

Adoption of mobile services

Moderating effects of service's information intensity

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This thesis was written as a part of the Master of Science in Economics and Business Administration program. Neither the institution, nor the advisor is responsible for the theories and methods used, or the results and conclusions drawn, through the approval of this thesis.

Preface

This paper is an a final and obligatory part of Master of Science in Business Administration studium at Norges Handelshøyskole.

Working on this paper has been a very rewarding process in sense of learning and developing my analytical and research skills.

I hope that this thesis will be appreciated as a valuable contribution to the existing papers and that somebody will find this assignment useful. Considering this paper as being relevant and constructive is the most I could wish.

I would like to use this opportunity to thank to my supervisor, Herbjørn Nysveen, for very constructive and fast feedback, for structured and well organized supervision and responsible approach towards this thesis.

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Abstract

The increased use of mobile technology has been dramatic in the recent years. Understanding some of the reasons for this immense expansion lies in comprehending the factors behind consumer usage patterns. Hence it is becoming more and more crucial for today's marketers to study how and why consumers adopt (new) technology and mobile services. The knowledge of adoption process and the factors driving it may be relevant for both providers and customers.

Several models for adoption of information technology or mobile services, in particular, have been developed. However, the combination of some of these models has not been studied yet. Therefore, first objective in this paper was to study the combination of some of these models, namely combined model of Nysveen, Pedersen & Thorbjørnsen (2005a) with a variable (compatibility) from Rogers' (1983) model. Secondly, there are still some unexplored dimensions related to the understanding of consumers' intentions to use mobile services, especially when it comes to the effect of moderating variables on the intention to use mobile services. Therefore, the examination of the effect of a moderating variable was the second objective in this paper as it enables a more nuanced understanding of motives for use of mobile services. And since information intensity is a service characteristic that has been researched very little, it was the one whose moderating effect was measured in the paper. Thirdly, throughout the paper it became clear that a new scale for measuring information intensity was needed, and thus the composition of the scale become the third objective and theoretical contribution of this paper.

This study builds on the past models deeply rooted in the recognized theories. I have used a set of theories consisting of Fishbein's multiattribute model, Theory of Reasoned Action, Theory of Planned Behaviour, Technology Acceptance Model, Innovation Diffusion Theory and some studies on the adoption of mobile services, such as Nysveen, Pedersen & Thorbjørnsen (2005a), Nysveen, Pedersen & Thorbjørnsen (2005b), Lexhagen, Nysveen & Hem (2005), Hung, Ku & Chang (2003) and Teo & Pok (2003).

The model in this paper proposed several direct effects and moderating effects of information intensity between the drivers of adoption and the consumers' intention to use mobile service, which were tested through two phased- method. In the first one, a pre-test was carried out in

order to find the information intensity of the particular mobile services. The scale for measurement was developed and tested. Once this was done, two services, one with high and one with low information intensity were selected for further study. The main research was then carried out in the second phase in order to test the effects between the variables.

Regression analysis was used to analyse the result from the questionnaire. The results showed that when compatibility was added to the combined model, the model's explanatory power increased. Thus, combining the model with a variable from another model was successful, and objective one was met. As to the second objective, it has been shown that the degree of information intensity moderated some of these relationships, namely the relationship between perceived enjoyment and intention to use mobile services, perceived expressiveness and intention to use mobile services and perceived behavioural control and intention to use mobile services.

The results of this research have both theoretical and practical implications for the future research or for the marketers. Limitations of the study can be addressed and solved in the consecutive studies.

1 Introduction

1.1 The importance of mobile technology and services

The study of how and why consumers adopt (new) technology and mobile services may be relevant and important for both providers and customers. Increased usage of mobile technology is also an important reason for studying its adoption.

1.1.1 Importance for providers

Understanding the drivers of adoption can give an idea to service providers or designers on how to tailor particular services so that they will be used by the customers. It can also contribute to better and deeper understanding of consumers' needs and expectations. In this way, vendors will be able to differentiate themselves from the competitors in form of how mobile services are designed for customers' particular needs. In addition, more customized, specific or better tailored services that meet customers' needs and expectations will enable providers to deliver superior customer experience. This in turn can have a positive effect on customer satisfaction and loyalty.

If a provider manages to achieve all this, the competitive advantage can increase together with positive effect on market share and increased revenues as a result of deeper understanding of how customers adopt the technology and/or services.

1.1.2 Importance for customers

As for a customer himself, understanding of motives for adoption of technology or services can increase the customer's awareness of his own motives for the use of mobile services. Being aware of own motives, customer can choose better and more deliberately technology or services that fits to his individual needs. It will also enable customer to make smarter choices from the pool of different mobile services. Thus, customer will not only be more satisfied, but can spare resources such as time and money, which were wasted on bad choices before, by choosing appropriate service right away.

1.1.3 Importance due to increased use of mobile technology

Increasing usage of mobile technology is another important reason for studying the factors behind the adoption and usage of technology and services. The presence of computer and information technologies in today's organisation has expanded dramatically (Venkatesh,

Morris & Davis 2003). Fast development of wireless networking and significant increase of mobile device users has led to an immense increase in number of mobile users (Yunos & Gao, working paper). Also in Norway, the trend of increasing use of mobile technology has reflected in, for instance, the amount of mobile telephone subscribers, which has increased from 1 676 763 in 1997 to 4 716 090 in 2004, which is more than the total number of inhabitants (<http://www.ssb.no/aarbok/tab/tab-439.html>, 29.januar 2006).

These facts increase the importance of understanding how consumers accept and use the technology, because for new technologies to improve productivity they must first be accepted and used. Davis (1989) says himself that it is important to understand what lies behind the intentions to use technology, because it helps vendors to assess user demand for new ideas and for organisation managers to evaluate these vendors' offerings. Another reason for studying technology adoption is due to constant development of new and more sophisticated information technology devices (Nysveen, Pedersen & Thorbjørnsen 2005a). Also tremendous development in mobile services itself that are available to mobile devices are creating new motives for use (Balasubramanian, Peterson, & Jarvenpaa 2002)¹. Those are all reasons for studying consumers' intentions to use technology and mobile services as they can give answers to the phenomena of today's mobile market.

1.2 What has been done in the area?

Studies attempting to understand motives for using different types of information technologies stretch back to mid-1970 (Compeau & Higgins 1995)². Several theoretical models have been proposed to explain users' acceptance behaviour. The most used ones include the Theory of Reasoned Action (Fishbein and Ajzen 1975), the Theory of Planned Behaviour (Ajzen 1991) and the Technology Acceptance Model (Davis 1989).

Nysveen, Pedersen & Thorbjørnsen (2005a) present a model that explains customers' intentions to use *mobile services* in particular, as a part of newly emerging technology. Rogers (1983) presents another adoption model which also explains factors underlying the adoption of technology, but from an innovation perspective. He says that getting a new idea adopted can often be very difficult, despite its advantages (Rogers 1983). Therefore it is important to understand the adoption process of innovations.

1.3 Problem definition

1.3.1 Combination of models

Both models, Nysveen et al (2005a) and Rogers (1983) can be used to explain customers' intentions to use mobile services, but differently. The combination of these different adoption models has not been studied yet. Therefore, I will attempt to combine Nysveen et al's (2005a) model with one variable from Rogers' model (Rogers 1983) (compatibility) to see how they influence intention to use mobile services when considered jointly. Adding a new driver of intention to use mobile services can alter original model and give some new interesting findings. The reason for including compatibility from Rogers' model as a new driver for explaining the intention to use mobile services is that compatibility can give newer and more complete picture of adoption. This is due to the fact that the other variables from Rogers' model in some way overlap with the variables from Nysveen et al's (2005a) model. Relative advantage, complexity, trialability and observability from Rogers' model can be associated with perceived usefulness, ease of use, behaviour control and subjective norms from Nysveen et al's (2005a) model, respectively. Since the concept of compatibility does not overlap, and is not contained in any of these variables, including it as a new variable in the combined model can bring some new perspectives.

1.3.2 Including moderating effect

Nysveen et al (2005b) argue that despite of some studies examining motives for using mobile services and devices, there are still some unexplored dimensions related to the understanding of consumers' intentions to use mobile services. By these dimensions is meant mostly the effect of moderating variables on the intention to use mobile services. They say that by examining the effect of moderating variables, it will be possible to get more nuanced understanding of motives for use of mobile services. Increasing the knowledge of moderating effects on the use of mobile services can make services better tailored to consumers' expectations and needs and thus increase the probability of adopting the service.

Few authors have investigated the moderating effects of service characteristics in studies of mobile service adoption. Nysveen et al (2005a) studied the type of interactivity (machine interactivity versus person interactivity) and service process characteristics (goal- directed process versus experiential process) as the two moderators on the relationship between the proposed drives of adoption and usage intentions. Nysveen et al (2005b) studied moderating

effect of gender on the relationships between the proposed antecedents and intention to use mobile services. Pedersen (2005) also contributed to somewhat limited research of moderating effects on intention to use mobile services. He claims that service characteristics can have impact on the innovations and thus on adaptation of these innovations. However, he does not go further to explain which services characteristics and how they moderate the intention to use mobile services. It is, however, Miles (2004) that underlines the importance of information intensity as a relevant service characteristic.

It has been suggested that including moderating variables on intention to use mobile services will contribute to important advances in marketing theories (Dabholkar & Bagozzi 2002)³, but the research on this issue is limited. Therefore, I will, in addition to combine Nysveen et al's (2005a) and Rogers' (1983) model, focus on the moderating effects on the relationship between the drivers of adoption and intention to use mobile service in order to fill in the gaps in past research. And since it has not been suggested how service characteristics moderate the relationship, I will particularly consider one service characteristic (information intensity) as a moderating variable in this paper. The reason for looking specifically at information intensity is due to the fact, that this characteristic has not been studied much, but is still attached significant importance (Miles 2004).

1.4 Theoretical contribution

In summary, in this paper I will seek to extend Nysveen et al's (2005a) model of intention to use mobile services and its effect on the adoption itself with compatibility from Rogers' (1983) model. In addition, by addressing the gaps in the research of moderating effects on the relationship between antecedents and intention to use mobile services, I would like to see how information intensity influences and moderates this relationship in particular.

Thus, this paper will have two main and one minor contribution:

- 1) Combination of Nysveen et al (2005a) with Rogers (1983) when it comes to the drivers of adoption, i.e. drivers of intention to use mobile services.
- 2) Moderating effect of information intensity as a service characteristic.
- 3) Establishing the measurement scale for information intensity.

1.5 Outline of the article

The remainder of the article is organized as follows: the following chapter gives a background for mobile services and growth of mobile technology. Then, next sections present the theoretical frameworks that are necessary for this study and the different hypotheses are proposed. In the method chapter, research design is described and the model is tested in the section afterwards. Conclusions, implications and limitations are given in the last chapter.

2 Mobile Services

2.1 Growth of mobile technology

As already mentioned, there has been an immense growth of the users of mobile technologies. The trend of increasing use of wireless technology has reached Norway as well, and can be illustrated by the increasing number of mobile phone subscribers. The statistics for Norway says that during year 2004, the number of mobile subscribers passed the number of inhabitants. Below follow some examples from the statistics:

- 17 out of 100 households did not have land phone
 - There were 4.716.090 mobile subscriptions registered in Norway in 2004
 - Every phone user talked 90 minutes more in 2004 than in 2003 on mobile phone; sent 40 more text messages per year and 11 more MMS per year in 2004 than in 2003
- (http://www.npt.no/portal/page?_pageid=121,47463&_dad=web&_schema=PORTAL&p_url=http%3A//www.npt.no/pt_internet/venstremeny/publikasjoner/telestatistikk/statistikk2004/telemarked2004.html, 29.01.2006)

Table 1 and figure 1 show the development for mobile phones in Norway from 1997 to 2004. The table shows the summary of number of mobile phone subscriptions, number of SMS and MMS messages sent and contact services from year 1997 up to 2004.

Mobile phone	1997	1998	1999	2000	2001	2002	2003	2004	%change
Mobilte telephone subscription	1 676 763	2 106 414	2 744 793	3 339 936	3 766 431	3 911 136	4 163 381	4 716 090	13 %
SMS-messages (1 000 000)	.	.	515	1 241	2 117	2 541	3 137	3 649	16%
Contact services (1 000 000)	.	.	.	.	80	123	271	494	82%
MMS-messages (1 000 000)	.	.	.	.	.	.	19	72	274%

Table 1: Marked for mobile phones and mobile services

Table 1 shows development in the use of mobile phones. Subscription of mobile phones has been steadily increasing since 1997. In 2004, number of subscriptions went beyond the number of inhabitants in Norway, and the percentage change compared to year 2003 was 13 percent. The emergence of SMS messages is dated back to 1999. The trend was also

increasing for SMS messages. At the end of 2004, the total number of sent messages per year was more than 7 times higher than it was in 1999. The increase in number of SMS messages sent in 2003 as compared to 2004 was 16 percent. Contact services have had an increasing trend since their introduction in 2001, and increased by 82 percent in 2004. MMS messages were introduced to the market latest, but percentage increase from 2003 to 2004 was the highest, namely 274 percent. One can also see from the table that the earlier the service was introduced to the market, the smaller percentage change there was between 2003 and 2004. This is understandable, as new services become popular right after their introduction to the market, while the usage of older services became more stable over time.

Figure 1 shows the summary of annual growth of mobile phone subscriptions in Norway and increasing usage of NMT and GSM manual mobile system.

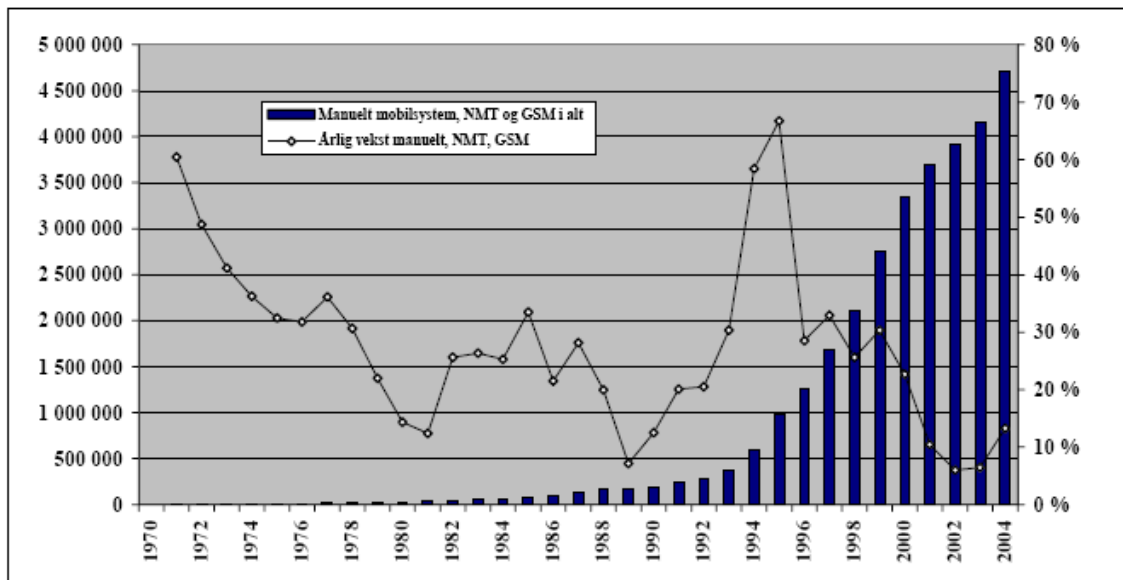


Figure 1: Number of mobile phone subscriptions per 31/12 1970–2004. Annual growth 1971–2004

(http://www.npt.no/pt_internet/venstremeny/publikasjoner/telestatistikk/statistikk2004/telemarkred2004.pdf, 29.01.2006)

- Manuelt mobilsystem, NM Tog GSM I alt = manual mobile system, NMT and GSM in total
- Årlig vekst manuelt, NMT, GSM = annual manual growth, NMT, GSM

The number of mobile phone subscriptions has been increasing gradually throughout the whole period.

Manual mobile system NMT was established in 1981 and the growth rate at that point was especially high. GSM system was established in 1993 and the growth rate this year was even higher than in 1981. The reason for growth rates to be so high at these two points is probably due to the fact that the new systems that were introduced (NMT and GSM, respectively) were much better and more functional than the ones used before.

2.2 Mobile services

The concept of mobile services is described by Nordman and Liljander (2003: 5). They say that it is “something that content provider can charge the mobile user for taking part in”. Applications are invisible to users and do not appear on users’ bill. When a customer orders a product with his wireless phone, many applications are needed to make it happen (e.g. security, certifications and so on).

As compared to wired internet, mobile services have certain advantages. Nordman and Liljander (2003) list such advantages. They include: Availability anywhere anytime, personalisation, availability of location- based services, and purchasing goods and services.

Availability anywhere and any time has its roots in the fact that wireless devices (e.g. mobile phones) can be easily carried around, they are light and small and thus it should not be an extra burden for the owner to have it with him at any point of time. Personalisation is specifically suitable for mobile phones because they are solely personal. They can even be used as personal identification cards and can be highly customized when information such name, address, date of birth, credit card information will be saved on mobile phone’s SIM-card (Ericsson Radio Systems 2001)⁴.

Availability of location- based services as they include finding a way in a city, locating within a specific area is another advantage that mobile services have. This particular feature can even be used for location- based advertising. Mobile services also make it possible for customers to purchase goods and services via mobile phone, as it is possible to access information anywhere and anytime. Almost 90 percent of consumer claim that they would prefer to make purchases via a mobile phone rather than on internet (Cysive 2001)⁵.

2.2.1 Growth of mobile services

Even though mobile services have not yet been widely adopted, they will gain importance as technology develops (Nordman & Liljander 2003). However, the immense increase in growth in mobile technology, as illustrated above, has recently led to increase in the services provided on mobile phones.

Figure 2 shows the increase of mobile services in the Norwegian market. The services taken into consideration were SMS, MMS and contact services. It can be seen from the figure that within year 2000, SMS services dominated among mobile services. However, since 2001 contact services (ring tones, logos, directory enquiries, games, voting via SMS) have emerged and grown very fast. Since 2003 it was MMS services that have emerged and grown very fast.

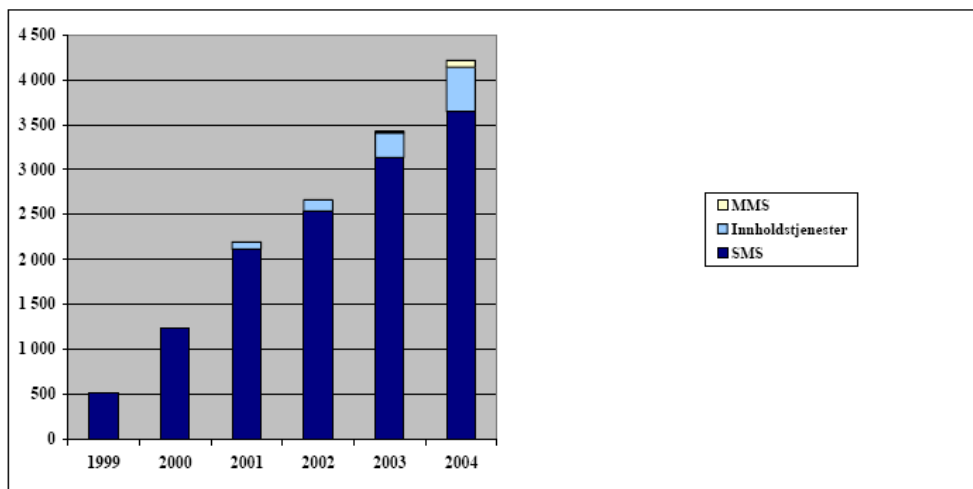


Figure 2: The growth of mobile services

(http://www.npt.no/pt_internet/venstremeny/publikasjoner/telestatistikk/statistikk2004/telemarked2004.pdf, 29.01.2006)

- Innholdstjenester = contact services

The official numbers say that in year 2004 more than 3, 65 billions SMS were sent, 494 millions contact service messages and 72 millions MMS messages were sent. However, the growth rate for SMS messages has somewhat declined in 2004.

2.2.2 Examples of mobile services

There are many mobile services available today. I will give a rough overview over available mobile services on today's market.

Generally, **Messaging** involves the following services:

Traditional text messaging, so called **SMS** (Short Message Service) involves sending and receiving messages to and from wireless phone number. However, it is also possible to send and receive messages from anyone with an e-mail address to the mobile phone. (<http://www.t-mobile.com>, 29.01.2006).

Instant messaging, or chatting, is primarily just like text messaging but faster. It allows people to talk to their friends online anytime, even without a computer, simply by using their mobile phones. Service provider must support instant messaging providers (for example Real time, Aol instant messenger, MSN messenger or Yahoo messenger). A person just logs in with existing username and password, sees who is available, and chats. (<http://www.t-mobile.com>, 29.01.2006).

Picture or video messaging, so called MMS (Multi-Media Messaging Service) allows pictures, sound and video clips to be attached to the traditional SMS messages. Pictures or movies taken by mobile phone can then be sent to other mobile phones or e-mail addresses. In order to use these services, both sender and receiver must possess a mobile phone with a camera. (<http://www.t-mobile.com>, 29.01.2006).

Alerts allow news headlines, scores, horoscopes, sport results etc. to be sent to a mobile phone. T- Mobile (http://www.t-mobile.com/services/messaging_alerts.asp, 29.01.2006) distinguishes between two types of alerts: Scheduled Alerts and Alerts On Demand. With scheduled alerts, user can decide on what alerts he wants to receive and the times and days he receives them. Alerts On Demand is the instant addition to the present alerts. A person just sends an appropriate code for the alert and gets the information he is wondering about at the moment, like for example a game score.

E-mail and internet on a mobile phone allows sending, receiving, and reading personal and business e-mails when necessary. With for example T- mobile's e-mail service, one can get unlimited access to up to eight personal e-mail accounts, (<http://www.t-mobile.com>, 29.01.2006). However, this service requires special mobile phone or handset, like for example BlackBerry. The M:Metrics report (<http://www.clickz.com/stats/sectors/wireless/article.php/3530886>, 03.02.2006) finds that

employed college students are 42 percent more likely to use mobile e-mail than the typical subscriber. That's 23 percent more likely than full-time workers.

Faxing is the last service in the group of messaging services. Norwegian TelenorMobil (www.telenor.no, 29.01.2006) offers its customers to receive faxes to the mobile phone anytime and anywhere. A person receives a SMS message announcing the arrival of new fax once somebody sends a fax to the person's mobile phone fax number. Then, the person can just print out the fax on the nearest printer.

The above mentioned services were services within messaging, also called communication services. Further down follow other types of services available through mobile phone:

Payment services involve paying for product and services with a mobile device. Karnouskos & Fokus (2004) define mobile payment as "any payment where a mobile device is used in order to initiate, activate, and/or confirm this payment". According to Wikipedia (http://en.wikipedia.org/wiki/Mobile_Payment, 03.02.2006) typical usage entails the user electing to make a mobile payment, being connected to a server via the mobile device, to perform authentication and authorization, and then being presented with confirmation of the completed transaction.

There are several ways of pursuing payment with mobile phone. One way is payment via SMS. Second is via electronic purse on mobile device the third way of payment is through charging telephone bill.

Karnouskos and Fokus (2004) predict bright future for mobile payment. As referred in their article, Wireless World Forum (www.w2forum.com) states that the size of the mobile Internet-based mobile payment market will grow from around US billion in 2002 to nearly US billion in 2006 and Global mobile commerce is predicted by Telecom Trends International (www.telecomtrends.net) to attract 1.7 billion users in 2008, who will use their mobile phone handsets to make an anticipated \$554 billion in transactions.

Mobile shopping services enables customers to shop wherever his or hers mobile phone is. To shop over the mobile phone, usually one has to send one SMS only. In order to shop through mobile phone, Norwegian TelenorMobil (<http://telenormobil.no/index.do>,

20.02.2006) requires every user to register their VISA card. Once this is done, one can buy for example cinema, concert, buss or plane ticket or playing money game, all via mobile phone.

Music and Sounds services offer wide range of ring tones, sounds, music and songs to choose from. Ring tones are easy to produce; they can easily be downloaded to the mobile phone from third party ring tone providers. These services have been very successful. According to Wilcox (2005: 87), ring tones account for around 90 percent of all network downloads to handsets. He also adds that ring tones services are highly successful mainly “due to everyone’s desire to be different in some small way and project a favourable image of themselves – fashionable, funny, etc.” The popularity of ring tones can be represented by revenues numbers which are projected to climb from \$417 million in revenues this year (2005) to over \$700 million by 2009, according to “US Ring Tone Forecast, 2004 to 2009,” a study released by Jupiter Research.

(<http://www.clickz.com/stats/sectors/wireless/article.php/3505981>, 03.02.2006).

Wallpaper allows people to decorate their own mobile phone. One can download artistic expressions, love themes, sports, or exotic locations to customize own phone. It is a way of expressing style, interest and taste. M:Metrics report finds working students to personalize content on their phones twice as often as other users.

(<http://www.clickz.com/stats/sectors/wireless/article.php/3530886>, 03.02.2006).

The popularity of **gaming services** increases. According to Forum NOKIA (2003), most analysts maintain that in 2001, the mobile games market produced around \$400 million in revenues globally and agree on that Asia (primarily Japan and South Korea) is responsible for 80 to 90 percent of current mobile games revenues, with Europe responsible for most of the remainder.

Forum NOKIA (2003) mentions five main ways of implementing games on mobile phone. The first one is Embedded Games. They come with the mobile phone when it is bought; they are already installed at the factory. Snake is the most famous example. No new games can be installed in addition to these. Popularity of embedded games is becoming less prevalent.

The second way of implementing a game on a mobile phone is SMS Games. They use SMS or SMS - extended MMS technology. SMS games are played by sending a message to a phone number that corresponds to the game provider's server, which receives the messages, performs some processing, and returns a message to the player with the results. Operators normally charge users a premium SMS fee. However, it can become slightly expensive for a game of any depth, since at least 10 exchanges with the server are required. (NOKIA, 2003).

The third way of implementing games of mobile phone is Browsing Games. These use Wireless Application Protocol (WAP) browser. WAP games are played by going to the game provider's URL (usually through a link on the carrier's portal), downloading and viewing one or more pages, making a menu selection or entering text, submitting that data to the server and then viewing more pages. WAP offers a friendlier interface than SMS, and is generally less expensive for consumers who pay for airtime only, rather than by the message. (NOKIA, 2003).

The fourth way includes J2ME and Other Interpreted Languages. This basically means downloadable games, usually coded in Java programming language. Here, the user agrees to pay a one-time fee to download and install the game on his/her handset. Java 2 Micro Edition (J2ME) is a form of the Java language that is optimized for small devices such as mobile phones and PDAs. It allows far better control over the interface than either SMS or WAP. (NOKIA, 2003).

The fifth way of implementing a game on a mobile phone mentioned by Nokia (2003) is C++ Applications. Mobile games can also be developed in C++ language. Compiled languages offer better control and greater speed for the same processing power. It enables rich, high-performance games. (NOKIA, 2003).

Compatibility with the existing technology is one issue faced by publishers of mobile games: "It is imperative that the publisher correctly identifies the handset, and not all games will work on all handsets," M:Metrics senior analyst, Seamus McAteer, told ClickZ Stats. "These issues stymie the ability to promote 'off deck.'"

(<http://www.clickz.com/stats/sectors/wireless/article.php/3568251>, 03.02.2006).

There are **other mobile services** available today and they include following: **Voicemail** is usually included in the mobile subscription. If the owner of the mobile phone is not available, the person calling can leave a voice message or telephone number. The owner gets an SMS message when somebody has left the message. **Directory enquiries** give access to the all telephone numbers from certain/all telecompanies in a particular area, extracted from a certain database. In Norway, TelenorMobil (<http://telenormobil.no/index.do>, 20.02.2006) gives access to telephone numbers from all telecompanies within the country, always updated. They can come in two forms, either as an SMS or as a WAP. **Video clips, or watching TV on mobile phone** is based on the establishment of a standard video telephony call to a server. The server answers the call with a video. These services are considered to be TV by the subscriber but they are actually download-on-demand video using dedicated bandwidth for that particular subscriber (Wilcox 2005).

2.2.3 Users pattern of mobile services

Hjorthol, Jakobsen, Ling, Nordbakke & Haddon (2005) say that statistics shows that there is a big variation in both age and gender when it comes to use of mobile services. Let us look at each of them.

Young people use text messages more than the old ones (Hjorhol et al 2005). According to Wilcox (2005), the success of mobile services has been enormous, especially for text messaging. It is common that school children write notes in the classroom and pass them to their friends. According to the Norwegian Forbrukerombudet (2004), children and youth are clearly the biggest users of mobile contact services. Table 2 illustrates this and shows the use of mobile phone among children and youth in years 2002 and 2003.

Age	Had mobile phone in 2002	Had mobile phone in 2003
7-9 years	8 %	16 %
10-11 years	46 %	58 %
12-13 years	84 %	89 %
14-15 years	89 %	96 %
16-17 years	97 %	100 %
20- 24 years	99 %	99 %

Table 2: Use of mobile phone among children and youth in 2002 and 2003
(Telenor Djuice, Per Christian Andersen. <http://www.dinside.no/php/art.php?id=107560>, Elisabeth Realfsen, 10.08.2004.)

Table 2 shows that every seventh 8- years old in Norway in 2003 owned a mobile phone and that 9 out of 10 13-years olds have their own mobile phone today. The proportion of mobile phone users is increasing in all age groups. The age where children get their own mobile phone for the first time is steadily decreasing (Hjorhol et al 2005). Table 2 also shows that only in one year, children ownership and the access to mobile phone increased substantially, especially for children at the age below 11. Moreover, it is worth noticing that everybody at the age between 16 and 17 possessed their own mobile phone in 2003. According to the CEO in Norwegian Telenor Djuice, Per Christian Andersen, this makes Norway to be the first country in the world where everybody in a certain population group has their own mobile phone. (<http://www.dinside.no/php/art.php?id=107560>, 10.08.2004).

Hjorhol et al (2005) also found out that children, whose parents got divorced, usually get mobile phone earlier than other children. In addition to this, social norms or normative pressure is an important reason to why children get mobile phones in such early age. The pressure is especially significant at the age of ten and eleven, and it results in the fact that a child gets a mobile phone although parents do not intend to buy it so early. Children are thus the main consumer segment and target group for the suppliers of mobile services.

Women use text messages more than men and young ones more than old ones (Hjorhol et al 2005). This can indicate generation differences when it comes to the use of SMS. However, among women at the same age, SMS is the preferred communication medium. Even though access to mobile phone is easier for men, and even though they use mobile communication more, Hjorhol et al (2005: 94) show that “use of SMS is more problematic for men than for women”. This is probably due to the fact that they use SMS services just as often as women, but their perception of the medium differs.

2.3 Summary

The recent research shows that there has been a significant growth in the number of users of both mobile technology and mobile services. Concerning mobile technology, the number of users in Norway went beyond the number of inhabitants in 2004. Concerning mobile services, MMS messages experienced the highest increase from year 2003 to 2004 in Norway.

There are plenty of mobile services being provided for use on mobile phones today. Types of services, price and quality varies among the service providers.

The statistics shows that there is a big variation in the use of mobile services concerning both age and gender. Average age for using mobile phone and mobile services is decreasing, and children and young people use the services more than the older ones. The usage pattern between men and women differs too.

3 Theory on adoption of technology and mobile services

In order to understand the processes behind the factors affecting consumers' intention to use and adopt mobile services, it is necessary to get a thorough understanding of the theory behind it. The theory on this topic is based on several models that have been developed gradually and built up on each another. In this chapter I will present such models and show how they can be used in the search for adoption of mobile services.

Theoretical models on user acceptance of information technology (e.g. mobile services) employ “intention to use” and “actual use” as the main dependant variables (Venkatesh et al 2003). Intention to use information technology as a predictor of behaviour (e.g. usage, adoption) has been well established in the literature (e.g. Ajzen 1991; Sheppard, Hartwick & Warshaw 1988⁶). Following figure 3 shows the basic concept:

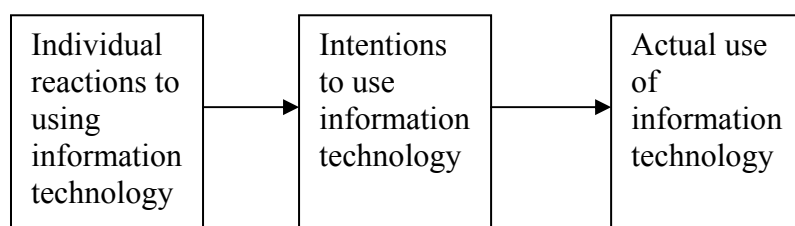


Figure 3: Theoretical model on user acceptance of information technology

Since intention to use information technology is a valid predictor of behaviour (use, adoption of technology), it is necessary to have a look at the theories that will explain more about behaviour and intention to use. There is a big variety of models that explains consumers' behavioural intentions and intentions to use technology. As for this paper, I will use following theories:

- Fishbein's multiattribute model towards object/behaviour (e.g. Shiffman & Kanuk 1994; Onkvisit & Shaw 1994), also called learning theory (Kassarjian & Robertson 1991)
- Theory of Reasoned Action (TRA; Fishbein & Ajzen 1975)
- Theory of Planned Behaviour (TPB; Ajzen 1991)
- Technology Acceptance Model (TAM; Davis 1989)
- Combination of models (Nysveen et al 2005a)
- Innovation diffusion theory (Rogers 1983)

3.1 Fishbein`s multiattribute model

This model suggests that a person`s attitude to any object/behaviour is based on individual`s belief about the object/behaviour and the evaluation of the object/behaviour.

Attitude towards object/behaviour = $\sum b_i \times e_i$, where:

- b_i is as belief component that expresses the probability that object/behaviour has a certain attribute i /consequence i . In other words, it is a belief that object possesses specific characteristics or that the behaviour has certain consequence.
- e_i is evaluation component associated with the attribute i /consequence i . This means the customer`s evaluation, liking or disliking, of the attribute i , or evaluation of the consequence of the behaviour.

Fishbein`s support for this statement comes from behavioural learning theory (Kassarjian & Robertson 1991: 325). The linkage was that “an attitude toward an object is more or less automatically learned as one learns about a new product, and that learning occurs in the form of beliefs about product attributes”.

This will in general mean that if a person is performing a behaviour believing it will have a positive outcome, he will have a favourable attitude toward it. If the person expects negative outcome, he will maintain a negative attitude toward it (Harrison et al 1997).

Based on this model, attitude towards object/behaviour can change when either evaluative aspect associated with an attribute i or consequence i changes, when strength of belief associated with an attribute i or consequence i changes or when attributes are added or removed.

There are two different ways how this model can be presented in research settings. These are known as weighted and non-weighted models. In empirical work, it is usual to use non-weighted models, which in this case means only taking consideration for evaluation component e_i . In other words, researchers focus only on consumers` evaluations of whether they like or dislike the attribute i .

3.2 Theory of Reasoned Action

Theory of reasoned action (Fishbein & Ajzen 1975) is an extension of Fishbein's multiattribute model to account for the relationship between attitudes and behaviour. TRA is intended to predict behaviour in situations where the customer controls his own behaviour and he is thoughtful about it. TRA states that the most important determinant of consumer actual behaviour is the intention to behave. The behavioural intention is affected by attitude towards behaviour and subjective norms, which are two new contributions to Fishbein's previous model. For graphical representation of TRA, please, refer to figure 4.

Attitude to behave is defined as "an individual's positive or negative feelings about performing the target behaviour" (Fishbein & Ajzen 1975: 216). Adding attitude towards behaviour as a new component means that in order to predict a specific behaviour it is necessary to measure person's attitude toward performing that behaviour, and not just general attitude toward the object at which the behaviour is directed (Kassarjian & Robertson 1991).

Subjective norms are defined as "the person's perception that most people who are important to him think he should or should not perform the behaviour in question" (Fishbein & Ajzen 1975: 302). Subjective norms are intended to account for social influences that the person's behaviour is exposed to. Thus, performing a particular behaviour is also influenced by other's opinions about the behaviour. And hence the intention to behave or to use technology would not be only determined by personal attitude towards the behaviour but will also be influenced by other's opinions about the behaviour. The rationale for direct effect of subjective norms on intention is that "people may choose to perform a behaviour, even if they are not themselves favourable toward the behaviour or its consequences, if they believe one or more important referents think they should, and they are sufficiently motivated to comply with the referents" (Venkates & Davis 2000: 187)

Subjective norms are further composed of two factors, namely normative beliefs and motivation to comply. Normative beliefs are beliefs of a specific referent about what a person should or should not perform. Normative beliefs are in other words beliefs about what others expect. Motivation to comply is a person's motivation to comply with normative beliefs, i.e. with the beliefs that other specific referents have.

Subjective norms = \sum normative belief x motivation to comply (Harrison et al 1997)

There are two different forms for TRA model distinguished. The one described so far is called non-weighted model. Weighted TRA model focuses on the relative strength of the links between attitude and intention and between subjective norms and intention. It also means that the model is not weighted or tested for motivation. It determines whether the formation of intention is primarily attitudinal or normative. The strength is denoted by w_1 and w_2 , respectively. If w_1 is greater than w_2 , then intention and behaviour are under attitudinal control; if w_2 is greater than w_1 the normative control prevails. The distinction between attitudinal or normative control can be of significance as it can help designing the proper approach to behaviour change strategies (Kasarjan & Robertson 1991). However, TRA model is usually used non-weighted.

Similarly to Fishbein's multiattribute model, in TRA the change in attitude can result in changing either evaluative aspect associated with consequence of the behaviour or changing the strength of belief associated with consequence of the behaviour. However, in TRA it can also be change in normative components (i.e. change in normative beliefs or in motivation to comply) that can be derived from this model.

Ryan & Bonfield (1980)⁷ support behavioural intentions as the determinants of the behaviour as they demonstrate predictive validity and external validity of the TRA model in a real-world marketing applications. In addition, TRA has been used to predict different behaviours (Sheppard et al 1988)⁸. Consequently, theory of reasoned action is one of the most influential theories of wide range of human behaviour (Vekantesh et al 2003). It suggests that attitude toward behaviour and subjective norms will determine intention to perform behaviour. And thus, it will be behavioural intention, rather than attitudes, that will determine actual behaviour.

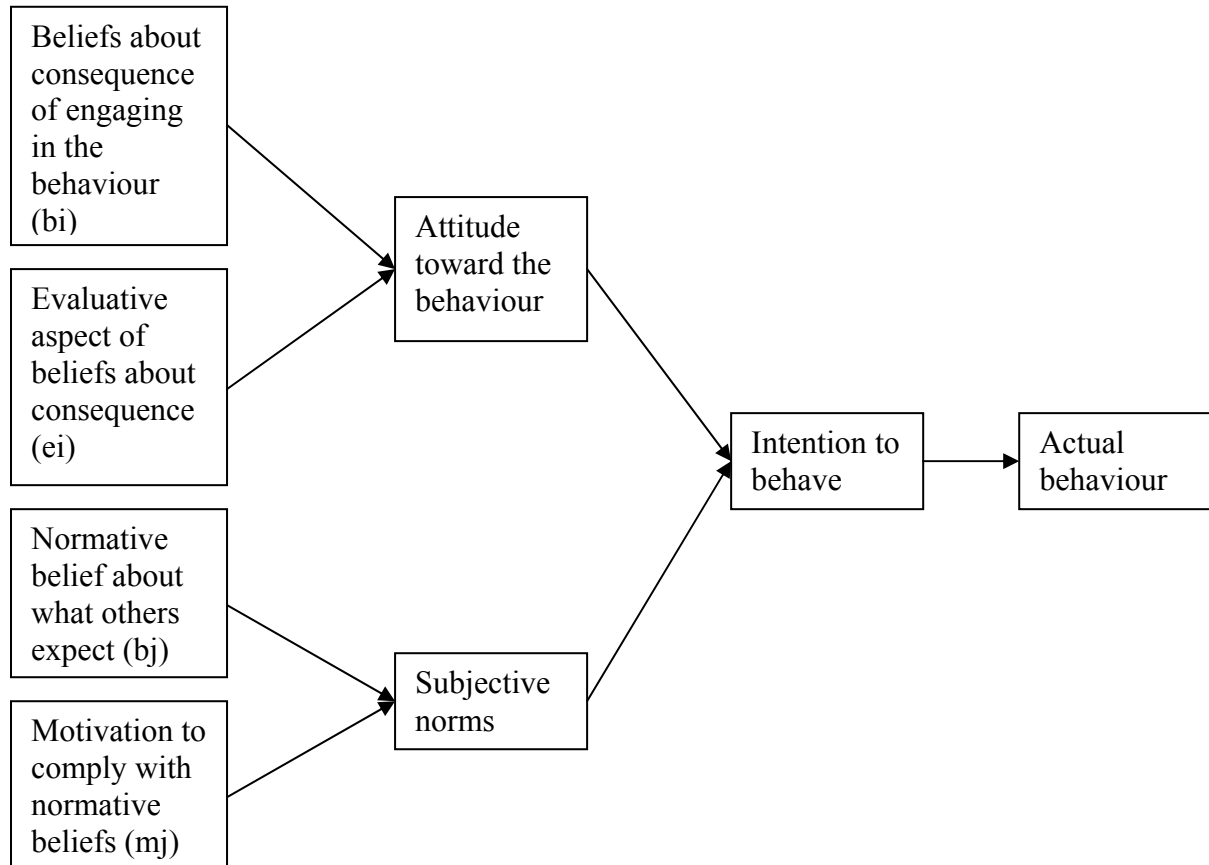


Figure 4: Theory of reasoned action (Kassarjian & Robertson 1991)

Figure 4 illustrates the fact that actual behaviour is a direct determinant of intention to behave. Intention to behave is in its turn positively determined by attitude toward the behaviour, which is composed of beliefs about the consequence of the behaviour and evaluation of the consequence of the behaviour, and by subjective norms, which are a function of normative belief and motivation to comply.

3.3 Theory of Planned Behaviour

Ajzen (1991) revises Theory of Reasoned Action and proposes an extension in form of perceived behavioural control in his Theory of Planned Behaviour (TPB) (please refer to figure 5). Perceived behavioural control is defined as “the perceived ease or difficulty of performing the behaviour” (Ajzen 1991: 188). Taylor and Todd (1995b:149)⁹ modify the definition of perceived behavioural control in context of Information Systems research (IS) as “perceptions of internal and external constraints on behaviour”.

Perceived behavioural control is included as an additional determinant of intentions and behaviour. It accounts for situations where people do not have a complete control over their behaviour. It says that the behaviour can be influenced by other factors than just the personal intention to perform the behaviour and other people's opinion about the behaviour (subjective norms) as it was in TRA. Such other factors refer to the amount of requisite opportunities and resources, such as time, money, skills and cooperation of others (Harrison et al 1997). The extent to which one possesses time, skills and money will determine intention to perform a particular behaviour (in this case to use and adopt a service) Thus, it is intention *and* the availability of resources and opportunities that jointly determine whether or not behaviour is performed.

Perceived behavioural control is further decomposed into control belief and perceived power. Control beliefs are beliefs about resources and opportunities that can be either part of a person's previous experience with the behaviour or can be influenced by second- hand information that increases or decreases the perceived difficulty of performing that particular behaviour (Ajzen 1988)¹⁰. Perceived power is the power of the particular control factor to facilitate or obstruct the performance of the behaviour.

Perceived control = \sum control belief x perceived power

As with the other models, perceived control can be either weighted or non-weighted. If not weighted, perceived- power- component of perceived control is not emphasized. In empirical work, it is common to consider perceived control as non-weighted.

Following figure 5 represents the theory of planned behaviour as a whole:

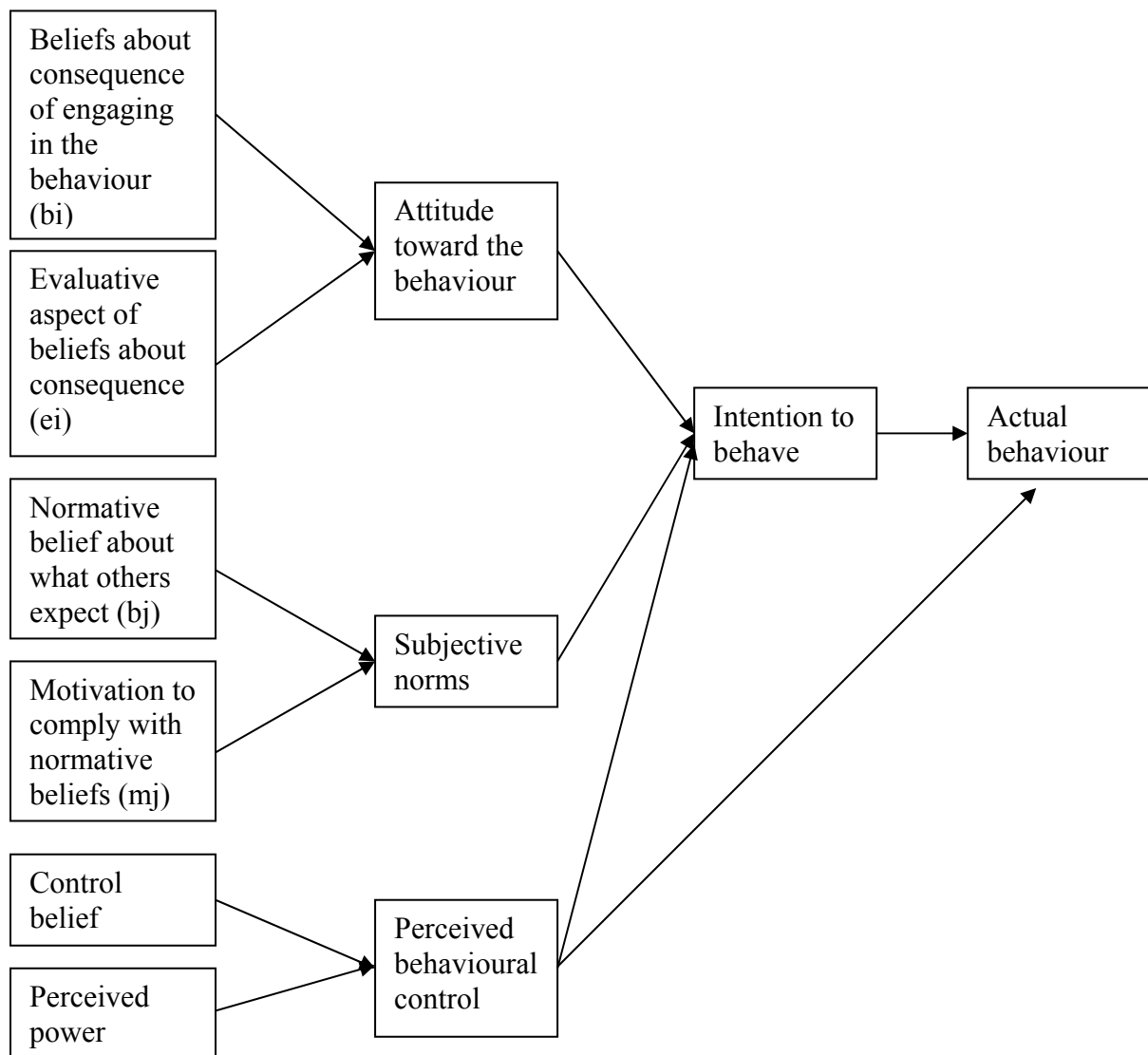


Figure 5: Theory of planned behaviour Ajzen (1991)

Ajzen (1991) shows that attitudes, subjective norms, *and* perceived behavioural control are all positively related to the intentions about the behaviour. Intention about the behaviour will thus predict the actual behaviour of a consumer.

Theory of planned behaviour has been used to predict intention and behaviour in variety of settings (Ajzen 1991)¹¹. It has been also successfully applied to acceptance and usage of many different technologies. For example Harrison et al (1997) summarise the wide range of settings: Schifter (1984)¹² used TPB to predict weight loss behaviour. Ajzen & Madden (1986)¹³ used it to predict college students' intentions to attend class and earn a good grade. Mathieson (1991)¹⁴ predicted a person's intention to use a specific information system. Taylor

& Todd (1995)¹⁵ used TPB to predict students' usage of computer resource centre. Hence, Harrison et al (1997) say that TPB has validity in broad settings.

3.4 Technology Acceptance Model

Several studies focusing on adoption of mobile services have their roots in Technology Acceptance Model (Davis 1989), that was originally designed to predict user's acceptance of information technology and usage on the job. TAM model has become the most widely applied model of user acceptance and usage (Ma & Liu 2004). Venkatesh & Davis (2000) claim that TAM has become well established as a robust, powerful and parsimonious model for predicting user acceptance.

TAM is grounded in the Theory of Reasoned Action (Fishbein & Ajzen 1975) and Theory of Planned Behaviour (Ajzen 1991). Numerous of research show that TAM consistently explains a substantial proportion of the variance (40%) in usage intentions and behaviour, and that TAM compares favourably with TRA and TPB (Venkates & Davis 2000).

The core of TAM lies in the hypothesis that intention to use a system is determined by two variables: perceived usefulness and perceived ease of use. Perceived usefulness is defined as "the degree to which a person believes that using a particular system would enhance his or her job performance" (Davis 1989: 320). Perceived ease of use is defined as "the degree to which a person believes that using a particular system would be free of effort" (Davis 1989: 320).

TAM theorizes that perceived usefulness and ease of use mediate the relationship between external variables, such as system characteristics, development process, training, and intention to use a system (Venkatesh & Davis 2000). Perceived usefulness and ease of use are hence user's beliefs on information technology and therefore form user's attitude toward technology which will, in turn, predict acceptance (intention to use technology); please refer to figure 6.

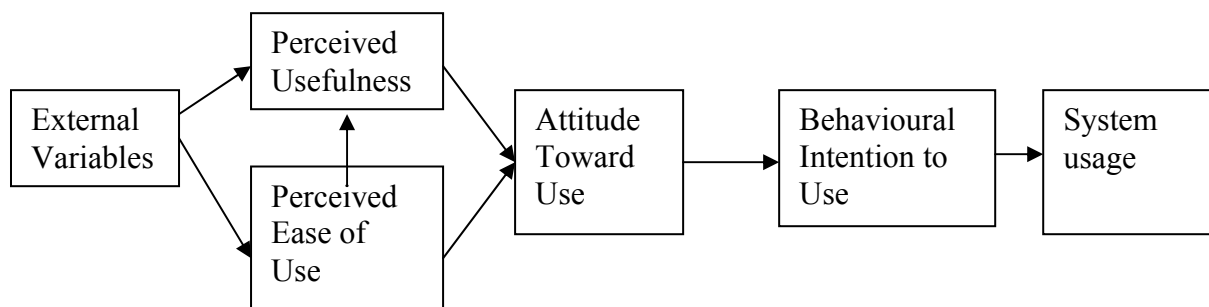


Figure 6: Technology acceptance model (Ma & Liu 2004)

The rationale behind these relationships is that technology that is easy to use, and is found to be particularly useful will have a positive influence on the intended user's attitude and intention towards using the technology. Consequently, the usage of the technology will increase (Taylor & Todd 1995)¹⁶.

In addition to this, after conduction of numerous experiments, Davis (1989) found out that overall, perceived usefulness was more correlated with the system usage than did perceived ease of use. He also suggested, after conducting a regression analysis, that perceived ease of use influences technology acceptance (usage of the system) via perceived usefulness, rather than directly. The reason for this is that the easier the system is to use the more useful it can be.

Venkates & Davis (2000) have extended the original TAM to TAM2 by including subjective norms as an additional predictor of intention to use technology. Reason for not including subjective norms in the original TAM in the first place was that Davis, Bagozzi & Warshaw (1989) found no significant effect on intentions over and above perceived usefulness and ease of use. However, they acknowledged that it was necessary to research further on "the impact of social influences on usage behaviour" (Davis et al 1989: 999)¹⁷.

The result of the study carried out by Venkatesh & Davis (2000) shows that subjective norms have significant direct effect on usage intentions. They hence confirmed that TAM2 provides a detailed evidence of the key forces behind perceived usefulness, while explaining 60 percent of variance in it. It thus shows that perceived usefulness, ease of use and subjective norms are important drivers of usage intentions.

Ma & Liu (2004) acknowledge that there have been about 100 studies done related to TAM between 1989 and 2001. TAM has been tested with different sample sizes, user groups, using different statistical tools, applied to many different user technologies and compared with different competing models (Gefen 2000)¹⁸. This had led to many divergent findings with many different explanations. Ma & Liu (2004) therefore carried out Meta- analysis of TAM in order to integrate all the findings and to generate a quantitative and objective synthesis. The result of their study confirmed Davis' original findings: Relationships between perceived usefulness and ease of use, and perceived usefulness and technology acceptance are strong,

while relationship between perceived ease of use and technology acceptance is weak. Thus, the relationship between usefulness and perceived ease of use cannot be ignored.

3.5 Combined Model

The above mentioned models create the ground for the determinants of consumers' behaviour when it comes to acceptance of technology and information systems, i.e. their intentions to use technology and information systems.

Although these models are very useful, Nysveen et al (2005a) suggest several extensions that may be relevant in explaining customers' intention to use *mobile services*. They try to integrate different models together to better predict adoption of mobile services.

Nysveen et al (2005a) list and sum up the suggestions for supplementing the original TAM model. Part of these theories comes from organisational context (information system theories- multiattributte, TRA, TPB, TAM) and some of them from everyday life context (gratification and domestication theories). Let us have a look on them.

Information system theories:

Nysveen et al (2005a) claim that TAM is most often used in job- related context and does not account for any costs for the user. However, customers' use of mobile service depends on the availability of resources as users of mobile services are usually charged for using them. Thus, it is necessary to account for situations which are beyond user's control. Situations like these are to be accounted for in TPB (Ajzen 1991) in form of perceived control, as it was mentioned before. The fact that customers themselves are charged for the mobile service makes TAM insufficient in everyday life context and thus must be extended by perceived control as there are other internal or external constrains on behaviour which are not accounted for in TAM.

Hand in hand with TAM2, Teo & Pok (2003) propose subjective norms as an antecedent of consumers' intentions to use mobile services. Subjective norms as a part of information system theories are used today to supplement the original TAM for social influence in form of other people's opinions (Venkatesh & Davis 2000).

Gratification and domestication theories:

It is necessary to extend TAM to account for situations where technology is used in everyday life context, not only in organisations where the original TAM has been most often used. Therefore, Nysveen et al (2005a) see it as reasonable to include nonutilitarian motives to explain consumers' intentions to use mobile services. These nonutilitarian motives used to explain intention to use mobile services have their roots in gratification and domestication research, respectively (Höflich & Rössler 2001; Leung & Wei 2000)¹⁹.

Gratification research considers users in everyday life rather than in organisational context. It suggests that users seek gratifications in media and technology use based on their individual "needs" and "motivations" (Lin 1996)²⁰.

Nonutilitarian motives that can be extracted from gratification studies include for instance enjoyment, fun seeking and entertainment. Enjoyment is defined as "the intrinsic reward derived through the use of the technology or service studied" (Igarria, Parasuraman & Baroudi 1996: 129)²¹. Hence, it will be also enjoyment, fun and entertainment that explain consumers' intention to use mobile services in addition to the factors included in TRA, TPB and TAM.

Domestication research (Silverstone & Hirsch 1992; Ling 2001 and Skog 2002)²² also focuses on individual users in everyday life rather than in organisational context. Studies by Höflich & Rössler (2001) and Leung and Wei (2000) suggest that expressiveness, as a means of displaying status, personality, fashion, style and image publicly can be done through the use of mobile services²³. Nysveen et al (2005a: 332) define expressiveness as "the degree to which users of mobile services perceive the services as suitable for expressing their emotions and social and or personal identity". Stryker & Burke (2000)²⁴ see expressiveness as peoples' perception of a mobile service's ability to express both social and personal identity dimensions.

This means that domestication studies further support expressiveness to be an important driver for intention to use mobile services.

All in all, Nysveen et al (2005a) were able to construct an integrated model (see figure 7), that explains customer intentions to use mobile services using information system theories, gratification and domestic theories. The final model includes the following adoption drivers:

perceived ease of use, perceived usefulness, social norms, perceived expressiveness, perceived enjoyment and perceived behavioural control.

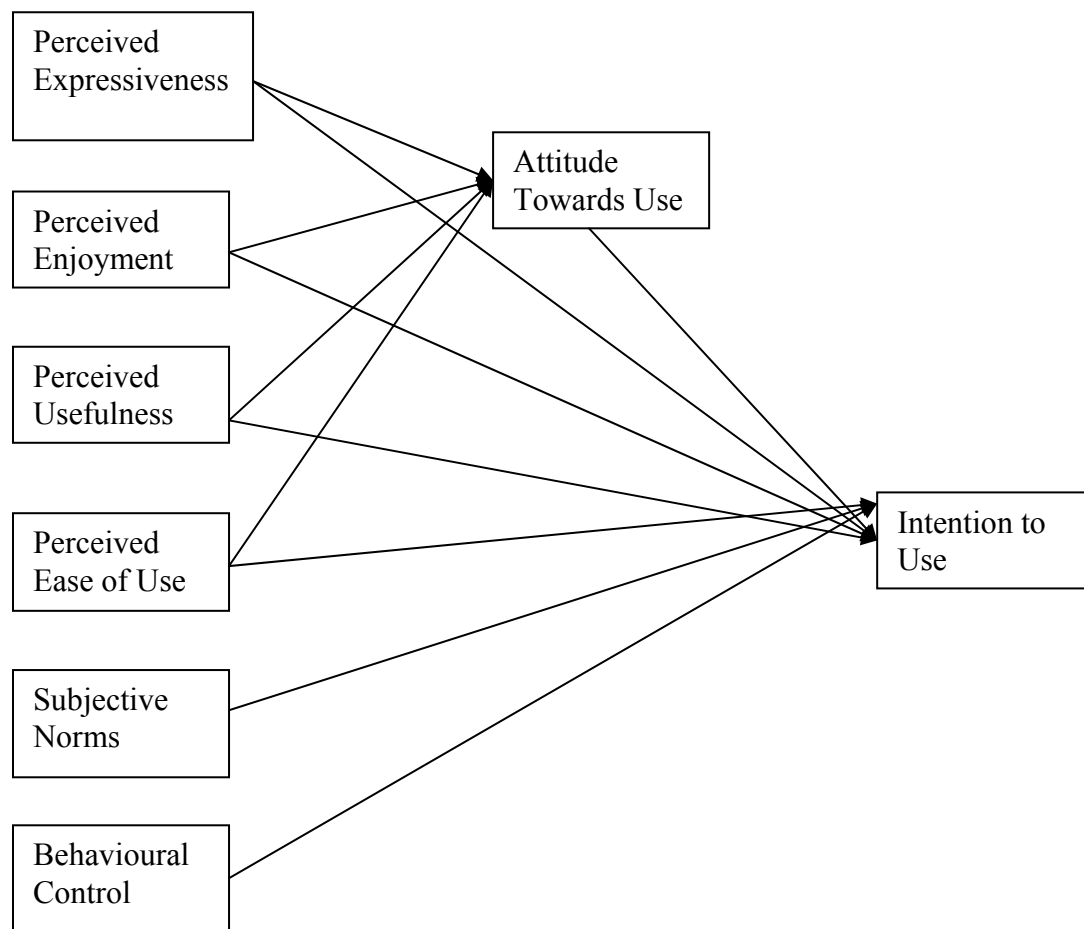


Figure 7: Combined model (Nysveen et al 2005a)

The results of Nysveen et al's (2005a) study confirm perceived usefulness, perceived ease of use and attitude toward use to be either direct or indirect determinants of mobile services' usage. Subjective norms and perceived control are further proved to be important antecedents of consumers' intentions to use mobile services. Perceived expressiveness and perceived enjoyment show the most promising and notable effect in the study. All the variables that were proposed to be the determinants of intention to use mobile services were significant (Nysveen et al 2005a).

3.6 Innovation Diffusion Theory

Innovation diffusion theory is another theory that explains acceptance of technology (Teo & Pok 2003).

In his book *Diffusion of innovations*, Rogers (1983: 233) defines innovation diffusion theory as “the process by which innovation is communicated through certain channels over time among the members of social system”²⁵. It conceptualizes the sequence of events where individual passes through initial point of basic knowledge of innovation, through forming a favourable or unfavourable attitude toward it, through a decision to either adopt or reject it, and through utilization of innovation to finally seeking reinforcement of the adoption decision made (Rogers 1983)²⁶. The key elements of this process are innovation, communication channels, time and social systems or innovation’s perceived characteristics, the individual’s attitude and belief, and communication received by the individual from his social environment (Karahanna, Straub & Chervany 1999)²⁷.

Rogers (1983) considers five attributes of innovation which influence the adoption of innovations, refer to figure 8. This approach, according to Rogers (1983), has been widely used for many years. He claims that the five attributes are somewhat empirically interrelated with each other, but at the same time, they are conceptually distinct. The selection of particularly these five attributes is based on past research. The five attributes are following: relative advantage, compatibility, complexity, trialability and observability.

Relative advantage is “the degree to which innovation is perceived as being better than the idea it supersedes” (Rogers 1983: 213). The degree of relative advantage can be expressed in, for example, economic profitability or in status giving. Research scholars have found out that relative advantage is one of the best predictors of an innovation’s rate of adoption and that it is positively related to it. The reason for this is that when individuals or organisations pass through innovation process, they are motivated to seek information in order to decrease uncertainty about the relative advantage of an innovation. Potential adopters want to know the degree to which a new idea is better than an existing one (Rogers 1983). As already mentioned in chapter 1, relative advantage from Rogers’ (1983) model can be associated with perceived usefulness from Nysveen et al’s (2005a) model.

Compatibility is “the degree to which an innovation is perceived as consistent with the existing values, past experiences and needs of potential adopters” (Rogers 1983: 223). The more compatible idea will be less uncertain to the potential adopter. Hence, compatibility has a positive direct effect on rate of adoption of innovations. Some analyses show compatibility to be of relatively less importance in predicting rate of adoption than other attributes. Innovation

can be compatible or incompatible with sociocultural values and beliefs, with previously introduced ideas, or with clients needs for innovation. The concept of compatibility does not directly overlap with any of the variables from Nysveen et al's (2005a) model. Thus, it makes it an interesting variable to focus on in this paper.

Complexity is “the degree to which an innovation is perceived as relatively difficult to understand and use” (Rogers 1983: 230). Rogers suggest that the complexity of an innovation is negatively related to its rate of adoption. The reason for this is that the less difficult the innovation will be to understand and use, the less complex it will be perceived. Thus, the rate of adoption will be higher. Complexity from Rogers' (1983) model can be related to perceived ease of use from Nysveen et al' (2005a) model.

Trialability is “the degree to which an innovation may be experimented with on a limited basis” (Rogers 1983: 231). The ideas that can be tried will be, according to Rogers, adopted more rapidly than innovations that have not been tried. Roger and other researchers (e.g. Singh 1966, Fliegel & Kivlin 1966a)²⁸ support the fact that trialability is positively and directly related to the rate of adoption of innovations.

Observability is “the degree to which the results of an innovation are visible to others” (Rogers 1983: 232). The more visible the innovation is to others, the faster the adoption of the innovation will be. This is the reason why Rogers suggest the positive relation between observability and adoption rate.

Rogers claims (1983) that these five attributes explain 49 to 87 percent of the variance in the rate of adoption. Figure 8 below summarises Rogers' findings.

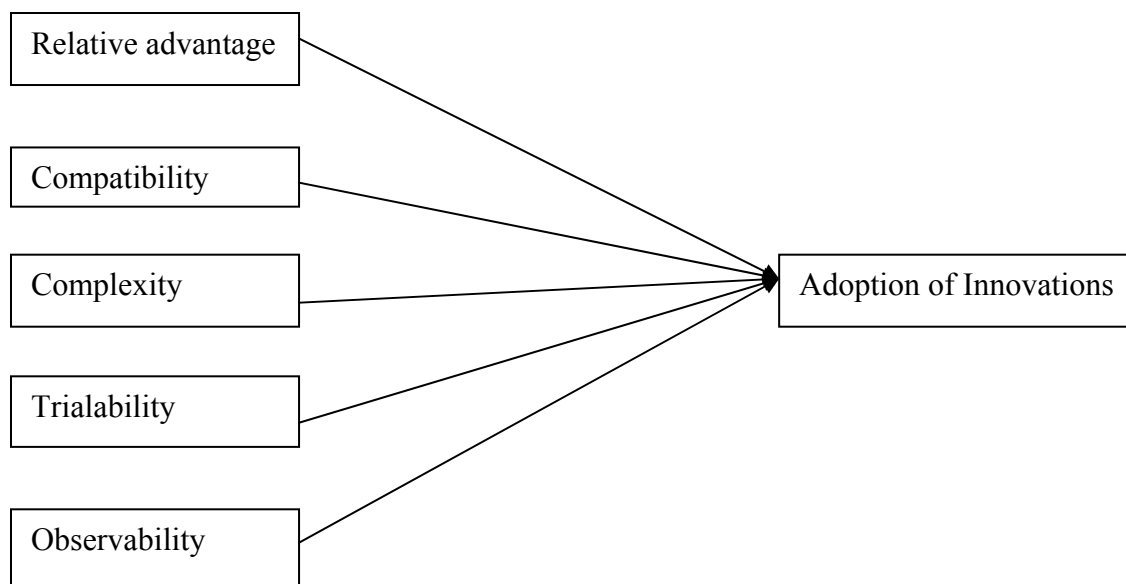


Figure 8: Drivers of adoption of innovations (Rogers 1983)

According to Rogers (1983), all five factors underlying the rate of adoption of innovation, except complexity, will have positive and direct effect on the rate of adoption of innovations. Complexity is, according to Rogers, negatively related to it. However, Tornatzky & Klein (1982)²⁹ found out that, of all of them, it was only relative advantage, compatibility and complexity that were consistently related to adoption *decisions*.

It is interesting to see, how certain aspects from Rogers' model relate to intention to use mobile services when combined with the driver of adoption from the combined model. Therefore, as already mentioned in the introduction, I will, in this paper, further develop Nysveen et al's (2005a) model with consideration of compatibility as one of the determinants which influence the intention to use mobile services, due to the fact that compatibility is the only variable that does not directly overlap with the variables from the combined model. Hence, compatibility has the potential for the most unique explanation in this paper.

3.7 Studies on the adoption of mobile services

In addition to the models and studies done on intention to behave and to use technology, there are some studies that have focused specifically on intention to use mobile services. Here, I will give a short overview over some of these studies. At the end of the chapter, I will summarize the findings from the studies presented here.

3.7.1 Concept of Adoption of mobile services

Rogers (1983 3: 21) defines adoption as “a decision to make a full use of an innovation”. In my case, this means actual use of mobile services. Davis (1989) adds also attitude toward use and intention to use as the factors influencing the adoption.

Attitude towards use has been defined by Fishbein & Ajzen (1975: 216) as “an individual’s positive or negative feelings about performing the target behaviour”.

In their theory of reasoned action, Fishbein & Ajzen (1975: 288) define behavioural intention as one’s intention to perform a specific behaviour. This definition creates a basis for intention to use, which was later on extended by Davis (1989) to intention to use technology. Nysveen et al (2005a) use further intention to use mobile services as a surrogate measure on the adoption of mobile services. Since the most of the authors use “intention to use”, this is the reason why I will use intention to use mobile services as a measure of adoption of mobile services as well. In this way, this paper becomes more comparable to the previous research.

3.7.2 Study 1: Nysveen, Pedersen & Thorbjørnsen (2005a)

The background for this model has been given in chapter 3.5. As already mentioned, Nysveen et al (2005a) developed original TAM model with some additional variables. Nysveen et al (2005a) aimed to explain consumers’ intentions to use mobile services. The results of the study show strong support for the effects of motivational influences (usefulness, ease of use, enjoyment and expressiveness), attitudinal influences (attitude), subjective norms and perceived control on consumers’ intentions to use mobile services. In other words, results confirm perceived usefulness, perceived ease of use and attitude toward use to be either *direct* or *indirect* determinants of mobile services usage. Subjective norms and perceived control are further proved to be important *direct* antecedents of consumers’ intentions to use mobile services. Perceived expressiveness and perceived enjoyment show the most promising and notable effect in the study. All the variables that were proposed to be the determinants of intention to use mobile services were significant.

In addition to this, they also found that process characteristics (goal oriented vs. experiential services) associated with the mobile services moderated some of the effects between the drivers of adoption and the intention to use mobile services. For goal- oriented services, such as SMS and payment via mobile phone, perceived ease of use and perceived control were

found to be especially important, while for experiential services (chat and game on the mobile phone) it was perceived expressiveness and perceived enjoyment that were important.

3.7.3 Study 2: Nysveen, Pedersen & Thorbjørnsen (2005b)

In another article, Nysveen et al (2005b) researched on how gender moderates the intention to use mobile chat services. Almost the same extended adoption model based on TAM was used as in their previous study, except that behavioural control was not included in the model this time. The results show that social norms and intrinsic motives such as enjoyment are important determinants of intention to use mobile services for female users. For male users, it was extrinsic motives such as usefulness and surprisingly expressiveness that were the key drivers for intention to use mobile chat services. Ease of use and attitudes did not have different effects across genders.

3.7.4 Study 3: Lexhagen, Nysveen & Hem (2005)

Lexhagen, Nysveen & Hem (2005) looked at which factors influenced intention to use mobile devices for coordination of a festival among festival staff. This study used Davis' technology acceptance model, too.

The results of the study reveal that perceived enjoyment, attitude towards using the technology, and perceived usefulness (indirect through attitude) are the main determinants for intention to use the mobile coordination service.

3.7.5 Study 4: Hung, Ku & Chang (2003)

Hung, Ku & Chang (2003) researched the topic of adoption of mobile services, too. They looked on how WAP services are adopted and which factors drive the intention to use WAP services in particular. In their study, they used theory of planned behaviour and innovation diffusion theory as a theoretical background. They claim that TPB effectively explains individual intentions and behaviour in adopting new information technologies.

The result of the study indicates that connection speed, user satisfaction, personal innovativeness, ease of use and usefulness determined intention to use WAP services indirectly through attitude. Peer influence was revealed to determine intention through subjective norms, and self efficacy determined intention to use WAP services through perceived behavioural control. Attitude, subjective norms and perceived behavioural control were all critical factors influencing the use of mobile WAP services. However, attitude and

subjective norms determined use of mobile WAP services indirectly through intention to use. Perceived behavioural control did not get support in determining intention to use in this study. Perceived behavioural control determines use of mobile WAP services only directly.

3.7.6 Study 5: Teo & Pok (2003)

In their paper, Teo & Pok (2003) examined the factors influencing the adoption of WAP – enabled mobile phones among Internet users. This study, similarly to the previous ones, used theory of reasoned action, theory of planned behaviour, technology acceptance model, and innovation diffusion theory as a theoretical basis, since it attempted to explain intention of certain behaviour and adoption of certain technology.

The results confirm the same as in Hung et al's (2003) study, namely that it is attitudinal factors and subjective norms, rather than perceived behavioural control, that influence intention to use a WAP – enabled mobile phone. Specifically, perception of relative advantage, risk and image were found to influence adoption intentions. Teo & Pok (2003) revealed that in addition to this, reference groups, too, play an important role in determining usage intentions.

Due to a common feature, it is interesting for this paper to see that Teo and Pok (2003) also examined the effect of compatibility on the usage intentions when forum sample and e-mail sample was used. They found out that compatibility for e-mail sample had a significant effect on the usage intention, but indirectly through attitude.

3.8 Summary of the results used in adoption studies

Below follows table 3 summarising the variables that were found to have significant influence of the intention to use mobile services. These are denoted by *.

Study	Perceived expressiveness	Perceived enjoyment	Perceived usefulness	Perceived ease of use	Subjective norms	Behavioural control	Attitudes
Study 1	*	*	*	*	*	*	*
Study 2	*	*	*	*	No effect	Not included in the model	*
Study 3	Not included in the model	*	*	No effect	Not included in the model	Not included in the model	*
Study 4	Not included in the model	Not included in the model	*	*	*	No effect	*
Study 5	Not included in the model	Not included in the model	Not included in the model	No effect	*	No effect	*

Table 3: Summary of significant variables in research on intention to use mobile services

Table 3 shows that attitudes toward intention to use mobile services have been significant in all studies. Perceived expressiveness, perceived enjoyment and perceived usefulness were all significant in the studies where they were included as independent variables. Subjective norms were not significant predictors of intention to use mobile services only once, whereas behavioural control and perceived ease of use were not significant determinants twice.

4 Service characteristics and Information intensity

4.1 Service characteristics

Researchers have provided substantial amount of publications which conceptualize characteristics which distinguish products from services. The most frequently cited features include intangibility, heterogeneity, simultaneity and perishability (e.g. Zeithaml, Parasuramen & Berry 1985; Lovelock & Gummesson 2004 and Johnne & Storey 1998).

Intangibility concerns the fact that services are performances, and therefore they cannot be seen, felt, tasted, or touched in the same manner in which goods can be sensed (Zeithaml et al 1985). Intangibility, according to Bateson (1979)³⁰, is the critical goods-services distinction from which all other differences emerge.

The quality and the performance of each service can vary from producer to producer, from consumer to consumer, or from time to time. This **heterogeneity** involves potential for high variability and is unique for services rather than products. “Many different employees may be in contact with an individual customer, raising a problem of consistency of behaviour” (Langeard, Bateson, Lovelock & Eiglier 1981: 16)³¹.

Simultaneity refers to inseparability of production and consumption, i.e. the simultaneous production and consumption of services. The process for goods is usually as follows: first production, second selling and then consumption. For services, the sequence is otherwise: services are first sold, then produced and consumed simultaneously, since the customer is present during the production of many services (haircuts, pizza home delivery, train trips. Simultaneity “forces the buyer into intimate contact with the production process” (Carmen & Langeard 1980: 8)³².

There are multiple perspectives on the meaning and implications of **perishability** (Lovelock & Gummesson 2004). However, perishability commonly states that services cannot be saved, stored for reuse at a later date, resold, or returned (e.g. Zeithaml et al 1985). Due to perishability of services, the problem of synchronization of supply and demand can occur. Sometimes too much demand exists and sometimes too little demand exists (Zeithaml et al 1985).

Less cited, but still valid is a characteristic mentioned by Miles (2004). He provides **information intensity** as another characteristic which distinguishes between services and goods in addition to the ones mentioned above. The reason for inclusion of information intensity as a necessary service characteristic is, according to Miles, the potential for both service effectivization and added value that lies in the informatization of services (Miles 2004)³³.

Since information intensity as a service characteristic has not been studied that much and because Miles (1994) attaches such importance to this variable, I will use this particular variable in my study.

It has been a traditional underlying paradigm in service marketing since 1980s that intangibility, heterogeneity, simultaneity and perishability are the characteristics that strictly differentiate between products (goods marketing) and services (service marketing) (Lovelock & Gummesson 2004). However, Lovelock & Gummesson (2004) claim that this paradigm has been deeply flawed recently. They see a need for reconsideration of this paradigm due to major changes in the service sector the past 20 years (for example automatisisation, outsourcing, advances in information technology and telecommunication, internet, and digitalisation) and because of immense variation along each of these characteristics within particular service. Therefore, it cannot be said any longer that these 4 characteristics distinguish uniquely between products and services.

Pedersen (2005) claims that service characteristics influence service development process (innovation process). Since the adoption is basically innovation taken in use, service characteristics would therefore influence adoption process as well. He describes different ways service characteristics can influence innovation (and thus adoption). One is the way processes are accomplished in and the characteristics that signify it. The other way is how successful different processes are. In the first case, service characteristics are independent determinants of innovation process. In the second case, service characteristics moderate the relationship between the drivers of innovation and the result. The last case is about how effective different types of processes are for services with different service characteristics. De Brentani (1991)³⁴ says that these relationships are not only valid for process characteristics, but can also be used for innovation types. Van der Aa & Elfring (2002)³⁵ claim that it is more probable that service characteristics are important for types of innovations that a man can

carry out and the degree of success for these than for the process characteristics in general. They add to this that service characteristics are crucial for the degree of success for organisation innovations and technological innovation.

Pedersen (2005: 24) assumes that service characteristics *moderate* the relationship between the variables. Since this is a little investigated topic, I will therefore focus on how information intensity as a service characteristic *moderates* the relationship between the drivers of adoption of mobile services and the intention to use mobile services in this paper.

4.2 Information intensity

Before I start to discuss different handling of information intensity concepts in the literature, I need to define which one of the different notions of information intensity I will use in this paper.

I have chosen the definition provided by Apte, Beath & Goh (1999). Despite little relevance of their paper to the adoption of mobile services, they provide the definition for information intensive services, which has relevance to the topic discussed in this paper. They define information intensive services as “those services that mainly involve collection, processing, and dissemination of information” (s.1106). I will use this specific definition as a basis for information intensity of services throughout the paper.

Let us have a look on different use of notion of information intensity in the present literature.

Palmer & Griffith (1998) claim that the foundation of information intensity is given by McFarlan (1984) and Porter & Millar (1985). In their article, Porter & Millar (1985) indicate that products and their value chains are no longer tangible. Instead, due to expanding informational component of market offerings, logistics, operations, marketing and services supporting value chains have also been a part of increased information flow across the chain of operations. This, in other words, means that information component of existing products increases in its importance.

McFarlan (1984) shows that new information technology can be seen as a means of companies' competitive advantage, as information systems can create barriers to entry, to build in switching costs, change balance of power in suppliers relationships, generate new

products and generally, change the basic rules of competition. However, Porter & Millar (1985) add to this that managers must understand that information technology is more than just computers. It is important to conceive IT as the information that the businesses create and use.

An important concept that highlights the role of information technology is the “value chain” (Porter & Miller 1985). As the result of the above mentioned, IT is a driving force in the value chain. The effect of IT on value chain and thus on competition can be summarized by the following statement: “Information technology is permeating the value chain at every point, transforming the way value activities are performed and the nature of linkage among them. It also is affecting competitive scope and reshaping the way products meet buyer needs.” (Porter & Millar 85: 151). This explains why information technology has acquired such a strategic importance.

Further reason, stating the importance of studying information intensity, can be illustrated by the following statement: “Differing market situations, as indicated by the interaction of information intensity and this new technology suggest different potentials for product and service branding...” (Palmer & Griffith 1998: 40). The fact, that understanding information intensity and new technology creates potentials for service branding is another reason why I focus on information intensity in this paper.

Glazer (1991) looks at marketing in information intensive environment. He constructs a framework for understanding information and information technology’s impact on marketing. Then he develops a way to measure the value of information which can be used to categorize firms according to their level of information intensity. Based on this categorisation he presents some propositions on how the level of information intensity influences some components of a firm strategy and organisational structure. He concludes with the following argument: “Technology- induced expansion in information- processing capacity has led to the emergence of information/knowledge as an asset to be managed and that, in turn, the inherent characteristics of the information “commodity” are having profound impact on a wide range of strategic and structural variables” (Glazer 1991: 16).

Apte et al (1999) have studied information intensive services but from another perspective than in relation to intention to use services. They looked on how production line versus the

case manager approach affects information intensive services. They found out that for information intensive services, such as banking, insurance and software development, case manager approach is well and more suitable in today's market place as it is enabled by more sophisticated information technologies and because it can deliver customized service with better quality customer service and shorter cycle times.

Due to the facts that information component of existing products increases in its importance, that information is nowadays seen as companies' competitive advantage and because information intensity and new technology creates potential for service branding, it is important to include information intensity as a moderating variable in this paper.

5 Hypothesis and research model

In order to study consumers' intention to use mobile services, I will in this chapter construct a model that builds on the past research, gaps in the research, and the objectives that I want to reach in this paper. Hence, I will postulate hypotheses for both direct effect of the antecedents of usage intentions and for the moderating effects of the information intensity on the relationship between the proposed antecedents and usage intentions.

5.1 The direct effect on the adoption of mobile services

5.1.1 Perceived Ease of use

Based on the definition of perceived ease of use, a person will perceive a service as easy to use when it won't require any extra efforts from him.

In their meta-analysis of the relationship between the characteristics of an innovation and its adoption, Tornatzky & Klein (1982)³⁶ find complexity, among other variables, to have the most consistent significant relationships across a broad range of innovation types. Davis (1989) claims that complexity, defined by Rogers & Shoemaker (1971: 154)³⁷ as “the degree to which an innovation is perceived as relatively difficult to understand and use”, parallels perceived ease of use quite closely. The reason for this is that the less complex the innovation is, the easier it will be to use. In addition to this, Davis (1989) claims that an application which is perceived to be easier to use than another is more likely to be accepted by users. Hence it follows that the less complex system or service is, the easier it will be for the users to use a service, the less effort it demands, and therefore the higher the probability for the user to use the service.

Thus perceived ease of use, in addition to be an antecedent of perceived usefulness, predicts the end-user's beliefs on a technology and therefore predicts his attitude toward the technology, which in turn predicts its acceptance (e. g. Ma & Liu 2004; Davis et al 1989; Venkatesh & Davis 2000). Hung et al (2003) showed that perceived ease of use influences intention to use mobile services positively. I therefore postulate the following hypothesis:

Hypothesis 1: Perceived ease of use has a direct positive effect on intention to use mobile services.

5.1.2 Perceived usefulness

It follows from the definition of perceived usefulness that people will consider a system to be useful when it enhances their job performance. A system high in perceived usefulness, in turn, is one for which a user believes in the existence of a positive use-performance relationship (Davis 1989). Within an organizational context, people are generally reinforced for good performance by raises, promotions, bonuses, and other rewards (Pfeffer, 1982; Schein, 1980; Vroom, 1964)³⁸.

Davis (1989) supports the hypothesis that perceived usefulness is a direct determinant of customers' intentions to use technology. The rationale behind this is that if the system or service will enhance person's job performance it will be considered as useful and thus a person will have higher incentive to use system or service as it helps to gain positive use-performance relationship.

Doll, Hendrickson & Deng (1998: 847)³⁹ have somewhat modified these definitions in order to make them fit systems that are not directly job-related. They reason that systems will be useful in general if they "contribute to accomplishing the end-user's purpose" or "to which a potential adopter views the innovation as offering value over alternative ways of performing the same task" (Agarwal & Prasad 1999: 365)⁴⁰. These modifications for not-job-related systems, therefore, make the technology acceptance model relevant for studying adoption of mobile services too.

The argument for the direct effect of perceived usefulness on the usage intentions for non-job related situations can be then summed up as following: As long as the system, or mobile service, contributes to consumer's accomplishment of a certain purpose or if the customers feels that when performing the same task, this system or service will give him higher value or satisfaction, then the system or service will be perceived as useful. In this way, a person will have higher incentive to use system or service as it helps to accomplish certain task and gain positive value and satisfaction. Hence, perceived usefulness will lead to positive usage intentions. Thus, in accordance with TAM, I postulate following:

Hypothesis 2: Perceived usefulness has a direct positive effect on intention to use mobile services.

5.1.3 Subjective norms

Based on the theory of reasoned action, Venkatesh & Davis (2000) supplement the original TAM model with concepts such as subjective norms. They explain the rationale behind the direct relationship towards intention to use a mobile service in lines with that a person can choose to perform behaviour or consequences of the behaviour based on the perception referents who are important to him think he should or should not do and if the person is sufficiently motivated to comply with the referent's opinion. Thus, if the referents think that the person should use a service, the person will do so if the referent is important to him, even if he is not himself favourable towards the usage. Venkatesh & Davis (2000) find subjective norms to have a direct positive effect on intention to use the service, and Teo & Pok (2003) reveal the importance of subjective norms on intention to use mobile services. Therefore:

Hypothesis 3: Subjective norms have a direct positive effect on intention to use mobile services.

5.1.4 Perceived Expressiveness

Leung & Wei (2000) and Höflich & Rossler (2001) confirm that gratifications that users get from using mobile services are in area of sociability, fashion and status, respectively. This indicates that the use of mobile services can serve as a way of expressing personality, status and image in a public context (Nysveen et al 2005a). Thus, when the users of mobile services are able to express personality, status or image by a service, the probability for using the particular service will be higher, as it contributes to higher perceived expressiveness. Hence, the direct link between expressiveness and intention to use of mobile service can be confirmed. There is a fair amount of domestication research (e.g. Ling 2001; Skog 2002)⁴¹ that further supports this direct link. I can therefore postulate:

Hypothesis 4: Perceived expressiveness has a direct positive effect on intention to use mobile services.

5.1.5 Perceived Enjoyment

Gratification studies (Höflich & Rössler 2001) indicate that among others, enjoyment is a significant factor influencing intention to use mobile services. The rationale behind this link is that when the mobile service leads to intrinsic reward it will enhance enjoyment, and hence there will be higher probability that the person will use this service. This claim is also

supported by the empirical results from the study of Nysveen et al (2005a), where perceived enjoyment was proven to be an important antecedents of usage intentions and had a significant effect on all services that had been studied (SMS, contact services, payment services, gaming services). Thus, it is reasonable to suggest:

Hypothesis 5: Perceived enjoyment has a direct positive effect on intention to use mobile services.

5.1.6 Perceived behavioural control

As already mentioned, TPB says the extent to which one has skills and money to perform particular behaviour (Harrison et al 1997) and the confidence in own ability to perform the behaviour (Ajzen 1991) is called perceived behavioural control. Thus, it is the availability of resources and opportunities, in addition to other factors, that would determine the intention to use the service.

The rationale behind the direct link to the intention to use mobile services is that “holding intention constant, the effort expended to bring a course of behaviour to a successful conclusion is likely to increase with perceived behavioural control” (Ajzen 1991: 184.) In other words, if a person has resources or abilities to use mobile services, *ceteris paribus*, he will experience greater control, and thus the probability for using the service will be higher. Therefore:

Hypothesis 6: Perceived behavioural control has a direct positive effect on intention to use mobile services.

5.1.7 Compatibility

Rogers (1983) splits compatibility into the three following categories: Compatibility with values and beliefs, compatibility with previously introduced ideas, and compatibility with needs. As originally intended in this paper, compatibility was meant to be measured by each of these components. However, a problem concerned this was encountered. I have not found any appropriate scale for measuring all these variables. The only available way to measure compatibility was based on Slyke et al (2004). However, the content of notion compatibility was here perceived more as “compatibility with lifestyle” rather than anything else. Thus, it

became clear that it will not be possible to test the effect of all three compatibility variables. Hence, I would use notion of “compatibility with life style” as the approach in this study.

Rogers (1983: 223) considers compatibility to be one of the determinants which influence the adoption of innovations, such as for example new mobile services. He claims that “an idea that is more compatible is less uncertain to the potential adopter”. Dissonance or incongruence in the mind of a consumer, which can occur when ideas are incompatible, would be smaller and thus the probability to use a service would be higher. Therefore the direct link between compatibility and intention to use mobile services is positive.

Hypothesis 7: Compatibility has a direct positive effect on intention to use mobile services.

5.2 Moderating effects of information intensity on independent variables

In this section, some of the moderating effect of information intensity on the relationship between the drivers of adoption and intention to use mobile services will be proposed. The appropriate hypotheses will be suggested where potential effects are assumed to exist. I expect that effects will not appear for all independent variables, and hence only variables where I believe effects are to be found will be described in this chapter.

5.2.1 Perceived ease of use

Low information intensive services, based on definition of information intensive services, would not require information at all or would require less amount of information, less information collection and/or less information processing. This would mean that a consumer would perceive the service as less complex and it would require less effort from him to use the service. Hence, the service would be perceived as easy to use and intention to use the mobile service would be higher.

Information intensive services would indicate higher efforts when collecting the information and/or processing it. This could in its turn lead to lower perceived ease of use as it would require exertion of higher efforts from the person. Thus, when information intensive services are involved, ease of use becomes more insurmountable and therefore more prominent to consider. In this way, ease of use becomes a central driver for decisions about the adoption of the service. Ease of use will then have a stronger positive effect on intention to use than for services with a low level of information intensity.

Hypothesis 8: The positive effect of perceived ease of use on the intention to use mobile services will be stronger for services with higher degree of information intensity than for services with low degree of information intensity.

5.2.2 Perceived Enjoyment

When it comes to perceived enjoyment, I would expect that this variable is significant for services with a low level of information intensity. Low information intensive services are not meant to collect neither to process any big amounts of data, they thus do not require much cognitive efforts, neither they offer high intellectual challenge. One could hence say that these services are not meant to reach any particularly ambitious goal. Nysveen et al (2005a) showed that perceived enjoyment is stronger for experiential services like for example game.

Therefore, low information intensive services could alternatively be used for fun and relaxing (as game on the mobile phone, for example, demonstrates). In other words, game on the mobile phone as low information intensive service is experiential type of service and service is hence used for enjoyment. It follows then that information intensity will have a negative influence on the relationship between perceived enjoyment and the intention to use mobile services.

Hypothesis 9: The positive effect of perceived enjoyment on intention to use mobile services will be stronger for services with lower degree of information intensity than for services with high degree of information intensity.

5.2.3 Perceived behavioural control

High information intensive services require collection and processing of large amount of information. In order to collect and process this information properly, it is desirable that a person managing the data has certain skills or resources to accomplish this task successfully. In other words, a person should have control over the behaviour when dealing with lots of information or with highly information intensive services. As highly information intensive services require work with lots of data, I would expect that these services are probably more goal oriented as a consumer wants to achieve a certain objective with all the data processing. And according to Nysveen et al (2005a) goal oriented services (and thus high information intensive services) require high levels of behavioural control. Since manipulation with goal oriented services requires high levels of behaviour control, I expect that management of highly information intensive services will also require high levels of behavioural control.

Therefore, it will be high information intensive services, rather than low information intensive services, for which positive perceived behavioural control will be important when adopting a service.

Hypothesis 10: The positive effect of perceived control on intention to use mobile services will be stronger for services with high degree of the information intensity than for services with low degree of information intensity.

5.3 Research model

As already mentioned, the purpose of this paper is to combine Nysveen et al’s (2005a) model with one the notion of compatibility as described by Rogers (1983) to see how they influence intention to use mobile services when considered jointly. In addition, I would like to see how information intensity as a service characteristic influences this relationship in particular.

Due to this objective, the hypotheses were formulated for the effect of each of the variables used in Nysveen et al’s (2005a) model and for compatibility from Rogers’ model (1983) on the intention to use mobile services. The moderating effects of information intensity on the relationships between some of the drivers of adoption and the intention to use mobile services were described as well. A summary of the hypotheses are presented in figure 9.

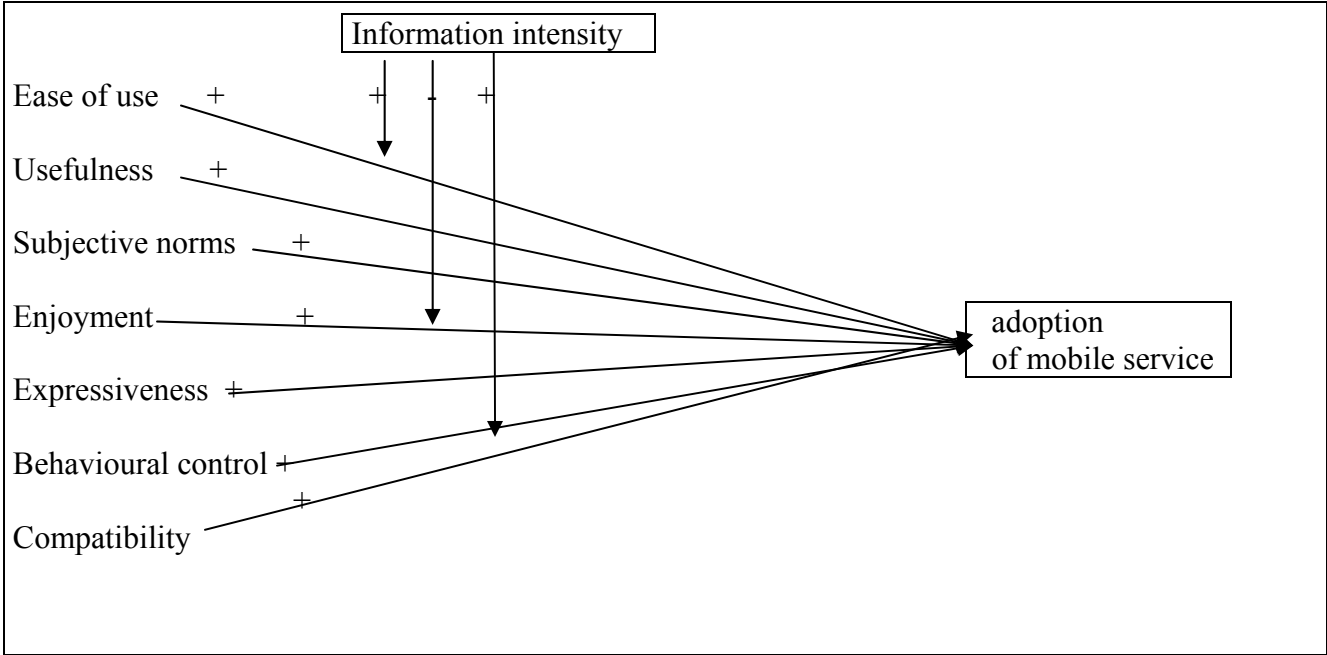


Figure 9: Summary of the hypothesis in this paper

From the conclusive figure 9, one can see that seven direct effects on the adoption of mobile services will be studied. As argued for in this chapter, information intensity does not moderate all the relationships. Figure 9 shows that information intensity is hypothesised to moderate only the effects of perceived ease of use, perceived enjoyment and perceived behavioural control.

6 Research method

6.1 Measurement of variables

6.1.1 Measures used in the similar studies previously

In order to decide which items would be used for measurement of the variables in the study, I constructed a table with an overview of the measures used in the previous studies on intention to use mobile services (see appendix 4).

Let me comment on this table as it creates the basis for the choice of the items used in this paper. I have included Davis' (1989) original scale for measuring perceived usefulness and ease of use in the summary table, since Davis is considered to be a founder for the two variables. The original scale for measuring subjective norms, attitude, intention and behavioural control has been developed by Fishbein & Ajzen (1975) in the theory of reasoned action and the theory of planned behaviour (Ajzen 1991). Since Nysveen et al (2005a, b) based their definitions mainly on Fishbein and Ajzen's (1975) definitions, I have not included these original measures in the table, but I have only used Nysveen et al's (2005 a, b) measures instead.

Nysveen et al (2005a, b) and Lexhagen et al (2005) defined explicitly the measures that they were using in their respective articles, and therefore I present the measures here as they used them. Hung et al (2003) adopted some measures from Davis (1989) and some from Taylor & Todd (1995b). Since Hung et al (2003) have not presented the modified measures in the paper, I have inserted Taylor & Todd's (1995b) original measures here. Teo & Pok (2003) took the starting point from Taylor & Todd (1995b), too, but somehow adjusted the measures for the WAP- enabled phones in their paper. For perceived ease of use they adopted and in some way adjusted Moore & Benbasat's (1991) measures. I present the adjusted measures in the table.

The notion of compatibility and the use of compatibility as a measure have been studied by several authors, for example, Taylor & Todd (1995b); Teo & Pok (2003); Slyke, Belanger & Comunale (2004) and Chen, Gillenson & Sherrell (2004). All of them, except Taylor & Todd (1995b), used the measure developed by Moore & Benbasat (1991). Therefore I present

Moore & Benbasat's (1991) original scale for compatibility. Since Slyke et al (2004), Chen et al (2004) and Teo & Pok (1995) also present adjusted scales that they adopted from Moore & Benbasat (1991), I insert their measure for compatibility too. Taylor & Todd's (1995b) scale for measurement of compatibility slightly deviates from Moore & Benbasat's (1991) scale, and I present their scale too.

According to Pedersen (2005), there is surprisingly little research done on operationalising of notion of information intensity. He based his measure of this concept on combination of Porter and Millar (1985) and Glazer (1991), because the former introduced "information intensity" first in the literature and the latter operationalised some elements of the notion. Therefore, I present Pedersen's complete scale for measurement of information intensity. Please note, that Pedersen's scale is originally in Norwegian language and that I have translated the scale into English for the purposes in this paper.

Moreover, since information intensity as a concept has been measured very little empirically, the measurement scale for it is poorly established at the first place. Therefore, in addition to Pedersen's scale, I use three items for measuring information intensity based on its definition from Apte et al (1999) in this paper. Due to the same reason, I include one of Porter & Millar's (1985) original items for measurement of information intensity.

6.1.2 Measures used in this study

Since my research model is greatly based on the Nysveen et al's (2005a) model, I used the same measures as they used in their study for measuring perceived usefulness, ease of use, expressiveness, enjoyment, subjective norms, behavioural control and intention to use. I adapted the measures for the particular mobile service relevant for my study (game on the mobile phone that comes with it and e-mail on the mobile phone).

There were several scales available for measurement of compatibility as such. Hence, the measure of compatibility was in this paper based on Slyke et al (2004) and somehow adjusted to mobile services. The content of notion compatibility was here perceived more as "compatibility with lifestyle" rather than anything else.

In order to measure information intensity a new scale was developed due to the lack of measurement of this variable before. The scale consisted of combination of Pedersen's (2005)

items and items based on the definition of information intensity by Apte et al (1999) and Porter & Millar (1985). For an overview of measures used in this study, please see appendix 3.

6.2 Data collection

There were two surveys involved in this paper. The first one, pre-test, was aimed to reveal the degree of information intensity of certain mobile services, so that they could be used in the main study afterwards. The second survey was meant to test the specific hypotheses suggested in the chapter 5.

6.2.1 Pre-test

The data were collected using a questionnaire survey. It contained eight mobile services measuring information intensity on a 9- item scale, see appendix 1. Respondents indicated an agreement on 5- point Likert scale. The questionnaire was distributed in Norwegian language among the NHH students in order to see whether people perceived different mobile services as having different degree of information intensity. This was then used to categorize some of the mobile services as low or high information intensive. Out of 40 distributed questionnaires, 35 were returned.

In order to find out whether respondents perceived various mobile services as being differently information intensive, the factor analysis was carried out for the nine items (questions). The details of this analysis can be seen in the table 4 below.

Variable	Factor 1	Factor 2	Factor 3
Question 1	0,821		
Question 2	0,849		
Question 3		0,706	
Question 4		0,895	
Question 5		0,886	
Question 6	0,831		
Question 7	0.804		
Question 8	0,845		
Question 9			0,968

Table 4: Principal component analysis for all items measuring information intensity (varimax rotation)- factor analysis 1. Values below 0,3 suppressed

The structure matrix showed the formation of three factors: question number 1 and 2 loaded together with questions 6, 7 and 8 as factor 1. Factor 2 was composed of questions 3, 4 and 5. The last question, 9, loaded with no other items and was a factor for itself. This was the reason why this item was removed when next factor analysis was carried out.

The results of second factor analysis are presented in the table 5. After the second factor analysis was carried out, this time without item number 9, two factors were formed. They were the same ones as before: Factor 1 was composed of item which directly dealt with information amount and intensity (question 1 and 2) and items which were based on the definition of information intensity itself (Apte et al 1999, question 6, 7 and 8). This factor was thus called “information intensity”. The second factor dealt with digitalisation and was composed of items described by Pedersen (2005). These were the questions 3, 4 and 5, and were commonly called “digitalisation”.

Variable	Factor 1	Factor 2
Question 1	0,822	
Question 2	0,849	
Question 3		0,725
Question 4		0,888
Question 5		0,878
Question 6	0,830	
Question 7	0,803	
Question 8	0,846	
Eigenvalues	3,603	1,947
Variance explained	45,039	24,332
Cronbach`s alpha	0,885	0,885

Table 5: Principal component analysis for all items measuring information intensity (varimax rotation)- factor analysis 2. Values below 0,3 suppressed

Since I have a reason to suspect that “digitalisation” factor would be fairly similar for all the services, because all of the mobile services can be digitalised up to certain extend, and since it was not the main interest in the paper, only the factor “information intensity” was considered for further analysis.

Since it was now clear that that there is a notion of “information intensity” among the data, and that some of the items measured this notion well, information intensity was tested across the mobile services. One- way ANOVA was used to test eight mobile services against information intensity. Of the services, service number 4 and 5 (game of the mobile phone that

comes with it or can be downloaded) had the lowest mean scores from the respondents (both 1,58). This was the reason why these two services were categorised as “low information-intensive” services. Based also on the mean scores, e- mail on the mobile, SMS and voice mail had the highest values (3,99; 3,30 and 3,11 respectively). These three were thus characterised as “high information- intensive” services. For all the mean values, refer to table 6 below. The reliability of the test, and thus the questionnaire, was within the acceptable range, with Cronbach’s alpha equal to 0,885. I can thus with certainty claim that the division of the above-mentioned services into low- and high information intensive was reliable.

Mobile service	Information intensity mean
SMS	3,30
MMS	2,97
Voicemail	3,11
Game	1,58
Java game	1,59
E-mail	3,99
Small payments	2,18
Bigger payments	2,59

Table 6: Mean values for information intensity

The ANOVA test was highly significant with F- value equal to 51,03.

For the purposes in the main study, one mobile service was chosen from each of the information intensity category. For high information intensive services, e- mail on the mobile phone was considered since it obtained the highest score in the questionnaires. For low information intensive services it was mobile game that comes with the mobile phone that was picked. Together with downloadable games it had the lowest mean scores on information intensity. However, I assume that people are more familiar with the more traditional mobile games, namely the ones that come with the mobile phone, and therefore could answer the questions considering this type of games better. This was the reason why I chose games on the mobile phone that come with it as the service for low information intensive services.

6.2.2 Main survey

6.2.2.1 Background

The data for the main research of this paper were collected through a questionnaire. The questionnaire consisted of two services each with different information intensity, namely

game on the mobile phone that comes with it (low information intensive) and e-mail on the mobile phone (high information intensive). Both services were measured against the 25 items that measured the variables used in this study (i.e. usefulness, ease of use, expressiveness, enjoyment, subjective norms, behavioural control, compatibility and intention to use). Participants indicated the agreement towards the items using a 5-point Likert- type scale that ranged from strongly disagree to strongly agree.

The questionnaire was distributed both personally and on e-mail in both English and Norwegian language to insure as high number of respondents as possible. The questionnaire was distributed to the students both at the Norwegian school of economics in Bergen and at the University College in Molde, as well as to students at universities in foreign countries.

Out of 180 questionnaires, 105 were returned. Sorting out the incompletely filled out questionnaires, 98 were completely filled out and used for further study.

6.2.2.2 Factor analysis

In order to test discriminant and convergent validity in the model, 23 items we used to carry out a factor analysis. The two items measuring the intention (questions 24 and 25) were not used in factor analysis as it was a dependent variable.

The first factor analysis computed six factors, that altogether explained 78,68 percent of variance in the material. Rotated component matrix showed that question 1 and 2 that measured perceived usefulness, loaded strongly together as factor 6. Question 3, also meant to measure usefulness, loaded very low with factor 4, and hence created a factor for itself. Low loading coefficient was undesirable and had to be dealt with in the successive factor analysis in form of exclusion from it. The questions measuring perceived ease of use (4-7) loaded strongly together, establishing factor 3. Perceived expressiveness, measured by questions 8-10 loaded strongly together as well, creating factor 1. There were some cross- loadings with factor 2. However, the difference between those cross- loadings was so big (ca 0,3 and 0,4), that the discriminant validity was considered satisfactory. According to Hair, Anderson, Tatham & Black (1998), the difference between the loading coefficients should be at least 0,1 in order to have valid discrimination between them. Questions 11-14, measuring perceived enjoyment, loaded strongly for the factor 2. The question 13 cross- loaded with factor 1 as well, but again, the difference between loadings was so big (0,41) that this did not cause any

problems. Questions 15-17, which were the items measuring subjective norms, loaded very strongly together. The problem encountered here was that they loaded as factor 1, which was already established factor for perceived expressiveness. Because of this, new factor analysis would have to be carried out. Perceived behavioural control, measured by items 18-20, loaded strongly for the factor 5. There were no problems with this factor. Finally, questions 21-23, that measured compatibility (with lifestyle), loaded strongly for factor 4. These questions cross-loaded with factor 1, but as before, the difference between the loadings was so huge, that cross-loading did not cause any harm to the data.

The detailed results of the factor analysis 1 can be seen in table 7 below. The definition of each item is attached in the appendix 3.

Variable	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5	Factor 6
Usefulness1						0,861
Usefulness2						0,884
Usefulness3				0,527		
Ease of use1			0,866			
Ease of use2			0,851			
Ease of use3			0,866			
Ease of use4			0,878			
Expressiveness1	0,637					
Expressiveness2	0,743					
Expressiveness3	0,785					
Enjoyment1		0,846				
Enjoyment2		0,844				
Enjoyment3		0,783				
Enjoyment4		0,871				
Sub.norms1	0,815					
Sub.norms2	0,733					
Sub.norms3	0,865					
Beh.control1					0,792	
Beh.control2					0,807	
Beh.control3					0,830	
Compatibility1				0,793		
Compatibility2				0,822		
Compatibility3				0,809		
Eigenvalues	8,799	3,542	1,942	1,488	1,314	1,012
Variance explained	38,255	15,398	8,443	6,471	5,713	4,398

Table 7: Principal component analysis of all items measuring independent variables (varimax rotation) - factor analysis 1. Values below 0,4 suppressed

In the first factor analysis only six factors were created, which was caused by perceived expressiveness and subjective norms being loaded to the same factor. Because of this and because I have seven independent theoretical variables in the model, second factor analysis was conducted. In the second analysis, I asked the SPSS program directly for computing seven factors, which was the number of variables theoretically reasoned for in this paper. Since the factor analysis was used here to mainly investigate internal consistency of my measures, I applied the criteria to Rust, Lemon & Zeithaml (2004) (parsimony, managerial usefulness, psychological meaningfulness and theoretical meaningfulness) and, as already mentioned, applied a seven- factor structure in the analysis.

The second factor analysis explained 82 percent of the variance in the data material. Rotated component matrix could show seven factors this time. Perceived usefulness (items 1 and 2) loaded strongly on the factor 7; item 3 loaded for itself and was the reason why the third factor analysis had to be carried out. Perceived ease of use (items 4-7) loaded strongly for factor 2, perceived expressiveness (items 8-10) made up factor 5, perceived enjoyment (items 11-14) loaded alone this time for factor 1, subjective norms (items 15-17) created factor 4, and behavioural control (items 18-20) loaded strongly together for factor 6. Items 21-23 for compatibility loaded together for factor 3. Hence, there were no variables this time that would load on the same factor and the criterion of having seven factors, as the model in this paper suggests, was fulfilled. Thus, the problem from factor analysis one has been solved. In addition, no cross- loadings, except expressiveness³, appeared among the data in the second round of the factor analysis.

Due to the problems with item 3 in both factor analyses, as it loaded together with compatibility as one factor, the third factor analysis was carried out in order to mend this problem. Solution lied in omitting this item from the entire factor analysis. This step lead to increase in overall explained variance to 83, 2 percent. Otherwise, I obtained the same results as before, except that subjective norms came as factor 3 and compatibility as factor 4 in this analysis. In the previous factor analysis this was the other way round.

The detailed results of the factor analysis 3 can be seen in table 8. The definition of each item is attached in the appendix 3.

Variable	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5	Factor 6	Factor 7
Usefulness1							0,861
Usefulness2							0,891
Ease of use1		0,870					
Ease of use2		0,849					
Ease of use3		0,867					
Ease of use4		0,879					
Expressiveness1					0,689		
Expressiveness2					0,797		
Expressiveness3					0,700		
Enjoyment1	0,850						
Enjoyment2	0,862						
Enjoyment3	0,781						
Enjoyment4	0,887						
Sub.norms1			0,816				
Sub.norms2			0,787				
Sub.norms3			0,818				
Beh.control1						0,801	
Beh.control2						0,805	
Beh.control3						0,826	
Compatibility1				0,804			
Compatibility2				0,836			
Compatibility3				0,816			
Eigenvalues	8,36	3,538	1,902	1,488	1,312	0,998	0,709
Variance explained	37,999	16,081	8,648	6,765	5,963	4,538	3,221
Cronbach`s alpha	0,931	0,918	0,904	0,954	0,864	0,780	0,861

Table 8: Principal component analysis of all items measuring independent variables (varimax rotation)- factor analysis 3. Values below 0,44 suppressed

Compared to factor analysis 1, the eigenvalues in the third and final analysis were somewhat reduced. In the analysis 1, all of the eigenvalues were over 1, which is the level above which the factors are considered to be significant (Hair et al 1998). Factor 7 in the third factor analysis was below this limit. However, this was considered as acceptable, as it was theoretically necessary to have seven factors instead of six.

Cronbach`s alpha was computed for the final factor analysis. This measure is most widely used for assessing the reliability of the entire scale. The acceptable lower limit for reliability of the data varies between 0,6 and 0,7 (Hair et al 1998: 118). In this research, all factors have reliability higher than 0,7, indicating highly reliable measurement scale.

6.2.2.3 Descriptives

Table 9 shows the characteristics of the sample used in the main survey. Four variables were chosen to describe the sample characteristics. They were gender, age, type of education and the length of the education.

Characteristics		Frequency
Gender	Female	52 %
	Male	48 %
Age	Under 20	2 %
	21-30	86 %
	Over 31	12 %
Type of education	High school	2 %
	Bachelors	54 %
	Masters	44 %
Length of education	Under 2 years	6 %
	3-5 years	88 %
	Over 6	6 %

Table 9: Sample characteristics

The table 9 shows that there was a slight overweight of females. Generally speaking, I obtained fairly equal representation of both genders, 52 percent and 48 percent. Most of the respondents were in their twenties (86 percent). The average age for respondents was 26,5 years. Majority of people in the sample (54 percent) have taken bachelor's degree. However, the portion of people with master's background was also rather high (44 percent). All respondents have finished their primary school education. Since almost everybody in the sample have taken higher education, it is not surprising to see that 88 percent of respondents have studied from 3 to 5 years. The average length of education for the sample was 3,8 years.

Table 10 shows some descriptives for the variables used in this study. The table shows minimum, maximum, mean, standard deviation, skewness and kurtosis for all the variables.

	Minimum	Maximum	Mean	St.deviation	Skewness	Kurtosis
Usefulness	1	5	2,71	1,22	0,22	-0,86
Ease of use	1	5	3,26	1,15	-0,34	-0,68
Expressiveness	1	5	1,33	0,71	2,97	9,77
Enjoyment	1	5	1,93	0,99	0,96	0,35
Sub. norms	1	5	1,56	0,93	1,78	2,58
Beh. control	1	5	3,56	1,21	-0,60	-0,618
Compatibility	1	5	2,06	1,16	0,92	-0,86
Intention	1	5	1,80	1,09	1,38	1,06

Table 10: Descriptives

Minimum and maximum values show that all the variables are consistently within the points on the scale that they had been measured on (from 1 to 5). Out of all variables, expressiveness had the lowest mean score (1,33) and behavioural control scored highest (3,56). Skewness, as a measure of a symmetry of distribution shows that three variables (expressiveness, subjective norms and intention) fall outside the range of -1 to +1. This, according to Hair et al (1998) indicates a substantially skewed distribution. Together with kurtosis, it is clear that especially perceived expressiveness deviates from the other variables when compared to the normal distribution, since its relatively high positive value indicates peaked distribution. This can also mean that one has to be more careful when interpreting the results due to divergence from the conditions of normal distribution of data. Behavioural control and intention have also kurtosis slightly different from normal distribution, but not in such obvious matter as expressiveness.

6.2.2.4 Multicollinearity diagnostic

Multicollinearity occurs when a single independent variable is highly correlated with the set of other independent variables (Hair et al 1998: 143). It represents the degree to which one variable can be predicted by the other variables in the analysis. High multicollinearity contributes negatively to the interpretation of the result as it makes it difficult to ascertain the effects of a single variable. Hair et al (1998) suggest that calculating tolerance and VIF values are good measures for testing multicollinearity. Table 11 below shows the values for the data in this study.

Variable	Tolerance	VIF
Usefulness	0,75	1,33
Ease of use	0,75	1,33
Expressiveness	0,42	2,41
Enjoyment	0,57	1,75
Subjective norms	0,44	2,29
Behavioural control	0,84	1,19
Compatibility	0,45	2,20

Table 11: Measures testing the impact of multicollinearity

According to Hair et al (1998), tolerance value should lay somewhere between 0 and 1. VIF values should vary between 1 to 10. They should not exceed 10, and the closer to 1 the better.

Either tolerance or VIF values in my data are within the above mentioned ranges. This indicates that the data do not suffer any collinearity problems.

Another way of testing the data for multicollinearity is through correlations. According to Berry & Feldman (1985), the correlations coefficients should not exceed 0,8 in order to be free of collinearity problems. Table 12 below shows the results of correlation test.

Variables	Usefulness	Ease of use	Expressiveness	Enjoyment	Sub. norms	Beh. control	Compatibility
Usefulness	1						
Ease of use	0,22*	1					
Expressiveness	0,27*	0,18*	1				
Enjoyment	0,23**	0,31**	0,58**	1			
Sub.norms	0,39**	0,15*	0,69**	0,46**	1		
Beh.control	-0,001	0,38**	-0,03	0,10	-0,03	1	
Compatibility	0,45**	0,28**	0,60**	0,56**	0,62**	0,08	1

Table 12: Correlation coefficients meant to measure collinearity

As one can see, none of the coefficients exceed the level of 0,8. This further supports the fact that multicollinearity was not present in the data. Tolerance and VIF values together with correlations coefficients give no support for the existence of multicollinearity in the data used for this study.

7 Results

Based on the results of factors analysis which indicated that the scale that was developed to measure the variables was highly reliable, each variable was computed in order to run the regression analysis. Regression analysis was in this paper used to study the direct effects of adoption drivers on the intention to use mobile services as well as to study the moderating effect of information intensity.

One of the conditions for successful multivariate regression is that the selection of independent variables should be based on their theoretical relationships to the dependent variable (Hair 1998). Since all the variables in this study were chosen based on previous research with solid theoretical reasoning supporting the choice of these variables, the condition should be satisfactory fulfilled.

Three regression analyses were carried out in this paper. The first one analysed the significance of the overall model, its direct effects.

The second and the third regression analysis were meant to reveal the moderating effects of information intensity of mobile services on the relationship between the independent variables and intention to use mobile services.

7.1 Overall regression

This model was meant to study the antecedents of usage intentions, i.e. the direct effects between the drivers of adoption and the intention to use mobile services. The results of the analysis show strong overall significance of the model, $p < 5\%$. R^2_{adj} is 55 %, which means that the model, or the drivers of adoption, significantly explains 55 percent of variance in the usage intention towards mobile services. This is a very good proportion for this paper, and hence it shows that the model has been well constructed.

The figure 10 below shows the coefficients for the independent variables in the study.

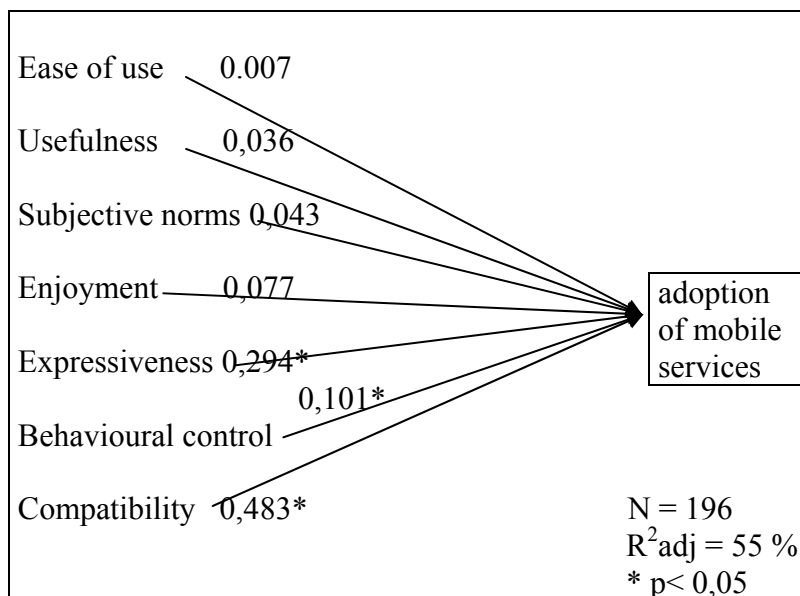


Figure 10: Standardized regression coefficients for the overall model

Variables that significantly explain the intention to use mobile services were perceived expressiveness, behavioural control and compatibility. This means that increase in any of these variables will lead to increased consumer's intention to use mobile services. Hence, hypothesis 4, 6 and 7 were confirmed. Hypothesis 1, 2, 3 and 5 were not confirmed.

It is slightly surprising that only three variables from the model significantly explain usage intention. In Nysveen et al's (2005a) model, for example, all six variables explained the customers' intention to use mobile services. The difference between that study and this lies probably in the inclusion of compatibility as a new variable. It can be observed from correlation matrix in table 12, that compatibility strongly correlates with usefulness, expressiveness, enjoyment and subjective norms. The variance from compatibility is in this case probably explained at the expense of those four other variables. In other words, compatibility "takes" the variance from the variables, and this might have had an effect on the significance of the other variables.

To study the combination of Nysveen et al's model (2005a) and compatibility from Rogers' model (1983) was, however, the major objective in this paper. The model's explaining power is high, indicating a construction of a good model when combined with compatibility. However, few predictors significantly explained usage intentions towards the mobile services in the model. Despite this, it is very interesting to see that services' compatibility with one's life style significantly increases the intention to use mobile services. The research on

compatibility's effect on the usage intentions was another important objective in this paper and it was successfully fulfilled. In this combined model, compatibility was a significant antecedent of intention to use.

7.2 Moderating effects

To measure the moderating effect of information intensity on the relationship between the drivers of adoption and usage intentions, two regression analyses were carried out. The first one used game on the mobile phone as low information intensive service in order to see its effect on the relationships, and the second one used e-mail on the mobile phone as highly information intensive service. Let me now present the findings for each of them.

When all seven independent variables in the model were tested against the intention to use mobile services for low information intensive service, the model was strongly significant, $p < 5\%$. The model explained 49 percent of variance in the usage intentions, which is quite strong and demonstrates a construction of a good model. Figure 11 below shows the coefficients for the low information intensive service (game).

The results from this analysis show that for low information intensive services, only three variables were significant. It was perceived enjoyment, perceived expressiveness and compatibility.

Next, the seven independent variables in the model were tested against the intention to use mobile services for high information intensive services. The model was strongly significant this time too, $p < 5\%$ and it explained 58 percent of variance in the usage intentions, which was slightly more than in the previous model. This indicates a construction of a very good model. Figure 12 below shows the coefficients for high information intensive service (e-mail).

This model had only two variables that significantly explained the usage intentions when information intensity was high. The two variables were perceived behavioural control and compatibility.

However, since compatibility was significant for both low and high information intensive services one cannot say that the degree of information intensity moderates the effect between

compatibility and the usage intentions. If compatibility was significant for either degree of information intensity, moderation could be confirmed. But due to significance for both degrees of information intensity, I have to conclude saying that the degree of information intensity does not moderate this relationship. On the other hand, the fact that compatibility is the only variable that was significant through all tests shows, that the inclusion of Rogers' variable was a good move and that the driver is a significant supplement for the model presented by Nysveen et al (2005a).

Summing up based on the analyses, it is the three following variables for which information intensity moderates their relationships towards intention to mobile services: perceived enjoyment, perceived expressiveness and perceived behavioural control. In addition to this, the models show that there is a difference in explanatory mechanisms between the two models, figure 11 and 12. This means, in other words, that information intensity has the moderating effect on the intention to use mobile services.

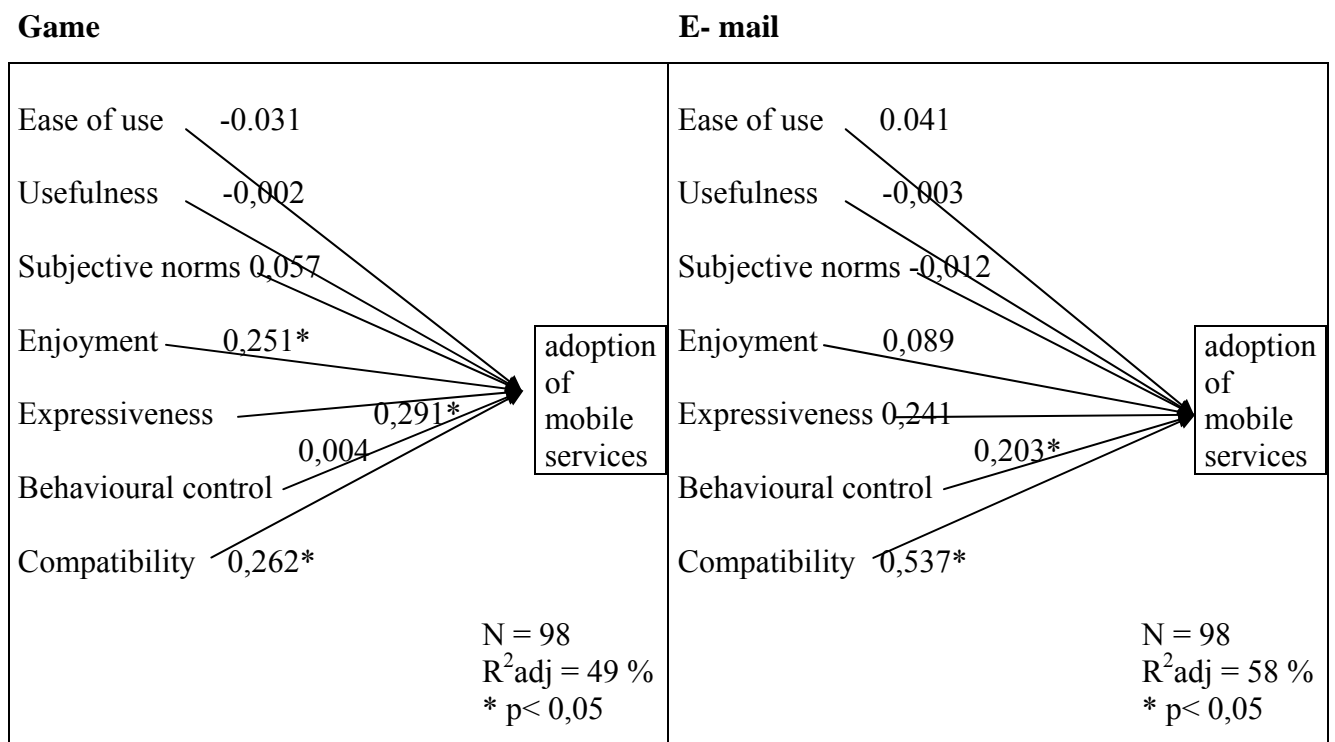


Figure 11: Standardized regression coefficients for low information intensive services

Figure 12: Standardized regression coefficients for high information intensive services

Let me now comment on each of the significant variables.

7.2.1 Perceived enjoyment

When it comes to perceived enjoyment, it is understandable that this variable is significant with low information intensive services. Low information intensive services are not meant to collect neither to process any big amounts of data, they are meant for fun and relaxing (as game on the mobile phone, for example, demonstrates). In other words, services are used for enjoyment. Game on the mobile phone as low information intensive service is an experiential (Nysveen et al 2005a) type of service. It is thus understandable that low information intensive services will have a positive influence on the relationship between perceived enjoyment and the intention to use mobile services. Hypothesis 9 was thus confirmed.

7.2.2 Perceived expressiveness

Perceived expressiveness was also surprisingly significant for low information intensive services. It is peculiar to see this significance, since it was predicted that expressiveness would not have any effect on the adoption of mobile services, due to the fact, that no good reason was found to justify the role of information intensity for the expression of oneself.

I see two possible explanations for the fact that expressiveness was significant in this paper. The first one could be that as already argued for earlier in this paper in chapter 5.2.3, I expect that high information intensive services are more goal oriented and low information intensive services are more experiential. As Nysveen et al (2005a) showed, expressive services are experiential services. Thus, I could assume that since low information intensive services are experiential and expressive services are also experiential, there will be some connection between low information intensive services and expressiveness and that expressiveness will thus be more important for low information intensive services. This reasoning could explain the significant effect of low information intensive services on the relationship between perceived expressiveness and intention to use mobile services.

Another possible explanation can have its root in very peaked kurtosis, kurtosis that deviates from the normal distribution. As already said, this peaked distribution can influence the results and they have to be interpreted carefully. Skewed distribution could thus lead to this unexpected result.

7.2.3 Perceived behavioural control

It is good to see that particularly perceived behaviour control was significant in this test. High information intensive services require the collection and processing of large amount of information. In order to process this information properly, it is desirable that a person managing the data has certain control over the behaviour. This can be contrasted to enjoyment where no control like this was necessary. It is therefore not surprising that enjoyment is not significant in this analysis, as these highly information intensive services are probably more goal oriented. This is because consumer wants to achieve a certain objective with all the data processing; he does not want to have fun only.

The perceived behavioural control was not only significant in this test, but had much bigger effect on the usage intentions when high information intensive services were involved. The positive effect of perceived control on intention to use mobile services will be hence stronger for services with high degree of the information intensity than for services with low degree of information intensity. This is because higher information collecting and processing probably increases one's control over own behaviour. The more information one has, the more confident he becomes about the behaviour and this in turn increases the intention to use mobile services. The hypothesis 10 is thus confirmed.

8 Conclusion

8.1 General conclusions

Table 13 summarises the findings in this paper.

Variable	Total	Low info intensity	High info intensity
Usefulness			
Ease of use			
Expressiveness	*	*	
Enjoyment		*	
Subjective norms			
Behavioural control	*		*
Compatibility	*	*	*
R ² adj	55,3 %	49,1 %	57,7 %

Table 13: Summary of the significant relationships

Out of all direct effects, three were significant in this paper. It is namely perceived expressiveness, perceived behavioural control and compatibility that positively influence the adoption of mobile services. The hypothesis 4, 6, and 7 were thus confirmed.

Out of moderating effects, information intensity influenced the relationships between perceived enjoyment and intention to use mobile services, perceived expressiveness and intention to use mobile services and between perceived behavioural control and intention to use mobile services. The hypothesis 9 and 10 were thus confirmed, and hypothesis 8 was not confirmed. In addition, a moderating hypothesis for perceived expressiveness was not formulated, but it turned out to be moderated by information intensity.

Summing up in other words, the degree of information intensity moderates the three following relationships: perceived enjoyment and adoption of mobile services, perceived expressiveness and adoption of mobile services and perceived behavioural control and adoption of mobile services.

There were three objectives in this paper: 1) Combination of Nysveen et al (2005a) with Rogers (1983) when it comes to the drivers of adoption, i.e. of intention to use mobile services, 2) Moderating effect of information intensity as a service characteristic and 3) establishing the measurement scale for information intensity.

1) The regression 1 shows the overall significance of the combined model. The model was found to have high explanatory power and was strongly significant. This means, that the model as a whole explains customers' intentions to use mobile services very well.

Compatibility variable was strongly significant throughout all of the analyses. This, together with the model's explanatory power shows, that the objective number one was successfully fulfilled.

2) It was interesting to see the effects of information intensity on some of the relations in the paper. Information intensity influenced relationship between enjoyment and the intention to use mobile services. Since the game on the mobile phone is low information intensive and characterized as experiential, the significance of perceived enjoyment makes sense. The same reasoning goes for significance of perceived behavioural control when it comes to highly information intensive services. E-mail on the mobile phone is high information intensive service, and can be categorized as goal oriented, it makes sense that relationship between perceived behavioural control and adoption of mobile services was significantly influenced by high information intensity. Information intensity also influenced relationship between expressiveness and the intention to use mobile services. This was unexpected, but the possible explanations for the significance was that either very peaked kurtosis or that low information intensive services are in fact experiential and at the same time, expressive services are also experiential. Thus, expressiveness will be more important for low information intensive services.

The fact that degree of information intensity does moderate some of the relationships makes it an important implication and should be included in the future studies on mobile service adoption.

3) The factor analysis done for the pre-test shows reliability of the items measuring information intensity of almost 89 percent (Crombach's alpha = 0,885). This is a high value indicating that despite lack of previous empirical measurements of information intensity, a well established scale for measuring of information intensity was now developed.

8.2 Implications

The results of this paper makes implications relevant both for theoretical and for managerial purposes. Let me comment on both of them in the subsequent chapters.

8.2.1 Theoretical implications

Adding compatibility as a new variable to the original combined model explains mobile service usage and hence makes Nysveen et al's (2005a) model even more interesting and more complete in explaining customers' intentions to use mobile services. It thus makes compatibility an important antecedent of usage intentions for mobile services. Up until now, the model for explaining customers' usage intentions for mobile services was based on information systems research, uses and gratifications research, and domestication research. Adding compatibility from Rogers' model emphasizes the importance of taking into consideration other, more untraditional drivers for explaining the intention to use mobile services. It also gives advanced possibilities for researchers and chance for richer and more varied research opportunities in the future. In this way, consumers' intention towards using mobile services can be studied even more comprehensively.

Since it was discovered in this paper that the degree of information intensity does moderate some of the relationships between the antecedents of adoption and the intentions to use mobile services, this will become an important characteristics to consider in the future studies. This also points out the importance of researchers using not only the traditional services characteristics in their research, such as intangibility, heterogeneity, simultaneity and perishability. The emphasis should be given on some less cited service characteristics, such as information intensity, as they seem to have significance. Furthermore, focus on information intensity should be emphasized due to the fact that the strict division paradigm between products and services is changing due to the reasons mentioned in the chapter 4, and thus the traditional service characteristics maybe not be as valid as they used to be. Therefore, the findings in this paper underline the importance of studying newer service characteristics in the future studies as a potential sources of moderating effects on the drivers of intention to use mobile services.

The composition of the scale measuring information intensity offers good research opportunities in future. The scale that was developed in this paper can either be used in the future studies or can be researched on more. The more research on the scale would mean the extension of the scale by new items or its empirical validation. In either case, this paper gives an array of opportunities for researchers to build on in the future studies.

8.2.2 Managerial implications

The results from this paper offer several implications for the managers when developing and increasing consumers' intention to use mobile services.

First, the result of the overall regression shows the importance and the advantage of including the compatibility with lifestyle as a variable when designing a mobile service, since it is a factor that is important for customers when they consider using the mobile service. Thus, in their marketing campaign, the marketing managers have to emphasize how the service fits with targeted group's lifestyle; mainly with their way of living, communicating and doing things.

Second, the results show the moderating effects of the degree of information intensity on the relationships between perceived enjoyment, expressiveness and behavioural control on the people's intention to use mobile services. This finding implies that industry players must be aware of moderating effects of information intensity when developing services since it apparently has an effect. Since enjoyment- adoption of mobile services relation is moderated by degree of information intensity, it will be important for mobile service producers pay attention to fun and excitement, especially when developing low information intensive services. The potential commercial for low information intensive services should possess entertaining and funny parts if consumers are to use the services. The relationship between perceived expressiveness and intention to use mobile services is also moderated by degree of information intensity. This finding implies that services with low information intensity should not only be funny and entertaining, but should at the same time enable its users to express their social and personal identity and their true self. It can be slightly challenging for service producers to combine both enjoyment and expressiveness factors in one service. However, it shows that mobile service industry is influenced by the degree of information intensity and can change rapidly as trends and fashions (and thus expressiveness) changes. The marketers must hence manage to compose services that are personalized, up to date and fun especially when they do not require lots of information amounts, collecting and processing.

Perceived behavioural control was found to have an influence on the consumers' intentions to use mobile services, especially when the mobile services are highly information intensive. This contributes to the fact that producers of mobile services must be aware of opportunities

and resources that are available for consumers when they develop a service, especially highly information intensive service. When customer experiences a service as highly information intensive, the control over own behaviour will become important. Therefore, the managers must for example consider potential customers' skills and money for adopting the service. To make potential users comfortable and in order to increase their perceived control over the behaviour, the managers can offer lower prices and free use of a service for a period for high information intensive services. This would enable customers to afford the service and learn the service. Their perceived control of behaviour can thus be increased.

Conclusively, it can be said that marketing managers must pay attention to and be aware of the information intensity when developing a new service as it plays an important role for consumers' intentions to use the service. They have to incorporate entertaining and expressiveness factors in the low information intensive services and they have to focus on increasing consumers' perceived behavioural control when developing high information intensive services. Implementing these factors when developing a service can create unique comparative and competitive advantage for the producers. This will then lead to the fact that customers will use the services and adopt them in the long run to the satisfaction of all parties involved.

8.3 Limitations

There are several factors that could have led to some weaknesses in this paper. However, the paper contains some strengths, too. Let me start by commenting on the weaknesses and then turn to the strengths later on.

First, the sample was not representative from the population. The sample used in this study consisted basically only of students with some exceptions, which can actually indicate too highly educated respondents. This had its advantage in the fact that it was easy to collect the data in the sense of fast responses, little time that was needed for collection and simple access to the response group. Collecting the data from student led thus to high response rate.

However, it became clear during the research that student-respondents were actually non-users of the services selected for this study. Many of them have heard about them and tried those couple of times, but only few of them were using the game or e-mail on the mobile phone actively. This is in fact understandable as it is expected that the game on the mobile phone will be used mostly by younger people, teenagers, whereas e-mail on the mobile phone

is mainly used by older people, businessmen (Blackberry can be such example). Respondents in this paper were mainly students aged 20-31 (86 percent), and thus do not fit in either of the categories. Students answered the questionnaire best they could, but based on their opinions and not on their real experience. Particularly this could cause problems. One can however speculate about the importance of the age, because on the other hand, the education level may be as relevant as age. It could be assumed that as much as young people use the game on the mobile phones, the less educated people do so, too. On the line of the same reasoning, as much as older people use e- mail on the mobile, more educated people, businessmen in particular, might use e- mail on the mobile phone, too. If this would be the case, the present sample would still not be representative from population, since it is still missing low educated segment.

Both age and education issues in the sample mean that the result have limited external validity. This implies that one has to be careful when interpreting the results in the segments outside the sample. In the future research this problem can be solved by either choosing another, more relevant services for study the when using students as a sample group, or choosing more appropriate response groups for the same services as in this paper, i.e. a group that actually uses game or e-mail on the mobile phone or a group with different levels of education.

Second, choosing the services studied in this paper could probably have been done more cautiously, and that is for two reasons: a) Since the response group was students, I should have selected services that regular students are more familiar with; services that were more relevant for students. As it was already mentioned above, the students did not have much of a practical experience with the services used in this study, which might have influenced results in a negative way. b) The services in this paper have been mono-operationalized with respect to low and high information intensity. This means that I had only one service for low and one service for high information intensity. If I had had more services in each of the information intensity categories, I would have got more robust results.

The issue with service selection contributes to limited external validity of the paper. However, this can be an interesting challenge for the future researchers. It offers them new and exciting research opportunities to work on in the times to come.

Third, one potential weakness of the paper lied in kurtosis for expressiveness. Together with skewness, it was clear that perceived expressiveness deviated from the normal distribution, since its relatively high positive value indicated a peaked distribution. The deviation from the normal distribution means that kurtosis can be very sensitive to outliers. Its value may depend on only few observations in the tails of the distribution, which may be erroneous or irrelevant observations (http://www.cis.hut.fi/aapo/papers/IJCNN99_tutorialweb/node13.html, 04.04.2006). This has probably led to different result than I expected. The result showed strong significance for perceived expressiveness when the relationship was moderated by information intensity despite no expectations about the significance of such moderating effect.

Despite the above- mentioned weakness, there are some strength in the paper.

First, all factor analyses in the paper showed that every variable or concept was measured properly. It was shown that measure for each of the variables fitted properly, especially compared to the previous research. The fact that each variable loaded strongly and well to the respective factors proves paper's high convergent validity. Discriminant validity says something about the degree to which the variables cross- loaded. As already described in the chapter 6, despite some cross- loading between the variables in my data set, the difference between the loadings was so big, that it did not cause any harm to the data. Thus, discriminant validity in this paper is considered satisfactory.

This leads to my second point about validity: Validity is defined as the extent to which a 1) measure or set of measures correctly represents the concept of the study and 2) how well the concept is defined by the measure (Hair et al 1998). Let me comment on each of them shortly: 1) As already mentioned, factor analyses in this paper showed that all the scales were correctly composed and that the variables were measured correctly with the appropriate items. 2) All definitions of the variables in this paper were based on the definitions from previous studies, or on the items used in the past studies, only slightly adjusted for the purposes of this paper. The only exception was the items measuring information intensity. However, the analysis showed that the scale was good enough and that the items measured information intensity reliably. All this should indicate that the validity in this paper was good and that there are no problems with the method in this sense.

Some other strengths in this paper includes strong and reliable results, which were proven through reliability analyses that was carried out for some test, the multicollinearity diagnostics that showed no problems with collinearity in the data and the high response rate in both surveys.

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10 List of notes

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Appendix

1. Pre-test questionnaire- Norwegian language
2. Main questionnaire- English language
3. Measures used in this study
4. Measures from the past research

1. Pre-test questionnaire- Norwegian language

Takk for din deltakelse i denne undersøkelsen!

Ved å delta i undersøkelsen hjelper du meg med en viktig del av min master oppgave og jeg setter stor pris på at du tar deg tid til å fylle den ut.

Vennligst, les nedenfor, og ta stilling til spørsmålene for hver tjeneste som er beskrevet. Sett "kryss" i den boksen som du mener er mest riktig for deg. Det er ingen fasitsvar på disse spørsmålene. Jeg er bare ute etter din mening.

Tjeneste 1: SMS

SMS innebærer mottagelse og sending av tekstmeldinger til og fra mobiltelefon. Det er også mulig å sende og motta meldinger på mobiltelefon fra Internett. Primær bruk av SMS er mellom familie medlemmer, venner og kjente. Det er altså SMS brukt som person til person tjeneste du skal ta stilling til her.

	Svært Uenig		Svært Enig		
	1	2	3	4	5
1. Denne tjenesten består primært av informasjon					
2. Tjeneste karakteriseres av høy informasjon intensitet					
3. Viktige deler av tjenesten kan digitaliseres					
4. Store deler av tjenesten kan formidles over elektroniske nett (Internett, telenett, ol.)					
5. Kunden får adgang til store deler av tjenesten gjennom elektroniske medier (Pc, mobil, ol)					
6. Denne tjenesten egner seg for samling av informasjon					
7. Denne tjenesten egner seg for behandling av informasjon					
8. Denne tjenesten egner seg for spredning av informasjon					
9. Denne tjenesten krever særlig høye kostnader for opplæring av kjøpere					

Tjeneste 2: MMS

MMS innebærer mottagelse og sending av tekstmeldinger, bilder, lyd, og video til og fra mobiltelefon. Det kreves at både sender og mottaker har mobiltelefon med et innebygd kamera. På denne måten kan for eksempel venner sende bilder, video eller et lydopptak av en konsert som de var med på til andre venner som ikke hadde anledning til å være med på konserten. Det er altså MMS som person til person tjeneste du skal ta stilling til.

	Svært Uenig		Svært Enig		
	1	2	3	4	5
1. Denne tjenesten består primært av informasjon					
2. Tjeneste karakteriseres av høy informasjon intensitet					
3. Viktige deler av tjenesten kan digitaliseres					
4. Store deler av tjenesten kan formidles over elektroniske nett (Internett, telenett, ol.)					
5. Kunden får adgang til store deler av tjenesten gjennom elektroniske medier (Pc, mobil, ol)					
6. Denne tjenesten egner seg for samling av informasjon					
7. Denne tjenesten egner seg for behandling av informasjon					
8. Denne tjenesten egner seg for spredning av informasjon					

9. Denne tjenesten krever særlig høye kostnader for opplæring av kjøpere					
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Tjeneste 3: Telefonsvarer (voicemail)

Telefonsvarer er vanligvis inkludert i mobil abonnement. Voicemail innebærer at den som ringer kan legge igjen en stemme beskjed eller telefon nummer hvis eieren av mobiltelefonen ikke er tilgjengelig. Eieren av mobilen får en SMS melding når en beskjed blir lagt igjen. Eksempel på bruk kan være en datter som vil snakke med sin mor mens mora er på et viktig møte, hun er altså utilgjengelig. Da kan datteren legge igjen beskjed til mora som kan ringe tilbake til sin datter når møtet er ferdig.

	Svært Uenig			Svært Enig	
	1	2	3	4	5
1. Denne tjenesten består primært av informasjon					
2. Tjeneste karakteriseres av høy informasjon intensitet					
3. Viktige deler av tjenesten kan digitaliseres					
4. Store deler av tjenesten kan formidles over elektroniske nett (Internett, telenett, ol.)					
5. Kunden får adgang til store deler av tjenesten gjennom elektroniske medier (Pc, mobil, ol)					
6. Denne tjenesten egner seg for samling av informasjon					
7. Denne tjenesten egner seg for behandling av informasjon					
8. Denne tjenesten egner seg for spredning av informasjon					
9. Denne tjenesten krever særlig høye kostnader for opplæring av kjøpere					

Tjeneste 4: Spill på mobil som kommer med mobilen

Dette er type spill som kommer automatisk med mobiltelefon når den er kjøpt. Spillet er med andre ord installert ved kjøp. Eksempler på slike spill er Snake og Card Deck som typisk er installert på nye mobiltelefoner når du kjøper de i dag.

	Svært Uenig			Svært Enig	
	1	2	3	4	5
1. Denne tjenesten består primært av informasjon					
2. Tjeneste karakteriseres av høy informasjon intensitet					
3. Viktige deler av tjenesten kan digitaliseres					
4. Store deler av tjenesten kan formidles over elektroniske nett (Internett, telenett, ol.)					
5. Kunden får adgang til store deler av tjenesten gjennom elektroniske medier (Pc, mobil, ol)					
6. Denne tjenesten egner seg for samling av informasjon					
7. Denne tjenesten egner seg for behandling av informasjon					
8. Denne tjenesten egner seg for spredning av informasjon					
9. Denne tjenesten krever særlig høye kostnader for opplæring av kjøpere					

Fortsettelse på neste side

Tjeneste 5: Spill på mobil som krever nedlasting fra Internett (Java spill)

Denne type spill krever at brukeren laster det ned fra Internett. Spillet er ofte programmert i JAVA. Brukeren samtykker vanligvis i å betale et engangs gebyr for å kunne laste ned spillet og installere den på egen mobiltelefon. Han/Hun kan da bruke spillet så lenge han/hun ønsker. Det er mulig å leste ned både "one-player" spill og "two player" spill der man spiller mot andre.

	Svært Uenig			Svært Enig	
	1	2	3	4	5
1. Denne tjenesten består primært av informasjon					
2. Tjeneste karakteriseres av høy informasjon intensitet					
3. Viktige deler av tjenesten kan digitaliseres					
4. Store deler av tjenesten kan formidles over elektroniske nett (Internett, telenett, ol.)					
5. Kunden får adgang til store deler av tjenesten gjennom elektroniske medier (Pc, mobil, ol)					
6. Denne tjenesten egner seg for samling av informasjon					
7. Denne tjenesten egner seg for behandling av informasjon					
8. Denne tjenesten egner seg for spredning av informasjon					
9. Denne tjenesten krever særlig høye kostnader for opplæring av kjøpere					

Tjeneste 6: E-post på mobilen

E- post på mobilen muliggjør sending, mottagelse og lesing av personlig og forretnings e-mail når det er nødvendig. På denne måten har man altså tilgang til e-post uten at man har datamaskin med seg.

	Svært Uenig			Svært Enig	
	1	2	3	4	5
1. Denne tjenesten består primært av informasjon					
2. Tjeneste karakteriseres av høy informasjon intensitet					
3. Viktige deler av tjenesten kan digitaliseres					
4. Store deler av tjenesten kan formidles over elektroniske nett (Internett, telenett, ol.)					
5. Kunden får adgang til store deler av tjenesten gjennom elektroniske medier (Pc, mobil, ol)					
6. Denne tjenesten egner seg for samling av informasjon					
7. Denne tjenesten egner seg for behandling av informasjon					
8. Denne tjenesten egner seg for spredning av informasjon					
9. Denne tjenesten krever særlig høye kostnader for opplæring av kjøpere					

Tjeneste 7 og 8: Betaling ved hjelp av mobil telefon

Her kan man betale for goder og tjenester via mobilen sin. Mobilen er da brukt for å starte, aktivere og/eller godkjenne betaling. Det som skjer er at når man velger å betale gjennom mobiltelefonen sin, blir man koblet til en server som yter bekreftelse og autorisasjon og til slutt godkjennelse av hele transaksjonen. Det finnes flere måter å foreta betaling på via mobilen. I denne undersøkelsen fokuserer vi på småpengebetalning og større betalinger (elektronisk lommebok). Les nedenfor (bla om) og ta stilling til hver av dem.

Tjeneste 7: Småpengebetaling

Småpengebetaling innebærer en overbetalt SMS. Man sender for eksempel en SMS som man betaler 15 kroner for og får en skjermsparer eller en ringetone til mobilen sin i retur.

	Svært Uenig			Svært Enig	
	1	2	3	4	5
1. Denne tjenesten består primært av informasjon					
2. Tjeneste karakteriseres av høy informasjon intensitet					
3. Viktige deler av tjenesten kan digitaliseres					
4. Store deler av tjenesten kan formidles over elektroniske nett (Internett, telenett, ol.)					
5. Kunden får adgang til store deler av tjenesten gjennom elektroniske medier (Pc, mobil, ol)					
6. Denne tjenesten egner seg for samling av informasjon					
7. Denne tjenesten egner seg for behandling av informasjon					
8. Denne tjenesten egner seg for spredning av informasjon					
9. Denne tjenesten krever særlig høye kostnader for opplæring av kjøpere					

Tjeneste 8: Større betalinger

Her kan man betale større pengesummer gjennom en såkalt elektronisk lommebok. Det betyr at den som har tilgang på shopping tjenesten gjennom mobiltelefonen sin automatisk får en egen mobilkonto som er tilgjengelig via mobilen. Man må overføre penger til den kontoen fra nettbank, kontofon eller giro før man skal betale. Et annet alternativet er at man registrer sin VISA kort på mobilen sin og betaler med den.

	Svært Uenig			Svært Enig	
	1	2	3	4	5
1. Denne tjenesten består primært av informasjon					
2. Tjeneste karakteriseres av høy informasjon intensitet					
3. Viktige deler av tjenesten kan digitaliseres					
4. Store deler av tjenesten kan formidles over elektroniske nett (Internett, telenett, ol.)					
5. Kunden får adgang til store deler av tjenesten gjennom elektroniske medier (Pc, mobil, ol)					
6. Denne tjenesten egner seg for samling av informasjon					
7. Denne tjenesten egner seg for behandling av informasjon					
8. Denne tjenesten egner seg for spredning av informasjon					
9. Denne tjenesten krever særlig høye kostnader for opplæring av kjøpere					

Takk for hjelpen!

2. Main questionnaire- English language

Thank you for taking a part in this research!!!!

By filling out this questionnaire you will help me immensely with my master thesis. I appreciate your effort.

Gender:

Age:

Type of education:

Length of education:

Please, read and answer the questions in relationship to the services that are described below (e-mail on mobile phone and game on mobile phone). Check the box (X) that corresponds the most with your perceptions. There are no rights and wrongs; I just need your opinion.

Service 1: Game on the mobile phone that comes with it

This is a type of game that comes automatically with the mobile phone when it is bought. In other words, the game is already installed when the phone is bought. Examples for such games are Snake and Card Deck which are typically installed on the new mobile phones bought today.

	Strongly disagree	1	2	3	4	5	Strongly agree
1. Using the game on the mobile phone is a time-saving way of playing games							
2. Using the game on the mobile phone is an efficient way of playing games							
3. The game on mobile phone is useful to me							
4. Learning to use the game on the mobile phone is easy to me							
5. It is easy to make the game on the mobile phone do what I want it to							
6. My interaction with the game on the mobile phone is clear and understandable							
7. It is easy to use the game on the mobile phone							
8. I often talk to others about the game on the mobile phone							
9. Using the game on the mobile phone is a part of how I express my personality							
10. Other people are often impressed by the way I use the game on the mobile phone							
11. I find the game on the mobile phone entertaining							
12. I find the game on the mobile phone pleasant							
13. I find the game on the mobile phone exciting							
14. I find the game on the mobile phone fun							
15. People important to me think I should use the game on the mobile phone							
16. It is expected that people like me use the game on the mobile phone							
17. People I look up to expect me to use the game on the mobile phone							
18. I feel free to use the kind of the game on the mobile phone I like to							
19. Using the game on the mobile phone is entirely within my control							
20. I have the necessary means and resources to use the game on the mobile phone							

21. I think that using the game on the mobile phone fits well with the way I like to play games					
22. Using the game on the mobile phone fits into my style of playing games					
23. Using the mobile phone to play games is compatible with how I like to do things					
24. I intend to use game on the mobile phone the next 6 months					
25. The next 6 months I intend to use game on the mobile phone frequently					

Service 2: E-mail on the mobile phone

E- mail on the mobile phone allows people to send, receive and read personal and business e-mail when necessary. In this way, people have access to their e-mail without having a computer.

Strongly disagree Strongly agree
1 2 3 4 5

1. Using e- mail on the mobile phone is a time- saving way of sending/receiving/reading e-mail					
2. Using e- mail on the mobile is an efficient way of sending/receiving/reading e-mail					
3. E-mail on mobile phone is useful to me					
4. Learning to use e- mail on the mobile phone is easy to me					
5. It is easy to make e- mail on the mobile phone do what I want it to					
6. My interaction with e- mail on the mobile phone is clear and understandable					
7. It is easy to use e- mail on the mobile phone					
8. I often talk to others about e- mail on the mobile phone					
9. Using e- mail on the mobile phone is a part of how I express my personality					
10. Other people are often impressed by the way I use e- mail on the mobile phone					
11. I find e- mail on the mobile phone entertaining					
12. I find e- mail on the mobile phone pleasant					
13. I find e- mail on the mobile phone exciting					
14. I find e- mail on the mobile phone fun					
15. People important to me think I should use e- mail on the mobile phone					
16. It is expected that people like me use e- mail on the mobile phone					
17. People I look up to expect me to use e- mail on the mobile phone					
18. I feel free to use the kind of e- mail on the mobile phone I like to					
19. Using e- mail on the mobile phone is entirely within my control					
20. I have the necessary means and resources to use e- mail on the mobile phone					
21. I think that using the e- mail on the mobile phone fits well with the way I like to communicate					
22. Using the e- mail on the mobile phone fits into my communication style					
23. Using the e- mail on the mobile phone to communicate is compatible with how I like to do things					
24. I intend to use e- mail on the mobile phone the next 6 months					
25. The next 6 months I intend to use e- mail on the mobile phone frequently					

3. Measures used in this study

Parentheses indicate the variables that fell out during the factor analysis.

Perceived Usefulness

Usefulness 1: Using the game on the mobile phone is a time-saving way of playing games,

Using e- mail on the mobile phone is a time- saving way of sending/receiving/reading e-mail

Usefulness 2: Using the game on the mobile phone is an efficient way of playing games,

Using e- mail on the mobile is an efficient way of sending/receiving/reading e-mail

(Usefulness 3: The game on mobile phone is useful to me, E-mail on mobile phone is useful to me)

Perceived Ease of use

Ease of use1: Learning to use the game on the mobile phone is easy to me, Learning to use e-mail on the mobile phone is easy to me

Ease of use2: It is easy to make the game on the mobile phone do what I want it to, It is easy to make e- mail on the mobile phone do what I want it to

Ease of use3: My interaction with the game on the mobile phone is clear and understandable, My interaction with e- mail on the mobile phone is clear and understandable

Ease of use4: It is easy to use the game on the mobile phone, It is easy to use e- mail on the mobile phone

Perceived Expressiveness

Expressiveness1: I often talk to others about the game on the mobile phone, I often talk to others about e- mail on the mobile phone

Expressiveness2: Using the game on the mobile phone is a part of how I express my personality, Using e- mail on the mobile phone is a part of how I express my personality

Expressiveness3: Other people are often impressed by the way I use the game on the mobile phone, Other people are often impressed by the way I use e- mail on the mobile phone

Perceived Enjoyment

Enjoyment1: I find the game on the mobile phone entertaining, I find e- mail on the mobile phone entertaining

Enjoyment2: I find the game on the mobile phone pleasant, I find e- mail on the mobile phone pleasant

Enjoyment3: I find the game on the mobile phone exciting, I find e- mail on the mobile phone exciting

Enjoyment4: I find the game on the mobile phone fun, I find e- mail on the mobile phone fun

Subjective norms

Subjective norms1: People important to me think I should use the game on the mobile phone, People important to me think I should use e- mail on the mobile phone

Subjective norms2: It is expected that people like me use the game on the mobile phone, It is expected that people like me use e- mail on the mobile phone

Subjective norms3: People I look up to expect me to use the game on the mobile phone, People I look up to expect me to use e- mail on the mobile phone

Perceived Behavioural control

Behavioural control1: I feel free to use the kind of the game on the mobile phone I like to, I feel free to use the kind of e- mail on the mobile phone I like to

Behavioural control2: Using the game on the mobile phone is entirely within my control, Using e- mail on the mobile phone is entirely within my control

Behavioural control3: I have the necessary means and resources to use the game on the mobile phone, I have the necessary means and resources to use e- mail on the mobile phone

Compatibility

Compatibility1: I think that using the game on the mobile phone fits well with the way I like to play games, I think that using the e- mail on the mobile phone fits well with the way I like to communicate

Compatibility2: Using the game on the mobile phone fits into my style of playing games, Using the e- mail on the mobile phone fits into my communication style

Compatibility3: Using the mobile phone to play games is compatible with how I like to do things, Using the e- mail on the mobile phone to communicate is compatible with how I like to do things

Information intensity

Information intensity1: Denne tjenesten består primært av informasjon

Information intensity2: Tjeneste karakteriseres av høy informasjon intensitet

(Information intensity3: Viktige deler av tjenesten kan digitaliseres)

(Information intensity4: Store deler av tjenesten kan formidles over elektroniske nett

(Internett, telenett, ol.))

(Information intensity5: Kunden får adgang til store deler av tjenesten gjennom elektroniske medier (Pc, mobil, ol))

Information intensity6: Denne tjenesten egner seg for samling av informasjon

Information intensity7: Denne tjenesten egner seg for behandling av informasjon

Information intensity8: Denne tjenesten egner seg for spredning av informasjon

(Information intensity9: Denne tjenesten krever særlig høye kostnader for opplæring av kjøpere)

4. Measures from the past research

Measures

The table below shows a summary of the measures used in the previous studies of intention to use mobile services. I will only show the variables that were common among the studies.

Study	Variable	Crombach`s Alpha	MVE AVE
Davis (1989)	Perceived Usefulness 1. My job would be difficult to perform without electronic mail 2. Using electronic mail gives me greater control over my work 3. Using electronic mail improves my job performance 4. The electronic mail system addresses my job-related needs 5. Using electronic mail saves me time 6. Electronic mail enables me to accomplish tasks more quickly 7. Electronic mail supports critical aspects of my job 8. Using electronic mail allows me to accomplish more work than would otherwise be possible 9. Using electronic mail reduces the time I spend on unproductive activities 10. Using electronic mail enhances my effectiveness on the job 11. Using electronic mail improves the quality of the work I do 12. Using electronic mail increases my productivity 13. Using electronic mail makes it easier to do my job 14. Overall, I find the electronic mail system useful in my job	0.97 in study 1 0.98 in study 2	-
	Perceived Ease of Use 1. I often become confused when I use the electronic mail system 2. I make errors frequently when using electronic mail 3. Interacting with the electronic mail system is often frustrating 4. I need to consult the user manual often when using electronic mail 5. Interacting with the electronic mail system requires a lot of my mental effort 6. I find it easy to recover from errors encountered while using electronic mail 7. The electronic mail system is rigid and inflexible to interact with 8. I find it easy to get the electronic mail system to do what I want it to do 9. The electronic mail system often behaves in unexpected ways 10. I find-it cumbersome to use the electronic mail system 11. My interaction with the electronic mail system is easy for me to understand 12. It is easy for me to remember how to perform tasks using the electronic mail system 13. The electronic mail system provides helpful guidance in performing tasks 14. Overall, I find the electronic mail system easy to use	0.91 in study 1 0.94 in study 2	-
Nysveen et al (2005a)	Perceived Usefulness 1. Using service makes me save time 2. Using service improves my efficiency 3. Service is useful to me	0.87	-
	Perceived Ease of Use 1. Learning to use service is easy to me 2. It is easy to make service do what I want it to 3. My interaction with service is clear and understandable 4. It is easy to use service	0.95	-
	Perceived Expressiveness 1. I often talk to others about service 2. Using service is a part of how I express my personality 3. Other people are often impressed by the way I use service	0.81	-
	Perceived Enjoyment 1. I find service entertaining	0.95	-

	<ul style="list-style-type: none"> 2. I find service pleasant 3. I find service exciting 4. I find service fun 		
	<p>Subjective norms</p> <ul style="list-style-type: none"> 1. People important to me think I should use service 2. It is expected that people like me use service 3. People I look up to expect me to use service 	0.86	-
	<p>Behavioural control</p> <ul style="list-style-type: none"> 1. I feel free to use the kind of service I like to 2. Using service is entirely within my control 3. I have necessary means and resources to use service 	0.77	-
	<p>Attitude</p> <ul style="list-style-type: none"> 1. Bad/good 2. Foolish/wise 3. Unfavourable/favourable 4. Negative/positive 	0.93	-
	<p>Intention</p> <ul style="list-style-type: none"> 1. I intend to use service the next 6 months 2. The next 6 months I intend to use service frequently 	0.90	-
Nysveen et al (2005b)	<p>Perceived usefulness</p> <ul style="list-style-type: none"> 1. Using mobile chat services make me save time when staying in contact with friends and family 2. Mobile chat services make me more social and available 3. Mobile chat services make me a person it is easier to stay in contact with 4. Mobile chat services are useful to me when staying in contact with friends and family 5. Mobile chat services make my contact with others better 	0.91	-
	<p>Perceived ease of use</p> <ul style="list-style-type: none"> 1. Learning to use mobile chat services is easy to me 2. It is easy to make the mobile chat services do what I want them to do 3. My interaction with mobile chat services is clear and understandable 4. It is easy to understand and interpret mobile chat messages 	0.96	-
	<p>Perceived Expressiveness</p> <ul style="list-style-type: none"> 1. Mobile chat services is something I often talk with others about or use together with others 2. Mobile chat services is something I often show to other people 3. I express my personality by using mobile chat services 4. Using mobile chat services gives me a status 	0.92	-
	<p>Perceived Enjoyment</p> <ul style="list-style-type: none"> 1. I find using mobile chat services entertaining 2. I find using mobile chat services pleasant 3. Using mobile chat services is exciting 4. It is fun to use mobile chat services 	0.96	-
	<p>Subjective norms</p> <ul style="list-style-type: none"> 1. People important to me think I should use mobile chat services 2. It is expected the people like me use mobile chat services 3. People I look up to expect me to use mobile chat services 	0.90	-
	<p>Attitude</p> <ul style="list-style-type: none"> 1. Good/bad 2. Wise/foolish 3. Favourable/Unfavourable 4. Beneficial/harmful 5. Positive/negative 	0.94	-
	<p>Intention</p> <ul style="list-style-type: none"> 1. I intend to use mobile chat services in the next 6 months 2. The next six months I intend to use mobile chat services frequently 	0.91	-
Lexhagen et al (2005)	<p>Perceived Usefulness</p> <ul style="list-style-type: none"> 1. The service was useful to me 2. The service made it easier for me to do my work properly 3. Using the service improved my effectiveness 4. Using the service helped me save time 	0.86	-
	<p>Perceived Ease of Use</p>	0.72	-

	<ul style="list-style-type: none"> 1. Learning to use the service was easy for me 2. It was easy to make the service do what I wanted it to 3. My interaction with the service was clear and understandable 4. It was easy to use the service 		
	<p>Perceived Enjoyment</p> <ul style="list-style-type: none"> 1. Using the service was entertaining 2. Using the service pleasant 3. Using the service exciting 4. Using the service was fun 	0.81	-
	<p>Attitude</p> <ul style="list-style-type: none"> 1. Using the service was foolish/wise 2. Using the service was unfavourable/favourable 	0.62	-
	<p>Intention</p> <ul style="list-style-type: none"> 1. I will like to use the service in a similar situation 2. If I have access to the system next time I take part in a similar festival, I will use this service 	0.86	-
Hung et al (2003)	<p>Perceived Usefulness- based on Davis (1989)</p>	Exceed 0.73	0.5-0.82
	<p>Perceived Ease of Use- based on Davis (1989)</p>	Exceed 0.73	0.5-0.82
	<p>Subjective Norms- adopted from Taylor and Todd (1995)</p> <ul style="list-style-type: none"> 1. People who influence my behaviour would think that I should use the CRC 2. People who are important to me would think that I should use the CRC 	Exceed 0.73	0.5-0.82
	<p>Perceived Behavioural Control- adopted from Taylor and Todd (1995)</p> <ul style="list-style-type: none"> 1. I would be able to use the CRC 2. Using the CRC is entirely within my control 3. I have the resources and the knowledge and the ability to make use of the CRC 	Exceed 0.73	0.5-0.82
	<p>Attitudes- adopted from Taylor and Todd (1995)</p> <ul style="list-style-type: none"> 1. Using the CRC is a (bad/good) idea 2. Using the CRC is a (foolish /wise) idea 3. (dislike/like) the idea of using the CRC 4. Using the CRC would be (unpleasant/pleasant) 	Exceed 0.73	0.5-0.82
	<p>Intention- adopted from Taylor and Todd (1995)</p> <ul style="list-style-type: none"> 1. I intend to use the CRC this term 2. I intend to use the CRC to print projects, papers or assignments this term 3. I intend to use the CRC frequently this term 	Exceed 0.73	0.5-0.82
Teo & Pok (2003)	<p>Perceived Ease of Use</p> <ul style="list-style-type: none"> 1. I believe that WAP-enabled mobile phone is cumbersome to use 2. I believe that it is easy to get WAP-enabled mobile phone to do what I want it to do 3. Overall, I believe that surfing the Internet using WAP-enabled mobile phone is easy 4. Learning to operate WAP-enabled mobile phone is easy for me 	0.79	-
	<p>Subjective Norms</p> <ul style="list-style-type: none"> 1. People who influence my behaviour would think that I should use a WAP-enabled mobile phone 2. People who are important to me would think that I should use a WAP-enabled mobile phone 	0.85	-
	<p>Perceived Behavioural Control</p> <ul style="list-style-type: none"> 1. I would be able to use a WAP-enabled mobile phone 2. Using a WAP-enabled mobile phone is entirely within my control 3. I have the knowledge and the ability to make use of the WAP-enabled mobile phone 	0.81	-
	<p>Attitudes</p> <ul style="list-style-type: none"> 1. Using a WAP-enabled mobile phone is a good idea 2. Using a WAP-enabled mobile phone is a wise idea 3. I like the idea of using a WAP-enabled mobile phone 4. Using the WAP-enabled mobile phone would be pleasant 	0.84	-
	<p>Intention</p> <ul style="list-style-type: none"> 1. If you are given the opportunity to adopt WAP-enabled mobile phone, how likely would you adopt it in the next 6 months 	-	-

	<p>2. If you are given the opportunity to adopt WAP-enabled mobile phone, how likely would you adopt it in the next 12 months</p> <p>3. If you are given the opportunity to adopt WAP-enabled mobile phone, how likely would you adopt it in the next 18 months</p>		
	<p>Compatibility</p> <p>1. Using WAP-enabled mobile phone fits well with my lifestyle</p> <p>2. I think that using WAP-enabled mobile phone fits well with the way I live my life</p> <p>3. Using WAP-enabled mobile phone is completely compatible with my current situation</p> <p>4. Using WAP-enabled mobile phone is compatible with all aspects of my lifestyle</p>	0.92	-
Moore & Benbasat (1991)	<p>Compatibility</p> <p>1. Using a PWS is compatible with all aspects of my work</p> <p>2. Using a PWS is completely compatible with my current situation</p> <p>3. I think that using a PWS fits well with the way I like to work</p> <p>4. Using a PWS fits into my work style</p>	0.86	-
Slyke et al (2004)	<p>Compatibility</p> <p>1. I think that using the Web fits well with the way I like to purchase products or services</p> <p>2. Using the Web fits into my purchasing style</p> <p>3. Using the Web to purchase products or services is compatible with how I like to do things</p>	0.90	-
Chen et al (2004)	<p>Compatibility</p> <p>1. Using the virtual store is compatible with most aspects of my shopping or seeking product information</p> <p>2. Using the virtual store fits my lifestyle</p> <p>3. Using the virtual store fits well with the way I like to shop or seek product information</p>	Composite reliability 0.87	0.86
Taylor & Todd (1995)	<p>Compatibility</p> <p>1. Using the CRC will fit well with the way I work</p> <p>2. A service that fits well with the way I work is (bad/good)</p> <p>3. Using the CRC will fit into my workstyle</p> <p>4. A service that fits into my work style is (bad/good)</p> <p>5. The setup of the CRC will be compatible with the way I work</p> <p>6. A service that is compatible with the way I work is (bad/good)</p>	-	-
Pedersen (2005)	<p>Information Intensity</p> <p>1. This service primarily consists of information</p> <p>2. Our business is characterised by high information intensity</p> <p>3. Important parts of the service can be digitalised</p> <p>4. Big parts of the service can be conveyed through electronic net (Internet, telenet and so on)</p> <p>5. Customers gain access to the big parts of the service through electronic media (pc, mobile phone and so on)</p>		
Based on definition of Apte et al (1999)	<p>Information Intensity</p> <p>1. This service is suited for collection of information</p> <p>2. This service is suited for processing of information</p> <p>3. This service is suited for dissemination of information</p>		
Porter & Millar (1985)	<p>High Information Intensive product</p> <p>1. A product requiring especially high costs for buyer training</p>		