Adoption of Mobile Services. Model Development and Cross-Service Study.

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Abstract

This study investigates the adoption of mobile services across four different service categories. The adoption model underlying the study includes analysis of the motivational, attitudinal, social and resource-related influences on adopters' intention to use mobile services. Overall, the model explains 62-75 percent of the variance in "intention to use". Two important findings stand out as very consistent across all four studies: The relatively strong influence of intrinsic and derived motivations and the lack of influence of social norms. This latter finding is rather surprising given past research on the importance of subjective norm in the adoption of new technology-based and communication services. Also notable is the observed differences in influences across types of services. Contrary to expectations, enjoyment and expressiveness were found to be important determinants of intention to use services that were dominantly utilitarian. By the same token, results revealed few effects of attitudinal processes on intentions to use established (as opposed to new) mobile services.

INTRODUCTION

Consumers' use of mobile communication devices is increasing rapidly. However, while cellular phones initially were used for voice services only, the use of data services, such as text messaging-, gaming-, contact-, and payment- services, is now starting to catch on. Understanding the behavioral adoption requirements of mobile services is important to researchers, marketers and industry players. For researchers, an important issue is how mobile end-user services differ from traditional ICT-services in ways that affect their adoption. For example, the personalization, location specificity and ubiquity of these services are suggested as important characteristics making their adoption different from other ICT-services (Rask and Dholakia, 2001; Balasubramanian, Peterson and Jarvenpaa, 2002; Watson, Pitt, Berthon, and Zinkhan, 2002). However, with the introduction of 2.5 and 3rd generation mobile services, a convergence is expected of mobile and traditional Internet based services. Consequently, much of what has already been learned from studies of the adoption of traditional Internet services may be relevant to understanding the adoption of future mobile services. In addition, research on the adoption of simple services like text messaging and simple SMS-based services may also provide important insights into understanding the process of mobile service adoption.

To understand this process, we suggest combining theories and models of traditional adoption research with findings from behavioral studies of mobile service adoption. Traditional Internet based services are typically studied applying diffusion and adoption research perspectives. These perspectives are not often applied to studies of the adoption and use of mobile services. Instead, a uses and gratifications (cf. Leung and Wei, 2000) or a domestication research perspective (cf. Haddon, 2001) is typically applied. Uses and gratification research has a long history in communication research and has been applied to

understand the gratifications sought by users of a wide variety of media. Recently, this perspective has also included studies of the gratifications of new communication media such as chat services, pagers and text messaging services. Domestication research studies typically focus the consequences of mobile service adoption and use, and these studies also suggest relevant ways in which traditional adoption models may be extended and modified to better explain the adoption of mobile services.

This study focuses two primary issues in the adoption of mobile services. One is the relationship between motivational, attitudinal, social and resource-based influences on the adoption of such services. For example, because many mobile services are communication services, one may expect social influence on the adoption decision to be strong. The motivational process may also be driven by the users seeking other gratifications of mobile services than of traditional ICT-based services. Furthermore, mobile services are often new and unexplored services indicating that much of the intention to adopt a service may be attitudinal rather than experiential.

The second issue we focus is how the relationship between motivational, attitudinal, social and resource-based influence may differ across categories of mobile services. For example, the gratifications obtained from mobile payment services may be very different from those of gaming services. Consequently, the motivational influence on the adoption of these services may be different as well. Likewise, mobile communication services are important services for maintaining users' social networks, and consequently, social influence may explain their adoption while not being influential in explaining the adoption of mobile entertainment services.

In the following, four different mobile services are presented and contrasted. Thereafter, three theoretical traditions contributing to understanding mobile services adoption are reviewed and coupled with presentations of studies of antecedents of mobile service adoption. Based on this review, a conceptual model – encapsulating the motivational, attitudinal, social and resource-based influences of mobile services adoption – is presented. This model is applied for proposing differences in the adoption pattern across types of mobile services. The conceptual model and subsequent propositions are in turn tested using data from four different surveys of mobile service adoption. The majority of these studies are conducted on Scandinavian mobile users. Lastly, the findings from these studies are compared and contrasted, and implications for research and practice are discussed.

CONCEPTUAL FOUNDATIONS

Mobile services

To investigate the issues presented above, a cross service study was required. In comparing services, variance in service characteristics is necessary. To provide this variance, two criteria were set up. Services presented in interactive media are often divided into communication services and transaction services (Watson, Pitt, Berthon and Zinkhan, 2002; Balasubramanian, Peterson and Jarvenpaa, 2002). Thus, the services should represent both communication and transaction services. Second, uses and gratification studies have revealed that media are used for purposes of both entertainment and utility (Flanagin and Metzger, 2001). Therefore, the study should include services intended to meet utilitarian gratifications as well as gratifications of entertainment, sociability, enjoyment and expressiveness. Of the four services used in this cross service study, text messaging and contact services represent *communication* services. The other two services, mobile payment and mobile gaming, may be characterized as *transaction* services. Two of the services, contact services and mobile gaming may be

characterized mainly as *entertainment* and expressiveness oriented services, while text

messaging and mobile payment services may be characterized as services meeting *utilitarian*

gratifications. This is illustrated in figure 1.

Insert figure 1 here

In an international setting, most mobile services may be considered new services, but in

Scandinavia, text messaging is now well integrated in the everyday lives at least of young

users. Also, mobile contact services have been available for a while and will be considered as

an established mobile service in this article. However, transaction services as gaming and

payment are novel services (new services) that most Scandinavians have yet not started to use.

These transaction services are also more expensive to use, and their use require new and

expensive mobile devices. In addition, transaction services are more complex and require a

higher level of experience and skill in using mobile services.

Text messaging services

Text messaging in the form of Short Message Services (SMS) has been one of the most

successful mobile services recent years. Currently, SMS is used either for mediating person-

to-person communication or for accessing mobile end-user services. While previous studies

focusing on media richness suggest this type of mediated communication is useful for the

performance of less equivocal tasks and the exchange of formal messages (Daft and Lengel,

1986), recent research gives more mixed predictions. For example, it has been suggested that

the low channel capacity of text messaging (Te`eni, 2001) is compensated by including more

affective components in the message. This also leads to an adjustment of message content

such as reduction of content formality, something that is typically observed in behavioral

studies of text messaging use (Kaseniemi and Rautiainen, 2002). However, Höflich and Rössler (2001) found that instrumentality was the only gratification significantly predicting the use of text messaging services. Although SMS is mainly used for purposes of utility, the inclusion of affective components and low formality in messages means that SMS have the potential for entertainment in addition to utility.

Mobile contact services

Mobile contact services extend person-to-person text messaging by a mechanism for sharing messages. The mechanism may include some form of message display, such as a TV-screen, a web-page or a wap-page, or it may just redistribute submitted messages to the mobile terminals of the contact service subscribers. The main purposes of most contact services are to express opinions on issues or to get in contact with (new) people. Currently, three forms of mobile contact services have been adopted in Scandinavia. By far, the most popular form of service is that including the TV-set as a message display area. Most of these services include elements of flirt or getting in contact without relating to any other subject in particular. The primary gratifications obtained from using these services are believed to be entertainment and sociability and the services have primarily been adopted by young users. Another form of contact services is chat services related to a specific topic. These services may originate from traditional discussion forums on the Internet or they may be serviced by some broadcast corporation (radio or TV). These topic-related chat services are more oriented towards expressing an opinion (expressiveness as gratification). The final form of contact services is chat or flirt services redistributing messages within a chat room directly to subscribers' handsets. The chat rooms may be subject-related or be organized by user segments (male, female, gay, lesbian etc.) and most include elements of flirt or getting in contact with new people with similar interests as oneself. In Scandinavia, almost all SMS-service providers

including TV and radio stations, newspapers and mobile portal providers, offer these form of contact services.

Mobile payment services

Mobile payment services currently exist in three forms. Payments using overtaxed SMS-messages are most common. Examples of such services are ringtones, logos and access to entertainment on the Internet. Second, payments using an electronic purse on the mobile terminal have gained in popularity and have so far mainly been used as a substitute for SMS-based payments. However, the mobile purse is now increasingly being used to pay for products and services with a price exceeding the overtaxed SMS-based payments. Examples of such services are loading the subscribers' prepaid account, mobile gambling, and payments for physical services such as bus, train and cinema tickets. A third way to link the mobile terminal to an underlying payment infrastructure is to charge the subscribers' telephone bill. Depending upon when content providers are being paid by the operator, this solution represents a credit or invoice-based payment mechanism. At the current stage of development, mobile payment solutions represent an emerging technology that is mainly used for services where there have not yet been established an existing payment infrastructure. Examples of such services are vending machine payments, payments for Internet content and services downloaded to the mobile phone.

Mobile gaming

In addition to preinstalled or operating system specific installed games, three different standards are currently used for mobile gaming: SMS-games, WAP-games and Java-based games. SMS-based gaming is, thus far, the most popular standard for gaming. For instance, Virtual Boyfriend/Girlfriend, a game created by Scottish Digital Brides, logs some 16,500 text

messages daily (The Economist, 2002). The Finnish game-developer Codeonline, owned by giants like AOL Time Warner, Bertelsmann and Motorola, currently provide SMS-based versions of e.g. "Who Wants to be a Millionaire?", "Trivial Pursuit" and "ET-The Extra-Terrestrial" to 250 million users through 40 different mobile operators. Codeonline generated more than 50 million paid gaming transactions in 2001. Although WAP (Wireless Application Protocol) has not become a huge success in Europe, many content providers are currently developing WAP-based games – believing that the adoption of GPRS and new billing models will launch the growth of WAP-services (Gaptime, 2001). Many of Codeonline's games, such as "Who Wants to be a Millionaire?" and "Trivial Pursuit" are also available in WAP versions – in addition to the SMS versions. Other games, such as Tease and Mobilisation are only available when using a WAP browser. Java is used as a programming language allowing multi-platform applications to run on Java-enabled mobile devices. These terminals allow users to download games in the form of small Java-applications (midlets) to their phone, saving online traffic fees when playing the game. Interactive Java-games can be either single- or multi player games.

Theory

Three different traditions have been identified as relevant to understanding the adoption and consumption of mobile services. First, we focus traditional adoption theory which has its foundation in both marketing and information systems research, and studies the adoption and use of information and communication technology in both everyday-life and organizational settings. Second, uses and gratification research are focused. This tradition has its origin in media- and communication theory, and studies the gratifications sought by adopters of different media and technologies. Third, we focus on domestication research, a tradition having its foundation in sociology. Domestication researchers study the adoption, use and

domestication of technology in society with a particular focus on the societal consequences of technology domestication.

Adoption research

Three mode ls stand out as the most widely applied when explaining ICT-adoption; the technology acceptance model (TAM) originally proposed by Davis (1989), the theory of reasoned action (TRA) originally proposed by Fishbein and Ajzen (1975), and the extension of TRA into a theory of planned behavior (TPB) originally proposed by Ajzen (1985). The technology acceptance model (Davis, 1989, Davis , Bagozzi and Warshaw, 1989) focuses on the attitudinal explanations of intention to use a specific technology or service. It includes five concepts - perceived user friendliness, perceived usefulness, attitudes towards use, intention to use and actual use. While user friendliness is primarily treated as an antecedent for attitude toward use, perceived usefulness is postulated to have a direct effect on intention to use, in addition to an effect on attitude toward use. This direct effect is explained as an instrumental intention not guided by attitude toward use (Davis, Bagozzi and Warshaw, 1989). Although the TAM is mainly applied to explaining the adoption of technology within organizations, the constructs of the model are meant to be fairly general (Davis et al., 1989; Doll et al., 1998). In many ways, TAM corresponds to rational or utilitarian theories of media choice and use.

TAM may be seen as a special case of the TRA (Fishbein and Ajzen, 1975). It is used to explain behavior beyond the adoption of technology. However, when applied to the explanation of use or adoption behavior, the TRA-model includes four general concepts - behavioral attitudes, subjective norm, intention to use and actual use. In general, TRA does not propose specific determinants of behavioral attitudes (attitudes towards use). In TRA,

however, these attitudes are composed of the belief that use leads to certain outcomes and the evaluation of the desirability of these outcomes. The inclusion of subjective norm represents an important addition when compared to TAM. In TRA, subjective norm is composed of the user's perception of how others think she should behave, and her motivation to comply with the expectations of these referents (Fishbein and Ajzen, 1975). With the subjective norm concept, TRA includes elements of social influence found in social explanations of media choice. TRA has been applied in its original form to explain the adoption of ICT-applications (e.g. Liker and Sindi, 1997), but typically TRA is used as a basis for modifying the TAM-model with subjective norm as suggested above (Venkatesh and Davis, 2000; Venkatesh and Morris, 2000).

The theory of planned behavior was proposed as an extension of the theory of reasoned action to account for conditions where individuals do not have complete control over their behavior (Ajzen 1985, 1991). Perceived behavioral control reflects the internal and external constraints on behavior, and is directly related to both behavioral intention to use and actual use. Consequently, actual use is a weighted function of intention to use and perceived behavioral control (Taylor and Todd, 1995). While the status of subjective norm in TPB is unclear, the inclusion of behavioral control has been shown to significantly improve the predictive power of TPB over TAM and TRA. TPB has been applied to explain the adoption of such diverse systems as spreadsheets (Mathieson, 1991), computer resource centers (Taylor and Todd, 1995), and recently, video conferencing systems (Townsend et al., 2001) and electronic commerce services (Battacherjee, 2000).

Few studies are found applying adoption research models to mobile services or telecommunication services in general. Plouffe et al. (2001a) concluded that the TAM model

may be too parsimonious and should successfully be supplemented and extended using more operational concepts, such as compatibility and image (see also Plouffe et al., 2001b). Kwon and Chidambaram (2000) applied the TAM model to explain the general adoption of mobile phones among regular subscribers in a metropolitan area in Hawaii. They also suggested the TAM model should be extended and included social pressure as an additional variable.

Uses and gratification research

Uses and gratifications research has its foundation in communication research, an integrated field of researchers in media, sociology and social psychology originally focusing on mass media and mass communications (Katz and Blumler, 1974). Uses and gratifications research focuses the individual user or adopter in everyday life, and the general idea is that adopters seek gratifications in mass media and technology use based upon their individual "needs" or "motivations" (Lin, 1996). As such, it has an instrumental foundation similar to rational or utilitarian theories of media use in traditional CMC and adoption research. Since the original studies focusing on gratifications of mass communication media, uses and gratifications research has been extended to study the gratifications of such diverse technologies and services such as video games (Sherry et al., 2001), Internet (Papacharissi and Rubin, 2000), email (Dimmick et al., 2000), household telephones (Dimmick and Sikand, 1994), instant messaging (Leung, 2001), and mobile phones (Leung and Wei, 2000).

Of particular relevance to this paper are the recent uses and gratifications studies of mobile services like voice and messaging. One may expect other gratifications to be sought from mobile voice services than traditionally sought from fixed telephony. Dimmick and Sikan (1994) identified three general gratifications; "sociability", "instrumentality" and "reassurance" from fixed telephony before the widespread adoption of mobile phones. Leung

and Wei (2000) stress that newer generations of mobile telephony introduces the telephone as a content medium as well as a communication medium. In general, seven gratifications were identified; "fashion/status", "affection/sociability", "relaxation", "mobility", "immediate access", "instrumentality" and "reassurance". Thus, the traditional telephony gratifications are found, but in addition, gratifications related to fashion, relaxation and entertainment, flexibility and mobility are identified. Leung and Wei (1999a) studied the gratifications from information search by pager use among young users in Hong Kong and found three factors labeled "information-seeking", "novelty" and "fun-seeking". In Leung and Wei (1999b), the general gratifications from pager use were identified as "sociability", "information seeking", "entertainment", "utility", and "fashion/ status". Thus, the gratifications of pager use were very similar to those sought from mobile phones, but the "fashion and status" gratification was found to be a particularly important gratification of pager use.

Höflich and Rössler (2001) conducted a uses and gratifications study focusing particularly on text messaging. Their study was done among 204 German mobile phone owners of age 14 to 18. They identified the following gratifications; "reassurance" (rückversicherung), "sociability" (kontaktpflege), "immediate access /availability" (verfügbarkeit), "instrumentality" (lebenshilfe) and "entertainment/enjoyment" (nutz-spaz). Thus, the gratifications were very similar to those of the mobile phone identified above. Of these gratifications, only "instrumentality" significantly predicted the use of text messaging services. Use of text messaging were found to correlate positively with voice service usage, but was uncorrelated with email and text message flirting service usage.

Of particular relevance to gaming services is a uses and gratifications study of video games (Sherry et al, 2001). Six different uses and gratifications were found: "competition",

"challenge", "social interaction", "diversion", "fantasy" and "arousal", where the most frequently reported reasons for using video games were challenge, arousal and diversion. Although the gratification of "social interaction" resembles "affection/sociability" (in Leung and Wei, 2000) and "diversion" approximates Leung and Weis' "relaxation"-factor, we observe that the gratifications of video games deviate from those of mobile phones on several aspects. Specifically, users of video games appear more focused on satisfying needs of competition, fun-seeking and entertainment than do mobile phone users, whereas mobile phone users put a larger emphasis on factors related to fashion, mobility and accessibility. Accordingly, we might expect *mobile* game users to particularly favor the "sociability" and "diversion/relaxation" gratifications of mobile games, although also appreciate the "competition" and "challenge" as well as the "mobility" and "accessibility" gratification of mobile services pinpointed above. We particularly expect the latter factors to be of importance given the typical user-situations of mobile gaming reported by Graham (2000). Graham (2000) studied the self-reported mobile gaming situations of Nokia users, and found that 24 percent reported "when waiting", 22 percent "in cars", and 12 percent "on trains". Only 21 percent reported "at home".

Domestication research

Domestication research is dominated by social science researchers and its reference disciplines are sociology, anthropology and ethnology. Domestication research has a long tradition of studying everyday life technology as the object being adopted (see Silverstone and Hirsch, 1992). Examples of technologies studied are fixed telephony (see Fisher, 1988), television (Silverstone and Haddon, 1996a) and home computers (Silverstone and Haddon, 1996b). Domestication studies are not limited to studies of individuals or aggregates, but are

found describing the adoption and usage patterns of groups in society (e.g. Townsend, 2000) as well as individual end-users (e.g. Ling, 2001).

A variety of explanations have been suggested in domestication studies of the widespread adoption of mobile services among young users. Most of these explanations have been applied in studies of text messaging adoption. Even though text messaging was not explicitly focused by Ling (2001), he indicated three conceptions of *fashion and style*, and suggested a development from "style as display" through "style as communication" to "style as a means to integrate social networks". With these conceptions, the use of text messaging may be understood as both a way of communication and as a means of social integration that plays a role as style marker when the mobile phone itself has lost its significance as an object of style display. This is closely related to Skog's (2002) interpretation of the mobile phone as *symbolic capital.* These symbolic elements of mobile phone use have also been confirmed in studies of mobile phone use in organizational contexts (Manning, 1996). However, Manning (1996) found that the mobile phone was status-enhancing at some levels in the organization while it was status-reducing at other levels.

There is also a relationship between symbolic capital and *social capital* when the object of symbolic value is a communication medium. In that case, there is a relationship between style as a way of communication and style as an indication of group membership (Weilenmann and Larsson, 2000). This gives rise to the idea of text message sending, receiving, filtering and sharing as an expressive communication activity used to display style and social capital. Because text messaging is asynchronous, discrete and stored (at least for a while), this particular use of the mobile is better suited as a style and social identity marker among

experienced users than regular calls. These explanations all support the importance of including subjective norms as an important adoption determinant of communication services.

The explanation of mobile service usage as "*ritual gift giving*" applies particularly to the explanation of text messaging services (Taylor and Harper, 2001a, b). For example, Kaseniemi and Rautiainen (2002) observed three additional uses of text messaging besides regular peer-to-peer messaging; message collection, chain messaging and collective reading. Most other studies of teenage text messaging use have reported similar behaviors (Ling and Yttri, 2002, Larsson, 2000). Taylor and Harper (2001a,b) give references to alternative explanations of gift-giving behavior that fits the observed use of text messaging, such as ritual explanations rooted in primitive elements of our culture, but also sociological, social psychological and economic explanations of gift-giving have been suggested. Based upon this theory, text messaging may be adopted for social influence reasons (pressure to participate in the ritual gift-giving), or it may be explained instrumentally (in which text messaging based gift-giving practices are adopted for utilitarian reasons). In adoption research, the first explanations will be represented by subjective norms while the second will be represented by a reinterpretation of what is considered useful in a service (usefulness).

Ling and Yttri (2002) have suggested that text message adoption among teens may be explained by a theory of *social learning and development* (and emancipation) because text messaging are particularly well suited for exchanging ideas on issues focused in teenagers social learning (e.g. exploration of sexuality, social interaction). For example, many of the chain messages identified by Kaseniemi and Rautiainen (2002) were of sexual content and were used to explore and learn the limits of appropriate content in messages.

Another suggestion is that the asynchronous form of messaging is particularly well suited for initiating and exploring new relationships (Ling and Yttri, 2002). For example, Ling and Yttri (2002) mention several situations in which text messaging is preferred to voice because it is used as an awareness or initiating service similar to what Nardi et al. (2000) report for instant messaging services. Thus, a *social network explanation* is introduced in which the difference between teenagers and other users is explained by the social networks of teenagers being more dynamic.

In addition to these – mainly social – explanations of messaging service adoption and use among young users, there have also been some domestication studies following the line of reasoning from functionally oriented, work/leisure context studies. For example, Grinter and Eldridge (2001) studied the adoption of text messaging among teenagers and found that text messaging were preferred to other media because it was considered quicker, cheaper, easier and more convenient to use. Karlsen et al. (2001) found a remarkable orientation towards usability and costs in their study of the potential adoption of mobile Internet services among Scandinavian teenagers. Thus, *instrumental or utilitarian* explanations of the adoption of these services are relevant also for younger users.

Model and propositions

To study the adoption of mobile services, we suggest a model integrating many of the most important findings of uses and gratification studies and adoption behavior of domestication research into a modified version of the theory of planned behavior of Ajzen (1985; 1991). The model is extended with perceived expressiveness, perceived enjoyment and perceived usefulness as determinants of both attitudes and intention to use (see e.g. Ling, 2001; Taylor and Harper, 2001a; Skog, 2002; Taylor and Harper, 2001b; Höflich and Rössler, 2001; Leung

and Wei, 1999a). The concept of perceived enjoyment (fun) has previously also successfully been applied in attitudinal models in marketing explaining technology adoption (see e.g. Dabholkar and Bagozzi, 2002). In figure 2, the modified TPB-model is illustrated. We use this illustration as a basis for the discussion of how the general TPB-model is extended and modified.

Insert figure 2 here

The model includes four primary influences of adopters' intention to use mobile services. First, *motivational* influences include traditional intrinsic (i.e. enjoyment), extrinsic (i.e. usefulness) and derived (i.e. expressiveness) motivations of adoption. These motivational influences are strongly intertwined and reflect the direct instrumentality of using mobile services. Such motivational influences on intention may or may not be mediated by attitudes. Concurrently, the second source of influence is *attitudinal* influences, stemming from both motivational determinants and social norm. Third, *social* influences – or subjective norms – are postulated to have a direct effect on intention in addition to the indirect effect through attitude. The fourth and last source of influence is *resource-related*, pertaining to the user's perceived behavioral control of the service. Thus, based on the argumentation so far, our main proposition is as follows:

Proposition 1

Intention to adopt mobile services is a function of motivational influenc es, attitudinal influences, social influences, and resource-based influences.

However, in the introduction we also proposed that the type of mobile service moderates the effects of the various antecedents of intention to adopt mobile services. Below we discuss the relationships between these four sources of influence on intention to adopt mobile services and suggest corresponding propositions on the moderating effects of mobile services.

Attitudinal and motivational influences

Perceived usefulness was originally seen as a fairly simple concept including components such as effectiveness and efficiency that are mainly related to extrinsic motivation in work contexts. As seen from uses and gratifications studies, the extrinsic motivations of mobile services are not limited to effectiveness and efficiency. Motivations of accessibility, flexibility, sociability and security have all been mentioned in these studies. We postulate that usefulness is a valid antecedent of intention to use mobile services as well. However, this antecedent seem to be more important for predicting intention to use utilitarian services (where efficiency and direct instrumentality are important) as opposed to entertainment services (where sociability and fun will be more important motivations). Thus, we propose that perceived usefulness is a stronger motivation for intention to use utilitarian services than for entertainment services.

Proposition 2a

Perceived usefulness is a stronger motivation for intention to use utilitarian services (text messaging and payment) than for entertainment services (contact and gaming).

In addition, motivations of enjoyment, fashion, status and expressiveness have all been mentioned. Some of these motivations are intrinsic, but other may perhaps best be characterized as derived, meaning that they provide an instrumentality or gratification that

was not intended by design and that perhaps also was not considered by the user at the time of the adoption. For example, intrinsic motivations of enjoyment lead to skills in which provide the user with digital capital, which in some social networks also involve symbolic and social capital. Thus, the traditional usefulness concept should be modified and extended when explaining the adoption of mobile services. First, traditional usefulness, such as efficiency and effectiveness may be less important in services designed for everyday life uses. Consequently, one is lead to the assumption that traditional extrinsic motivations are less important. However, studies also suggest the usefulness concept should be extended and supplemented to cover the issues of intrinsic and derived motivations for using services designed for everyday life uses. For example, *enjoyment and entertainment* go beyond usefulness, and are perceived as instrumental of services primarily designed for entertainment (mobile games, mobile video and audio streaming, chat and flirt services) (Leung and Wei, 1998, 2000). The instrumentality of these services is enjoyment and entertainment in itself, not the efficiency or effectiveness of being able to access mobile entertainment services ubiquitously. This indicates that enjoyment should be included in an adoption model developed for users of mobile services as a separate concept contributing both to perceptions of usefulness and attitudes towards use. This, in turn, leads us to the following proposition:

Proposition 2b

Perceived enjoyment is a stronger motivation for intention to use entertainment services (contact and gaming) than utilitarian services (payment and text messaging).

For a service to involve symbolic and social capital, a requirement is that it has some element of *expressiveness*. In CMC-research, expressiveness is compared to instrumentality as two styles of communication (Boneva, et al. 2001). Expressiveness is used for communication in

relationships of emotional intimacy and sharing, while instrumentality is used for communication in relationships based on common activities. Expressiveness is an instrumental attribute of a communication service partly influencing usefulness and partly influencing attitudes and intentions directly. Many mobile services are communication services primarily, and thus the extrinsic motivations for using the service are communication-related. Also, the requirements of expressiveness suggested by domestication research include using the communication service to communicate at several levels, to demonstrate participation in several networks, maintaining different roles, and to share and collect prior communication sessions. These are all expressive elements of communication that originate in the derived motivations discussed above. Thus, we expect expressiveness to be more relevant when explaining the adoption of communication services than transaction services.

Proposition 2c

Perceived expressiveness is a stronger motivation for intention to use communication services (contact and text messaging) than transaction services (gaming and payment).

Attitudes are generally believed to be the results of personal and social influences. However, in the technology acceptance model (TAM), attitudes towards use are determined by personal influences only. When including subjective norm in the model, it is possible to create a relationship between norms and attitudes that may be partic ularly relevant to young users' adoption of mobile services. Thus, we suggest accepting an influence of subjective norm on attitudes. We also suggest extending the determinants of attitudes towards use from purely instrumental determinants to more intrinsic and derived determinants such as enjoyment and expressiveness. However, the attitude formation process is believed to be similar for

usefulness, enjoyment and expressiveness in that the individual sees a service as instrumental in fulfilling intrinsic, extrinsic and derived gratifications, and consequently develops a positive attitude towards using it. The relationship between attitudes and intentions may be different for different service categories. For example, for services that are widespread and well known, it is easy to obtain information on other users' experience and also to gain experience from actually using the service oneself. This indicates that for established services, instrumental and experiential motives are the most important explanations of user intentions. Conversely, if services are new and unknown, intentions to use services may be based upon general attitudes and less on experientially derived motives. Among the four services studied in this article, text messaging and contact services are the most established services. Thus, the following proposition seems plausible:

Proposition 2d

Attitude towards use is a stronger motivation for intention to use new mobile services (transaction services - gaming, payment) than established services (communication services - text messaging and contact).

Social influences

Subjective norms are the norms developed through external and interpersonal influence. In general, Webster and Trevino (1995) suggest social influences, and thus, subjective norms to be more influential in explaining the adoption and use of new media. Consequently, even though social motivations for adoption may be important, these motivations may by now be more instrumental than norm based, and should be identified through instrumental determinants of attitude toward use rather than through subjective norm. To give an example, young users may find text messaging instrumental in social coordination because all other

members of their social network uses it, but still feel little social pressure towards using text

messaging services as a norm. However, some mobile services are still at an early stage of

development and may be considered new media. Thus, subjective norm is generally believed

to be more important to less widespread service s.

Proposition 2e

Subjective norm is a stronger motivation for intention to use communication services (text

messaging and contact) than transaction services (gaming and payment)

Resource-related influences

The inclusion of *behavioral control* in TPB has been an important contributor to its

explanatory power. Behavioral control is a general term composed of elements of individual

traits and perceptions of operators' and providers' facilitation. In general, we argue that

behavioral control is believed to be less important to young users than other users because of

their experience and skill in using text messaging services and the facilitation of services

supporting regular text messaging use offered by operators and service providers to the young

user segm ent. Financial resources and pricing, however, are indirectly believed to be

important determinants of behavioral control due to both limited resources among young

users and recent findings that these users are more price sensitive than previously assumed

(Karlsen et al., 2001). However, the perception of some mobile services (e.g. text messaging)

as cost efficient services makes users perceptions of behavioral control of these services less

important as a determinant of adoption than of voice services or services with hidden costs

(Carroll et al., 2002). In general, we argue that the influence of behavioral control on intention

to use is greatest for complex, new, and terminal demanding services. For example, the

adoption of technically complex services, services requiring advanced terminals, services with

hidden costs or generally expensive services will be more influenced by behavioral control than simple and cost efficient services. Thus it is likely to expect a greater influence of behavioral control on intentions for gaming and payment services than for text messaging and contact services.

Proposition 2f

Behavioral control is a stronger motivation for intention to use new and complex services (transaction services - gaming and payment) than for services that are old and simple (communication services - text messaging and contact)

METHODOLOGY

Design, procedure and sample characteristics

Four individual surveys were conducted to investigate cross service differences in the adoption model. All surveys were designed as simple one-group posttest designs. A quasi-experimental setting was applied by first presenting a set of services to the subjects asking them to indicate their current and intended use. Next, subjects were given a stimulus text focusing on one of the listed services or service categories. For example, in the text messaging survey the following stimulus text was used: "*We now want you to focus on text messaging services that in different ways are used to keep or get in contact with others. Examples of such services are sending text messages to friends and family, chat services and flirt services. Using SMS to receive logos and ring tones is not relevant here*".

The *text messaging* survey was administered by school contacts at three upper secondary schools during a period of three weeks in March, 2002. The questionnaire was answered during dedicated class hours giving a response rate of 62.3% (of the number of questionnaires

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distributed) after careless respondents had been removed. The *contact services* survey was announced at 40 online newspaper sites providing mobile contact services using an ad that was presented at times when the newspapers had "unsold ad space" in the period from July 1 to August 1, 2002. The survey was entirely web-based and when compared to the number of subjects clicking on the ad, the response rate was 43.6%. Careless respondents using less than 180 seconds on the survey were removed. The *payment services* study was conducted by including a recruitment text in the SMS account balance service of the prepaid customers of a significant Scandinavian mobile carrier. The text suggested either visiting the study web-site or replying "contact" by SMS to be contacted by project researchers. When being contacted, project researchers asked for respondents' addresses to mail them the survey questionnaire. The contact based version of the recruitment method was used for one day, while the web-based method was used for 2 days in April, 2002. A total of 579 respondents visited the survey web site and 320 (55.3%) completed this version. 313 questionnaires were mailed and 175 (55.9%) returned a completed mail version of the survey. The *gaming services* study was announced using regular posts at 28 international and national web-based discussion forums for gaming, mobile gaming and mobile entertainment services. All postings were made to announcement and news topics at the forums. In addition, the link was implemented at "Midletcentral.com". The posts and link resulted in 1030 visits to the survey web sites. 201 (19.5%) respondents completed the survey after careless respondents had been removed. Sample demographics of all four studies are shown in table 1.

Insert table 1 here

From table 1, we see that there are large differences in sample demographics. The text messaging study was conducted among upper secondary school students, and demographics

are as expected. The contacts services study shows a distribution of subjects with an age, education and gender distribution corresponding to the general Internet population. The sample of the payment service study represents the population of prepaid customers, the corresponding proportion of female subjects is larger, and the sample consists mainly of younger users without university education. Finally, the sample of the gaming services study represents the population of international mobile gaming discussants with a large proportion of male subjects and a large proportion of university educated users. Even though the samples are representative of their cor e populations, the data should be controlled for the identified age, gender and education differences before cross population generalization is recommended. In particular, the age and gender differences have been carefully controlled throughout this study.

Measures

The model presented in figure 2 includes 7 concepts. Most of these concepts are well founded in adoption, uses and gratification, or domestication research literature. Consequently, the construct validity of these concepts is in general considered acceptable. To measure the concepts, a questionnaire was designed containing multiple measures of each of the 7 concepts. In general, the concepts were measured by the subjects indicating their agreement with a set of statements using a seven-point scale ranging from "strongly disagree" to "strongly agree". "Attitude towards use" was measured using seven-point scales of bipolar adjectives. For each study, the items were adapted to the service studied. This means the wording of the items was referring to different contexts as well as to different purposes of use for each service. Still, the wording was kept as similar as possible across studies. In table 2, the reliabilities of each of the measures for each of the studies as well as the reliabilities of the measures when joined across studies are shown.

From table 2 we see that the reliabilities of behavioral control in the text messaging study were below the acceptable 0.75 limit set by Nunnally (1978). For the other concept the relia bility was acceptable for all four services studied.

Usefulness was measured using four items developed from adapting the original items of Davis et al. (1989) to our setting. Attitude towards use was measured using four bipolar adjectives indicating different aspects of the subjects' attitude towards use. The items were very similar to those used by Davis (1989), Taylor and Todd (1995) and Battacherjee (2000). To cover the elements of enjoyment, a four item scale was developed collecting items from uses and gratification scales. The first of the items covered the "entertainment" conception (Leung, 2001), the second the "relaxation" conception (Leung and Wei, 2000), the third item covered the "excitement" conception also found in studies of video-game and T V-gratifications (Sherry et al., 2001). The final item was a general item covering the "fun-seeking" gratification (Leung and Wei, 1999b).

The choice of a particular concept - "expressiveness" - as a perceived attribute of a service or technology is unique in our model. The term has been used in social psychology of individuals' general ability to express their emotions or identity (Cassidy et al., 1992). Studies of text messaging use have shown how one of the most important ways of expressing ones service use is to discuss the service with others and to share it with others (Larsson, 2000; Grinter and Eldridge, 2001; Kaseniemi and Rautiainen, 2002). Thus, items referring to this particular form of expressiveness were included. Similar items, measuring the gratification of

sharing technology use with others - social interaction, have been included in studies of video games as well (Sherry et al., 2001) and TV (Lee and Lee, 1995).

Subjective norm was measured using three items almost identical to the items used by Mathieson (1991) and Battacherjee (2000). A somewhat simpler version of the measure was used by Venkatesh and Davis (2000). In addition, a general norm item was designed inspired by sociological research on mobile service use (Skog, 2002). The measure of behavioral control was almost identical to the measure applied by Battacherjee (2000) and Taylor and Todd (1995). Finally, intention to use was measured by presenting a list of mobile services organized by user context and complexity to the subjects. The subjects were asked to indicate how much they intended to use these services on a 7-point scale form "very little or not at all" to "very much". Intention to use was aggregated over the items presented on the list. To comply more fully with the traditional measures of adoption research, intention to use was also measured with a two item scale adapted from Battacherjee (2000) and Mathieson (1991).

To test the discriminant and convergence validity of the independent variables in our model, the items of all five independent variables were included in a confirmatory factor analysis including five factors. The analysis showed that the five factors explained 77 % of the variance in the material. The resulting factor loadings are shown in table 3.

Insert table 3 here

From table 3 we find the discriminant and convergence validity to be satisfactory.

RESULTS

In this section, we present individual results from the four studies of each mobile service.

From figure 3, we see that all fit indexes for the four services are within acceptable intervals,

and thus, the model fit is considered acceptable. The models explain between 62 and 75

percent of the variance in "Intention to use". These observations indicate that the explanatory

power of the adoption models is good when compared to other studies using parts of the

adoption model presented here for explaining adoption processes.

Text messaging

The results of this estimation for the text messaging service are illustrated in figure 3a.

Insert figure 3 (3a, 3b, 3c, 3d) here

When investigating model relationships, we first see that intention to use text messaging is

explained by direct instrumentality of usefulness, enjoyment and expressiveness, attitudes

towards use and behavioral control. Subjective norm does not significantly influence intention

to use text messaging directly. However, norms have a small indirect effect on intentions

mediated by attitudes. It should further be noticed that the direct effect of expressiveness is

significant only at the 5 percent level. Attitude towards use is significantly influenced by

usefulness, enjoyment and subjective norm. Expressiveness does not significantly influence

attitudes.

Perceived expressiveness and perceived enjoyment both have a positive effect on perceived

usefulness. From these findings, we conclude that the extended model explains a large

proportion of the variance in intention to use, that the suggested concepts of enjoyment and

expressiveness are important contributors to this explanatory power, and that subjective norm seems less important in explaining the adoption of text messaging services among these young users.

Contact services

The adoption model for the contact service data is shown in figure 3b. When investigating the standardized regression coefficients, we find that intention to use contact services is influenced by the direct instrumentality of perceived expressiveness and enjoyment, perceived usefulness, and attitude toward use. Perceived usefulness is only significant at the 5 percent level and should be considered rather weak when compared to the direct instrumentality effects of enjoyment and expressiveness. Expressiveness is a particularly important instrumental determinant of these services indicating that high volume users of contact services see these services as an important part of "the way they express themselves". Subjective norm and behavioral control are not found to significantly influence intentions. Thus, intentions to use contact services are mainly explained by the direct instrumentality of enjoyment and expressiveness, by attitude toward use and to some extent by perceived usefulness. This is somewhat different from regular text messaging services and is an indication that contact services are perceived more as entertainment servic es than utility services. The lack of influence from behavioral control also indicates that these services are not perceived as services needing much facilitation or skills to be utilized.

Attitudes are influenced by enjoyment, usefulness and subjective norm. The effect of subjective norm on attitudes is only significant at the 5 percent level. As for text messaging, both perceived enjoyment and perceived expressiveness have positive significant effects on perceived usefulness.

Payment services

The adoption model for the payment service data is shown in figure 3c. When inspecting the standardized regression coefficients, we find that intention to use mobile payment services is explained by the direct instrumentality of enjoyment and expressiveness, but not by usefulness. However, it seems that usefulness is all the more important in the determination of attitudes, but the weak influence of attitudes on intentions indicate that attitudes and intentions are not as closely related for these services as for text messaging services. Thus, users may have a positive attitude towards payment services partly because they perceive them as useful for fulfilling needs of entertainment and expressiveness, but still not intend to use the services to any extent. This indicates a separation of the motivational and attitudinal processes of payment service users that was not found for users of text messaging services, where these motivational and attitudinal processes were very similar and were influenced by similar antecedents.

Furthermore, attitude towards use has a significant effect on intention at the 5 percent level. Subjective norm does not influence intentions, but behavioral control does. This latter finding is quite easy to explain because mobile payment services require the facilitation of an underlying payment infrastructure as well as user skills. When looking at the determination of usefulness, both enjoyment and expressiveness are important determinants. Attitudes towards use are influenced by enjoyment, expressiveness and usefulness, but not by subjective norm. In general, subjective norm seem to have very little relevance in the adoption model of payment services.

Gaming services

The adoption model for the gaming service data is shown in figure 3d. The regression coefficients show that the direct instrumentality of enjoyment and expressiveness both significantly influence intention to use mobile gaming services. We also observe that perceived usefulness, attitudes towards use and subjective norm do not significantly influence intention, and that the influence of behavioral control is significant only at the five percent level. From these findings, it seems that intention to use mobile gaming services is influenced by motivational processes and behavioral control only. We also observe that subjective norm does not influence attitudes, so there is no indirect influence of this variable on intention to use mobile gaming either. Attitude toward use is influenced by perceived enjoyment and perceived usefulness. As for the other three models, perceived usefulness is significantly influenced by both perceived expressiveness and perceived usefulness.

CONCLUSIONS AND DISCUSSION

Conclusions

The results show significant effects of attitude towards use on the intention to use text messaging and contact services (i.e. communication services) and payment services. Perceived usefulness was revealed to influence intention to use text messaging and contact services. Motivational influences (perceived expressiveness and perceived enjoyment) are both found to be a significant predictor of intention to use all four mobile services. Also, resource based influences (behavioral control) show significant influences on intention to use mobile services except for contact services. Social influences, however, had no direct effects on intention to use any of the four mobile services – although indirect effects mediated by attitudes were observed for text messaging and contact services. Consequently, we conclude that motivational and resource-based influences are the most important drivers of intention to

use mobile services while effects of attitudinal and social influences seem to be moderated by type of mobile service. In general, the results show partial support for proposition 1.

Turning to the propositions of cross-service differences, several interesting effects are observed. In order to display these findings in a lucid and simple manner, table 4 sums up the significant influences on intention to use the various services.

Insert table 4 here

Proposition 2a predicted stronger effects of perceived usefulness on intention to use utilitarian services than entertainment services. The results do not support this proposition. Even though usefulness had a significant effect on intentions to use text messaging, this effect was not observed for payment services. Neither was proposition 2b supported because perceived enjoyment was found to be a significant predictor of all four mobile services, not only of entertainment services as predicted in proposition 2b. This may be explained by a mix of utility- and entertainment- gratifications sought in the mobile services categorized as utility services in this article. By the same token, no support was found for proposition 2c because perceived expressiveness was revealed as a significant driver of the intention to use all four services, not only for communication services. Further, the results showed no support for proposition 2d. Rather, the opposite effect was observed; in which attitudinal processes showed significant influences on intensions to use well-established services (text messaging and contact services), but were less influential for new services (payment and gaming). Subjective norm was predicted to be a more important driver for intention to use communication services than transaction services. Although no direct effects of subjective norms were observed for any of the four services, such norms indirectly influenced intention

to use communication services through the mediating variable of attitudes. For transaction services, no direct or indirect effects of norms were observed on the intentions to use transaction services. Thus, we conclude that partial support for proposition 2e was found. Finally, behavioral control was proposed to have a stronger effect on intention to use new mobile services than established services. The results revealed significant effects of behavioral control on all of the services except for contact services, leaving us with partial support for proposition 2f.

In addition to the influences of intention to use services, we studied the determinants behind attitudinal influences. Consistent with the findings above, usefulness was also determined by enjoyment and expressiveness. While intention to use a specific service was not consistently influenced by usefulness, attitudes towards use were. In addition, enjoyment was an important determinant of attitudes, whereas expressiveness did not influence attitudes – except for payment services.

These findings generally supported our proposition that adoption models would differ across service categories. However, the theoretically proposed directions of adoption model differences were not consistently supported.

Discussion

There are several surprising findings and lacks of findings in our study that require further discussion. One of the most important of these was the lack of support for subjective norm as a determinant of intention to use. A tentative explanation for this finding is that mobile services are no longer novel services in the segments investigated here. That is, the investigated users may find the various mobile services as instrumental in social coordination,

in expressing values and in being entertained, yet feel little social pressure per se towards using these services as a norm. When all members of ones social network use mobile devices and – services, the felt pressure to adopt additional services may not be particularly strong. Thus, subjective norm may no longer influence intention to use these services.

The majority of propositions presented in this paper were not supported, and for some of the suggested propositions, we found significant results opposing our propositions. Three of these propositions were the influence of usefulness, enjoyment and attitudes. First, usefulness was suggested as an important influence of intentions to use services with utilitarian gratifications. This was supported for text messaging services but not for payment services. We moderated this assumption in the theoretical section by introducing the concept of context-based usefulness. Context-based usefulness was proposed as relative to the intended instrumental gratifications of a service, and replaced the absolute components of usefulness, such as time savings, improvement and efficiency. This may explain why contact services were not found useful in initiating new real contacts and why text messaging services were found useful in communicating with known others. However, further investigation into the conceptions of usefulness as relative to service contexts and intended gratifications is necessary.

Enjoyment was suggested to be a stronger motivation for using entertainment services than for using utility services. However, the results revealed significant effects of enjoyment on intention to use mobile service for all four services. An implication of the result is that even utilitarian services should include elements of entertainment to stimulate perceived enjoyment when using the services, and through this, increase intention to use the mobile utility service. At least, the gratification of enjoyment seems to be expected by current users of mobile services.

Attitudes were proposed to be more influential for novel services because experiential influence, such as that stemming from motivational influence, was unfounded for these services. This proposition was not supported, and in fact, we found most support for attitudinal influence on the intention to use services that were well established (text messaging and contact services). Thus, attitudes may well have been developed towards a service, but attitudinal influence seemed to require user experience. For the communication services, attitudes were found influential and also, attitudes were partly socially determined for these services. This indicates that the attitudinal process of mobile services is more complex than originally suggested and that it may be different for communication and transaction services.

Behavioral control was proposed to be most influential for new and complex services, and services requiring an underlying infrastructure. However, behavioral control was found to be influential for all services except contact services. Lack of influence on intentions for the contact service may be explained by service simplicity, but we also expected this to be the case for text messaging services.

LIMITATIONS AND IMPLICATIONS

Limitations

This study includes four individual surveys on mobile service adoption. Consequently, both internal and external validity issues differ across surveys. All studies, however, share a set of measures and procedures that are very similar. The procedure used to recruit subjects in all studies was similar. In most cases, the subjects took an initiative to participate in the study. In the text messaging study, however, recruitment was not initiated by the subjects. However, our results did not indicate that the selection form applied in this study made our participants

different from non-participating adopters. However, the subjects of all studies were either adopters, or had shown an explicit interest in expressing their opinions on a particular service category. Self-selection procedures did not seem to affect the results in ways that interact with our findings. Samples were in general sufficiently large to guarantee statistical conclusion validity, but the international focus of the mobile gaming study resulted in large variances, and a larger sample size would have been desirable in this particular survey. We conclude that in general, the internal validity of our results is acceptable. However, internal validity was limited to the constructs, measures, samples and services we had studied. For example, text messaging services conclusions were in principle limited to young adopters' use of text messaging services used primarily as a person-to-person communication service.

An important issue is how well these conclusions generalize first to other similar services and other similar segments, and second, across mobile services and segments. Our opinion is that even though the internal validity of our conclusions are generally good, generalizations to similar services and segments should be done with care and generalizations across services and segments should be done most cautiously. Generally, three issues are relevant. To threaten external validity, the subjects, setting or time of the study must be special in a way so that our conclusions do not generalize to other subjects, settings and times. The subjects of the studies differ considerably across studies. In general, text messaging results may be generalized to young adopters, contact messaging results may be generalized to the Internet population, payment services results may be generalized to mobile prepaid subscribers, and mobile gaming results may be generalized to high involved gaming subjects. Generalization beyond these populations is limited. Still, much was done to investigate whether the selection of subjects in our study interacted with our results in ways that limited or strengthened their external validity. For example, analyses were controlled for gender and age differences where

appropriate showing how these variables interacted with service category. This knowledge may be used to adjust and adapt our results when trying to generalize to similar populations. Moreover, the fact that the most important findings (i.e. the strong influences of enjoyment and expressiveness, and lack of influence of norms) are very uniform across the different samples, segments and services studied, should in itself strengthen the external validity of these results.

The settings applied in our studies were primarily selected to allow generalization to similar service categories. It is our opinion that the text messaging, contact, payment and gaming services used in our study were not selected in ways that interacted with our findings in ways that makes it unwise to generalize these results to other mobile messaging, contact, payment and gaming services. Gaming services, however, were studied in a rather general context and thus, generalization may be limited. However, although the samples in the four studies were somewhat heterogeneous, consistency of results regarding effects of enjoyment, expressiveness and subjective norm may indicate valid results.

Implications

When suggesting implications of the results presented above, two findings stand out as very consistent across all studies: The importance of intrinsic and derived motivations and the lack of influence of norms. The importance of intrinsic and derived motivations in adopting mobile services suggests that these gratifications are expected by current mobile service users. Thus current users expect and require these gratifications to be met by mobile services. This represents a challenge to mobile service developers including service elements to meet such gratifications in services primarily designed for utilitarian purposes. It also has implications for the content distributed by mobile services and for the principles of integrating underlying

content. For example, users may expect these gratifications to be met by the content paid for using mobile payment services as well as by the payment service in itself. Even though our findings suggest enjoyment and expressiveness to be consistent requirements of mobile services, interpreting this result should also be done with care. Because of limitations in the external validity of our study, these findings are restricted to interested subjects or adopters. Thus, enjoyment and expressiveness are expected of mobile services, but many such services have not got a widespread adoption, and including enjoyment and expressiveness as gratifications obtained may not guarantee their widespread adoption. For example, users not currently adopting mobile services may have done so because enjoyment and expressiveness are such important gratifications of current services. To reach new users, it is not obvious that the same gratifications should be met. Further research is required to identify differences in the importance of these gratifications to current adopters and non-adopters.

The finding that subjective norm had no direct effect on intentions for any services was surprising and indicate that both the norm concept and the complexity of mobile service adopters' adoption requirements should be reconsidered by most industry players. First, norms, sociability, fashion and expressiveness are often equated and simplified in industry analyses (see e.g. Computerworld, 2002). Our findings indicate that strong norms towards using mobile services may exist, but in general, these norms do not explain variance in mobile services use. Furthermore, norms of relevance to the adoption of mobile services, such as a norm of having a well functioning social network, may exist. To demonstrate and obtain a well-functioning social network, mobile services for social network mediation may be used. However, the intentions to use these services are explained by the gratifications of sociability and expressiveness, not by the norm of mobile service use. Thus, the complexity of the motivational and attitudinal influence on intention to use mobile services is underestimated in

the simplified explanations often found in industry reports. This is also why we recommend more research into the complexity of the motivational and attitudinal influences of adoption, rather than a focus on direct norms of mobile service use.

The results also give some directions for marketing strategies of mobile services. For communication services, traditional marketing campaigns influencing users' attitudes seem to be an effective marketing strategy. Due to little influence of attitude towards use on intention to use, this strategy does not seem to be useful for mobile transaction services. Furthermore, the positive effect of perceived enjoyment on intentions point to the importance of developing services that are fun to use to recruit users of the service. Behavioral control is a significant antecedent of intention to use three of the four mobile services. Thus, it seems to be a fruitful marketing strategy to demonstrate the services and to give potential customers the opportunity to try out the service offered. Most likely, this will influence intention to use the service positively through increased behavioral control. However, generally, the most important antecedent of intention to use was revealed to be expressiveness. Expressiveness focuses on the expression of individuals' emotions and identity. Thus, one possible strategy is to develop services that are supportive of individuals' identity and can be used to express this self-identity. However, self-identity is a construct related to more enduring personal characteristics, as for example values. Thus, designing marketing services for revealing identities sought in various segments may be a suitable strategy, and next, mobile services supportive of these identities may be developed.

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Figure 1: Categories of mobile services.

	Utilitarian	Entertainment
Communication	text	contact
Transaction	payment	game

Figure 2: Proposed model of mobile service adoption.
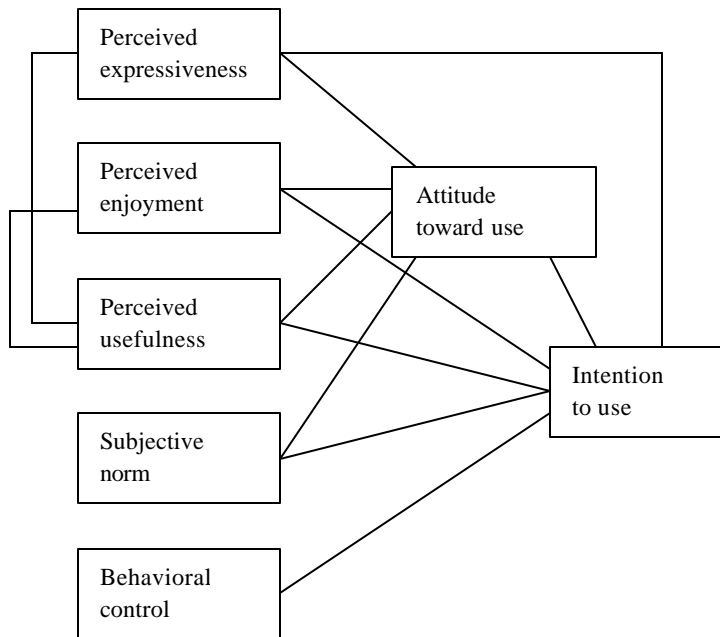
Table 1: Sample demographics

Age	Texting	Contact	Payment	Gaming
0-19	97.3	9.9	29.1	19.2
20-29	2.6	40.2	42.8	50.3
30-39	0.0	28.0	17.7	24.4
40-49	0.0	14.0	7.2	5.2
50-59	0.0	6.7	2.7	1.0
60 and above	0.0	1.1	0.6	0.0
Education				
Primary	n/a	8.3	38.4	2.6
Secondary	n/a	43.1	52.5	17.0
University <3	n/a	28.2	7.9	32.0
University >=4	n/a	20.3	1.2	48.5
Sex				
Male	44.3	55.2	44.9	91.1
Female	55.7	44.8	55.1	8.9
N-complete	658	684	495	201

Table 2: Measure reliabilities

Measure/study	Texting	Contact	Payment	Gaming	Total
Expressiveness	0.75	0.92	0.85	0.87	0.85
Enjoyment	0.93	0.96	0.94	0.94	0.96
Usefulness	0.86	0.91	0.86	0.77	0.89
Subjective norm	0.80	0.90	0.83	0.94	0.85
Behavioral control	0.66	0.80	0.75	0.82	0.78
Attitude	0.85	0.94	0.89	0.90	0.93
Intention	0.80	0.91	0.87	0.92	0.91

Table 3: Principal components analysis of independent variable measures (loadings below 0.35 are not shown).

Variable loadings	1	2	3	4	5
(Eigenvalue)	(1.96)	(1.51)	(8.19)	(1.36)	(0.90)
Perceived expressiveness					
I often talk to others about "service"			.709		
I often show "service" to others			.679		
Using "service" is part of how I express my personality			.752		
Other people are often impressed by the way I use "service"			.822		
Perceived enjoyment					
I find "service" entertaining	.819				
I find "service" is pleasant	.822				
I find "service" exiting	.845				
I find "service" is fun	.860				
Perceived usefulness					
Using "service" makes me save time		.771			
Using "service" improves my efficiacy		.796			
"Service" makes me a better consumer/player		.754			
"Service" is useful to me		.759			
Subjective norm					
People important to me think I should use "service"				.744	
It is expected that people like me use "service"				.852	
People I look up to expect me to use "service"				.804	
Behavioral control					
I feel free to use the kind of "service" I like to					.759
Using "service" is entirely within my control					.865
I have the necessary means and resources to use "service"					.824

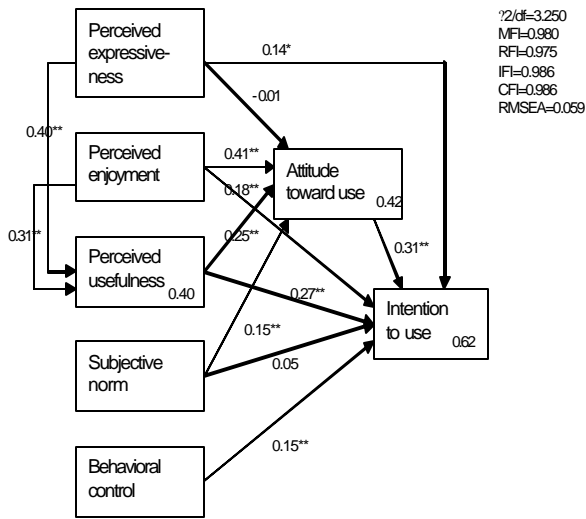Figure 3: Adoption models of the four mobile services.

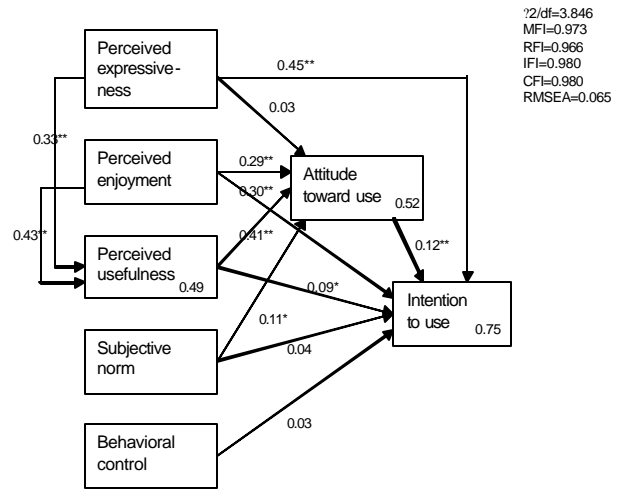Figure 3a: Adoption model of text messaging

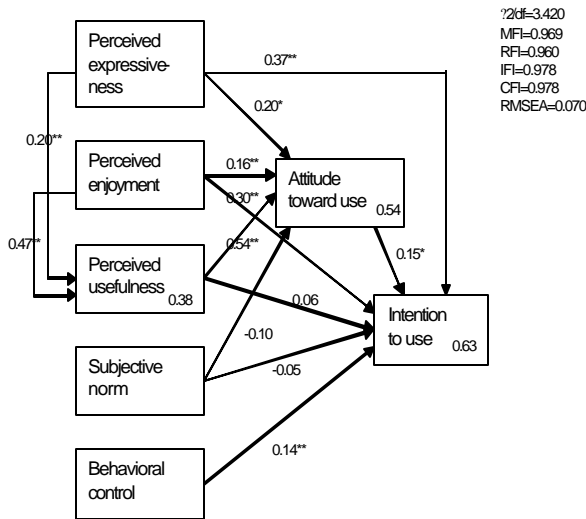Figure 3b: Adoption model of contact services

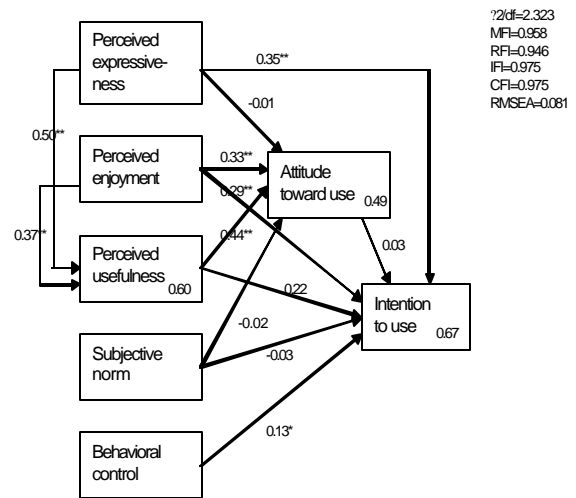Figure 3c: Adoption model of payment services

Figure 3d: Adoption model of gaming services

Table 4: Antecedents of intention to use. A cross study comparison.

Antecedents/Study	Text messaging	Contact	Payment	Gaming
Usefulness	**	*		
Enjoyment	**	**	**	**
Expressiveness	*	**	**	**
Attitude	**	**	*	
Subjective norm				
Behavioral control	**		**	*

* p < .05
** p < .01

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