, including mobile devices, the authors find that TAM-based research models which includes factors similar to enjoyment tend to have better predictive power with regard to consumer intention toward adopting a technology than the original TAM. Correspondingly, perceived enjoyment has been frequently used as an important antecedent to the mobile technology adoption (e.g. Cheong and Park, 2005; Kim *et al.*, 2007; Ko *et al.*, 2009; Lu and Su, 2009).

2.3 Brand equity

The term "brand" refers to a combination of names, signs, symbols, and designs through which customers can identify the offerings of a specific company and distinguish these offerings from those of competitors (American Marketing Association, 1960). A brand can be considered as a cluster of functional and emotional values which are unique and can provide customers with favorable experience (De Chernatony *et al.*, 2006). A

successful brand is valuable, since it can enable marketers to gain competitive advantages by facilitating potential brand extensions, developing resilience against competitors' promotional pressures, and creating entry barriers to competitors (Kim *et al.*, 2008a; Rangaswamy *et al.*, 1993; Rowley, 2009).

Brand equity is generally defined as the marketing effects, or the value added to the product, specifically attributable to the brand (Keller, 1993; Rangaswamy *et al.*, 1993). In other words, brand equity is the difference between the utility of the substantial attributes of a focal branded product and the total utility of the brand (Yoo *et al.*, 2000). Brand equity can be considered a mix of both customer-based brand strength (equity) and financial brand equity (Barwise, 1993). Financial brand equity refers mostly to the value of a brand for accounting purposes, while customer-based brand equity refers to the customers' familiarity and unique associations with the brand in memory (Keller, 1993). As the aim of this study is to investigate how m-commerce properties influence the behaviors of individual consumers through brand-equity-related factors, a customer-based perspective is adopted for conceptualizing brand equity.

Brand equity has been considered a multi-dimensional construct which is composed of a variety of factors, as summarized in Table II. Considering the various suggestions

Brand equity factor	Definition	Literature
Brand loyalty	A deeply held long-term commitment to consistently repurchase or repatronize a product/service of the same brand, free from the effects of situational factors and marketing efforts that have the potential to result in switching behaviors	Aaker, 1991, 1996; Baker *et al.*, 2010; Kim *et al.*, 2008a; Oliver, 1999; Yoo *et al.*, 2000
Brand image	An overall perception of a brand derived from the brand associations held in consumer memory	Keller, 1993; Keller, 1998
Perceived quality	A consumer's evaluation of a recent consumption experience regarding a product's overall excellence	Aaker, 1991, 1996; Baker *et al.*, 2010; Yoo *et al.*, 2000
Brand associations	Anything, including attributes of a product/service, reputation of a company, and characteristics of product/service users, which linked in consumer memory to a brand	Aaker, 1991, 1996; Baker et al., 2010; Keller, 1998; Yoo *et al.*, 2000
Brand awareness	The strength of the trace of a brand in consumer memory, as reflected by the consumers' ability to identify the brand under different conditions	Aaker, 1991, 1996; Baker *et al.*, 2010; Keller, 1993; Kim *et al.*, 2008a; Yoo *et al.*, 2000
Market behavior	The condition of a brand in the market, which can be measured by the market share, the relative market price (compared to competitors), and the distribution coverage of the brand (level of accessibility of consumers with regard to the product)	Aaker, 1996

Table II.
Dimensions of brand equity

presented in the literature, it is concluded that brand loyalty, perceived quality, brand associations, and brand awareness are the most common dimensions used for measuring brand equity (Aaker, 1996; Baker *et al.*, 2010; Chang and Liu, 2009; Yoo *et al.*, 2000) in this study. These four dimensions are also critical for the following reasons. First, brand loyalty is considered a core dimension of brand equity, as it is key for building entry barriers, forming a price premium and avoiding deleterious price competition, and gaining strategic advantages in response to the actions of competitors (Aaker, 1996). Additionally, brand image is composed of consumers' perceptions about a brand as reflected by a set of meaningful associations in their memories (Aaker, 1991; Keller, 1993), and thus can be appropriately represented by brand associations. Furthermore, from a customer-based brand equity perspective, the factor of market behavior is inappropriate for use as a measure of brand equity, as it relates more to the operations of the companies which own the brands than to the direct consequence of consumer behaviors.

2.4 Mobile service adoption and brand equity

The concept of brand equity has historically been applied to both e-commerce and m-commerce studies. For example, Chau and Ho (2008), in line with Aaker's (1991) brand equity dimensions of perceived quality, brand awareness, brand associations, and brand loyalty, empirically examine the key factors influencing the development of brand equity in the context of internet banking services. Delgado-Ballester and Hernandez-Espallardo (2008) confirm the positive influence of brand associations on customers' trust and behavioral intentions regarding branded online travel agencies. Song *et al.* (2010) discuss the issue of brand extension in online environments and address the importance of the perceived quality, brand associations, and brand image of a parent brand on generating benefits for an extended brand.

A number of researchers have highlighted the importance of personalized and interactive mobile media/advertising as marketing tools for interacting with consumers or facilitating interactions among consumers in order to build or raise brand awareness and loyalty in various m-commerce domains, such as retailing, content selling, and banking (e.g. Kavassalis *et al.*, 2003; Perey, 2008; Prins and Verhoef, 2007; Riivari, 2005; Smutkupt *et al.*, 2011; Troshani and Hill, 2011). Additionally, in the context of the mobile communications industry, Baker *et al.* (2010) examine the importance of brand equity in generating greater consumer demand for mobile communications products/services. In a similar vein, Jurisic and Azevedo (2011) address the need to increase brand equity by building and maintaining customer-brand relationships, which can be done by valuing the issues that customers value the most in order to increase their emotional attachments to the brand. In summary, previous studies have implied there is a significant linkage between the consumer-perceived m-service quality, as a result of consumer perceptions of the key m-commerce attributes, and the key brand equity factors, and highlighted the important role that these factors play in mediating the effects of the key m-commerce attributes on the adoption of a specific m-service.

Nevertheless, there are few studies that specifically explore m-service consumer behaviors from the perspective of brand equity, with a number of notable exceptions. One is the work of Rondeau (2005), which explores challenges and strategies related to the branding of mobile applications. He also addresses the importance of investigating

which mobile application features have greater influence on consumer brand perception and, in turn, the success of branding initiatives, and he thus calls for more research into this particular issue. Additionally, Qi *et al.* (2009) empirically examine and confirm the significant effect of brand experience (i.e. perceived quality, brand awareness, and brand associations) on consumer attitudes regarding using mobile data services. Furthermore, Gill and Lei (2009) offer insights into the relationship of m-service features and brand associations by finding that low-quality brands tend to benefit more from the addition of a congruent functionality (i.e. it has similar goals to the base m-service), while high-quality brands are more likely to benefit from the addition of an incongruent functionality. In a similar vein, He and Li (2011) specifically point out and empirically examine the significant role that brand associations have in mediating the effects of service quality (e.g. the quality in terms of the key m-commerce attributes) on the satisfaction and brand loyalty of mobile service consumers.

Despite the efforts that have been made to investigate issues related to brand equity in the m-commerce context, there are few studies that specifically investigate the linkage between key m-commerce attributes and brand equity. Because the effectiveness of the development of brand equity is known to be product- and market-characteristic dependent (Chau and Ho, 2008; Park *et al.*, 1986), the findings of previous brand equity studies, which mostly focus on the development of brand equity of branded service providers in the traditional market, may have little relevance to the development of the brand equity of m-service providers in the m-commerce context. Consequently, this study aims to investigate the relationships among key m-commerce attributes, core components of brand equity, and behaviors of m-commerce consumers.

3. Research model and hypotheses

3.1 The research model

Based on the results of the literature review, a research model to depicting the relationships between m-commerce attributes and the key dimensions of brand equity is developed, as presented in Figure 1. Purchase intention refers to the tendency of consumers with regard to purchasing products/services at the same shop and the sharing of their use experiences with others (Zeithaml *et al.*, 1996). Purchase intention has long been used as an objective indicator of consumer behavior in m-commerce studies (e.g. Ko *et al.*, 2009; Kuo *et al.*, 2009; Mahatanankoon, 2007) and studies investigating the roles of various dimensions of brand equity play in the market (Aaker, 1996; Tan and Piron, 2002). Consequently, purchase intention is included in the research model to represent the consequence of brand equity.

The logic of the development of the research model can be better understood with reference to the well-known appraisal, emotional response, and coping framework (Bagozzi, 1992; Lazarus, 1991). Based on this framework, the proposed research model consists of three categories of constructs: beliefs (appraisals), attitudes (emotional responses), and behaviors (coping responses). The four identified key m-commerce attributes represent beliefs (e.g. Pedersen, 2005; Prykop and Heitmann, 2006; Venkatesh *et al.*, 2003; Xu *et al.*, 2011), the four brand-equity factors refers to attitudes (e.g. Baker *et al.*, 2005; Chang and Liu, 2009; Chau and Ho, 2008; Hao *et al.*, 2007), and purchase intention is a behavioral measure. Chau and Ho (2008) argue that because the consumer evaluation of a brand is related to the attributes (e.g. m-commerce attributes) of the branded products/services, the development of consumer-based brand equity is

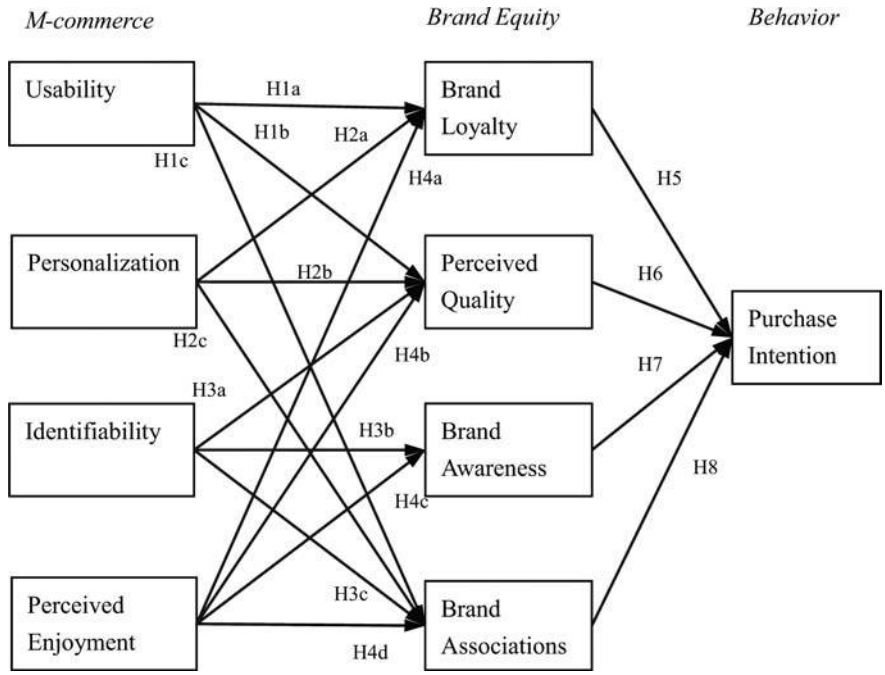

Figure 1.
The research model

dependent on these attributes. This supports for the need to specifically examine the relationships between the m-commerce attributes and the key factors of brand equity. Therefore, the verification of the significance of the hypothesized paths indicated in the proposed research model is expected to provide researchers and practitioners with insights into the adoption of the indicated paradigm, namely the beliefs-attitudes-behavior chain, in a variety of m-commerce contexts, as suggested in the existing literature (e.g. Lin and Wang, 2006; Wang *et al.*, 2004).

Additionally, while the formation and maintenance of brand equity is critical to make points of differentiation that lead to competitive advantages based on nonprice competition, as suggested in the literature (Aaker, 1991), mobile service providers need to understand their own individual strengths and weaknesses in order to improve their individual brand equities. Consequently, it is very important for the mobile service providers to understand how and why a specific component of brand equity is formed in order to use this knowledge to develop guidelines to plan for their future product/service development. Thus, the fundamental theoretical proposition of this study is that the achievement of different m-commerce attributes can have different impacts on the development of the brand equity of a mobile service provider.

There are differences in the conceptualization of both the key m-commerce attributes and the key brand equity factors among researchers, as already discussed in the previous sections. Thus, instead of adopting the concepts of one single group of researchers, this study summarizes and integrates the findings in the existing literature in order to identify the most important factors, namely the key m-commerce attributes and the key brand equity factors mentioned in the submitted manuscript,

and then uses these as reliable measures for evaluating the quality of mobile services and the brand equity of mobile service providers. It is believed that such efforts to integrate the concepts of m-commerce attributes and brand equity factors have strengthened the significance and usefulness of the proposed research model of this study in terms of understanding the behaviors of mobile service consumers.

3.2 M-commerce attributes and brand equity

The importance of achieving usability of e-commerce and m-commerce applications/systems in terms of enhancing the quality of user experience has been widely emphasized (e.g. Bolchini and Paolini, 2004; Choi, 2007; Tarasewich, 2003). Research has found usability to be the most significant source of frustration for mobile internet users, indicating the importance of usability in determining customers' perceived quality of an m-commerce web site (Venkatesh *et al.*, 2003). Rondeau (2005) argues that a positive experience using mobile applications, as a result of positive usability, can lead to positive consumer evaluation of the quality of the applications and can be translated by the consumer into a favorable associations towards the brand.

Tarafdar and Zhang (2007) empirically confirm that usability has a significant positive impact on loyalty to a web site. Scharl *et al.* (2005) argue that the ubiquitous and location-awareness features of mobile devices/technologies enable m-commerce vendors to provide consumers with time- and location-sensitive, personalized information that promote products, services, and ideas, thus benefiting all stakeholders. From a vendor viewpoint, such benefits include effective brand-building activities and the provision of high-quality products/services to consumers by means of mobile technologies. Prykop and Heitmann (2006) argue that ubiquitous and location-centric mobile technologies have the potential for substantial value creation, and offer companies the advantage of getting closer to customers' product usage and consumption activities, both of which tend to have positive effects on brand loyalty and the associations between the values, benefits, and attributes reflected by the brand. Kim *et al.* (2009a) find that ubiquitous computing can lead to improved customer relationship, such as customer loyalty, and stronger customer recall for certain attributes of a brand (brand associations). From the perspective of customer-perceived value of mobile-based services, Deng *et al.* (2010) argue that if customers can achieve their specific purposes by using these services anytime and anywhere (e.g. communicating with their stock brokers for an urgent stock exchange transaction), they will think highly of the functional value (perceived quality) of these services, and thus become more loyal to the service providers as a result of the increased switching costs. Wu *et al.* (2011) argue that the provision of ubiquitous healthcare to anyone at any time and any place has become imperative for improving healthcare quality. In summary, the following hypotheses are developed:

H1a. Usability positively influences consumers' brand loyalty toward mobile value-added service providers.

H1b. Usability positively influences consumers' perceived quality with regard to mobile value-added service providers.

H1c. Usability positively influences consumers' brand associations with regard to mobile value-added service providers.

Venkatesh *et al.* (2003) indicate that the key to success in the mobile/wireless context (more so than in the traditional Web context) is the ability to offer services desired by customers in a personalized manner (i.e. perceived quality). A number of e-commerce studies (e.g. Barkhi *et al.*, 2008; Srinivasan *et al.*, 2002; Tarafdar and Zhang, 2007) indicate that personalizing an e-tailer web site can generate various benefits for customers, such as effective web surfing and better matches between customers and products. These benefits will result in positive customer perceptions of the web site's quality, inspire customer associations that can lead to a positive customer attitude toward the web site, and attract repeat visits (i.e. increased customer loyalty). For example, Chau and Ho (2008) verify the positive effect of personalization on customer-perceived benefits associated with the use of the products/services of the brand. Additionally, personalization has been proposed as an important antecedent for evaluating m-commerce loyalty (Choi *et al.*, 2008). A number of e-commerce and m-commerce studies also suggest that personalization can help increase customer loyalty by building a meaningful one-to-one relationship, enhance customer-perceived product quality by better fulfilling customer needs, and build favorable brand associations by differentiating products from those of the competitors (e.g. Fan and Poole, 2006; Riecken, 2000). Therefore, the following hypotheses are presented:

H2a. Personalization positively influences consumers' brand loyalty toward mobile value-added service providers.

H2b. Personalization positively influences consumers' perceived quality with regard to mobile value-added service providers.

H2c. Personalization positively influences consumers' brand associations with regard to mobile value-added service providers.

Identifiability enables m-commerce vendors to provide consumers with personalized products/services and thus create unique value for individual consumers (Mahatanankoon *et al.*, 2005; Xu *et al.*, 2011). Whereas brand awareness reflects consumers' perceptions of the salience of a brand and brand associations involves the image of a brand (Aaker, 1996; Keller, 1993), the unique consumer value provided by m-commerce branded vendors can significantly impress consumers. This can result in the generation of a positive brand image constituted by the strong cognitive associations between the unique values reflected by the brand (Prykop and Heitmann, 2006). Choi (2007) illustrates the importance of the identifiability of mobile devices and networks on enhancing the quality of mobile web search. In summary, it can be inferred that identifiability enables consumers to more positively perceive the quality of the products/services received and to become more aware of the brands as a result of the impressions from the personalized products/services received (i.e. increased brand awareness), and positively impacts consumer perceptions and attitudes toward a brand (i.e. increased brand associations). Therefore, the following hypotheses are developed:

H3a. Identifiability positively influences consumers' perceived quality with regard to mobile value-added service providers.

H3b. Identifiability positively influences consumers' brand awareness of mobile value-added service providers.

H3c. Identifiability positively influences consumers' brand associations with regard to mobile value-added service providers

Cyr *et al.* (2006) find that an enjoyable user experience with mobile devices/applications has a significantly positive impact on customer loyalty in an m-commerce context. Van der Heijden (2003, 2004) empirically confirms the significant positive influence of perceived enjoyment on the attitude toward and intention to use the focal systems/web sites. In the context of mobile internet adoption, Hong *et al.* (2006) recognize the important role that perceived enjoyment plays in continued IT usage behavior (loyalty) and encourage future researchers to specifically investigate this issue. Additionally, brand awareness and brand associations usually reflect the images and salience that are unique to a brand in the customers mind, such as functional benefits and fun/enjoyment values (Aaker, 1996; Keller, 1993; Limon *et al.*, 2009). Ko *et al.* (2009) argue that perceived enjoyment can positively influence customers' evaluation of m-commerce products/services regarding both cognitive and affective elements (perceived quality). Correspondingly, perceived enjoyment has been considered an intrinsic motivation of system use behaviors (e.g. Hong and Tam, 2006; Kang *et al.*, 2009; Thong *et al.*, 2006). Consequently, it is reasonable to recognize perceived enjoyment as a unique feature differentiating the products/services of a particular brand from those of other brands. These findings suggest the following hypotheses:

H4a. Perceived enjoyment positively influences consumers' brand loyalty toward mobile value-added service providers.

H4b. Perceived enjoyment positively influences consumers' perceived quality with regard to mobile value-added service providers.

H4c. Perceived enjoyment positively influences consumers' brand awareness of mobile value-added service providers.

H4d. Perceived enjoyment positively influences consumers' brand associations with regard to mobile value-added service providers.

3.3 Brand equity and purchase intention

Brand loyalty can be defined as the behavioral response of a consumer to a product/service (Jacoby and Chestnut, 1978). Thus, brand loyalty has been considered key for the generation of repeat purchases (e.g. Koo, 2006; Zeithaml *et al.*, 1996; Fischer *et al.*, 2010). Aaker (1991, 1996) argues that a higher perceived quality associated with credible brands can increase consumer evaluations of these brands, and thus, it is a good predictor of purchase history. Additionally, many researchers have empirically confirmed the positive effect of perceived quality on the consumers' purchase intentions (e.g. Baek *et al.*, 2010; Hao *et al.*, 2007; Tsiotsou, 2006; Zeithaml *et al.*, 1996).

Brand awareness can affect the perceptions and attitudes of consumers, as it helps differentiate the brand from competitors, and thus can be a driver of brand choice (Aaker, 1996). Additionally, both Chu *et al.* (2005) and Tan and Piron (2002) argue that the building of brand awareness in consumers' minds can significantly influence the purchasing behaviors of consumers. Qi *et al.* (2009) argue that perceived quality (as a result of product experience), brand awareness (as a result of appearance experience), and brand associations (as a result of market communication experience) have a positive effect on consumer intention to use mobile data services. Petruzzellis (2010)

suggests that positive brand awareness and brand associations can form favorable consumer knowledge of the brand and thus have positive effects on consumer behaviors regarding the brand.

Keller (1993, 1998) argues that both product- and non-product-related attributes of a brand, which contribute greatly to the formation of brand associations, can directly affect the purchase or consumption process of consumers. O'Cass and Lim (2001) find that brands are indeed differentiated by consumers through the associations attached to them, and empirically verify that brand associations affect the purchase intentions. Jarvelainen (2007) also indicates that strong, positive brand associations can help customers trust the invisibility and intangibility of the e-commerce environments and enhance customer intention to purchase online. Furthermore, research suggests that consumers tend to support or buy a brand when they recognize that the brand has a desired attitude toward the issues they perceive as important (e.g. Delgado-Ballester and Hernandez-Espallardo, 2008; Jurisic and Azevedo, 2011; Kates, 2000; Veloutsou, 2007), which implies the positive link between brand associations and consumer purchase intention.

In summary, Baker *et al.* (2010) suggest that brand equity, which is composed of brand loyalty, perceived quality, and brand awareness/associations can generate greater consumer demand in the context of mobile communications industry. Therefore, the following hypotheses are proposed:

H5. Brand loyalty positively influences purchase intention toward mobile value-added services.

H6. Perceived quality positively influences purchase intention toward mobile value-added services.

H7. Brand awareness positively influences purchase intention toward mobile value-added services.

H8. Brand associations positively influence purchase intention toward mobile value-added services.

4. Research method

4.1 Development of instruments

Usability was measured using the items representing ubiquity, location-awareness, and convenience. The item of ubiquity was adopted from Ko *et al.* (2009). Measures of location-awareness and convenience were not found in the literature, the item for measuring location-awareness was thus developed with reference to the argument of Yuan and Zhang (2003), and the item for measuring convenience was developed with reference to those proposed by Ko *et al.* (2009) and Li and Yeh (2010) to measure the construct of usefulness. Personalization was measured using items adapted from Ribbink *et al.* (2004), Choi *et al.* (2008), and Li and Yeh (2010). Specific measures for the identifiability were not found in the literature. Consequently, the items for this construct were developed with reference to the arguments of Agarwal and Venkatesh (2002), Clarke (2001), and Mahatanankoon *et al.* (2005). The items for the perceived enjoyment construct were adopted from Kim *et al.* (2007) and Mahatanankoon (2007). Brand loyalty and brand associations were measured by items adapted from those in Aaker (1996). The constructs of perceived quality and brand awareness were measured

by items adapted from Aaker (1996) and Yoo *et al.* (2000). Measures for the construct of purchase intention were adopted from Liang and Lai (2002).

The survey items were pilot-tested with 38 experienced mobile valued-added service consumers to examine their internal consistency and reliability using Cronbach's alpha coefficient analysis and the item-to-total correlation coefficient analysis. The final questionnaire consisted of 34 items. These items were considered highly reliable and adequate measures for their respective constructs since the individual Cronbach's alpha coefficients of the constructs (ranging from 0.73 to 0.92) were all greater than 0.7 (Kannan and Tan, 2005). Additionally, all the individual item-to-total correlation coefficients were greater than 0.4 (ranging from 0.426 to 0.891), indicating that the item is at least moderately correlated with most of the other items for the same latent construct, and will make a good component of the summated rating scale (Chang and Wang, 2008; Churchill, 1979). Items in the survey (see the Appendix,Table AI) were measured using a seven-point Likert scale ranging from (1) strongly disagree to (7) strongly agree.

4.2 Data collection

This study was conducted in Taiwan because of the high penetration rate of mobile phone (120.2 per cent) technologies. The population of this study includes all individuals who are able to request for mobile value-added services via the mobile/wireless internet and have been purchasing these services in the past year. According to the results of a survey conducted by the Foreseeing Innovative New Digiservices in Taiwan (Foreseeing Innovative New Digiservices, 2011), the population of this study accounted for 59.2 per cent of mobile phone users in Taiwan by the end of 2010. Additionally, prior research indicates that most of the qualified participants (54.2 per cent) of this study are between 21 and 30 years old (Kuo *et al.*, 2009; Li and Yeh, 2010).

Data for this study were collected using an online questionnaire. The online questionnaire was hosted by the My3q system (www.my3q.com), a well-known web company that offered free online survey construction and hosting services. To solicit a pool of respondents who would be as close to the general public of the mobile value-added service consumers as possible, a number of web forums of mobile value-added services on the three most popular m-service forum hosting systems in Taiwan, which were PTT Bulletin Board System (www.ptt.cc), ePrice (www.eprice.com.tw), and My Mobile Life (www.mml.com.tw), were randomly selected as the survey distribution channels. Finally, the URL of the online questionnaire was posted on the discussion boards of 16 web forums for two months to invite mobile value-added service consumers to participate in the survey. To extract the questionnaires of qualified respondents, efforts were made to filter out respondents who had systematic answers to the survey items, who responded to the survey repeatedly (by checking their emails and IP addresses), or who had not been purchasing and using mobile value-added services within the previous year.

There are a number of benefits to using an online survey. First, the ability of an online survey to make respondents feel anonymous and to be free from the constraints of time and space can help researchers reach their respondents more easily and efficiently than using other collection methods (Bhattacherjee, 2002). Second, the survey can be implemented to ensure mandatory responses for every survey items, preventing incomplete answers from being submitted (Wang and Emurian, 2005). Third, because the validity of any research methodology relying on volunteers is

contingent on the ability and willingness of the volunteers to provide meaningful responses, participants from self-selected samples, such as those participating in an online survey, tend to provide clearer, more complete, and more meaningful responses than participants who are not self-selected volunteers (Hsu *et al.*, 2007). Finally, prior research indicates that findings generated from internet samples tend to be unaffected by presentation formats and are not adversely affected by non-serious or repeat responders (Gosling *et al.*, 2004). Additionally, most of the web forum participants in Taiwan who responded to online surveys were between 21 and 30 years old, as indicated in prior studies (e.g. Chang and Chen, 2008; Hsu *et al.*, 2007). Therefore, the sampling frame that was composed of the participants of these selected web forums was considered to be adequate, taking into consideration the representatives of the sample acquired. Finally, a total of 651 questionnaires were received, in which 497 valid questionnaires were identified by performing the screening steps indicated previously, giving a valid return rate of 76.34 per cent.

To ensure the quality of the data collected, three major sources of bias in online surveys associated with the representativeness of the sample collected identified in the existing literature (Best *et al.*, 2001; Couper, 2000), which are noncoverage bias, sampling bias, and nonresponse bias, were assessed. First of all, noncoverage bias is associated with the issue that not everyone in the target population is in the sample frame population. In terms of the online survey of this study, this issue is associated with the question of whether all the members of the target population have access to the internet and are visitors of the online forum selected for distributing the call for participation of this study. As a recent report indicates that more than 63 per cent of people in Taiwan have experience in purchasing products/service via the internet (*Global Views Monthly*, 2011), implying the high level of the popularity of the internet use, the issue of the potential respondents' having internet access is not a serious concern. Additionally, considering the characteristics of the target population indicated previously, we focused on a subset of the target population, which included potential respondents who had internet access and were visitors of m-service related online forums, and the online forums used in this study were randomly selected from the most popular online forum hosting systems as presented earlier. Therefore, the restricted population typically had no noncoverage bias or had very high rate of coverage (by definition), as illustrated by Couper (2000). Correspondingly, our data collection method did produce a sample with characteristics similar to the target population, which will be illustrated in the subsequent section regarding the sample profile. Overall, the noncoverage bias is not a serious issue. Nevertheless, given the previous discussion, it should be noted that the generalizability of the results of this study best applies to m-service consumers who exhibited the characteristics of the sample and to those who are disposed to respond to a circulated request to participate in a similar survey.

Second, because the responses of the online survey came from non-random sampling method, the potential impact of sampling bias (i.e. not all members of the sample frame are measured) was assessed by performing a test of homogeneity on the demographic variables. Thus, all constructs were tested against demographic controls, which include gender, age, level of education, and occupation, using the method of the analysis of variance. The results indicated that the mean scores of all the constructs were all indifferent ($p > 0.05$) among the demographic controls. Consequently, the survey responses could be combined as a single dataset for the subsequent analysis.

Finally, the potential non-response bias, which remains the most critical concern of web survey (Best *et al.*, 2001; Couper, 2000; Gosling *et al.*, 2004), was assessed by comparing the early versus late respondents. This method is developed based on the following two reasons (Armstrong and Overton, 1977). First, it is assumed that research participants who respond less readily (e.g. answering the survey later or requiring more prodding to answer) are more like nonrespondents. The second reason can be understood through the concept of successive waves of a questionnaire. The term "waves" refers to the response generated by a stimulus, such as a follow-up calls for participation. It is assumed that survey participants who respond in later waves are assumed to have responded because of the increased stimulus and are expected to be similar to nonrespondents. Consequently, the early and late respondents were compared on demographic variables, including gender, age, level of education, and occupation, using independent-samples *t*-test. The results indicated that there were no statistically significant differences in terms of gender ($p = 0.65$), age ($p = 0.47$), level of education ($p = 0.30$), and occupation ($p = 0.88$) between these two data sets. Therefore, it was determined that non-response bias was not a serious concern.

4.3 Data analysis method

SEM was used for data analysis, while maximum likelihood estimation was used to acquire estimates of the model parameters. A two-phase approach for SEM analysis (Anderson and Gerbing, 1988; Hair *et al.*, 2006) was adopted. First, the measurement model was estimated using confirmatory factor analysis (CFA) to examine the overall fit, validity, and reliability of the model. Second, the hypotheses between constructs were examined using the structural model.

5. Results and discussion

5.1 Profile of the sample

A total of 54.8 per cent of the survey respondents were female. Additionally, a majority of the respondents (85.5 per cent) were between 21 and 30 years old. As most of the individuals in the sampling population were in the age group of 21-30 as mentioned previously, the representativeness of this sample in terms of age would not be a serious concern. In terms of education level, more than 95% of the respondents received a college-level education or above, which indicated that most of them were capable of learning about and using mobile value-added services. The data also indicated that all of the respondents were frequent users of mobile value-added services, with the average amount each respondent spent on mobile value-added services being 3.5 US dollars per month, which was very close to the 3.9 US dollars per month indicated in a survey regarding the consumption of mobile internet users (Foreseeing Innovative New Digiservices, 2007). As a whole, the respondents were therefore considered adequate representatives of m-service consumers in Taiwan who purchase and use mobile value-added services on a regular basis.

5.2 Measurement model

The reliability of the measures for each of the nine constructs was first tested by examining individual Cronbach's alpha coefficients. Then, using the LISREL 8.7 software, CFA assessed the measurement model in terms of goodness-of-fit, convergent validity and discriminant validity.

Various indices have been used to evaluate the goodness-of-fit (GOF) of a measurement model. Here, we report seven fit indices indicating acceptable model fit (Hair *et al.*, 2006) as follows: the chi-square (χ^2) statistic; the ratio of χ^2 to the degrees of freedom (χ^2/d.f.); comparative fit index (CFI); normed fit index (NFI); standardized root mean residual (SRMR); goodness-of-fit (GFI); and adjusted goodness-of-fit (AGFI).

The initial test of the measurement model indicated that most of the model fit indices did not pass their individual recommended levels, and thus the measurement model was revised through item deletion. Three items which exhibited low factor loadings and squared multiple correlations were then removed, and data for the remaining 31 items were then used for subsequent analysis. As shown in Table III, after the item deletion process reported previously, all the individual Cronbach's alpha coefficients of the constructs investigated were greater than the recommended level of 0.7 or higher (Kannan and Tan, 2005). Additionally, by performing the principal component factor analysis, the Kaiser-Meyer-Olkin (KMO) measure, the result of the Bartlett sphericity test, and the eigenvalue of each of the construct were examined. The results of this analysis indicated that all the KMO measures (ranging from 0.69 to 0.87) were greater than 0.5, all the Bartlett sphericity tests had statistically insignificant results, and all the eigenvalues were greater than one (ranging from 2.05 to 3.90). This demonstrated that each variable (i.e. item) was significantly correlated to and well-predicted by the other variables, and all the factors (i.e. constructs) were useful (Hair *et al.*, 2006; Kaiser and Rice, 1974). Consequently, it was determined that the measurement model was appropriate for performing CFA.

The GOF indices for the measurement model were then checked. As shown in Table IV, all GOF indices for the hypothesized measurement model after item deletion indicated an adequate measurement model, except GFI and χ^2/d.f. statistic. Although the GFI of the structural model was slightly lower than the recommended level of greater than 0.9 in Hair *et al.* (2006), it was higher than the level of 0.8 required by Bagozzi and Yi (1988). Additionally, although the χ^2/d.f. statistic was slightly higher than the recommended level of less than 3 in Hair *et al.* (2006), it was below the cutoff value of 5 suggested by Wheaton *et al.* (1977). Since the model passed most of the goodness-of-fit indices in the three categories mentioned previously, it was concluded that the measurement model exhibited good fit (Hair *et al.*, 2006). As a result, no further changes were made.

Subsequently, the psychometric properties of the measurement model were assessed in terms of its convergent validity and discriminant validity (Bagozzi and Yi,

Table III.
Cronbach's alpha coefficient of the constructs investigated after item deletion

Construct	Cronbach's alpha	Item deleted	Number of item[a]
Usability (US)	0.92		3
Personalization (PER)	0.88		4
Identifiability (ID)	0.77	ID1	3
Perceived enjoyment (PE)	0.93		5
Brand loyalty (BL)	0.91		3
Perceived quality (PQ)	0.88		4
Brand awareness (BAW)	0.86		3
Brand associations (BAS)	0.88		3
Purchase intention (PI)	0.80	PI3, PI4	3

[a]Total 31 items

Fit Indices	Criteria[a]	Result/value
χ^2 statistic	Insignificant; however, significant p-value can be expected	1303.61 (Significant)
χ^2 /d.f.	<3	3.28 (d.f. = 398)
SRMR	<0.08 (with CFI >0.92)	0.05
GFI	≥ 0.9	0.86
AGFI	≥ 0.8	0.82
CFI	≥ 0.9	0.98
NFI	≥ 0.9	0.98

Notes: [a]The criteria are valid when the sample size is greater than 250 and the number of observed indicators for all the latent constructs is equal to 30 or higher
Sources: Bagozzi and Yi, 1988; Gefen *et al.*, 2000; Hair *et al.*, 2006; Hu and Bentler, 1999; Marsh *et al.*, 2004

Table IV.
GOF indices for the measurement model after item deletion

1988; Fornell and Larcker, 1981; Hair *et al.*, 2006). There are three primary measures for evaluating the convergent validity of a measurement model:

(1) The factor loadings of the indicators, which must be statistically significant and with values greater than 0.6.

(2) The composite reliability (CR), with values greater than 0.6.

(3) The average variance extracted (AVE) estimates, with values greater than 0.5.

As shown in Table V, all factor loadings (ranging from 0.67 to 0.95) were statistically significant, and a majority of them were larger than the more restrictive criterion of 0.7 put forth by Hair *et al.* (2006), except for that of the ID2. This indicated that each item in the measurement model was strongly related to its respective construct, since half or more of the variances in all the indicators were explained by their respective latent constructs. Additionally, all CR values (ranging from 0.80 to 0.94) were higher than 0.6, indicating a reliable measurement model. The AVE values ranged from 0.58 to 0.84, which indicated that each construct was strongly related to its respective indicators. Overall, the measurement model exhibited adequate convergent validity.

Finally, the discriminant validity of the measurement model was checked. As shown in Table VI, the AVE estimate of each construct is larger than the squared correlations of this construct to any other constructs. This indicated that the constructs were more strongly related to their respective indicators than to other constructs in the model (Fornell and Larcker, 1981). Table VII presents descriptive statistics for each of the constructs in the research model. Overall, the respondents had favorable perceptions of the indicated key attributes of mobile value-added services, and enjoyed using them. Additionally, the respondents exhibited high loyalty toward their respective mobile value-added service brands, and valued highly the quality of these services. The data also indicated that the respondents well understood what their respective mobile value-added service brands stood for, and tended to think of these brands when it came to issues related to mobile value-added services. Finally, the respondents exhibited a high intention to purchase mobile value-added services in the near future.

Construct	Indicator	Factor loading*	Composite reliability (CR)	Average variance extracted (AVE)
Usability	USE1	0.95	0.94	0.84
	USE2	0.89		
	USE3	0.91		
Personalization	PER1	0.79	0.90	0.69
	PER2	0.86		
	PER3	0.86		
	PER4	0.81		
Identifiability	ID2	0.67	0.81	0.58
	ID3	0.78		
	ID4	0.83		
Perceived enjoyment	PE1	0.82	0.94	0.77
	PE2	0.87		
	PE3	0.85		
	PE4	0.93		
	PE5	0.90		
Brand loyalty	BL1	0.88	0.93	0.81
	BL2	0.94		
	BL3	0.89		
Perceived quality	PQ1	0.85	0.90	0.69
	PQ2	0.87		
	PQ3	0.87		
	PQ4	0.72		
Brand awareness	BAW1	0.83	0.89	0.72
	BAW2	0.92		
	BAW3	0.80		
Brand associations	BAS1	0.81	0.91	0.76
	BAS2	0.94		
	BAS3	0.87		
Purchase intention	PI1	0.75	0.82	0.61
	PI2	0.75		
	PI5	0.82		

Table V.
Convergent validity for the measurement model

Notes: *All factor loadings of the individual items are statistically significant ($p < 0.01$)

5.3 Structural model

Table VIII summarizes the GOF indices for the structural model, showing that most of the fit indices indicated an adequate structural model, except the GFI and χ^2/d.f. statistic. Although the GFI of the structural model was slightly lower than the recommended level of greater than 0.9 in Hair *et al.* (2006), it was higher than the level of 0.8 required by Bagozzi and Yi (1988). Additionally, although the χ^2/d.f. statistic was higher than the recommended level of less than 3 in Hair *et al.* (2006), it was below the cutoff value of 5 suggested by Wheaton *et al.* (1977). Thus, it was concluded that the structural model in this study exhibited good fit.

Construct	1	2	3	4	5	6	7	8	9
Usability	*0.84*								
Personalization	0.32	*0.69*							
Identifiability	0.30	0.49	*0.58*						
Perceived enjoyment	0.10	0.30	0.36	*0.77*					
Brand loyalty	0.12	0.27	0.36	0.53	*0.81*				
Perceived quality	0.12	0.30	0.36	0.36	0.49	*0.69*			
Brand awareness	0.06	0.17	0.30	0.34	0.42	0.29	*0.72*		
Brand association	0.12	0.29	0.36	0.36	0.45	0.50	0.38	*0.76*	
Purchase intention	0.22	0.40	0.42	0.55	0.59	0.53	0.46	0.56	*0.61*

Note: Diagonals represent the average variance extracted, and the other matrix entries represent the squared factor correlations

Table VI.
Discriminant validity for the measurement model

Construct	Mean	SD
Usability	5.46	1.07
Personalization	5.15	0.99
Identifiability	5.05	0.93
Perceived enjoyment	4.81	1.01
Brand loyalty	4.53	1.02
Perceived quality	4.81	0.99
Brand awareness	4.57	0.99
Brand association	4.74	0.97
Purchase intention	4.75	0.94

Table VII.
Descriptive statistics of the investigated constructs

Fit Indices	Criteria[a]	Result/value
χ^2 statistic	Insignificant; however, a significant p-value can be expected	1612.00 (Significant)
χ^2 /d.f.	<3	3.92 (d.f. = 411)
SRMR	<0.08 (with CFI > 0.92)	0.07
GFI	>0.9	0.83
AGFI	≥ 0.8	0.80
CFI	≥ 0.9	0.98
NFI	≥ 0.9	0.97

Notes: [a]The criteria are valid when the sample size is greater than 250 and the number of observed indicators for all the latent constructs is equal to 30 or higher
Sources: Bagozzi and Yi, 1988; Gefen *et al.* 2000; Hair *et al.*, 2006; Hu and Bentler, 1999; Marsh *et al.*, 2004

Table VIII.
Goodness-of-fit indices for the structural model

Thus, the hypotheses were examined (Hair *et al.*, 2006). Figure 2 presents the standardized path coefficients, their significance for the structural model, and the coefficients of determinant (R^2) for each endogenous construct. The standardized path coefficient indicates the strength of the relationships between the independent and dependent variables. The R^2 value indicates the percentage of variance explained by the independent variables. Finally, the dotted lines with path coefficients presented in italic indicate rejected hypotheses.

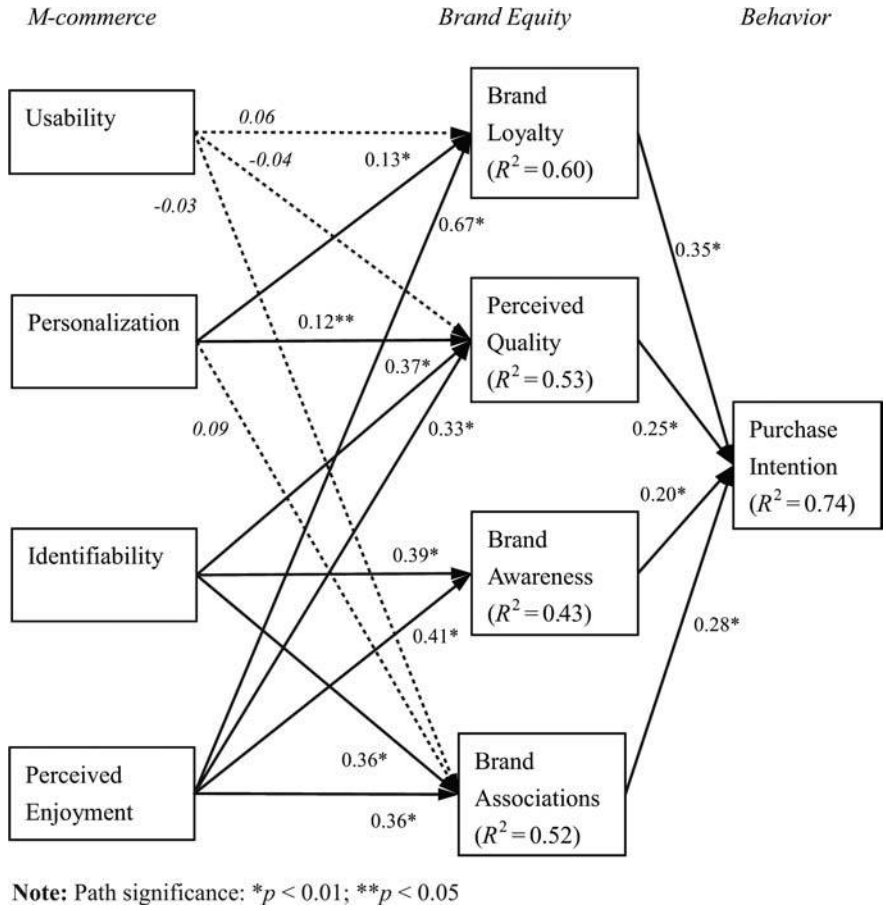

Figure 2.
Hypotheses testing results

As indicated in Figure 2, *H1* and *H2c* were rejected, while all the other hypotheses were supported. Usability of mobile value-added services had no significant effects on brand loyalty, perceived quality, and brand awareness (*H1a*, *H1b*, and *H1c*). It was also found that the more personalized the mobile value-added services were, the more likely that the consumers considered these services as of high quality and that they would become loyal to the brands of the service providers (*H2a* and *H2b*), whereas an increased degree of personalization of mobile value-added services did not exhibit significant effects on the brand associations (*H2c*). Identifiability of mobile value-added service providers had a significant positive effect on the perceived quality, brand awareness, and brand associations of consumers (*H3a*, *H3b*, and *H3c*). As expected, it was found that customers' perceived enjoyment of using mobile value-added services had a direct positive effect on brand loyalty, perceived quality, brand awareness, and brand associations (*H4a*, *H4b*, *H4c*, and *H4d*). Finally, *H5*, *H6*, *H7*, and *H8* were supported, indicating that brand loyalty, perceived quality, brand awareness, and brand

associations had a direct positive effect on the customers' intention to purchase mobile value-added services.

Using the standardized path coefficients between constructs in the research model, the significant direct, indirect, and total effects (direct effect plus indirect effect) between these constructs are summarized in Table IX. Analysis of the structural model indicated that the m-commerce attributes that influenced brand loyalty ($R^2 = 0.60$), perceived quality ($R^2 = 0.53$), brand awareness ($R^2 = 0.43$), and brand associations ($R^2 = 0.52$) accounted for a great deal of their respective variances. Additionally, the results also indicated that all the constructs in the research model had either a direct or indirect influence on the consumers' intention to purchase mobile value-added services, except for usability. Overall, these constructs accounted for 74 percent of the variance of purchase intention.

5.4 Discussion

According to the research results, it was found that all the four brand equity factors had a direct positive effect on purchase intention, as suggested in the previous studies (e.g. Baek *et al.*, 2010; Koo, 2006; O'Cass and Lim, 2001; Tsiotsou, 2006; Zeithaml *et al.*, 1996). These findings also further confirm the arguments of Aaker (1991, 1996) and Keller (1993, 1998), who stress the importance of successful brand building and management practices in terms of increasing the added value of the branded products/services and facilitating consumers' purchasing behaviors.

Additionally, with the exception of usability, all the m-commerce attributes were found to have direct positive influences on at least one of the four brand equity factors, and thus all had an indirect positive influence on purchase intention. Usability had no significant influence on brand loyalty, perceived quality, and brand associations, probably due to the characteristics of the research samples. Specifically, over 80 percent of the respondents of this study were between 21 to 30 years old and with college or graduate degrees, and such individuals frequently learn about and use new information technologies. Therefore, the features of the m-commerce usability would be essential instead of distinguishing ones for mobile value-added services in the eyes of the respondents (Kuo *et al.*, 2009). Consequently, usability cannot significantly influence the respondents' perceived quality or help them distinguish one mobile value-added service provider from the others (brand associations), and thus cannot significantly contribute to the variations of the respondents' brand loyalty to their respective mobile value-added service providers.

The research results also indicate that the more personalized the mobile value-added services are, the more likely that the consumers considered these services as of high quality and that they would become loyal to the brands of the service providers, as suggested in the existing literature (e.g. Choi *et al.*, 2008; Srinivasan *et al.*, 2002; Tarafdar and Zhang, 2007). However, it was found that personalization had no significant effect on the brand associations. This is probably because personalization has recently become an essential m-commerce characteristic, which is widely applied by m-commerce companies (Lee and Park, 2006), and thus was unable to help consumers distinguish one mobile value-added service brand from the others, and then develop specific memory links to a specific brand (Aaker, 1996).

Identifiability had a significant positive effect on the perceived quality, brand awareness, and brand associations. As suggested in previous studies, these results

Table IX.
Effects of variables on the purchase intention of mobile value-added services

	Brand loyalty		Perceived quality		Brand awareness		Brand associations		Purchase intention	
	Direct effect	Indirect effect	Direct effect	Indirect effect	Direct effect	Indirect effect	Direct effect	Indirect effect	Direct effect	Indirect effect
Usability	–	–	–	–	–	–	–	–	–	–
Total effect		–		–		–		–		–
Personalization	0.13	–	0.12	–	–	–	–	–	–	0.08
Total effect	*0.13*		*0.12*			–		–	*0.08*	
Identifiability	–	–	0.37	–	0.39	–	0.36	–	–	0.27
Total effect		–	*0.37*		*0.39*		*0.36*		*0.27*	
Perceived enjoyment	0.67	–	0.33	–	0.41	–	0.36	–	–	0.50
Total effect	*0.67*		*0.33*		*0.41*		*0.36*		*0.50*	
Brand loyalty	–	–	–	–	–	–	–	–	0.35	–
Total effect		–		–		–		–	*0.36*	
Perceived quality	–	–	–	–	–	–	–	–	0.25	–
Total effect		–		–		–		–	*0.25*	
Brand awareness	–	–	–	–	–	–	–	–	0.20	–
Total effect		–		–		–		–	*0.20*	
Brand associations	–	–	–	–	–	–	–	–	–	0.28
Total effect		–		–		–		–	*0.28*	
Coefficient of determinant (R^2):		0.60		0.53		0.43		0.52		0.74

indicate that by accurately recognizing the identities of individual consumers, mobile value-added service providers can provide these consumers with individual-based services and marketing information that enables personal touch and creates unique consumer value (Mahatanankoon *et al.*, 2005; Yuan and Zhang, 2003. This, in turn, can enhance consumers' perceived quality of the services received, and improve the consumers' knowledge (brand awareness) about and develop specific memory links to the brands of their respective service providers (Prykop and Heitmann, 2006).

As expected, it was found that customers' perceived enjoyment had a direct positive effect on all of the four brand equity factors. These results echo the findings of previous studies (e.g. Cyr *et al.*, 2006; Van der Heijden, 2003, 2004), indicating that when consumers' perceived enjoyment, as a proxy of the hedonic value of using mobile value-added services, increases, their perceived quality of these services and brand loyalty can be enhanced. Additionally, these results are consistent with those of previous studies in terms of reconfirming the positive relationships of brand awareness and brand associations with the enjoyment values perceived by the consumers via using the products/services of a particular brand (e.g. Aaker, 1996; Keller, 1993; Limon *et al.*, 2009).

Finally, the results also indicated that among the m-commerce attributes, perceived enjoyment had the highest total effect on purchase intention. Additionally, among the four brand equity factors, brand associations and brand loyalty had a greater higher total effect on purchase intention than perceived quality and brand awareness. This result is consistent with the argument of previous studies (e.g. Aaker, 1996; Oliver, 1999; Yoo *et al.*, 2000), which indicate that brand loyalty is the core dimension of brand equity that can reduce switching behaviors, while strong and positive brand associations can remarkably facilitate purchase intentions (e.g. Keller, 1993; Kim *et al.*, 2008a). The results also show that perceived enjoyment had the greatest total effect on each of the four brand equity factors compared to the other m-commerce attributes, and had the greatest total effect on the purchase intention compared to all the other constructs in the research model. It is thus concluded that ensuring an enjoyable user experience is therefore critical to developing brand equity, which, in turn, can enhance the profits of mobile value-added service providers.

6. Implications

6.1 Implications for theory

The key implications of this study are twofold. First, this study applied the concepts of brand equity to the investigation of the m-service adoption of consumers. Whereas brand equity has been considered one of the key drivers of corporate success because it enables differentiation which lead to competitive advantages based on nonprice competition (Aaker, 1991) in various business contexts (e.g. Chau and Ho, 2008; Delgado-Ballester and Hernandez-Espallardo, 2008; Song *et al.*, 2010), the issues of brand equity in an m-service context have drawn very limited attention, with a few exceptions (e.g. Baker *et al.*, 2010; Jurisic and Azevedo, 2011; Rondeau, 2005). By comparing existing marketing literature of brand management and brand equity, this study identified four key brand equity factors, including brand loyalty, perceived quality, brand awareness, and brand associations, and specifically investigated the effects of these four brand equity factors on the purchase intention of m-service consumers. The research results indicated the significant influence of these brand

equity factors on the purchase intention of m-service consumers, thus providing researchers with support for the application of brand equity/management perspective in this context.

Additionally, this study has contributed to m-service adoption research by specifically examining the effects of the key m-commerce attributes identified in the existing literature, including usability (composed of ubiquity, location-awareness, and convenience), personalization, identifiability, and perceived enjoyment, on the behaviors of m-service consumers from a brand equity perspective. The relationships among the indicated m-commerce attributes, key brand equity factors, and consumer purchase intention were validated using statistically rigorous methods. Because m-services are distinct from e-commerce services due to their unique attributes, it is important to examine the adoption of these m-services by explicitly considering the key m-commerce attributes indicated previously to provide m-service professionals with a comprehensive understanding of how m-service providers can design and deliver their services to achieve favorable consumer perceptions regarding their services.

Given the contributions of the existing m-service adoption studies indicated earlier, very few have specifically examined the effects of key m-commerce attributes on consumer behaviors, with a few exceptions (Ko *et al.*, 2009; Mahatanankoon *et al.*, 2005; Venkatesh *et al.*, 2003). However, these studies were not conducted from a brand equity perspective; therefore, their findings are insufficient in providing m-service professionals with insights into the development of sustainable competitive advantages (e.g. brand equity) beyond a specific m-service by means of the realization of the key m-commerce attributes when designing and delivering m-services. Consequently, the findings of this study have advanced our understanding of this under-addressed topic. To conclude, this study has extended the application of previous theoretical frameworks regarding m-commerce attributes and brand equity factors and has advanced the understanding of the key m-commerce attributes and brand equity factors in the context of mobile value-added service consumption.

6.2 Implications for practice

The results of this study highlight a number of direct and indirect relationships that determine consumers' intention to purchase mobile value-added services. First, all the four m-commerce attributes had direct effects on at least one of the brand equity factors, except for usability. This indicates that to develop brand equity for gaining competitive advantages, usability is both indispensable and also insufficient on its own. M-service providers should put considerable efforts into accurately recognizing the true identities of individual consumers, and then provide them with more personalized services and more enjoyable user experiences in order to generate and maintain a desirable level of brand equity.

Additionally, the research findings suggest that consumer purchase intention can be enhanced if the formation of brand loyalty, perceived quality, brand awareness, and brand associations of m-services are effectively managed. Consistent with the results of previous studies, it was also found that among the four brand equity factors which had a direct effect on purchase intention, brand associations and brand loyalty had relatively higher total effects than perceived quality and brand awareness. This echoed the perception of the dominant role of brand loyalty with regard to generating

corporate profits, and emphasized the importance of building favorable impressions which might lead to the generation of unique, positive memory links between consumers and the brand. Corresponding to the results of the path analysis, brand loyalty can be positively influenced by personalization and perceived enjoyment, as brand associations are by identifiability and perceived enjoyment. It is thus particularly critical for m-commerce managers to implement strategies which can facilitate the development and maintenance of the indicated psychological processes in order to enhance brand loyalty and generate positive brand associations, and, in turn, raise the consumers' purchase intention.

Finally, perceived enjoyment was found to be the most influential factor that positively affected consumers' intention to purchase mobile value-added services. Therefore, this factor should be prioritized by mobile value-added service providers when they intend to improve the quality of their services, make good impressions on consumers, develop positive memory links in consumer minds, and enhance consumer loyalty. The enhancement of perceived enjoyment may be done through various means including improving the design aesthetics of user interfaces, and providing more interesting and playful content.

7. Conclusion

Although issues related to both m-commerce and brand equity have drawn significant attention from both academics and practitioners, studies that specifically explore m-service consumer behaviors from the perspective of brand equity are rare. Among those limited studies, studies that adopt a communication/interaction perspective (e.g. mobile advertising and mobile social networking), although highlighting the importance of brand equity issues in the context of m-services, have put only marginal efforts into examining these issues by taking into consideration the unique features of such services (e.g. Jurisic and Azevedo, 2011; Kavassalis *et al.*, 2003; Perey, 2008; Prins and Verhoef, 2007; Riivari, 2005; Smutkupt *et al.*, 2011; Troshani and Hill, 2011).

Additionally, other studies that have taken one step further into the empirical investigation of the relationship between m-service adoption and brand equity either adopt an abstract and somewhat indeterminate conceptualization (e.g. Gill and Lei, 2009; Qi *et al.*, 2009), or only focus on one or two dimensions of brand equity (e.g. He and Li, 2011; Rondeau, 2005). Above all, none of these studies specifically considers the effects of unique m-commerce attributes, with the exception Rondeau (2005). Thus, their findings are insufficient in terms of offering comprehensive explanations of how and why consumer perceptions of a specific m-service brand are developed. Since the effectiveness of the development of brand equity, at least to a significant degree, is product-characteristic dependent (Chau and Ho, 2008; Park *et al.*, 1986), the findings of the studies indicated previously are insufficient in terms of providing m-commerce researchers and practitioners with insights into the relationship between the development of the brand equity of m-service providers and the unique m-commerce attributes (i.e. the product characteristics of m-commerce). Therefore, their contributions suffer from omission of important m-service-specific attributes.

Consequently, the primary objective of this study was to examine how the brand equity of the vendors of mobile value-added services could be developed by means of the key m-commerce attributes. This study empirically examined the relationships among four value proposition attributes of m-commerce (usability, personalization,

identifiability, and perceived enjoyment), four key factors of brand equity (brand loyalty, perceived quality, brand awareness, and brand associations), and the purchase intention of consumers. The findings of this study, in contrast to those of the relevant existing studies, can provide m-service professionals with insights into the development of the brand equity of m-service providers by concentrating their efforts on the key m-commerce attributes when designing and delivering m-services, as well as ultimately generating sustainable competitive advantages to support their long-term prosperity.

This study has two limitations. One is related to the surprising results of the insignificant relationship between usability and brand equity. To further investigate the influence of the features of usability on the core brand equity factors and thus on consumers' purchase intention, studies that examine this issue are encouraged. Additionally, whereas the variables in the research model were able to explain a significant amount of the variances of brand loyalty, perceived quality, brand awareness, brand associations, and purchase intention, there is still a need to find additional variables that can enhance the ability of the proposed model to explain and predict brand equity factors and the purchase intention of consumers, such as satisfaction, perceived value, aesthetics, and trust.

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Appendix

Table AI.
List of survey items by construct

Item	Question
Usability	
US1	The mobile value-added services are accessible at any time and place
US2	My mobile value-added service provider is capable of identifying my location and providing me with on-the-spot information I need
US3	The mobile value-added services can improve the quality of my life by enhancing my task effectiveness
Personalization	
PER1	I feel that my personal needs have been met when using the mobile value-added services
PER2	I feel that my mobile value-added service provider has the same norms and values as I have
PER3	My mobile value-added service provider provides me with information regarding its services according to my preferences
PER4	There are various ways to submit inquiries to my mobile value-added service provider
Identifiability	
ID1	My mobile value-added service provider can treat me as a unique person and respond to my specific needs.(discarded)
ID2	My mobile value-added service provider can accurately identify me using the information stored on my mobile device
ID3	I can receive personalized marketing information (e.g. shopping offers, advertisements, coupons) from my mobile value-added service providers through my mobile device
ID4	My mobile value-added service provider can learn about my personal preferences from my previous experience of using its mobile value-added services
Perceived enjoyment	
PE1	I have fun using mobile value-added services
PE2	Using mobile value-added services provides me with a lot of enjoyment
PE3	I enjoy using mobile value-added services.
PE4	When using mobile value-added services, I am spontaneous
PE5	When using mobile value-added services, I am playful
Brand loyalty	
BL1	I was satisfied with the product or service of X brand during my last use experience
BL2	I would buy X brand on the next opportunity.
BL3	I would recommend the product or service of X brand to others
Perceived quality	
PQ1	The mobile value-added services of X brand are of high quality
PQ2	In comparison to alternative brands, the likely quality of X brand is extremely high
PQ3	The mobile value-added services of X brand have consistent quality
PQ4	In comparison with alternative brands, X brand is the leading brand in the mobile value-added service market
Brand awareness	
BAW1	I have heard of the mobile value-added services of X brand
BAW2	I know what X brand stands for
BAW3	I can recognize X among other competing brands
Brand association	
BAS1	I have a clear image of the type of person who would use X brand
BAS2	This brand is made by an organization I would trust
BAS3	The organization associated with X brand has credibility

(*continued*)

Item	Question
Purchase intention	
PI1	I plan to buy the mobile value-added services of X brand right away
PI 2	I am willing to purchase the mobile value-added services of X brand again if I am satisfied with it
PI 3	I will recommend the mobile value-added services of X brand to someone who seeks my advice (discarded)
PI 4	I will say positive things about the mobile value-added services of X brand (discarded)
PI 5	I will do more business with the organization associated with X brand in the near future

Table AI.

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