

A Conceptual Framework and Propositions for the Acceptance of Mobile Services

Sally Rao¹ and Indrit Troshani²

¹ University of Adelaide, School of Commerce, sally.rao@adelaide.edu.au

² University of Adelaide, School of Commerce, indrit.troshani@adelaide.edu.au

Received 15 January 2007; received in revised form 14 May 2007; accepted 25 May 2007

Abstract

Mobile services are heralded to create a tremendous spectrum of business opportunities. User acceptance of these services is of paramount importance. Consequently, a deeper insight into theory-based research is required to better understand the underlying motivations that lead users to adopting mobile services. As mobile services bring additional functional dimensions, including hedonic and experiential aspects, using extant models for predicting mobile services acceptance by individuals may be inadequate. The aim of this paper is to explore, analyse and critically assess the use of existing acceptance theories in the light of the evolving and ubiquitous mobile services and their underlying technologies. Constructs affecting consumer adoption behaviour are discussed and relevant propositions are made. Managerial implications are explored and future research directions are also identified.

Key words: Mobile services, innovation adoption, mCommerce

1 Introduction

Mobile technologies and services are heralded to create a tremendous spectrum of business opportunities. Mobile technology is enabled by the collective use of various communication infrastructure technologies and portable battery-powered devices. Mobile devices are powered by applications which deliver various services, enhancing flexibility, mobility, and efficiency for users within business and life domains. A mobile service is an activity or series of intangible activities that occur when mobile consumers interact with systems or service provider employees with the support of a mobile telecommunications network [97]. There are various categories of mobile services. For example, mobile content and information services (e.g. map, and location-based services, news, personalisation and entertainment content downloads) make information available to mobile users in different modalities; messaging services such as Short Message Service (SMS), Multimedia Messaging Service (MMS) and email enable the exchange of text and multimedia messages; transaction-based services enable transactions such as mobile banking, airline reservations. In general, mobile services are ubiquitous and portable, and characterised by a personalised and context awareness nature. As a result, these services allow for single wireless devices, such as mobile phones, to be used seamlessly and pervasively across traditionally distinct spheres of life, such as work, home, or leisure [14]-[15], [59]. The mobile telecommunications industry predicts that mobile services constitute a massive source of potential revenue growth [6], [67]. Competition among operators is now largely based on value added content services and 3G rollouts which are expected to deliver multimedia-rich content to consumers. The two fastest growing categories are music and video/TV services, which are forecast to see a five-year compound annual growth rate of 190% and 112% respectively [49]-[51].

Despite the availability of technologically advanced mobile devices there is evidence that advanced mobile services which run on these have not been widely adopted [20], [56]. For example, the current penetration rate in many countries in Europe, North America, and Asia-Pacific, including Australia and New Zealand lags behind forerunners such as Japan and South Korea [41], [52], [67]. Given the difference between rapid growth rates in the adoption of mobile technologies and associated services in some countries and the relatively slow growth rates in others [13], [59] it is important to identify the factors that predict further adoption.

Personalisation, ubiquity and location specificity of mobile services make their adoption somewhat different from other Information and Communication Technology (ICT) services. High diffusion rates of mobile devices and services are evident in countries such as South Korea and Japan [20], [41]. Further, mobile technologies and the associated services integrate both the business and social domains of the user's life [36], [59]. This means that mobile services are used with various levels of time commitment (e.g. busyness) and self-ascribed roles (e.g. professional and on duty or private and off duty) [33]. The levels of complexity and diversity that may be encountered during the adoption of mobile services also call for further research. This complexity and diversity are attributed mainly to the strong relationship between the mobile devices and their users because the former always carries the identity of the latter [21]. As a result, spatial positioning and identification of users is easier in the mobile context than in the traditional innovation adoption contexts [39]. In addition, the lifecycle of mobile technologies is generally short. That is, new technologies become rapidly obsolete, and are likely to be replaced by newer ones. This short lifecycle not only creates higher levels of perceived adoption risks but also requires a certain amount of recurring learning before adopters can be confident and satisfied in using the mobile devices and services [86]. This means that applying extant innovation adoption theories outright to determine mobile services adoption may be inadequate. Further, mobile technologies and associated services are also used to meet hedonic and experiential needs, factors which have not been considered in these theories [58], [68].

Many studies have been conducted concerning users' intentions for adoption of mobile services, most of which have been based on Davis's (1989) technology acceptance model (TAM). However, parsimony has been one of TAM's strengths but also its major weakness as it has limited use in explaining users' behavioural intention to adopt complex mobile services [100]. Consequently, when studying their adoption, many authors have extended TAM with additional constructs, such as subjective norm [47], [92], perceived expressiveness, enjoyment, and behavioural control [73]-[74], facilitating conditions (e.g. low price offering and prepaid schemes) [78], perceived entertainment and perceived flexibility [14]-[15], [25]. Although existing models focus on several antecedents of mobile service adoption, there are many unexplored dimensions. For example, factors such as user's prior knowledge and its compatibility with new mobile services, personal innovativeness, security and privacy on the behavioural intention to adopt mobile services as well as the interplay amongst them still remain largely unexplored.

The aim of this paper is to extend the existing models and to propose an integrated and eclectic conceptual framework which attempts to explain adoption behaviour of users of mobile services. To accomplish this, we start with a critical assessment of existing acceptance models. Next, relevant constructs and their relevance to mobile services are discussed and theoretical propositions are derived. The constructs are then integrated into a new adoption framework suitable for mobile services. Finally, the implications of this framework are discussed and future research directions are provided.

2 A Review of Theoretical Models of Innovation Acceptance and Adoption

Many competing theoretical models co-exist in the innovation acceptance and adoption literature, each with different focus and tested in different contexts. However, most of these models attempt to build theories to explain how and why innovations or technologies are adopted and predict the level of acceptance and adoption. While one stream of research focuses on acceptance and adoption of innovation at an individual and societal level [26], [30], other streams focus on implementation success at an organizational level [62].

Many of the previously empirically researched models such as Theory of Reasoned Action (TRA), Motivational Model, Theory of Planned Behaviour (TPB), have been drawn from social psychology, others, such as Social Cognitive Theory (SCT) and Innovation Diffusion Theory (IDT) from sociology. Others specifically apply technology adoption theories, for example, Technology Acceptance Model (TAM). Several hundred of studies have been conducted using these models to explain end-users' innovation adoption behaviour. While each of these models made unique contributions to the literature on technology acceptance and adoption, most of them theorise behaviour intention and/or usage as the key dependent variable in explaining acceptance of information technology because behavioural intentions are motivational factors that capture how hard people are willing to try to perform a behaviour [4]. For example, TPB suggests that behavioural intention is the most influential predictor of behaviour; after all, a person does what s/he intends to do. In a meta-analysis of 87 studies, an average correlation of 0.53 was reported between intentions and behaviour [87]. The models that have been most frequently quoted in the technology acceptance and adoption literature are discussed next.

Theory of reasoned action (TRA). The Theory of Reasoned Action is considered to be a general theory and has been applied to explain behaviour beyond adoption of technology. It is the most systematic and extensively applied approach to attitude and behaviour research. This model proposes that an individual's actual behaviour is determined by the person's intention to perform the behaviour, and this intention is influenced jointly by the individual's attitude and subjective norms. Attitude is defined as "a learned predisposition to respond in a consistently favourable or unfavourable manner with respect to a given object" (p.6) [24]. A person's attitude towards a behaviour is largely determined by salient beliefs about the consequences of that behaviour and the evaluation of the desirability of the consequences [40]. Subjective norm is defined as the person's perception that most people who are important to them think that they should or should not perform the behaviour in question [35]. In brief, TRA asserts that attitude and subjective norm and their relative weights directly influence behavioural intention.

Theory of planned behaviour (TPB) and Decomposed theory of planned behaviour. TPB, which generalizes TRA by adding a third construct – perceived behavioural control [4] – has been one of the most influential theories in explaining and predicting behaviour, and it has been shown to predict a wide range of behaviours [87]. TPB asserts that the actual behaviour is determined directly both by behavioural intention and perceived behavioural control. Perceived behavioural control was included to account for the availability of both cognitive and situational resources required to carry out behaviour [5]. Behavioural intention is, therefore, formed by one's attitude, subjective norm and perceived behavioural control [4]. Further, a decomposed TPB includes constructs such as relative advantage, compatibility, influence of significant others, and risk, which are derived from the innovation diffusion literature, and decomposing the three perceptions in TPB into a variety of specific belief dimensions. This model offers several advantages over TPB and is considered more complete and management-relevant by focusing on specific factors that may influence adoption and usage [92].

Motivational theories. Motivation theories are rooted in psychological research to understand individuals' acceptance of information technology [31], [48]. These theories distinguish between extrinsic and intrinsic motivation. While extrinsic motivation refers to the performance of an activity in helping achieve valued outcomes, intrinsic motivation puts emphasis on the process of performing an activity [18], [32]. For example, perceived usefulness is an extrinsic source of motivation [31] while perceived enjoyment [31], perceived fun [48] and perceived playfulness [70] are intrinsic sources of motivation. Both sources of motivation affect usage intention and actual usage. Therefore, in addition to ease of use and usefulness, intrinsic motivators, such as enjoyment, which are affect-based, will also play a role in such a usage environment that information technology applications are both used for work and play [70].

Technology acceptance model (TAM). TAM can be seen as an adaptation of the theory of reasoned action (TRA) and was developed to explain individual system use in the workplace [29]. This model further suggests that two beliefs - perceived usefulness and perceived ease of use - are instrumental in explaining the user's intentions of using a system. Perceived usefulness refers to the degree to which "a person believes that use of the system will enhance his or her performance" whereas perceived ease of use is the degree to which "a person believes that using the system will be free of effort" [33]. Simply put, a technology that is easy to use and is useful will lead to a positive attitude and intention towards using it.

The main advantage of this model over others is that the two related beliefs can generalize across different settings. Thus, some argue that it is the most robust, parsimonious and influential model in explaining information technology adoption behaviour [37], [92], [102]. Indeed, since its development, it has received extensive empirical support

through validations, applications and replications for its prediction power [90]-[91], [101]. A number of modified TAM models were proposed to suit new technologies including Internet and intranet [3], [23]-[24], [46].

A major theoretical limitation of TAM is the "exclusion of the possibility of influence from institutional, social, and personal control factors" (p. 49) [35]. Thus the suitability of the model for predicting general individual acceptance needs to be re-assessed as the main TAM constructs do not fully reflect the specific influences of technological and usage-context factors that may alter user acceptance [57], [90]. In response to this, a number of modifications and changes to the original TAM models have been made. The most prominent of these is the Unified Theory of Acceptance and Use of Technology (UTAUT), a unified model that integrates constructs across eight models [33]. UTAUT provides a refined view of how the determinants of intention and behaviour evolve over time and assumes that there are three direct determinants of intention to use (performance expectancy, effort expectancy and social influence) and two direct determinants of usage behaviour (intention and facilitating conditions). However, both TAM and UTAUT have received criticisms with the fundamental one being about the problem in applying these models beyond the workplace and/or organisation for which they were originally created [20]. This criticism is applicable to mobile services as these are used across the spheres of work, home and leisure of an individual.

Innovation diffusion theory. The innovation diffusion theory is concerned with how innovations spread and consists of two closely related processes: the diffusion process and adoption process [85]. Diffusion is a macro process concerned with the spread of an innovation from its source to the public whereas the adoption process is a micro process that is focused on the stages individuals go through when deciding to accept or reject an innovation. The aggregate adoption process is subsequently an S-shaped function of time. Key elements in the entire process are the innovation's perceived characteristics, the individual's attitude and beliefs, and the communication received by individuals from their social environment. In relation to the factors pertaining the innovation, factors such as, relative advantage, complexity, trialability, observability and compatibility were considered important in influencing individual's acceptance of the innovation [85]. The innovation diffusion theory has been used, for example, to explain Internet-based service adoption.

Domestication approach. While diffusion theories focus on the macro process of adoption, domestication research typically studies how technologies are adopted in everyday life [89]. Sociologist researchers focused on the societal consequences of the process in which the use of technology becomes integrated into a person's everyday life [78]. It is appropriate to consider this approach in the adoption of mobile services because with mobile phones and related services the boundary between leisure and work is often blurred. That is, services that are adopted for personal use in leisure time are often also adopted for professional use in work contexts [76]. As a result, considering the domestication approach is relevant as it helps highlight the non-utilitarian character of mobile services adoption and use (e.g. enjoyment or expressiveness of personality, status, and image in a public context) [14], [73].

3 An Adoption Model for Mobile Services

Mobile services differ from traditional systems in that mobile services are ubiquitous, portable and can be used to receive and disseminate personalised and localised information [88], [92]. The theories and models examined in the previous section and the underlying constructs have been tested in organisational settings, where individuals use new technologies for work purposes. In general, users who adopt mobile services for personal non-work purposes incur both data transmission charges and charges for using the service, which may limit mobile services usage and affect motivation to use them. In addition, as suggested earlier, users may adopt mobile services to seamlessly and pervasively fulfill their everyday life needs across distinct aspects of their life including work, home, and leisure [33], [59], [73]-[74]. It follows that theories and models examined in the previous section and the underlying constructs may not be readily applicable to mobile services adoption. Drawing from domestication research, innovation diffusion and motivational studies, we identify constructs that predict the adoption of new mobile services that may be empirically tested. Using an eclectic approach can provide a deeper and richer understanding of the mobile services adoption phenomenon [54]. The constructs are discussed next before the model is depicted.

3.1 User Predisposition

User predisposition refers to the internal factors of an individual user of mobile services. Personal differences strongly influence adoption. There is evidence that successful acceptance of innovations depends as much on individual adopter differences as on the innovation itself. Recognising individual differences that impact technology adoption is important because it helps identify segments of adopters who are more likely to adopt technology innovations than others, which in turn, helps providers address adopter needs more closely [67]. Further, these individual adopters can then act as opinion leaders or change agents to facilitate the diffusion of the technology further [85]. Diffusion resources can also be used more effectively and efficiently [3]. In this paper, we define user predisposition as the collection of a number of factors including the individual's prior knowledge and experience of existing mobile services, compatibility, behavioural control, image, personal innovativeness, and perceived enjoyment which are examined below.

First, *prior knowledge* is essential for the comprehension of the technology and related services. Knowledge occurs when a potential adopter learns about the existence of an innovation and gains some understanding concerning its

functionality [44]. Knowledge consists of two components, namely, familiarity and expertise. For instance, the former constitutes the number of mobile services-related experiences accumulated by consumers over time, which include exposure to advertising, information search, and interaction with salespersons. The latter represents the ability to use mobile services, and it includes beliefs about service attributes (i.e. cognitive structures) as well as decision rules for acting on those beliefs (i.e. cognitive processes) [7]. However, "knowledge alone cannot determine the basis for adoption" (p.167) [44] of a technology or innovation. Adopters' previous positive or negative experiences with a technology or service can have a significant impact on their perceptions and attitudes towards that technology or service [61], [91]. Because of their greater clarity and certainty, direct prior experiences are likely to have a stronger impact on perceptions and attitudes towards usage than indirect or incomplete evidence (i.e. pre-trial) [59], [61].

The second variable within the user predisposition construct is *compatibility*. In [44], Rogers defines compatibility as the degree to which an innovation is perceived to be consistent with existing values of potential adopters. In general, high incompatibility will adversely affect potential adopters of an innovation, which decreases the likelihood of adoption [86]. In the context of wireless devices, lifestyle compatibility is the extent to which adopters believe mobile devices and services can be integrated into their daily lives. For example, adopters' lifestyle in terms of degree of mobility is likely to have a strong impact on their decision to adopt the technology [75], [92]. For example, a person who leads a busy lifestyle, and is employed in an information-intensive job, and is always on the move is more likely to adopt a wireless device and its associated services compared to a person who leads a sedentary lifestyle.

Third, *perceived behavioural control*, a dynamic and socio-cognitive concept, has attracted a lot attention in adoption literature. Perceived behavioural control is an individual's belief about the "presence or absence of requisite resources and opportunities" [5]. A more recent definition describes perceived behavioural control as a construct which reflects user perceptions of both internal and external constraints of adopting an innovation [109]. These perceived constraints have a direct relationship with the perception of ease of use [99]. Recent empirical findings suggest that perceived behavioural control is comprised of two distinct components, namely, self-efficacy which is an individual's judgment of their capability to perform a behaviour, and controllability which constitutes an individual's belief if they have the necessary resources and opportunities to adopt the innovation [47], [104]. In the original technology acceptance models, the cost of adopting an innovation was not considered to be a relevant construct because the actual users in an organisational setting did not have to pay for the technology. However, in the context of individual adoption, cost becomes a relevant factor [50]. The cost of accessing wireless services which includes the cost of the handset, subscription, services and communications fees is higher than that of accessing wired-based internet services [104]. Thus, as part of controllability, perceived financial resources or costs required to adopt mobile technologies and services affect behavioural intention [58], [63]. For example, perceived financial cost was found to adversely affect users' behavioural intention to use mobile banking [65]. This is particularly relevant in the adoption of mobile services, which may be 'nice-to-have', but not absolute necessities. Further, evidence also suggests that adopters of mobile services attempt to assess the value of adoption by comparing perceived costs against the benefits [28], [64], [75]. In brief, behaviour control denotes a subjective judgment of the degree of control over the performance of a behaviour, not the perceived likelihood that performing the behaviour will produce a given outcome [4]. In the context of mobile services adoption, perceived behavioural control refers to the individual perception of how easy or difficult it is to get mobile services which encompasses in individual's ability to afford the costs associated with mobile services.

Fourth, *image* refers to the degree to which the adoption and the use of an innovation is perceived by users to enhance their image or status in their social system [8], [71]. In the Innovation Diffusion Theory, image is included as an important aspect of relative advantage [84]. For some innovations, "the desire to gain social status" may be the one of the most important motivations (p. 215) [61]. Individual mobile phone users are likely to be cognizant of the image that they project in their social networks. Many adopt mobile services because they believe that these services may help them create, alter or preserve a positive image and social status for themselves within their social setting rather than for addressing a necessity [92], [109]. For example, early adopters of WAP services were either trendy or technology savvy and mobile phone users who wanted to be associated with these groups had the propensity to adopt WAP services [66].

Next, *personal innovativeness* is the innate willingness of an individual to try out and embrace new technologies and their related services for accomplishing specific goals. Based on the Innovation Diffusion Theory, personal innovativeness (also known as technology readiness) [67] embodies the risk-taking propensity which exists in certain individuals and not in others [3], [67], [77]. This definition helps segment potential adopters into what [44] characterises as innovators, early adopters, early and late majority adopters and laggards. Personal innovativeness represents a confluence of technology-related beliefs which jointly contribute to determining an individual's predisposition to adopt mobile devices and related services. Therefore, given the same level of beliefs and perceptions about an innovation, individuals with higher personal innovativeness are more likely to develop positive attitudes towards adopting it than less innovative individuals [3]. The recognition of personal innovativeness helps identify various categories of mobile service adopters and understanding how early adopters are likely to shape the opinions of later ones by becoming engaged in frequent advise-giving capacities [17], [109].

Finally, intrinsic motivators such as *perceived enjoyment* need to be added to the model to explain mobile service adoption behaviour. Perceived enjoyment refers to the degree to which using an innovation is perceived to be

enjoyable in its own right and is considered to be an intrinsic source of motivation [8]. Because the market for innovative mobile services is comprised of both corporate users and consumers, factors focusing on perceived enjoyment constitute an important consideration [20], [75]. That is, adopters use an innovation for the pleasure or enjoyment its adoption might bring and, therefore, serve as an end unto itself. Further, intrinsic enjoyment, derived by playing mobile games for example, satisfies pleasure-oriented or hedonic needs and operates outside valued outcomes or immediate material needs (i.e. extrinsic motivations), such as enhanced job performance and increased pay [68], [70]. Previous research suggests that perceived enjoyment is one of the most important types of user needs [9]. In fact, because mobile services can be accessed anywhere and anytime, many mobile users prefer to use them to "kill time" [79] or for fun and pleasure [108]. The enjoyment that is perceived to be derived by using mobile services is, therefore, expected to affect the attitude and the intention of users to adopt them. Upon adoption, individuals are more likely to use the mobile services that offer enjoyment more extensively than those which do not [38], [55], [72].

In the context of the above discussion concerning user predisposition, we have the following propositions:

- P1a: Prior knowledge and experience have a positive influence on the attitude of users towards adopting mobile services.
- P1b: Life-style compatibility has a positive influence on the attitude of users towards adopting mobile services.
- P1c: Perceived behavioural control has a positive influence on the attitude of users towards adopting mobile services.
- P1d: Image has a positive influence on the attitude of users towards adopting mobile services.
- P1e: Personal innovativeness has a positive influence on the attitude of users towards adopting mobile services.
- P1f: Perceived enjoyment has a positive influence on the attitude of users towards adopting mobile services.

3.2 Perceived Usefulness

Perceived usefulness is "the degree to which a person believes that using a particular system would enhance his or her job performance." (p. 320) [33]. That is, potential adopters assess the consequences of their adoption behaviour based on the ongoing desirability of usefulness derived from the innovation [23], [100]. In fact, information system adoption research suggests that "a system that does not help people perform their jobs is not likely to be received favourably" (p. 537) [74]. Perceived usefulness is also known as performance expectancy [102] which is based on the expectancy theory that models the roles of beliefs in decision making [81], [83], [103]. That is, an innovation is believed to be of high usefulness when a potential adopter believes that there is a direct relationship between use, on the one hand, and productivity, performance, effectiveness or satisfaction, on the other [64]. Usefulness recognition is important because it has been found to have a strong direct effect on the intention of adopters to use the innovation [1], [29].

Using the user acceptance theory developed by Triandis [77], [78] as a basis, Chau [41] argues that perceived usefulness can be split into two parts. Near-term usefulness is perceived to have an impact on the near-term job fit, such as job performance or satisfaction [94]-[96]. Long-term usefulness is perceived to enhance the future consequences of adoption including career prospects, opportunity for preferred job assignments or social status of adopters [23], [94]-[96]. Although perceived near-term usefulness has the most significant impact on the behavioural intention to adopt an innovation, perceived long term usefulness also exerts a positive, yet lesser impact [23], [53]. In the case of mobile services, perceived usefulness is defined as the degree to which the mobile services provide benefits to individuals in every day situations [59]. Although many mobile services are leisure related, services such as news, stock alters or banking may also influence how a user performs a task. Further, characteristics that are inherent to mobile services, such as their personalised and ubiquitous nature, their portability, and their context awareness potential are likely to contribute to perceived usefulness of mobile services in ways that have not seen before.

Considering the arguments above we define the following propositions:

- P2a: Perceived near-term usefulness has a positive influence on the attitude of users towards adopting mobile services.
- P2b: Perceived long-term usefulness has a positive influence on the attitude of users towards adopting mobile services.

- P2c: Perceived near-term usefulness has a more significant positive influence than Perceived long-term usefulness on the attitude of users towards adopting mobile services.

3.3 Perceived Ease of Use

Perceived ease of use is the “degree to which a person believes that using a particular system would be free of effort.” [33]. Other constructs that capture the notion of perceived ease of use, are complexity and effort expectancy [85], [102]. Perceived ease of use may contribute towards performance, and therefore, near-term perceived usefulness and the lack of it can cause frustration, and therefore, impair adoption of innovations [29], [90], [98], [100], [101]. The impact of perceived ease of use on a user’s intention to adopt an innovation either directly or indirectly through perceived usefulness has been documented well in the literature. However, its role in the Technology Acceptance Model remains controversial [38]. In [68], Fang et al. found that the nature of an innovation or a task or service related to it may influence its perceived ease of use [38]. For example, perceived ease of use affects the intended use of an innovation only when it provides intrinsic motivation but not when it provides extrinsic rewards to its users [43].

In the mobile setting, perceived ease of use represents the degree to which individuals associate freedom of difficulty with the use of mobile technology and services in everyday usage [59]. Mobile services in particular that are easy to use will be less threatening to individuals [70], in that, they might find them less complex or tedious to use. For example, there is evidence in the media that using certain services on a mobile device can be quite tedious, especially when browsing Internet-like interfaces on mobile devices [92]. Together with relatively small screen sizes and associated miniaturized keypads, the overall usage experience may be adversely affected. In addition, user-friendly and usable intuitive man-machine interfaces, including clear and visible steps, suitable content and graphical layouts, help functions, clear commands, symbols and meaningful error messages are likely to influence adoption as well [27]. In fact, perceived ease of use can be explained by usability characteristics and guidelines which have been empirically validated in [60]. Hence, mobile services which are perceived to be easier to use than others are more likely to be accepted by users [80].

As a consequence, we propose the following propositions:

- P3a: Perceived ease of use has a positive influence on the attitude of users towards adopting mobile services.
- P3b: Perceived ease of use has a positive influence on perceived usefulness.

3.4 Social Influence

Social influence constitutes the degree to which individuals perceive that important or significant others believe they should use an innovation [102]. This construct is included both in the theory of reasoned action and the theory of planned behaviour which both posit that social influence can be an important determinant in technology acceptance and usage. In [85], Triandis argues that individuals learn and use behaviours based upon which they see in their social groupings. That is, behaviours observed in others influence the observer to emulate them [11]. Therefore, social influence can play a significant role in affecting innovation adoption decisions. Social influence seems to be more significant in the earlier rather than later phases of adoption and its effect decreases with sustained usage [94], [100]. Social influence also appears to have an impact on perceptions about the innovation in voluntary settings [102].

Based on the Innovation Diffusion Theory, Bhattacharjee [89] distinguishes between two forms of social influence, namely, external and interpersonal, both of which are well documented in marketing [44]-[45] and information systems literatures [2], [17]. External influence includes the mass media reports, expert opinions, and other non-personal influences which adopters may take into account when making their acceptance decisions [12]. Interpersonal influence refers to word-of-mouth influence by referent groups [36]. These include peers, friends, superiors, computer and technology experts. The opinions of important referents could constitute the basis for a user’s feelings concerning the utility of an innovation. For example, if a superior or peer says that one particular innovation might be useful, such a suggestion could affect a prospective user’s perception on the usefulness of the innovation [109]. Research also shows that pressure from referent groups to adopt an innovation is effective because it contributes to reducing perceived risk associated with adoption [52], [64], [92]. For example, research on young consumers adoption of mobile services suggests that the use of mobile services is a “group marker or social identifier” [106]. That is, social networks and position of the adopter in them have a strong influence on adoption.

Given that strong theoretical and empirical support for social influence, we make the following propositions:

- P4a: Interpersonal influence has a positive influence on the attitudes of users towards adopting mobile services.
- P4b: External influence has a positive influence on the attitudes of users towards adopting mobile services.

3.5 Facilitating Conditions

Facilitating conditions refer to external controls and catalysts in the adoption environment which aim at facilitating adoption and diffusion of new technologies [93]. Facilitating conditions can make adoption behaviour less difficult by removing any obstacles to adoption and sustained usage [94], [102]. In the context of mobile services adoption, these conditions can be provided by mobile operators, mobile content providers, the government and other stakeholders [64]. For example, mobile operators can encourage adoption by providing handset subsidies, free content, mass advertising campaigns and active promotion aimed at increasing awareness about mobile services [92]. As a consequence, promotional measures are likely to positively affect the attitudes, and in turn, on users' behavioural intentions for adopting mobile services.

Facilitating conditions also capture the existence of a trusting environment. These conditions determine the user's expectations from the relationship with their service providers, and increase their perceived certainty concerning the provider's expected behaviour. Generally, trust is essential in all economic activities where undesirable opportunistic behaviour is likely to occur [42]. However, trust becomes vital in a mobile environment, where situational factors such as uncertainty or risk and information asymmetry are present [10]. On the one hand, adopters of mobile technology are unable to judge the trustworthiness of mobile operators and service providers, and on the other, the latter can also easily take advantage of the former by engaging in harmful opportunistic behaviours. For example, mobile operators and service providers can sell or share the transactional and behavioural information of their users or even their personal information. In mobile adoption research the trusting environment has often been encapsulated in a construct called perceived credibility [63], [105]. In order to create trust or credibility, we argue that both perceived security and privacy are required. Evidence shows that both security and privacy can become obstacles for the adoption of mobile services [38], [80]. Perceptions of a secure environment and that users' personal information is not abused are both likely to increase trust, and, consequently, positively affect users' attitude and behavioural intentions to adopt mobile services.

As a result, we propose the propositions that follow:

- P5a: Promotion of mobile services has a positive influence on the attitude of users towards adopting mobile services.
- P5b: Perceived security protection has a positive influence on the attitude of users towards the adoption of mobile services.
- P5c: Perceived privacy protection has a positive influence on the attitude of users towards the adoption of mobile services.

3.6 Moderating variables

Demographic variables have been used by domestication researchers to explain adoption behaviour patterns of mobile services. Evidence shows that gender and age might influence the adoption of technology and related services due to their moderating effects on other constructs [73], [102]. In general, men tend to exhibit task-oriented attitudes suggesting that usefulness expectations might be more accentuated in men than women [69]. This is particularly the case for younger men [101]. On the other hand, ease of use expectations are more salient for women and older adopters [16]. Further, women are predisposed to be more sensitive to the opinions of members of their social structure. As a result women are more likely to be affected by social influence factors when deciding to adopt new mobile technologies and services [101]. Similarly, because affiliation needs increase with age [82], older adopters are more likely to be affected by social influence. However age on its own may not be a reliable variable in explain adoption behaviour. Mobile service adoption and usage may vary significantly among young users, thus, treating them as a homogeneous group is not appropriate. Therefore, we argue that gender and age affect all of the constructions that were discussed in the previous sections as moderating variables.

In this context we define the following propositions:

- P6: Gender and age moderate user predisposition, perceived usefulness, perceived ease of use, social influence, and facilitating conditions towards adopting mobile services.

To summarise the constructs discussed in this section, Figure 1 portrays our proposed model of mobile service adoption. The managerial implications that the constructs of this model have are discussed next.

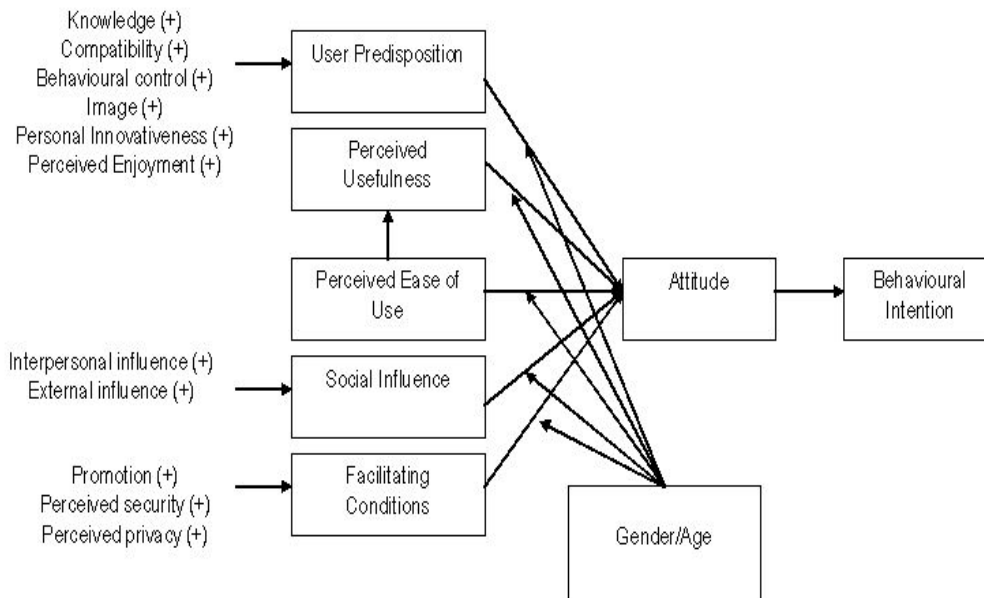


Figure 1: Proposed model of acceptance of mobile services

4 Managerial Implications and Conclusions

User acceptance of mobile technology and related services is of paramount importance for both researchers and industry practitioners. A deeper insight into theory-based research is required to better understand the underlying motivators and barriers that will lead users to or inhibit them from adopting these mobile services. In this paper we have explored and critically reviewed existing technology acceptance theories. Relevant constructs of extant models were discussed in the light of evolving mobile technologies and services and then incorporated into an extended acceptance model of mobile services, taking into account several perspectives including technology adoption models, motivation theory, innovation diffusion theory and domestication approach. The proposed model attempts to view acceptance of mobile services beyond traditional organisational borders and include life and leisure dimensions. Further the model can be tested empirically to provide the foundation to guide further research in the area of mobile services adoption.

There are several implications for content providers, developers, policymakers and academics who want to assess the likelihood of success of new mobile services. First, our model is meant to be a generic model for mobile services. We believe that our conceptual framework is a contribution to the existing knowledge because it adds many unexplored dimensions that influence the adoption of mobile services. These include the impact of factors such as existing user knowledge and its compatibility with new mobile services, personal innovativeness, security and privacy on the behavioural intention to adopt mobile services. As a result the proposed framework will help managers understand what drives the adoption and evolution of mobile services. In addition, the wide array of factors in our model suggests that the adoption and usage of new mobile services should be studied jointly from social, economic, and psychological perspectives and draw from marketing, consumer behaviour and psychology theories [34]. Our model also constitutes a basis for developers and marketers to establish an assessment framework for new services. As Pedersen (2005) argues, such a framework can be useful for determining the adoption potential of new services.

Second, we stress that the importance of the factors proposed in the framework may vary across mobile service types which have different objectives. For example, text messaging (SMS) and payment systems are goal-oriented services, whereas mobile games are experiential [74]. As a result, there are differences in the characteristics of mobile services which cannot be treated as neutral and which ought to be considered in the context of different market niches. Taken together, the combination of service and market characteristics are likely to affect adoption patterns across markets [14]-[15]. Further, consideration of mobile service characteristics and goals is also likely to affect their adoption patterns when bundled with other services [14]-[15].

Third, designing content and services suitable for mobile phones constitutes an important issue that affects their adoption and diffusion. Developers need to recognise that mobile applications are quite different from their PC counterparts [41]. Design of mobile services should focus on the unique advantages that mobile technology can provide such as personalization and context-specificity which we argued affect the perceived usefulness construct. Content providers must design content "for value-contexts specific for mobile use which provide users freedom from complicated configuration procedures, and ubiquitously serve and support current day-to-day individual social practices" (p. 7) [7]. Further, the design of content and of mobile services should encompass both intrinsic and extrinsic motivation dimensions [70] and improve user-friendliness and usability for user acceptance to be enhanced.

For example, content developers should take into account the limited attention span constraint when designing mobile applications. This includes abbreviating content (e.g. movie clips) into short clips and providing more control for users during content delivery such as postponing, interrupting, and restarting. In any case content variation should focus on user-centered goals (e.g. enjoyment) [107]. More importantly than many managers thought, any benefits associated with mobile content and services need to be communicated via appropriate marketing efforts and channels. That is, consumers need to be educated about the possibilities of mobile services and the convenience that these services can bring to them when adopted into their daily routines.

Fourth, most mobile devices have limited available resources including memory, processing power, and user interface, which have the potential to offset ubiquity benefits [21], [39]. Because 'made-for-the-medium' content type and design may be required [67], the available technologies which determine screen size, display quality and processing speeds should be taken into consideration [41]. It is, therefore, important for mobile services to be categorised (e.g. transactional services, entertainment services, personalisation services, etc.) in a parsimonious and meaningful taxonomy [38]. We believe that this is an important implication for future research for both academics and practitioners on the one hand and mobile service developers and designers on the other: it allows them to assess if there is a fit between a technology and a service, also known as service-technology fit. Fang et al. [68] argue that this is the first step into addressing the lack of service type focus in existing adoption models in the mobile space. The combined effect of these factors on navigation patterns, adopters' cognitive overload and subjective perceptions about the usability and ease of use of mobile applications can have a critical impact on uptake [22].

Fifthly, the factors in the proposed framework can be used not only to identify the features of a mobile service desired by the users but also by the marketers to segment the users and design mobile services that will meet the users' needs. We identify user predisposition, perceived usefulness, perceived ease of use, social influence, and facilitating conditions as strong predictors of mobile services adoption. The importance of these factors is expected to differ for individual factors such as age and gender which we argue are moderating variables. These are important as they provide guidelines to mobile service developers and marketers in accommodating different demographics, therefore, providing insights affecting segmentation strategies [73]. In addition, given the personalised character of mobile services, marketers need to be aware that these services may be intensely dependent and sensitive to new trends in style and fashion. It follows that mobile devices and their services are accessories which individuals use to make fashion statements concerning individual style and social identity. This means mobile devices and services may become quickly obsolete unless timely and up-to-date services are continuously provided to subscribers.

It is vital that the nature of these services should also feature strongly in marketing communication campaigns. These factors should be seriously considered and form the basis of segmentation when developing marketing and diffusion strategies. Mobile services users including innovators and early adopters typically have a high propensity to experiment with new mobile services. They can be more innovative, and more likely to consider a technology as more favourably, and be less likely to be constrained by situational and cognitive resources [51] than users in other categories. It is, therefore, extremely important that these individuals should be approached first and served with the new mobile services as they can act as both opinion leaders and changes agents for the widespread diffusion of these services. However, caution should also be taken when tailoring market strategies as, due to lack of relevance, marketing mobile services for adopters in one category is likely to frustrate adopters in the other. Therefore, both developers and marketers should be prudent in recognising that the confluence of various individual characteristics with varying levels of prior experience, perceptions and learning predispositions are all likely to influence adoption and retention patterns [19], [47], [67]. Further research needs to investigate the dynamic influencing factors proposed in our framework, test the model amongst different types of adopters and refine measurements of the core constructs, and thus, deepen the understanding of mobile service adoption.

References

- [1] D. A. Adams, R. R. Nelson, and P. A. Todd, Perceived usefulness, ease of use, and usage of information technology: a replication, *MIS Quarterly*, vol. 16, no. 2, pp. 227-247, 1992.
- [2] R. Agarwal and J. Prasad, The role of innovation characteristics and perceived voluntariness in the acceptance of information technologies, *Decision Science*, vol. 28, no. 3, pp. 557-582, 1997.
- [3] R. Agarwal and J. Prasad, A conceptual and operational definition of personal innovativeness in the domain of information technology, *Information Systems Research*, vol. 9, no. 2, pp. 204-215, 1998.
- [4] I. Ajzen, The theory of planned behavior, *Organisational Behavior and Human Decision Process*, vol. 52, no. 2, pp. 179-211, 1991.
- [5] I. Ajzen and T. J. Madden, Prediction of goal-directed behavior: attitudes, intentions, and perceived behavioral control, *Journal of Experimental Social Psychology*, vol. 22, no. 5, pp. 453-474, 1986.
- [6] P. Alahuhta, J. Ahola, and H. Hakala, Mobilising business applications: a survey about the opportunities and challenges of mobile business applications and services in Finland. Helsinki: Tekes, 2005.
- [7] J. W. Alba and J. W. Hutchinson, Dimensions of consumer expertise, *Journal of Consumer Research*, vol. 13, no. 3, pp. 411-454, 1987.
- [8] S. S. Al-Gahtani and M. King, Attitudes, satisfaction and usage: factors contributing to each in the acceptance of information technology, *Behaviour & Information Technology*, vol. 18, no. 4, pp. 277-297, 1999.

- [9] B. Anckar and D. D'Incau, Value creation in mobile commerce: findings from a consumer survey, *Journal of Information Technology Theory and Application*, vol. 4, no. 1, pp. 43-64, 2002.
- [10] S. Ba and P. A. Pavlou, Evidence of the effect of trust building technology in electronic markets: price premiums and buyer behavior, *MIS Quarterly*, vol. 26, no. 3, pp. 243-268, 2002.
- [11] A. Bandura, *Social Learning Theory*. Englewood Cliffs, NJ: Prentice-Hall, 1977.
- [12] I. Bhattacharjee, Acceptance of e-commerce services: the case of electronic brokerages, *IEEE Transactions on Systems, Man, and Cybernetics - Part A: Systems and Humans*, vol. 30, no. 4, pp. 411-420, 2000.
- [13] M. Bina and G. M. Giaglis, Exploring early usage patterns of mobile data services, in *Proceedings. International Conference on Mobile Business*, Sydney, Australia, 2005.
- [14] H. Bouwman, C. Carlsson, F. J. Molina-Castillo, and P. Walden, Barriers and drivers in the adoption of current and future mobile services in Finland, *Telematics and Informatics*, vol. 24, no. 2, pp. 145-160, 2007a.
- [15] H. Bouwman, T. Haaker, and H. De Vos, Mobile service bundles: the example of navigation services, *Electronic Markets*, vol. 17, no. 1, pp. 20-28, 2007.
- [16] N. Bozionelos, Psychology of computer use: prevalence of computer anxiety in British managers and professionals, *Psychological Reports*, vol. 78, no. 3, pp. 995-1002, 1996.
- [17] J. C. Brancheau and J. C. Wetherbe, The adoption of spreadsheet software: testing innovation diffusion theory in the context of end-user computing, *Information Systems Research*, vol. 1, no. 2, pp. 699-719, 1990.
- [18] B. J. Calder and B. M. Staw, Self-perception of intrinsic and extrinsic motivation, *Journal of Personality and Social Psychology*, vol. 31, no. 4, pp. 599-605, 1975.
- [19] S. K. Card, T. P. Moran, and A. Newell, *The Psychology of Human-Computer Interaction*. Hillsdale, NJ: Lawrence Earlbaum Associates, 1983.
- [20] C. Carlsson, K. Hyvonen, P. Repo, and P. Walden, Adoption of mobile services across different platforms, in *Proceedings. 18th Bled eCommerce Conference*, Bled, Slovenia, 2005.
- [21] M. Chae and J. Kim, What's so different about the mobile Internet?, *Communications of the ACM*, vol. 46, no. 12, pp. 240-247, 2003.
- [22] M. Chae and J. Kim, Do size and structure matter to mobile users? an empirical study of the effects of screen size, information structure, and task complexity on user activities with standard web phones, *Behaviour & Information Technology*, vol. 23, no. 3, pp. 165-181, 2004.
- [23] P. Y. K. Chau, An empirical assessment of a modified technology acceptance model, *Journal of Management Information Systems*, vol. 13, no. 2, pp. 185-204, 1996.
- [24] P. Y. K. Chau and P. J.-H. Hu, Information technology acceptance by individual professionals: a model comparison approach, *Decision Science*, vol. 32, no. 4, pp. 699-719, 2001.
- [25] J. H. Cheong and M.-C. Park, Mobile internet acceptance in Korea, *Internet Research*, vol. 15, no. 2, pp. 125-140, 2005.
- [26] D. R. Compeau and C. A. Higgins, Computer self-efficacy: development of a measure and initial test, *MIS Quarterly*, vol. 23, no. 2, pp. 189-211, 1995.
- [27] C. Condos, A. James, P. Every, and T. Simpson, Ten usability principles for the development of effective WAP and m-commerce services, *Aslib Proceedings*, vol. 54, no. 6, pp. 345-355, 2002.
- [28] A. M. Crawford, International media habits on the rise, *Ad Age Global*, vol. 2, no. 11, 2002.
- [29] F. D. Davis, Perceived usefulness, perceived ease of use, and user acceptance in information technology, *MIS Quarterly*, vol. 13, no. 3, pp. 319-340, 1989.
- [30] F. D. Davis, R. P. Bagozzi, and P. R. Warshaw, User acceptance of computer technology: a comparison of two theoretical models, *Management Science*, vol. 35, no. 8, pp. 982-1002, 1989a.
- [31] F. D. Davis, R. P. Bagozzi, and P. R. Warshaw, Extrinsic and intrinsic motivation to use computers in the workplace, *Journal of Applied Social Psychology*, vol. 22, no., pp. 1111-1132, 1992.
- [32] E. L. Deci and R. M. Ryan, *Intrinsic motivation and self-determination in human behavior*. New York: Plenum Press, 1985.
- [33] R. R. Dholakia and N. Dholakia, Mobility and markets: emerging outlines for m-commerce, *Journal of Business Research*, vol. 57, no. 12, pp. 1391-1396, 2004.
- [34] A. Dickinger, M. Arami, and D. Meyer, Reconsidering the adoption process: enjoyment and social norms - antecedents of hedonic mobile technology use, in *Proceedings. 39th Hawaii International Conference on System Sciences*, Kauai, Hawaii, 2006.
- [35] A. Dillon and M. Morris, User acceptance of information technology: theories and models, *Journal of American Society for Information Science*, vol. 31, no., pp. 3-32, 1996.
- [36] G. Elliot and N. Phillips, *Mobile Commerce and Wireless Computing Systems*. Harlow: Pearson Education Limited, 2004.
- [37] S. Elliot and C. Loebbecke, Interactive, inter-organizational innovations in electronic commerce, *Information Technology & People*, vol. 13, no. 1, pp. 46-66, 2000.
- [38] X. Fang, S. Chan, J. Brzezinski, and S. Xu, Moderating effects of task type on wireless technology acceptance, *Journal of Management Information Systems*, vol. 22, no. 3, pp. 123-157, 2005.
- [39] S. Figge, Situation-dependent services - a challenge for mobile operators, *Journal of Business Research*, vol. 57, no. 12, pp. 1416-1422, 2004.
- [40] M. Fishbein and I. Ajzen, *Belief, attitude, intention and behaviour: an introduction to theory and research*. Reading, MA: Addison-Wesley, 1975.
- [41] J. L. Funk, The future of the mobile phone Internet: an analysis of technological trajectories and lead users in the Japanese market, *Technology in Society*, vol. 27, no. 1, pp. 69-83, 2005.

- [42] D. Gefen, E. Karahanna, and D. W. Straub, Trust and TAM in online shopping: an integrated model, *MIS Quarterly*, vol. 27, no. 1, pp. 51-90, 2003.
- [43] D. Gefen and D. W. Straub, The relative importance of perceived ease of use in IS adoption: a study of e-commerce adoption, *Journal of the Association for Information Systems*, vol. 1, no. 8, pp. 1-28, 2000.
- [44] P. M. Herr, F. R. Kardes, and J. Kim, Effects of word-of-mouth and product-attribute information on persuasion: an accessibility-diagnostics perspective, *Journal of Consumer Research*, vol. 17, no. 4, pp. 454-462, 1991.
- [45] S. L. Holak, Determinants of innovative durables adoption: an empirical study with implications for early product screening, *Journal of Product Innovation Management*, March, pp. 50-69, 1988.
- [46] R. P. Horton, T. Buck, P. E. Waterson, and C. W. Clegg, Explaining intranet use with the technology acceptance model, *Journal of Information Technology*, vol. 16, no., pp. 237-249, 2001.
- [47] S.-Y. Hung, C.-Y. Ku, and C.-M. Chang, Critical factors of WAP services adoption: an empirical study, *Electronic Commerce Research and Applications*, vol. 2, no. 1, pp. 42-60, 2003.
- [48] M. Igbaria, S. Parasuraman, and J. J. Baroudi, A motivational model of microcomputer usage, *Journal of Management Information Systems*, vol. 13, no. 1, pp. 127-143, 1996.
- [49] Informa, *Mobile Content and Services: Worldwide Market Analysis & Strategic Outlook*. London: Informa Telecoms & Media, 2005a.
- [50] Informa, *Global Mobile Forecasts to 2010: Worldwide Market Analysis & Strategic Outlook 2005-2010*. London: Informa Telecoms & Media, 2005b.
- [51] Informa, *Global Mobile: The International Business Newsletter of Mobile Communications Markets*, vol. 13, no. 6, 2006a.
- [52] K. Ishii, Internet use via mobile phone in Japan, *Telecommunications Policy*, vol. 28, no. 1, pp. 43-58, 2004.
- [53] J. J. Jiang, M. K. Hsu, G. Klein, and B. Lin, E-commerce user behaviour model: an empirical study, *Human Systems Management*, vol. 19, no. 4, pp. 265-276, 2000.
- [54] P. Kanana and S. Balasubramanian, A social-economic-psychological model of technology adoption and usage: an application to online investing, *Decision Support Systems*, vol. 39, no. 3, pp. 505-524, 2005.
- [55] M. Kaufaris, Applying the technology acceptance model and flow theory to online consumer behaviour, *Information Systems Research*, vol. 13, no. 2, pp. 205-223, 2002.
- [56] M. Khalifa and S. K. N. Cheng, Adoption of mobile commerce: role of exposure, in *Proceedings. 35th Hawaii International Conference on System Sciences*, Hawaii, 2002.
- [57] J. L. King, V. Gurbaxani, K. L. Kraemer, F. W. McFarlan, K. S. Raman, and C. S. Yap, Institutional factors in information technology innovation, *Information Systems Research*, vol. 5, no. 2, pp. 139-169, 1994.
- [58] M. Kleijnen, M. Wetzels, and K. de Ruyter, Consumer acceptance of wireless finance, *Journal of Financial Services Marketing*, vol. 8, no. 3, pp. 206-217, 2004.
- [59] L. Knutsen, I. D. Constantiou, and J. Damsgaard, Acceptance and perceptions of advanced mobile services: alterations during a field study, in *Proceedings. International Conference on Mobile Business*, Sydney, Australia, 2005, pp. 326-331.
- [60] A. L. Lederer, D. J. Maupin, M. P. Sena, and Y. Zhuang, The technology acceptance model and the World Wide Web, *Decision Support Systems*, vol. 29, no. 3, pp. 269-282, 2000.
- [61] M. S. Y. Lee, P. J. McGoldrick, K. A. Keeling, and J. Doherty, Using ZMET to explore barriers to the adoption of 3G mobile banking services, *International Journal of Retail & Distribution Management*, vol. 31, no. 6, pp. 340-348, 2003.
- [62] D. Leonard-Barton and I. Deschamps, Managerial influence in the implementation of new technology, *Management Science*, vol. 34, no. 10, pp. 1252-1265, 1988.
- [63] H. Lin and Y. Wang, Predicting consumer intention to use mobile commerce in Taiwan, in *Proceedings, International Conference on Mobile Business*, Sydney, Australia, 2005.
- [64] J. Lu, C. Yu, C. Liu, and J. E. Yao, Technology acceptance model for wireless internet, *Internet Research: Electronic Networking Applications and Policy*, vol. 13, no. 3, pp. 206-222, 2003.
- [65] P. Luarn and H. H. Lin, Toward an understanding of the behavioral intention to use mobile banking, *Computers in Human Behavior*, vol. 21, no. 6, pp. 873-891, 2005.
- [66] M. Mackenzie and M. A. O'Loughlin, *WAP Market Strategies*. London: Ovum Ltd., 2000.
- [67] A. P. Massey, V. Khatri, and V. Ramesh, From the web to the wireless web: technology readiness and usability, in *Proceedings. 38th Hawaii International Conference on System Sciences*, Hawaii, 2005.
- [68] C. Mathwick, N. Malhotra, and E. Rigdon, Experiential value: conceptualization, measurement and application in the catalog and Internet shopping environment, *Journal of Retailing*, vol. 77, no. 1, pp. 39-56, 2001.
- [69] G. C. Minton and F. W. Schneider, *Differential Psychology*. Prospect Heights, IL: Waveland Press, 1980.
- [70] J.-W. Moon and Y.-G. Kim, Extending the TAM for a World-Wide-Web context, *Information & Management*, vol. 38, no. 4, pp. 217-230, 2001.
- [71] G. C. Moore and I. Benbasat, Development of an instrument to measure the perceptions of adopting an information technology innovation, *Information Systems Research*, vol. 2, no. 3, pp. 192-222, 1991.
- [72] T. P. Novak, D. L. Hoffman, and Y. Yung, Measuring the customer experience in online environments: a structural modeling approach, *Marketing Science*, vol. 19, no. 1, pp. 22-42, 2000.
- [73] H. Nysveen, P. E. Pedersen, and H. Thornbjørnsen, Explaining intention to use mobile chat services: moderating effects of gender, *Journal of Consumer Marketing*, vol. 22, no. 5, pp. 247-256, 2005a.
- [74] H. Nysveen, P. E. Pedersen, and H. Thornbjørnsen, Intentions to use mobile services: antecedents and cross-service comparisons, *Journal of Academy of Marketing Science*, vol. 33, no. 3, pp. 330-346, 2005b.
- [75] M. Pagani, Determinants of adoption of third generation mobile multimedia services, *Journal of Interactive Marketing*, vol. 18, no. 3, pp. 46-59, 2004.

- [76] L. Palen, M. Salzman, and E. Youngs, Discovery and integration of mobile communications in everyday life, *Personal and Ubiquitous Computing*, vol. 5, no. 2, pp. 109-122, 2001.
- [77] A. Parasuraman, Technology readiness index: a multiple item scale to measure readiness to embrace new technologies, *Journal of Service Research*, vol. 2, no. 4, pp. 307-320, 2000.
- [78] P. E. Pedersen, Adoption of mobile internet services: an exploratory study of mobile commerce early adopters, *Journal of Organizational Computing and Electronic Commerce*, vol. 15, no. 3, pp. 203-221, 2005.
- [79] M. Perry, K. O'hara, A. Sellen, B. Brown, and R. Harper, Dealing with mobility: understanding access anytime, anywhere, *ACM Transactions on Computer-Human Interaction*, vol. 8, no. 4, pp. 323-347, 2001.
- [80] T. Pikkarainen, K. Pikkarainen, H. Karjaluoto, and S. Pahnla, Consumer acceptance of online banking: an extension of the technology acceptance model, *Internet Research*, vol. 14, no. 3, pp. 224-235, 2004.
- [81] L. Porter and E. Lawler, *Managerial Attitudes and Performance*. Homewood, IL: Irwin-Dorsey, 1968.
- [82] S. R. Rhodes, Age-related differences in work attitudes and behavior: a review of conceptual analysis, *Psychological Bulletin*, vol. 93, no. 2, pp. 328-367, 1983.
- [83] D. Robey, User attitudes and management information system use, *Academy of Management Journal*, vol. 22, no. 3, pp. 527-538, 1979.
- [84] E. M. Rogers, *Diffusion of Innovations*. New York: Free Press, 1983.
- [85] E. M. Rogers, *Diffusion of Innovations*. New York: Free Press, 1995.
- [86] M. Saaksjarvi, Consumer adoption of technological innovations, *European Journal of Innovation Management*, vol. 6, no. 2, pp. 90-100, 2003.
- [87] B. H. Sheppard, J. Hartwick, and P. R. Warshaw, The theory of reasoned action: a meta-analysis of past research with recommendations for modifications and future research, *Journal of Consumer Research*, vol. 15, no. 3, pp. 325-343, 1988.
- [88] K. Siau, E. P. Lim, and Z. Shen, Mobile commerce: promises, challenges, and research agenda, *Journal of Databases Management*, vol. 12, no. 2, pp. 4-13, 2001.
- [89] R. Silverstone and E. Hirsche, *Consuming Technologies*. London: Routledge, 1992.
- [90] S. Taylor and P. A. Todd, Understanding information technology usage: a test of competing models, *Information Systems Research*, vol. 6, no. 2, pp. 144-176, 1995.
- [91] S. Taylor and P. A. Todd, Assessing IT usage: the role of prior experience, *MIS Quarterly*, vol. 19, no. 4, pp. 561-570, 1995a.
- [92] T. S. H. Teo and S. H. Pok, Adoption of WAP-enabled mobile phones among Internet users, *Omega: The International Journal of Management Science*, vol. 31, no. 6, pp. 483-498, 2003.
- [93] D. J. Terry, Self-efficacy expectancies and the theory of reasoned action, in *The Theory of Reasoned Action: Its Application to AIDS-preventive Behaviour* (D. C. Terry, C. Gallois, and M. McCamish, Eds.). Oxford: Pergamon, 1993.
- [94] R. Thompson, C. Higgins, and J. Howell, Influence of experience on personal computer utilization: testing a conceptual model, *Journal of Management Information Systems*, vol. 11, no. 1, pp. 167-187, 1994.
- [95] H. Triandis, *Attitude and Attitude Change*. New York: John Wiley, 1971.
- [96] H. Triandis, Values, Attitudes and Interpersonal Behavior, in *Proceedings. Nebraska Symposium on Motivation*. Lincoln, 1979, pp. 195-259.
- [97] E. A. M. Van De Kar, *Designing Mobile Information Services: An Approach for Organisations in a Value Network*, PhD Dissertation, Faculty of Technology, Policy and Management, Delft University of Technology, Delft, 2004.
- [98] V. Venkatesh, Creating favourable user perceptions: exploring the role of intrinsic motivation, *MIS Quarterly*, vol. 23, no. 2, pp. 239-260, 1999.
- [99] V. Venkatesh, Determinants of perceived ease of use: integrating control, intrinsic motivation, and emotion into the technology acceptance model, *Information Systems Research*, vol. 11, no. 4, pp. 342-365, 2000b.
- [100] V. Venkatesh and F. D. Davis, A theoretical extension of the technology acceptance model: four longitudinal field studies, *Management Science*, vol. 46, no. 2, pp. 186-204, 2000.
- [101] V. Venkatesh and M. G. Morris, Why don't men ever stop to ask for directions? gender, social influence, and their role in technology acceptance and usage behavior, *MIS Quarterly*, vol. 24, no. 1, pp. 115-139, 2000a.
- [102] V. Venkatesh, M. G. Morris, G. B. Davis, and F. D. Davis, User acceptance of information technology: toward a unified view, *MIS Quarterly*, vol. 27, no. 3, pp. 425-478, 2003.
- [103] V. Vroom, *Work and Motivation*. New York: Wiley, 1964.
- [104] Y.-S. Wang, H.-H. Lin, and P. Luarn, Predicting consumer intention to use mobile service, *Information Systems Journal*, vol. 16, no. 2, pp. 157-179, 2006.
- [105] Y.-S. Wang, Y.-M. Wang, H.-H. Lin, and T.-I. Tang, Determinants of user acceptance of Internet banking: an empirical study, *International Journal of Service Industry Management*, vol. 14, no. 5, pp. 501-519, 2003.
- [106] A. Weilenmann and C. Larsson, On doing 'being teenager'. Applying ethnomethodology to the analysis of young people's use of mobile phones, in *Proceedings. IRIS 23. Laboratorium for Interaction Technology*, Uddevalla, 2000.
- [107] B. X. Xu, W. W.-K. Ma, and E. See-To, Will mobile video become the killer application for 3G? An empirical model for media convergence: Lancaster University Management School, Working Paper 2006/044, 2006.
- [108] S. Xu, X. Fang, S. Chan, and J. Brzezinski, What tasks are suitable for handheld devices?, in *Proceedings. Tenth International Conference on Human-Computer Interaction*, New Jersey, 2003, pp. 333-337.
- [109] M. Y. Yi, J. D. Jackson, J. S. Park, and J. C. Probst, Understanding information technology acceptance by individual professionals: toward an integrative view, *Information & Management*, vol. 43, no. 3, pp. 350-363, 2006.