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Factors Affecting Acceptance of Mobile Content Services among Mature Consumers

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ABSTRACT

The aim of this study is to increase our understanding of mature consumers as
users of technological services. More specifically, the objective is to find out
which factors have an effect on the acceptance of mobile content services in the
target group. The services studied are mobile services, including content that is
provided by a service provider. Examples of mobile content services are mobile
news, mobile banking and downloading ringing tones. In order to arrive at a
theoretical model, the previous literature on technology acceptance is explored
from a general and a more age group-specific perspective. The literature review
is multidisciplinary, concentrating on knowledge generated in marketing and
information systems science. The model that is tested in the empirical part is
synthesised from the Technology Acceptance Model, TAM (including perceived
usefulness, perceived enjoyment, perceived ease of use and behavioural
intention) and four individual difference variables (cognitive age, technology
anxiety, prior similar experience and subjective norm). In this study mature
consumers are represented by Finnish baby boomers (born between 1945 and
1955). The data (620 usable responses) were gathered through a structured
postal questionnaire. The main analytical method used is structural equation
modelling (SEM). TAM proved to explain mobile content services acceptance
among Finnish baby boomers extremely well. In addition, the four individual
difference variables were shown to have an effect on one or more of the
variables of TAM. On the basis of the results consideration is given to the
theoretical contributions, practical implications and limitations of the study,
and suggestions for future research are made.

Keywords: ageing/mature consumers, information technology, technology
acceptance, mobile services, structural equation modelling

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Tampere, January 2009
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FIGURES

TABLES

CONTENTS

1 INTRODUCTION

1.1 Background and Relevance of the Topic

This research seeks to describe some of the factors affecting the acceptance of mobile content services among mature consumers. The relevance of the topic relates to two current themes: the theme of continuous technological development and the theme of global population ageing. These themes are extremely important to the business community due to their close relation to two of the major sources of business opportunities, namely technological changes, and social and demographic changes (Shane 2003, 23).

Technological Development
Developments in information technology (IT) have shaped the lives of individuals, for instance, by changing ways of interpersonal communications and by enabling new, more mobile, lifestyles. Similarly, advances in IT in conjunction with decreasing costs of implementation and use have presented the business community with possibilities for altering the methods by which business is conducted (Curran & Meuter 2005) as well as created totally new business opportunities. According to Bitner (2001) one of the most profound factors influencing services marketing today is technology and its immense potential for new service offerings. One specific area of IT that is creating these new service opportunities is mobile technology.

During the 1990s the role of mobile technology in society began rapidly to increase. Mobile phones and connections soon became widespread. The growth in user acceptance of mobile phones is beyond compare in the history of technology adoption (Jones 2003). Worldwide the number of subscriber connections exceeded 2 billion in 2005 (GSM Association 2005). Although the popularity of mobile services cannot be measured by the popularity of mobile devices or connections, their extensive penetration can to some extent be seen as an indication of the potential magnitude of the mobile service phenomenon.

Mobile phones are widely used for communication purposes. More advanced mobile content services have not yet approached their zenith. The breakthrough in these services, especially in Europe, did not come as early as had been expected, but mobile content services are nevertheless reality – more so as third generation (3G) networks and smart phones, enabling a growing diversity of services, become widespread. To assist this breakthrough we need to understand the factors affecting the acceptance (or abandonment) of mobile content services.

Explaining user acceptance of new technology has been a long-standing issue in information systems (IS) research. Since the nineteen seventies researchers have sought to identify the conditions or factors facilitating usage (Compeau & Higgins 1995; Legris, Ingham & Collerette 2003). Among early examples of researchers taking an interest in user acceptance are Swanson (1974) and Lucas (1975). The need for research on acceptance in organisational settings is clear – technology cannot improve organisational performance if it is not used (Davis, Bagozzi & Warshaw 1989). Acceptance among customers is as important, if not even more important, to companies as acceptance among employees, due to the rapid growth of technology-based service delivery options. In the same way as investments in technology inside a company are wasted if it is not used, so too are investments in technology-based services and products if these are not widely accepted among customers.

One promising approach to increasing the success of technology-based service introductions is through an understanding of the antecedents of technology acceptance (Curran & Meuter 2005). As long ago as in 1989 Davis et al. stated:

> As technical barriers disappear, a pivotal factor in harnessing this expanding power becomes our ability to create applications that people are willing to use (...) Practitioners and researchers require a better understanding of why people resist using computers in order to devise practical methods for evaluating systems, predicting how users will respond to them, and improving user acceptance (…)

During the last 19 years much has been learned, but the continuous development of new technological products/services and changes in people as well as in our society keep us occupied with much the same questions.

The acceptance of self-service-technologies (e.g., Dabholkar & Bagozzi 2002; Curran & Meuter 2005; Meuter, Bitner, Ostrom & Brown 2005) and the acceptance of Internet services and electronic commerce by consumers (e.g., Balabanis & Vassileiou 1999; Trocchia & Janda 2000; Pavlou 2003) have recently gained attention among marketing scholars. The factors affecting the acceptance of mobile content services is a newly emerging research area and the number of publications on the subject remains modest. Among them are Suoranta (2003), Cheong and Park (2005), Kaasinen (2005) and Lu, Yao and Yu (2005).

Ageing Population

The population of the world is ageing rapidly. Two main forces are responsible for this situation: increase in life expectancy and high birth rates, especially in developed countries during the post-Second World War years (Moschis 2003). According to the Population Division of the United Nations (2002), by the year 2050 the number of older people (60 years and older) will exceed the number of children (0-14 years) for the first time in history. We are shifting from a youth-oriented to a middle-aged and mature society (Dychtwald 1997).

In 2002 every tenth person was aged 60 years or older, by 2050 according to UN estimates every fifth and by 2150 every third person will be 60 years or older. Since the distribution of older people around the world is not even, it is estimated that 37 per cent of people will be 60 years or older in Europe by the year 2050. For Finland the estimate is 34 per cent. The proportion of older people is currently much higher in the more developed than the less developed areas of the world, but the pace of ageing in developing countries is much more rapid and their transition from a young to an old age structure will be more compressed over time. (United Nations 2002.) The ageing of the population is a global phenomenon that will have an effect all over the world and on all facets of human life (SeniorWatch 2002).

The fact of population ageing also raises a host of corporate issues, mostly under the headings of workforce and marketing (Moschis 2003). In relation to the quantity of older adults and their purchasing power, the attention given to them by marketers is insufficient. Traditionally marketers have focused on younger buyers but in the future, if marketers do not start including 50-plus consumers in their marketing plans, they will end up with losses of sales and revenue due to the decrease in younger buyers (Silvers 1997). The stereotypes that exist of older consumers have not made them particularly attractive in the eyes of marketers. These stereotypes, among other things, condemn ageing consumers as seekers of stability and routine, non-innovative (Schiffman & Sherman 1991) and reluctant to adopt new technologies (Vuori & Holmlund-Rytkönen 2005). However, it has been suggested that these images no longer fit reality (Silvers 1997), one reason being the entrance of the baby boom generation onto the mature market.

Previous research has generally defined the chronological age at which mature market begins to be 50, 55 or 65 (for review see Bone 1991). Depending on the country in question and the precise definition of the baby boom generation used, the whole or at least a large part of this generation has now passed the milestone of 50 years. The baby boom generation consists of people born during the years of high birth rate following the end of the Second World War and they are often described as being different from the previous generations (e.g., Carrigan & Szmigin 1999; Schewe & Noble 2000). People now over 50 were brought up on television, continued innovation and development (Szmigin & Carrigan 2001a). It is time for marketers to realise that today's mature people differ from previous generations. They do not form a homogeneous group (Long 1998), but rather they are a varied group with differences in their spending power, circumstances and use of time (Szmigin &

Carrigan 2001a), and contrary to the existing stereotypes, they are in fact innovative (Szmigin & Carrigan 2000) and adept consumers (Szmigin & Carrigan 2001a).

Such terms as the mature market, mature consumers, the grey market, ageing consumers, older consumers and 50-plus consumers are used in the literature on consumers aged 50 years and older. These terms will also appear in this dissertation. The empirical research focuses specifically on Finnish baby boomers (50- to 60-year-old at the time of the survey). It is important to realise that most of the consumers belonging to the baby boom generation will not consider themselves as *ageing* consumers, let alone *old* or *grey* consumers. "Mature consumer" is probably the best term available and is thus preferred here. Other terms are mostly used when referring to the previous literature. The problem with different terms arises from the artificial age boundary of 50 years set by marketers and marketing researchers. Multiple terms that do not necessarily correspond with the self-images of those aged, for example, between 50 and 60 years, are still widely used in the literature.

The reason for older people being perceived as less likely to accept innovations is not at all clear, and probably reveals more about cultural attitudes towards the older generations than about the facts (Szmigin & Carrigan 2000). Increasingly, it has been observed that ageing people do not fit this long-standing stereotype (Schiffman & Sherman 1991; Mathur, Sherman & Schiffman 1998), and thus the oversimplified negative effect of chronological age on innovative behaviour suggested by it can by no means be taken as a fact describing the mature consumers of today.

Already in the early 1990s Schiffman and Sherman (1991) examined an age-subcultural segment -the new age elderly- that they saw as possessing a value orientation that would be prototypical for increasing numbers of older consumers in the near future. Schiffman and Sherman's research revealed the new age elderly to be particularly discerning, skilful and knowledgeable consumers, due to their experience in consuming. They stated that unskilled marketers have misinterpreted this consumer sophistication to mean that older consumers are not innovative and that a more appropriate characterisation for this group would be "selectively innovative". In other words, older consumers adopt new things when they feel that they will truly benefit from them.

The idea that mature consumers are selectively innovative suggests that this group does not fit the traditional stereotype. However, this does not imply that as consumers they are identical to younger consumers. Some empirical results have been obtained that illustrate the notion of older consumers as selectively innovative in the context of Internet services. Vuori and Holmlund-Rytkönen (2005) found that Internet users aged over 55 are mostly interested in the same services and operations as are younger users, that is, sending and receiving e-mail, searching information and using e-bank services. However, their 55+ respondents were not interested in the kind of online entertainment services that are popular among younger Internet users. Their mature respondents could thus be seen as being selectively innovative. Further, taking into account the fact that, for instance, the number of Internet users is lower in

the older age groups (Statistics Finland 2008), it seems clear that when it comes to the acceptance of technology younger and older consumers are to some extent different and thus, knowledge on younger consumers' acceptance of technology does not necessarily fully apply to mature consumers.

The reasons for the increasingly positive attitudes of mature consumers towards technological consumer innovations are manifold. As already mentioned, today's mature consumers differ from those of past generations due to their life history (Szmigin & Carrigan 2001a). They are more educated and experienced consumers than their predecessors. Another contributing factor is the encroachment of technology into working life, which for many has made it necessary to learn technology-related skills. In addition, the pressures for better productivity in the public sector have resulted in the increased uptake of self-service technologies. In many cases non-technological service encounters have been made unattractive by increasing their price relative to that of technological self-service options. It seems that a positive attitude towards technology is a condition of success in many different areas of life.

The fact that marketers focus on younger buyers is especially true in the case of technological products and services. Naturally the assumed lack of innovativeness of ageing consumers has contributed to this. Although mature consumers and the changes in this specific market have started to receive attention from academic researchers, mature consumers and their acceptance of technological services have gained only little attention. A few recent articles focusing on ageing consumers' acceptance of the Internet are available (Trocchia & Janda 2000; Tatnall & Lepa 2003; Eastman & Iyer 2004; Vuori & Holmlund-Rytkönen 2005). Existing studies mostly focus on providing descriptive information on older individuals' Internet use (Trocchia & Janda 2000), or they are interested in finding direct correlations between background information and Internet use or between hypothesised affecting factors and use. Thus there seems to be a need for testing a theoretically based model of technology acceptance among mature consumers that goes beyond simple correlations and also takes into account possible mediator variables. Further, as the use of mobile services becomes more and more common, there arises a need to examine the factors influencing the acceptance of mobile content services. This study attempts to fill a gap in the marketing literature by developing a model that describes the factors affecting the acceptance of mobile content services among mature consumers.

1.2 Research Objectives

The aim of the study is to increase our understanding of mature consumers as users of technological services. More specifically, the objective is to find out what factors have an effect on the acceptance of mobile content services in the specific target group. In this study, the focus is on the phenomenon of

technology acceptance within the target group (i.e., consumers aged between 50 and 60 years), and thus the study is not broadened to comparisons between different age groups. The study consists of a theoretical and an empirical part. The theoretical part (the second chapter) has the following objectives:

1) to explore previous research and reasoning concerning technology acceptance from a general perspective;

2) to study individual difference variables that could have an effect on technology acceptance specifically among mature/ageing consumers;

3) to review previous research on the acceptance of mobile content services;

4) to formulate a model of acceptance to be tested in the empirical part of the study.

The first theoretical objective leads us to the roots of this research. In information systems research in particular there is a strong tradition of examining technology acceptance. Marketing scholars have also relied on those traditions, bringing with them their own views and emphases (e.g., Dabholkar & Bagozzi 2002). The present review of theories and previous research on general technology acceptance first presents alternative theoretical models and then focuses on a line of research that is rooted in the Technology Acceptance Model (TAM) by Davis (1989).

The second theoretical objective has an age group-specific approach. Both in marketing and information systems research several individual difference variables affecting technology acceptance have been proposed. This study focuses on user variables that are related to the individual's personality and user-situational variables. Four individual difference variables that are considered to be important among mature consumers have been selected for closer scrutiny. The individual difference variables, namely cognitive age, technology anxiety, prior similar experience and subjective norm, are expected to help in achieving a deeper understanding of technology acceptance compared to the use of a general technology acceptance model (i.e., TAM) alone.

The third theoretical objective looks at the previous research where the focus is on the acceptance of mobile technology. The history of acceptance research on mobile content services is a short one. Although visions of killer applications have been present for some time the acceptance research is still in its infancy. Without acceptance among consumers, acceptance has been hard to study. It is hoped that the review of the previous research on the acceptance of mobile content services further supports the selection of TAM as a starting point for model formulation in this study.

The fourth objective is to formulate a theoretical model describing factors affecting the acceptance of mobile content services among the specific group of mature consumers. The model is synthesised from TAM and the relevant individual difference variables.

The theoretical model describing factors affecting the acceptance of mobile content services among mature consumers is the starting point for the empirical part of the study. In the empirical part the model of acceptance and the 18 hypotheses that it posits are tested (for the hypotheses see Chapter 2.4). In this study mature consumers are represented by Finnish baby boomers (i.e., Finnish people born between 1945 and 1955). Thus the empirical object of this research is to study what factors affect the acceptance of mobile content services among Finnish baby boomers. The precise research questions are:

1) Do the variables of the Technology Acceptance Model (perceived usefulness, perceived ease of use and perceived enjoyment) explain the acceptance of mobile content services among Finnish baby boomers?

2) What is the effect of the individual difference variables (cognitive age, technology anxiety, experience, subjective norm) on the perceived usefulness, perceived ease of use, perceived enjoyment and intention to use mobile content services among Finnish baby boomers?

The present study relies on many of the philosophical assumptions of contemporary positivism. The methodological approach of the study is quantitative and the aim is to produce findings that are, at least to some extent, generalisable. The empirical part is based on survey data that were collected in 2005 from 620 respondents. The main analytical method used is structural equation modelling (SEM).

1.3   Theoretical Foundations

This research participates in the debate on customer acceptance of technological services. This debate is clearly multidisciplinary. In the marketing domain the present study belongs to the *services marketing* school of thought (Lagrosen & Svensson 2006) as well as the *consumer behaviour* school of thought (Sheth, Gardner & Garrett 1988, 110-126; Lagrosen & Svensson 2006). Within the services marketing school of thought the emerging area that concentrates on consumer self-service technology (SST) adoption (e.g., Meuter, Ostrom, Roundtree & Bitner 2000; Curran, Meuter & Surprenant 2003; Meuter, Ostrom, Bitner & Roundtree 2003; Curran & Meuter 2005; Meuter et al. 2005) is relevant to this study. Like the other research on SST adoption this one too relies on theories and concepts originally developed by psychologists and theories that information systems scientists have adopted and modified from psychology.

Because of the specific interest in mature consumers the present study is also clearly rooted in consumer behaviour school of thought where a growing debate is being conducted on the ageing of the world's population and the need of recognising the true nature and potential of the mature market (e.g., Wolfe 1997; Silvers 1997; Dychtwald 1997; Long 1998; Carrigan & Szmigin 1999;

Szmigin & Carrigan 2001a; Ahmad 2002). The consumer behaviour school of thought has traditionally relied heavily on knowledge developed in the behavioural sciences, for example, psychology (Sheth et al. 1988, 112). This knowledge is also adopted in this research, for example in the use of the cognitive age concept and attitude formation theories.

Technology adoption has also been of interest to those marketing researchers that have concentrated on issues relating to new information technologies in general. Their area of interest is often referred to as *electronic business*. Presumably, few would regard electronic business as a separate school of thought within marketing. However, it has been a prominent line of research for several years. A number of scholars have specialised in research on the electronic environment. In addition, several journals focusing specifically on electronic business have appeared over the years (Bharati & Tarasewich 2002). Although researchers on electronic business rely on theories drawn from the more prominent marketing schools of thought it may also be seen as a separate line of research within marketing. Of the marketing schools of thought electronic business overlaps at least with those of services marketing and consumer behaviour.

Figure 1 depicts the position of this research within the marketing domain, as well as its relations to the relevant theories and concepts from other disciplines. It may be seen as a partial exposition of the evolution of technology acceptance thinking from the point of view of marketing. The references in Figure 1 are examples of early research on relevant concepts and models. The references cited in the figure are by no means all-inclusive. More references will be introduced in the literature review. In addition, for the sake of clarity, within the circle depicting the marketing domain, only the research areas of relevance to this study (i.e., services marketing, consumer behaviour and electronic business) are shown.

Both consumer beliefs regarding technological services and individual differences between consumers are included in the model of acceptance that is developed in this study. From among the alternative models/theories found in the literature the Technology Acceptance Model (TAM) proposed by Davis (1989) is selected as a base model to which other relevant affecting variables are attached in this study. TAM was developed within information systems science and originally focused on two beliefs about the technology in question: perceived usefulness and perceived ease of use (Davis 1989). Later on perceived enjoyment (Davis, Bagozzi & Warshaw 1992) and several other variables such as self-efficacy, job relevance and subjective norm (e.g., Venkatesh & Davis 2000; Venkatesh 2000) were added to the model.

PSYCHOLOGY

Theory of Reasoned Action
(Fishbein & Ajzen 1975)
- beliefs
- subjective norm
- behavioural intentions

Social Cognitive Theory (Bandura 1986)
- self-efficacy
- others' use
- experience

Anxiety (e.g., Spielberger 1966)

Personal Age
(Kastenbaum, Derbin,
Sabatini & Artt 1976)

INFORMATION SYSTEMS

Technology Acceptance Model
(Davis 1989, Davis et al. 1992)
- perceived usefulness
- perceived ease of use
- perceived enjoyment

Computer Anxiety
(e.g., Cambre & Cook 1985)

MARKETING

Services Marketing School of Thought

SST Adoption
Technology Anxiety
(Meuter et al. 2003)

Electronic Business

Consumer Behaviour Scool of Thought

Cognitive Age
(Barak & Schiffman 1981)

Adoption of Theories and Concepts   ● "Factors Affecting Acceptance of Mobile Content Services among Mature Consumers"

FIGURE 1   Position of the Research within the Marketing Domain and the Origins of the Relevant Theories, Models and Concepts

TAM is deeply rooted in the behavioural sciences and particularly psychology (Davis 1989; Davis et al. 1989). Fishbein and Ajzen's (1975) Theory of Reasoned Action (TRA) is used as a theoretical base for defining the causal linkages between the variables of TAM (Davis et al. 1989). It is noteworthy that marketing researchers have adopted the TRA through two different routes. Firstly, it has been adopted directly from psychology and secondly, indirectly in a modified form (i.e., as TAM) through information systems science.

Of the several different models that have been created in order to gain a better understanding of the process of new technology adoption, TAM (Davis 1989) is considered to be the most widely accepted in information systems research (Agarwal & Prasad 1999; Venkatesh 2000). Another line of information systems research, relevant to this study, has focused on the importance of individual difference variables in IT acceptance (for reviews see Zmund 1979; Nelson 1990; Alavi & Joachimsthaler 1992). Such variables as cognitive style, personality attributes, demographics and user-situational variables (e.g., experience, training and involvement) have been studied within this research orientation (Zmud 1979; Alavi & Joachimsthaler 1992).

Although the primary focus of the research within marketing that concentrates on consumer use of SSTs is on individual differences and attitude models that can be used to predict intentions (Meuter et al. 2005), innovation characteristics, following Rogers (1995) (e.g., Meuter et al. 2005), and TAM's belief constructs (e.g., Curran & Meuter 2005) have also been studied. Individual difference variables explored in the SST adoption literature include technology readiness (Parasuraman 2000), technology anxiety (Meuter et al. 2003; Meuter et al. 2005), need for interaction (Curran & Meuter 2005; Meuter et al. 2005), inertia, previous experience and demographics (age, gender, education and income) (Meuter et al. 2005). Many of the individual difference variables studied in SST adoption have their origin in the behavioural sciences.

Consumer behaviour researchers have also studied individual differences related to innovation/technology acceptance. In connection with the innovative behaviour of ageing consumers the concept of cognitive age has received considerable attention among one group of consumer behaviour researchers (e.g., Barak & Schiffman 1981; Barak & Gould 1985; Wilkes 1992; Szmigin & Carrigan 2000). A more detailed description of the theories and concepts relevant to the present study is provided in Chapter 2 (Acceptance of New Technology – Literature Review).

1.4 Structure of the Study

The study is organised as follows. The aim of Chapter 2 is to present the theoretical foundations of this study. Technology acceptance is first explored from a general perspective. This general perspective provides the base model to which the relevant external variables can be attached. After the general

approach, individual difference variables that could have an effect on technology acceptance, specifically among mature consumers, are addressed. Earlier studies on the acceptance of mobile content services are also covered. The chapter ends with the presentation of the theoretical model and hypotheses to be tested in the empirical part of the study.

Chapter 3 leads us to the empirical part of the study. The chapter covers a range of issues related to the execution of the research. The research approach, the selection criteria for the target population, the questionnaire, the operationalisation of the theoretical constructs, the process of sampling and data collection, the background characteristics of the respondents, the analytical method, and the reliability and validity of the study are all discussed.

Chapter 4 presents the main results of the study. First, the data are described in terms of means, medians and standard deviations. After this, a measurement model for each latent variable is tested. The analysis continues with the estimation of the base model (i.e., Technology Acceptance Model, TAM). After an acceptable solution is found, models combining one individual difference variable at a time (cognitive age, technology anxiety, previous experience, subjective norm) to the TAM are tested.

Chapter 5 concludes the study. This chapter begins with a discussion on the main empirical findings. The theoretical contributions of the study as well as its implications for practitioners are considered. Finally, the limitations of the study and suggestions for future research are presented.

2 ACCEPTANCE OF NEW TECHNOLOGY – LITERATURE REVIEW

Technological development presents the business community with possibilities for altering the methods of conducting business (Curran & Meuter 2005) as well as creating new business opportunities (Shane 2003, 23). Consumer acceptance of technological innovations has become crucial to marketers due to the rapid growth of technological products and technology-based service delivery options. However, understanding the factors that influence an individual user's acceptance of technology is also of interest in a variety of other research fields. An apt example of this is a Finnish research project on adolescents' use of mobile phones which combined researchers from various research areas, such as folklore, anthropology, ethnology, sociology, social psychology, social and public policy, communications, information science and marketing (Kasesniemi & Rautiainen 2001). In this study, however, the theories and perspectives on technology acceptance of information system science and marketing research are in focus.

Since the nineteen seventies, *information systems* researchers have tried to find out what factors facilitate technology acceptance. For long the focus was on understanding technology acceptance in an organisational environment. Thus many articles on this topic have been published in journals that focus on *management information systems (MIS)*. Along with the introduction of the Internet a focus on consumer settings has also become more popular among information systems researchers. In information systems research, theories adapted from *psychology* play an important role.

Marketing research is another field that has given considerable attention to the question of technology adoption. Marketing researchers have adopted theories both from the information systems sciences as well as from psychology. Compared to information systems researchers marketing researchers have focused more on acceptance among consumers, although among *marketing management* researchers the focus has been similar to that among MIS researchers. Consumers' acceptance of technology is of interest in many

research areas of marketing, at least those of *services marketing, consumer behaviour/psychology* and *electronic business*.

The focus of the present study is on consumer acceptance. However, because many of the theories applied in consumer acceptance research were originally developed for acceptance research in an organisational environment, these theories have an important role in the literature review as well. The questions posed in marketing and in information systems research about consumer acceptance are very similar. Many of the articles published on technology acceptance could have equally been written by either marketing or information systems scholars. Both have tried to understand the psychology of user acceptance as well as the characteristics of the technological innovations that affect their diffusion. One difference seems to be that in information systems research the emphasis has been on developing models of technology acceptance, whereas in marketing research the emphasis has been on examination of one or few possible explanatory factors at a time.

The literature review in this chapter is divided into three main sections. The first section considers technology acceptance from a general perspective. Here, this general perspective means that no specific age-group or technology is in focus. During the past decades several theoretical models describing the determinants of acceptance and utilisation have been developed in order to gain a better understanding of the process of new technology adoption. In this review, alternative theoretical models are introduced. The Technology Acceptance Model (TAM) is the base model chosen for this study and thus in the literature review the focus is clearly on TAM. A detailed description of TAM, its origins, formulation and previous use is provided.

In the second section an age group-specific approach is taken. The literature on ageing consumers clearly stresses that ageing consumers should not be seen as a homogeneous group (Bone 1991; Moschis 1993, 2003; Dychtwald 1997; Leventhal 1997; Long 1998; Szmigin & Carrigan 2001a; Ahmad 2002). Thus, it is seen as crucial to study how individual differences might affect technology acceptance. In the area of marketing in particular, researchers have been interested in numerous different individual variables such as cognitive age (Szmigin & Carrigan 2000), technology anxiety (Meuter et al. 2003), technology readiness (Parasuraman 2000) etc., and their effect on innovation adoption. Also within IS research, a parallel research line to TAM, has concentrated on the importance of individual difference variables in information technology acceptance (for reviews see Zmund 1979; Nelson 1990; Alavi & Joachimsthaler 1992). Here, variables that appear to be important, specifically in the case of mature consumers, are examined.

The theoretical model formulated in the last section of this chapter is largely based on the content of the first two sections, that is, on the review of previous research on general technology acceptance and individual difference variables. However, before the theoretical model is formulated it is necessary also to review the previous research on the acceptance of mobile content services. Thus, the third section of the literature review will contemplate the research done during the last few years, in the particular context of mobile

content services. As noted in the research objectives, the main purpose of this section is to provide further support for the selection of TAM as a starting point for model formulation.

2.1 Technology Acceptance – a General Perspective

Of the models explaining technology acceptance the Technology Acceptance Model (TAM) by Davis (1989) and different versions of it (refinements and extensions) seem to be the most widely accepted in information systems research (Agarwal & Prasad 1999; Venkatesh 2000; Lee, Kozar & Larsen 2003). TAM is also well accepted among marketing scholars, as is implied by its use in marketing research (e.g., Dabholkar & Bagozzi 2002; Lu, Yu, Liu & Yao 2003). TAM has its theoretical roots in Fishbein and Ajzen's (1975) Theory of Reasoned Action (TRA). TRA itself, as well as the Theory of Planned Behavior (TPB) derived from it (Ajzen 1985), has also been applied in studies of technology acceptance (e.g., Davis et al. 1989; Mathieson 1991). In addition to TAM, TRA and TPB, the Innovation Diffusion Theory (IDT) (by Rogers 1995, first published in 1962) is a well known theory that has been used in studies of technology acceptance.

In this chapter these alternative models/theories are introduced. The chapter begins by introducing IDT since it is seen as a general conceptual framework for discussing technology acceptance. Next, TRA, which serves as a theoretical basis for both TPB and TAM, is introduced. Then TPB, an extension of TRA, is briefly sketched. Finally, a detailed description of TAM is given. Since the Technology Acceptance Model is the base model selected for this study, a strong focus will be on TAM. The chapter concludes by giving the grounds for the selection of TAM.

2.1.1 Innovation Diffusion Theory

Technology acceptance is often subsumed under the theoretical analysis of innovation diffusion and although the Innovation Diffusion Theory (by Rogers 1995, first published in 1962) is not concerned with information technology exclusively, it offers a conceptual framework for discussing acceptance at a general level (Dillon & Morris 1996). The diffusion of an innovation has been defined as "the process by which an innovation is communicated through certain channels over time among the members of a social system" (Rogers 1995, 5). According to this definition there are four main elements in the diffusion of innovations, namely the innovation, communication channels, the social system and time. *An innovation* is "an idea, practice, or object that is perceived as new by an individual or other unit of adoption". In IDT, communication is defined as the process of creating and sharing information

among the participants in order to reach a mutual understanding, and the means by which messages get from one individual to another is called *a communication channel* (e.g., mass media or interpersonal). *Social systems* are formed by individuals, informal groups or organisations that are engaged in joint problem-solving to accomplish a common goal. (Rogers 1995, 5, 10-23.)

IDT is a broad theory of innovation diffusion, covering a wide range of issues. One of IDT's strengths is the inclusion of the time element (Rogers 1995, 18) and those parts of the theory that are clearly related to this time dimension are also quite well-known. According to Rogers (1995, 20-23) the time dimension is involved in IDT (1) in the innovation-decision process, which consists of five stages (knowledge, persuasion, decision, implementation and confirmation); (2) in the adopter categories (innovators, early adopters, early majority, late majority and laggards), reflecting the innovativeness (in terms of the time of adoption) of an individual compared with other members of the social system; and (3) in the S-shaped rate of adoption.

IDT suggests that five perceived attributes of an innovation - relative advantage, compatibility, complexity, trialability and observability - are one important explanation of the rate of adoption of an innovation. *Relative advantage* is the extent to which an innovation is perceived as better than its precursor. *Compatibility* is the extent to which an innovation is seen as consistent with potential adopters' values, experiences and needs. *Complexity* is the extent to which an innovation is perceived as difficult to use. *Trialability* is the extent to which an innovation may be experimented with before adoption, and *observability* is the extent to which the outputs of an innovation are visible to others. (Rogers 1995, 206-244.)

Two of Rogers' attributes of an innovation are similar to the constructs of perceived usefulness and perceived ease of use included in the Technology Acceptance Model (TAM, Davis 1989). Relative advantage is similar to perceived usefulness (Taylor & Todd 1995a, Agarwal & Prasad 1997). In TAM 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). Thus both in the definition of relative advantage and perceived usefulness there is an aspect of enhancement relative to the previous situation (Moore & Benbasat 1991). Complexity is analogous (although in the opposite direction) to perceived ease of use (Taylor & Todd 1995a, Agarwal & Prasad 1997), which is defined as "the degree to which a person believes that using a particular system would be free of effort" (Davis 1989). Further, compatibility is related to both perceived usefulness and perceived ease of use, since potential adopters' consistent values and needs are likely to contribute to perceived usefulness, and consistent experience is likely to contribute at least to effortless usage.

In the context of information technology, Moore and Benbasat (1991) have extended Rogers' perceived attributes of an innovation by dividing observability into result demonstrability (the extent to which the results of using the innovation are tangible) and visibility (the actual visibility of an innovation), and by adding a new attribute of image (social approval). They

developed an instrument to measure these seven attributes of an innovation. Later they found only relative advantage, compatibility and ease of use to affect continued usage decisions (Moore & Benbasat 1996, 144). An early meta-analysis of the IDT literature has found these same attributes of relative advantage, compatibility and complexity to be the ones most consistently related to adoption (Tornatzky and Klein 1982, cited in Agarwal & Prasad 1997).

Moore & Benbasat's (1991) measurement scales have since been used, for example, by Agarwal & Prasad (1997) and Venkatesh, Morris, Davis & Davis (2003). Agarwal & Prasad (1997) found visibility, compatibility and trialability to affect current system usage, whereas relative advantage and result demonstrability affected continued usage, measured as usage intention. Venkatesh et al. (2003) found only relative advantage and ease of use to affect usage intention in voluntary settings; relative advantage had an effect on usage intention at three points in time (post-training, one month and three months after implementation) and ease of use had an effect on intention measured after training.

2.1.2 Theory of Reasoned Action

The ultimate goal of Fishbein and Ajzen's Theory of Reasoned Action (TRA) is to predict and understand an individual's behaviour (Ajzen & Fishbein 1980, 5). This reasoned action approach assumes that people's behavioural intentions follow reasonably from their beliefs about performing the behaviour in question. These beliefs are not necessarily realistic; they may be inaccurate, biased or irrational. Nonetheless, they provide the cognitive foundation from which intentions are eventually assumed to follow in a reasonable and consistent fashion. (Ajzen & Fishbein 2005, 193-194.)

TRA holds as a boundary condition that the behaviours being studied are under full volitional control (Madden, Ellen & Ajzen 1992). According to a TRA person's intention to perform a specific behaviour is an immediate determinant of action, whereas intention is a function of two basic determinants: attitude and subjective norm. Attitude towards a behaviour simply describes the person's positive or negative evaluation in relation to performing that behaviour. Subjective norm relates to the person's perception of social pressures directed at him to perform (or not to perform) the behaviour. For some intentions attitudinal considerations may be more important than normative ones and vice versa. At the next level are the antecedents of attitudes and subjective norms. TRA states that an attitude is a function of beliefs about consequences of the specific behaviour and evaluations of these potential outcomes. Subjective norm is a function of person's beliefs that specific individuals think he/she should (or should not) perform the behaviour and his/her motivation to comply with the specific referents (see Figure 2). (Fishbein & Ajzen 1975, 14-16; Ajzen & Fishbein 1980, 5-8.)

TRA has received considerable attention within the field of consumer behaviour and it appears to predict consumer intentions and behaviour fairly well. Interestingly, it has been found to have strong predictive validity even when investigating activities that do not fall within the boundary condition of volitional control. (Sheppard, Hartwick & Warshaw 1988.)
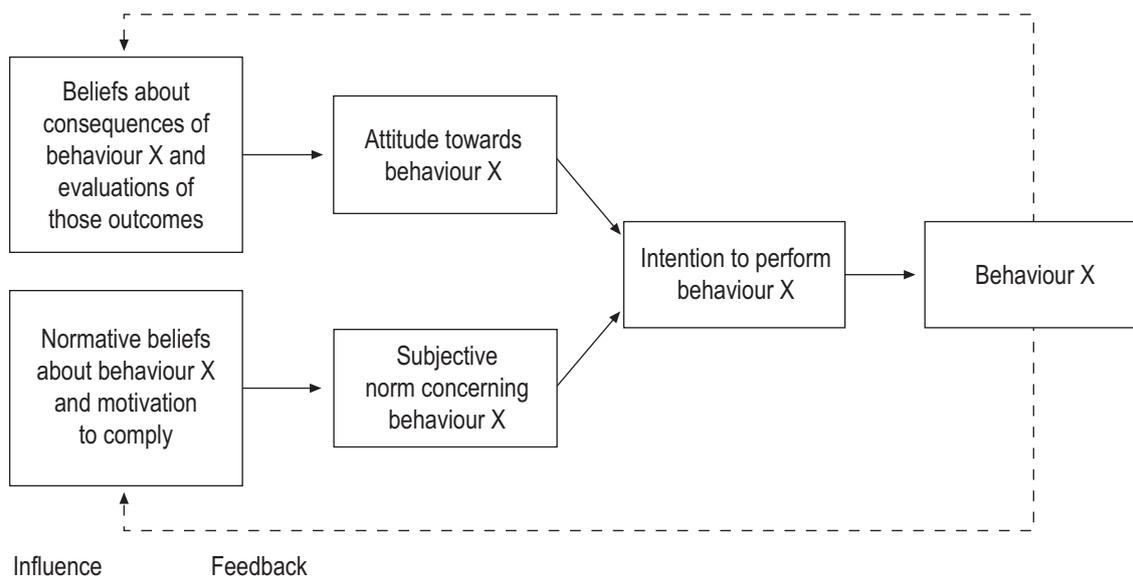
FIGURE 2   Theory of Reasoned Action (Fishbein & Ajzen 1975, 16; Ajzen & Fishbein 1980, 8, Ajzen 2002)

TRA suggests that all the other variables, such as personality traits or demographic characteristics, affecting behaviour do so indirectly through their influence on the beliefs that a person holds or on the relative importance he/she accords to attitudinal and normative considerations (Ajzen & Fishbein 1980, 9). Because TRA captures the internal psychological variables through which the numerous external variables examined in IS research influence behaviour (i.e., acceptance), TRA has the potential to provide a common frame of reference to which the researcher can integrate different lines of inquiry (Davis et al. 1989). However, although TRA is a general model that is applicable to several areas, specific models (i.e., the Technology Acceptance Model and modifications of it) have been derived from TRA to better fit the context of technology acceptance (Dillon & Morris 1996). It seems that in technology acceptance research, TRA in its original form has mainly been used in studies comparing two or more models of user acceptance (Davis et al. 1989; Venkatesh et al. 2003).

2.1.3 Theory of Planned Behaviour

Ajzen (1985) has extended TRA's boundary condition of volitional control by proposing the Theory of Planned Behavior (TPB), which incorporates perceived behavioural control as an antecedent of behavioural intention and behaviour

(Madden et al. 1992). Thus, TPB is meant to better deal with behaviours over which people have incomplete volitional control (Ajzen 1991). TPB posits that in addition to behavioural beliefs and normative beliefs, human action is guided by beliefs about factors that may facilitate or impede performance of the behaviour and the perceived power of these factors (see Figure 3) (Ajzen 2002). It is these control beliefs about the possession of requisite resources and opportunities for performing a given behaviour that give rise to perceived behavioural control (Madden et al. 1992; Ajzen 2002). In the case of consumer behaviour, issues of control may, for example, relate to financial constraints or a product's availability (Ajzen 2008, 538). The effect of intention on behaviour is expected to be stronger when actual control is high rather than low. To the extent that perceived control is realistic, it may serve as a proxy for actual control and be used to improve prediction of behaviour. (Ajzen & Fishbein 2005, 194.)
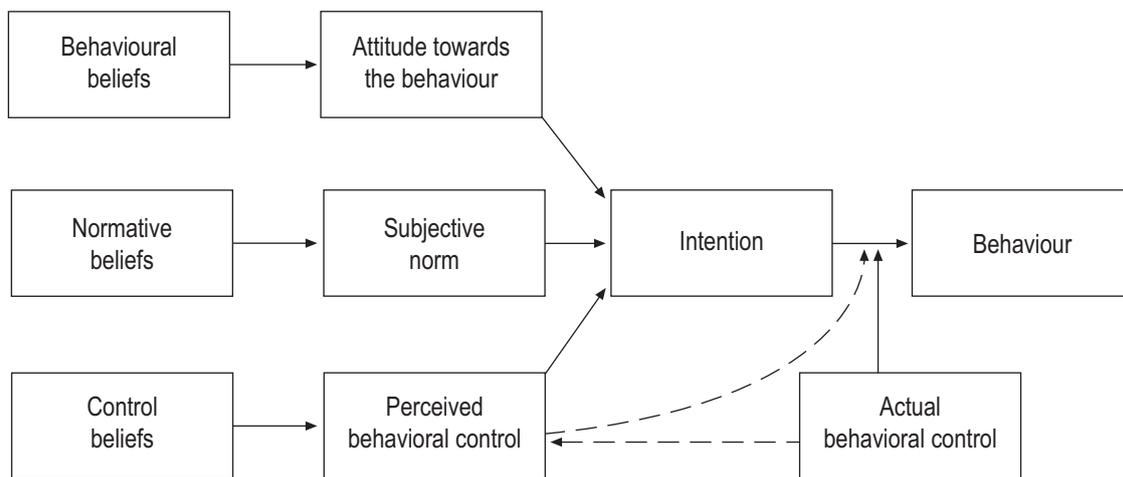
FIGURE 3   Theory of Planned Behaviour (Ajzen 1991, Ajzen & Fishbein 2005, 194)

Only a few technology acceptance studies have tested TPB. As with the technology acceptance studies applying TRA, TPB has mainly been used in studies comparing two or more possible models of user acceptance (Mathieson 1991; Taylor & Todd 1995a; Venkatesh et al. 2003). An explanation for the rare use of TPB may be found in the finding by Sheppard et al. (1988) indicating that TRA (in which perceived behavioural control is excluded) has strong predictive validity even in the case of behaviours over which people have incomplete volitional control. Also the fact that the Technology Acceptance Model (TAM) was derived from TRA may have diminished the popularity of TPB in technology acceptance research.

2.1.4 Technology Acceptance Model

The Technology Acceptance Model (TAM) uses Fishbein and Ajzen's Theory of Reasoned Action (TRA) as a theoretical basis on which to explicate causal linkages between the variables in the model (Davis et al. 1989). The original TAM posits that technology acceptance can be explained by two beliefs, namely perceived usefulness and perceived ease of use. In the original TAM, perceived usefulness is defined as "the degree to which a person believes that using a particular system would enhance his or her job performance", that is, if a system is high in perceived usefulness, then the user believes that there is a positive link between use and performance. 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.) According to Davis (1989) although perceived usefulness and perceived ease of use are not the only variables affecting acceptance, they seem to play a central role.

TAM is tailored to model user acceptance of information systems with the objective of both explaining and predicting user behaviour across a wide range of technologies and user populations. Although rooted in TRA, TAM differs from TRA in several theoretical aspects (for a more thorough explanation and justification of these changes see Davis et al. 1989).

First, in TRA salient beliefs are selected afresh for each new context, whereas TAM's usefulness and ease of use are proposed a priori as fairly general determinants of technology acceptance. *Second*, TRA sums all beliefs multiplied by evaluations into a single construct, whereas TAM retains usefulness and ease of use as distinct constructs. Modelling beliefs in a disaggregate manner makes it possible to compare the relative influence of each belief and thus adds to understanding of the phenomenon. *Third*, in TAM usefulness and ease of use are not multiplied by self-stated evaluation weights because usefulness and ease of use are expected to be positively valued outcomes for most people. *Fourth*, TAM does not include the subjective norm as a determinant of behaviour. It was originally left out of the model because of the construct's uncertain theoretical and psychometric status. (Davis et al. 1989.) Later on its influence has been studied (see e.g., Venkatesh & Davis 2000).

Fifth, although originally TAM included attitude as an antecedent of intention (see Figure 4), it was later on excluded from it (see Figure 5). Davis et al. (1989) discovered that attitude did not generally intervene between beliefs and intentions. Instead they found a direct belief-intention link. Other researchers have verified this finding (e.g., Taylor & Todd 1995a). Although Davis and his colleagues (e.g., Venkatesh & Davis 1996; Venkatesh & Davis 2000) omitted attitude from TAM, some others have also applied the original TAM (including attitude) in their studies (e.g., Agarwal & Prasad 1999; Hu, Chau, Sheng & Tam 1999; Lu et al. 2003; van der Heijden 2003; Curran & Meuter 2005). It is very difficult to compare these studies with contradictory findings about attitude since consistent measures of attitudes are not used across studies (compare for example Taylor & Todd 1995a and van der Heijden 2003).
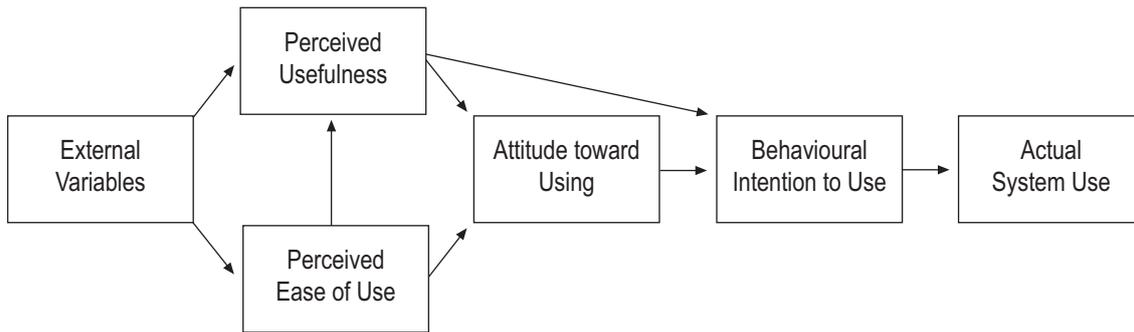
FIGURE 4   Original Technology Acceptance Model, TAM by Davis 1986 (cited in Davis et al. 1989)
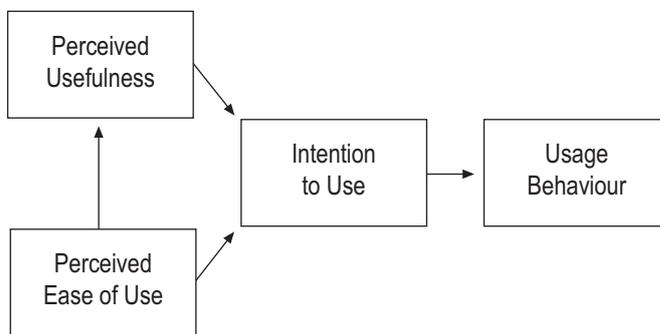
FIGURE 5   Modified Technology Acceptance Model, TAM (Venkatesh & Davis 2000)

All in all, the debate over whether attitudes should be included in TAM is somewhat baffling, since Ajzen (2002) clearly states that behavioural beliefs measure the same underlying attitude construct that the direct attitude measures do. In other words, behavioural beliefs are assumed to determine the attitude towards behaviour but they are not assumed to determine the direct measure of attitude. Thus researchers who include both belief-based measures (e.g., I find mobile content services easy to use) as well as direct attitude measures (e.g., Using mobile content services is good – bad) in their models are actually measuring the same construct in two alternative ways (i.e., direct and indirect). As Ajzen points out, "Belief-based and direct measures are fallible indicators of the same underlying, latent constructs. (…) therefore, it would be a mistake to model the belief-based measures as antecedents or causes of the direct measures". The important difference between these measures is that the indirect belief measures give insight into why people hold certain attitudes (Ajzen 2002). In the case of technology acceptance this information is naturally invaluable in guiding the design and marketing of technological applications.

Sixth, TAM states that there is a link between the two beliefs in that ease of use has an effect on usefulness (Davis et al. 1989). This relation is very logical – the easier a system is, the more useful it can be (Venkatesh & Davis 2000). The direct effect of perceived ease of use on intention is stronger in the early stages of behaviour. With experience the effect becomes indirect, operating through usefulness. (Davis et al. 1989.)

Time and time again TAM has been replicated, validated and proved to predict the use of information systems (e.g., Venkatesh & Davis 1996; Agarwal & Prasad 1999; Agarwal & Karahanna 2000; Venkatesh & Davis 2000; Venkatesh 2000; Lee et al. 2003). Over the years the research results have generally been consistent (Legris et al. 2003). There is extensive empirical support that TAM is robust across time, settings, populations and technologies (Venkaesh 2000). In numerous empirical studies TAM has been found to explain approximately 40 per cent of the variance in usage intentions and behaviour. Perceived usefulness has been shown to be a strong determinant of usage intentions, the regression coefficients typically being about 0.6. (Venkatesh & Davis 2000.) Also, in studies that have tested the effects of Roger's (1995) perceived innovation characteristics, relative advantage (similar to usefulness) has appeared to be overwhelmingly important for user acceptance (see e.g., Suoranta 2003). Regression coefficients for the effect of perceived ease of use on intention has usually been around 0.2 (e.g., Davis et al. 1989; Venkatesh & Davis 2000).

Although widely accepted and successfully applied, TAM has also been subjected to criticism. Lee et al. (2003) surveyed the opinions of leading IS researchers on TAM and found their concerns to fall into four different categories. Firstly, they felt that TAM researchers may have fallen into the trap of replicating previous studies with only minor adjustments. Secondly, some of them felt that TAM research may be overdone and that the extensive attention targeted to TAM may have diverted research from other areas of interest. Thirdly, TAM has possibly narrowed down the variables included in studies of technology adoption, resulting in reduced attention to the role of technology and design. Fourthly, TAM was criticised for its simplicity, which limits its value to practitioners.

Based on their survey as well as meta-analysis of TAM articles, Lee et al. (2003) also outlined suggestions for improving future TAM research. Among other things, they suggested incorporating more variables (such as emotion, habit and personality difference) into TAM, exploring the boundary conditions (such as experience and task type) of TAM, investigating actual usage instead of self-reported usage, and integrating other theories (e.g., diffusion of innovation theory) with TAM. In the present study, perceived enjoyment, user variables that relate to an individual's personality, and user-situational variables are incorporated into the basic TAM model.

2.1.5 External Variables of TAM

Along the lines of TRA, TAM suggests that external variables affect intention indirectly through usefulness and ease of use (Venkatesh 2000). Indeed the results of a meta-analysis of the empirical research done with TAM confirm that external variables are fully mediated by usefulness and ease of use, and that external variables contribute only marginally to the explanation of variance in technology usage. What external variables provide is better understanding of

usefulness and ease of use, and the actions required to increase usage. (Legris et al. 2003.) In other words, while TAM is very powerful in predicting acceptance, it does not help in understanding or explaining acceptance profoundly enough (Venkatesh & Davis 1996). In fact, Davis et al. (1989) have stated that the key purpose of TAM is to provide a basis for examining the impact of external factors on user behaviour. Research has been done to model both the determinants of usefulness (e.g., Venkatesh & Davis 2000) and the determinants of ease of use (e.g., Venkatesh & Davis 1996; Venkatesh 2000).

Antecedents of Usefulness
TAM2 (see Figure 6) was created to extend TAM to include additional determinants of usefulness and intention. The additional theoretical constructs were social influence processes (subjective norm, voluntariness, image) and cognitive instrumental processes (job relevance, output quality, result demonstrability). The antecedents of perceived usefulness in TAM2 explained up to 60 per cent of the variance of perceived usefulness. TAM2 introduced the following relationships: (1) Subjective norm (defined according Fishbein & Ajzen 1975) has a direct effect on intention when the usage of a technology is mandatory and a person has relatively little experience of this technology; that is, the effect is moderated by experience and voluntariness. (2) Subjective norm also has an influence on usefulness that is moderated by experience. (3) Subjective norm has an effect on image (status benefits) that in turn affects usefulness. (4) Job relevance and output quality have an interactive effect on usefulness. (5) Result demonstrability has a direct effect on usefulness. (Venkatesh & Davis 2000.)

Antecedents of Ease of Use
Venkatesh (2000) has formulated and empirically tested a model (see Figure 7) that describes the determinants of ease of use. The model is based on an anchoring and adjustment heuristic which means that without specific knowledge an individual relies on general information that acts as an anchor. If additional information (i.e., following direct experience) becomes available, individuals have a tendency to adjust their judgements to better suit this new information, while not totally abandoning the initial anchoring criteria.

In the model the general anchors influencing early perceptions of ease of use are internal control (computer self-efficacy), external control (facilitating conditions), intrinsic motivation (computer playfulness) and emotion (computer anxiety). Along with experience an individual adjusts his/her perceptions of the ease of use of a particular system. While the individual is gaining experience, the role of computer anxiety and computer self-efficacy remains, whereas the role of computer playfulness diminishes over time giving way to system-specific perceived enjoyment. Objective usability serves as an adjustment for efficacy and anxiety, and the facilitating conditions shift from general to system-specific. The model explains up to 60 per cent of the variance in system-specific ease of use. In testing his model Venkatesh found that an individual's general beliefs about computers were the strongest determinants of

system-specific ease of use, even after experience with the system. This finding calls for a focus on individual difference variables in order to enhance user acceptance, rather than over-emphasising system-related perceptions and design characteristics, as is often the case. (Venkatesh 2000.)
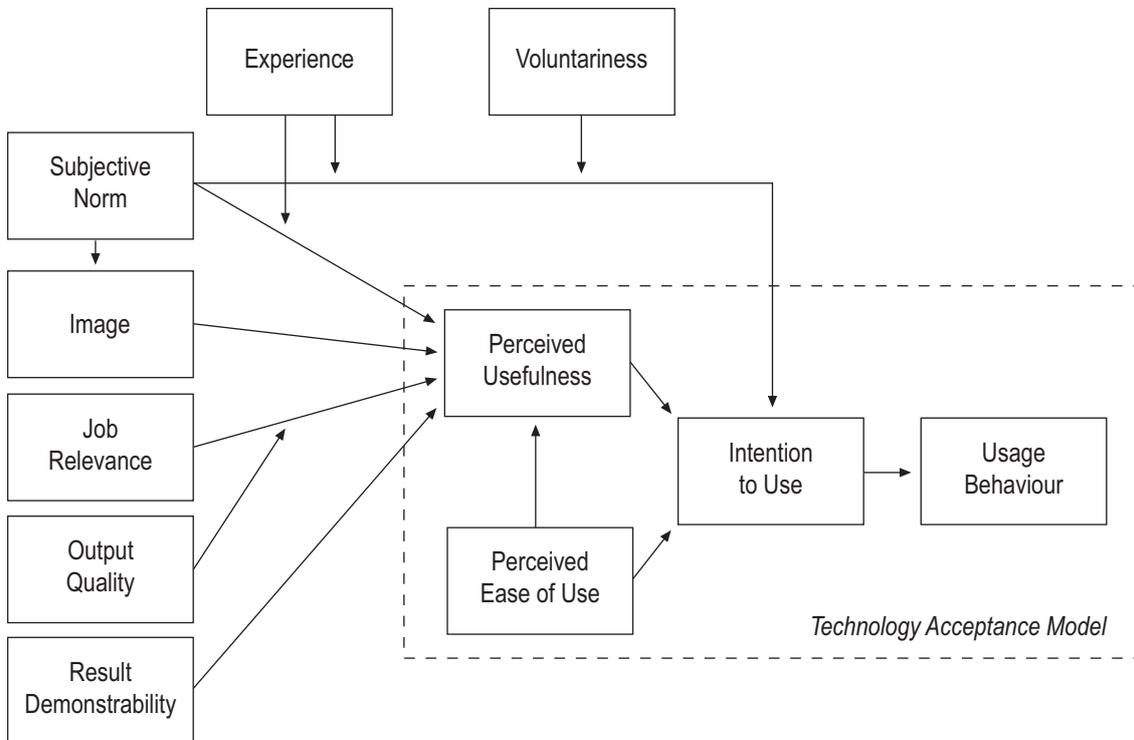
FIGURE 6   Enhanced Technology Acceptance Model, TAM2 (Venkatesh & Davis 2000)
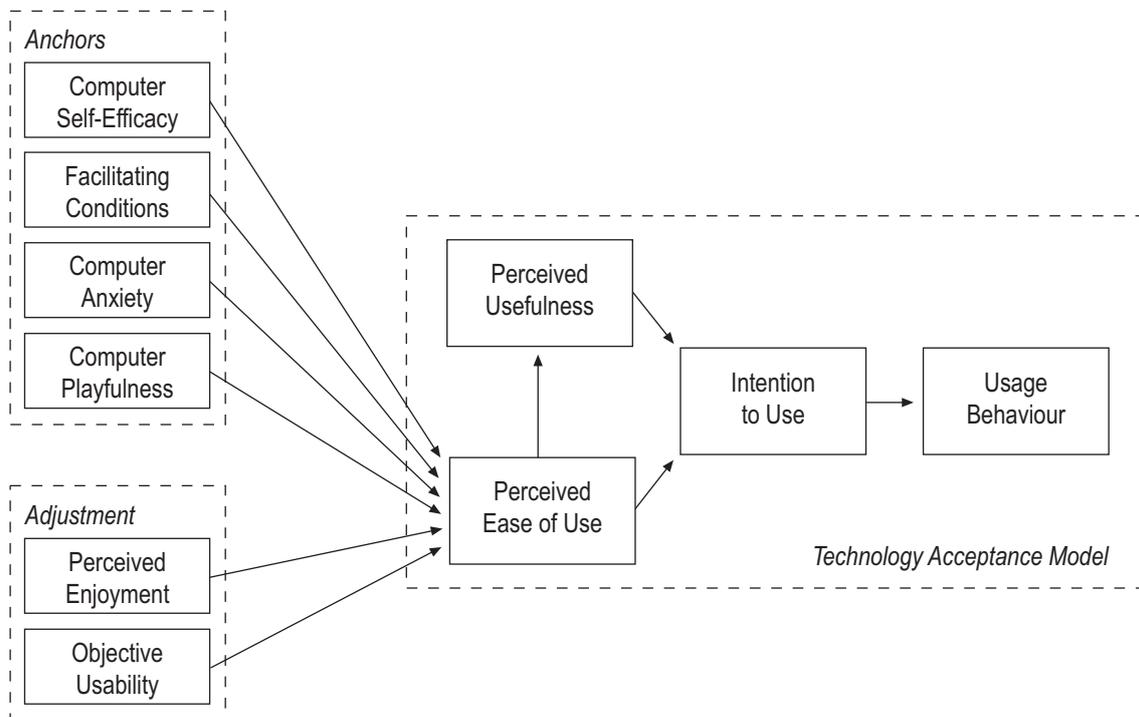
FIGURE 7   Determinants of Perceived Ease of Use (Venkatesh 2000)

2.1.6 An Addition to TAM - Perceived Enjoyment

An important addition to TAM is a belief called perceived enjoyment. Davis et al. (1992) have found intrinsic and extrinsic motivation to be key drivers of intention to use technology. Intrinsic motivation refers to doing something because it is inherently interesting or enjoyable, whereas extrinsic motivation refers to doing something for the sake of a separable outcome (Ryan & Deci 2000). Following this dichotomy, a variable called perceived enjoyment is an example of an intrinsic motivation, and perceived usefulness is an example of an extrinsic motivation to use technology (Davis et al. 1992).

Perceived enjoyment can be defined as the extent to which using a specific technology is perceived to be enjoyable in its own right, aside from any performance consequences resulting from usage (Venkatesh 2000). Definitions of perceived playfulness (e.g., Moon & Kim 2001) and perceived fun (e.g., Igbaria, Parasuraman & Baroudi 1996) are very similar to the definition of perceived enjoyment, and all these three terms have been used to describe virtually the same construct. Here it is important to note that playfulness as an individual trait is different from a perceived playfulness, which is an individual's belief about his/her interaction with a specific technology.

The model tested by Davis et al. (1992) differs somewhat from TAM that includes only two beliefs (perceived usefulness and perceived ease of use). In it perceived usefulness and perceived enjoyment are determinants of behavioural intentions, whereas perceived ease of use and output quality operate as determinants of usefulness and enjoyment. Just as perceived ease of use influences usefulness, it is likely to influence perceived enjoyment, because systems that are difficult to use are less likely to be perceived as enjoyable (Teo, Lim & Lai 1999). In the model there is also a variable called task importance which moderates the effect of ease of use and output quality on usefulness. Davis et al. (1992) found a positive interaction between usefulness and enjoyment, implying that enjoyment has a greater positive effect on intentions when the technology is perceived as useful and vice versa. *Usefulness and enjoyment were found to explain up to 75 per cent of variance in intentions* (Davis et al. 1992).

The role of perceived enjoyment in relation to other TAM constructs is a bit vague. Unlike Davis et al. (1992), Venkatesh (2000) places perceived enjoyment as an antecedent of perceived ease of use (see Figure 7). Venkatesh (2000) justifies positing enjoyment as an antecedent of perceived ease of use by reference to the fact that he found (1999) the perceived ease of use-behavioural intention relationship to be moderated by game-based vs. traditional training. Venkatesh (1999) also found that respondents who participated in game-based training aimed at enhancing playfulness scored higher on the perceived enjoyment scale adapted from Davis et al. (1992). Unfortunately, because of his focus on the effectiveness of game-based training, he did not include perceived enjoyment in his model (Venkatesh 1999), and thus was not able to determine the relation between perceived enjoyment and the other constructs of TAM. In contrast to Venkatesh (2000), many others have seen perceived enjoyment as a

belief, consistent with Davis et al. (1992), on the same level as perceived usefulness and ease of use (e.g., Igbaria, Iivari & Maragahh 1995; Teo et al. 1999; Moon & Kim 2001; van der Heijden 2004; Cheong & Park 2005). The effect of perceived enjoyment on intention seems often to be around 0.10 – 0.15 (β) (see e.g., van der Heijden 2003; Cheong & Park 2005).

The empirical evidence has consistently supported the importance of perceived usefulness over perceived ease of use and enjoyment (Venkatesh 1999; van der Heijden 2004). However, a number of exceptions can be found (e.g., Venkatesh 1999; Moon & Kim 2001). In these studies ease of use and enjoyment have been stronger predictors of acceptance than usefulness. Moon & Kim (2001) studied usage of the Internet for an entertainment purpose and found perceived playfulness to have the strongest effect on behavioural intentions. Venkatesh (1999) found perceived ease of use to have a higher overall effect on intention to use than usefulness in game-based training. Van der Heijden (2004) argues that the differences in the predictive importance of the various determinants are explained by the purpose of the system, that is, whether the purpose is to provide hedonic or utilitarian value.

2.1.7 Grounds for Selecting TAM

The reasons for choosing TAM as the base model for this study and thus the main focus in this chapter are many. *Firstly*, TAM has been selected because of its generality. TAM has been applied, for instance, in research concerning the acceptance of specific computer programs (e.g., Davis 1989; Davis et al. 1989), acceptance of computer usage in general (e.g., Igbaria et al. 1995; Igbaria et al. 1996), acceptance of the Internet (e.g., Teo et al. 1999; Moon & Kim 2001), acceptance of a specific website (e.g., van der Heijden 2003) and acceptance of the mobile Internet (e.g., Cheong & Park 2005). In their meta-analysis Lee et al. (2003) classify the different types of information systems used in TAM studies into four major categories. These are communication systems (e.g., e-mail, voicemail, fax), general purpose systems (e.g., Windows, PC, www), office systems (e.g., word processor, presentation, data base programs) and specialised business systems (e.g., computerised model, case tools, hospital IS). They conclude that TAM has been found successfully to predict acceptance of these different technologies.

Secondly, although, TAM was originally created to explain user acceptance of information technology at work (Venkatesh & Davis 2000), over the years it has also been applied to consumer acceptance. It seems that in consumer settings TAM and its modifications have most often been used to study acceptance of the Internet or Internet-based services (see e.g., Moon & Kim 2001; van der Heijden 2003; Pavlou 2003). On the basis of these successful applications of TAM in explaining consumer acceptance, it can be concluded that TAM lends itself well also to consumer settings. One specific area of interest within services marketing has been the acceptance of self-service technologies (SSTs, i.e., "technological interfaces that enable customers to

produce a service independent of direct service employee involvement") (Meuter et al. 2000). Some of these studies have also used TRA and TAM as their theoretical basis (e.g., Dabholkar & Bagozzi 2002; Curran & Meuter 2005).

Thirdly, TAM's variables have also been proven to be crucial in technology acceptance in studies that have not specifically used TAM as a theoretical framework. Meuter et al. (2003) studied the benefits of using SSTs and found, for example, convenience and ease of use, time savings and service quality (cf. perceived usefulness), and enjoyment to affect SST usage. In addition, Meuter et al. (2000) found, through conducting a qualitative critical incident study, that usefulness and ease of use played a critical role in customer satisfaction with SSTs. Further, in studies using IDT's perceived characteristics of an innovation, relative advantage (similar to perceived usefulness) and complexity (analogous to ease of use) have been seen to occupy an important role in explaining adoption (Tornatzky & Klein 1982, cited in Agarwal & Prasad 1997; Moore & Benbasat 1996, 144).

Fourthly, TAM has performed well against TRA and TPB in comparison studies (e.g., Davis et al. 1989; Mathieson 1991). In comparing TAM and TRA, Davis et al. (1989) found TAM to be a better predictor of intention to use a specific system. Mathieson (1991) found TAM to explain slightly more variance in intention than TPB. Taylor and Todd (1995a) found that TAM, TPB and a model they called "decomposed TPB" all exhibited reasonable fit to the data and explained similar amounts of the target behaviour. They concluded that if parsimony is used as a criterion and the central goal of a model is to predict usage then TAM is preferable, although their decomposed TPB model (with 13 variables) provides a deeper understanding of the determinants of usage. In the present study the parsimony of the TAM model is seen as an advantage since external variables (i.e., individual difference variables) will be connected to the general model of acceptance.

Fifthly, taking into account the fact that many technological applications nowadays include entertaining elements, it is important that a model explaining technology acceptance includes, in addition to utilitarian aspects (extrinsic motivation), also hedonic aspects (intrinsic motivation). In TAM this aspect is acknowledged with perceived enjoyment (Davis et al. 1992).

Sixthly, in the non-TAM related literature on mature consumers the importance of the basic belief variables of TAM, ease of use and usefulness, is stressed. Moschis (2003) states that there are certain attributes that older consumers value in general, two of which are convenience and functionality. Convenience could among other things be good location, ease of purchase, or ease of using services/products, whereas functionality for older consumers concerns the essential benefits (cf. usefulness) of the product. (Moschis & Mathur 1993; Moschis 2003.)

Finally, TAM's key purpose has been stated to be one of providing a basis for examining the impact of external factors, such as individual differences, on user behaviour (Davis et al. 1989). As the present study aims at combining a general model of user acceptance with a set of individual difference variables

that are relevant in the case of mature consumers, the choice of TAM seems to be well justified.

2.2 Individual Difference Variables

Questions concerning the effect of individual differences on the acceptance of new technology-based services are becoming increasingly important for service practitioners in making decisions on (1) whether to offer technology based services, (2) how to design them to be appealing to different consumers, (3) which type of consumers such services should be targeted at and (4) how to do so (Dabholkar & Bagozzi 2002). In studying the acceptance of technology among mature consumers individual differences assume an important role, since the literature on ageing consumers clearly stresses the fact that ageing/mature consumers should not be seen as a homogeneous group (Bone 1991; Moschis 1993, 2003; Dychtwald 1997; Leventhal 1997; Long 1998; Szmigin & Carrigan 2001a; Ahmad 2002).

As a term individual differences could be used to refer to any differences between individuals. From a general perspective of this kind, the differences between individuals' beliefs (e.g., TAM's perceived usefulness) would also be counted as individual differences. However, according to Dabholgar and Bagozzi (2002), to marketers the relevant consumer differences include demographic factors, psychographic profiles and personality traits. Of these Dabholkar and Bagozzi (2002) see the personality traits of consumers as the most interesting consumer differences, since they lie at the heart of consumer attitude formation and behavioural intentions. Similarly, in the IS research literature individual differences are seen as user factors that include such variables as cognitive style, personality attributes, demographics and user-situational variables (Zmud 1979; Alavi & Joachimsthaler 1992).

Individual difference variables that can be found both in the literature on technology acceptance or innovation adoption and in the literature on ageing consumers have been selected for the present study. Thus these variables are considered to be relevant in the case of mature consumers. This is not meant to imply that these variables would not be important in the case of younger consumers; it is just that they are assumed to be of a particular importance in the case of mature consumers. In this study, the selected individual difference variables are divided into *user variables* and *user-situational variables*. The user variables included are related to individual's (user's) personality, his/her unique characteristics. Demographic variables would also come under the heading of user variables, but such variables are not included as independent variables in this study (with the exception of a comparison made between chronological and cognitive age).

In IS research it has been customary to term a certain group of individual difference variables user-situational variables. Although this concept of user-

situational variables has not been strictly defined, such variables as experience, training and involvement are usually included (e.g., Alavi & Joachimsthaler 1992). In this study user-situational variables are seen as variables that describe the individual (user) and are inseparable from contextual aspects. For example, stating that someone has experience holds little information if the statement does not mention any domain for that experience.

For the purposes of this study a classification of individual difference variables was created (see Table 1). Table 1 lists only the variables used in this study, and thus is not all-inclusive. The idea of this classification is to show how the selected variables differ from each other. The literature review indicated that the individual difference variables previously studied varied in specificity. Accordingly, in this study the specificity of the domain of an individual difference variable varies across four levels. These levels are named as the general (no specific domain is stated), technology-specific (technology in general), related technology-specific and mobile content service-specific levels. *Cognitive age* is a variable that is not bound to any specific domain; *technology anxiety* deals with technology in a more general manner and thus belongs to the technology-specific level; *prior SMS and Internet experience* are seen as technologies related to mobile content services and belong to the level of related technology; *prior mobile content service usage* and *subjective norm* are, in this study, mobile content-specific constructs and belong to the highest level of specificity.

TABLE 1   Individual Difference Variables

	Specificity of the Domain			
	General (no specific domain)	**Technology-Specific**	**Related Technology-Specific**	**Mobile Content Service-Specific**
User Variables	Cognitive Age	Technology Anxiety		
User-Situational Variables			SMS Experience	Subjective Norm
			Internet Experience	Mobile Content Service Experience

Type of Individual Difference

As already mentioned, two types of individual difference variables are utilised in this study: user variables and user-situational variables. Cognitive age is seen as a user variable. The classification of technology anxiety is somewhat

problematic. It could be positioned under either user variables or user-situational variables. Naturally, because technology anxiety is indeed technology-specific, it is "situational". However, this is taken into account by classifying it as technology-specific. In addition, technology anxiety may fluctuate over time, which would make it "situational". Although the level of anxiety may vary over time and circumstances, in this study technology anxiety is positioned under user variables since it is seen as a variable clearly connected to an individual's personality. Prior similar experience and subjective norm are classified as user-situational variables. Next, the selected variables, namely cognitive age, technology anxiety, prior similar experience and subjective norm, will be discussed one at a time.

2.2.1 Cognitive Age

Chronological age, which tells the number of years since birth (Barak 1987), is a measure that is almost always used by researchers to describe a sample of interest. According to Barak and Schiffman (1981), the ultimate shortcoming of chronological age is the fact that it does not take into account that people often feel of an age that does not equal their birth age. This self-perceived age (rather than chronological age) seems to be the age that has a more profound effect on people's purchasing behaviour (Barak & Schiffman 1981; Auken, Barry & Anderson 1993). According to Schiffman and Sherman (1991) "age is revealing itself to be more of a state of mind than a physical state (i.e., chronological age)".

A variety of non-chronological age variables have appeared in gerontology (for short review see Barak & Schiffman 1981). Of these a social-psychological age construct, termed personal age (by Kastenbaum, Derbin, Sabatini & Artt 1972, cited in Barak & Schiffman 1981), has served as a cornerstone for the development of a self-perceived age measure, labelled "cognitive age", that has been created for (Barak & Schiffman 1981) and applied in consumer behaviour research (e.g., Szmigin & Carrigan 2000; Wilkes 1992; Gwinner & Stephens 2001). Cognitive age provides important clues about older adults' attitudes towards purchasing and consuming (Stephens 1991).

Cognitive age is defined as "an individual's actual age-role self-concept, reflecting his/her age-identity in terms of four age dimensions (feel-age, look-age, do-age and interest-age) expressed in years" (Barak & Gould 1985). Thus building on the four dimensions suggested by Kastenbaum et al. (1972, cited in Barak & Schiffman 1981) the construct of cognitive age combines the age a person feels, the age a person thinks he/she looks, the age a person perceives himself/her to act and the age a person sees as reflecting his/her interests (Barak & Schiffman 1981). The results from several studies show that elderly respondents are considerably more likely to report a more youthful cognitive age than their chronological age (e.g., Barak & Schiffman 1981; Barak 1987; Wilkes 1992; Auken et al. 1993; Szmigin & Carrigan 2000). For example, in a study conducted by Auken et al. (1993) the average difference between the

respondents' chronological and cognitive age was 13.5 years (the chronological ages of the respondents ranged from 56 to 87 with a mean age of 67.9 years), and in a study by Szmigin and Carrigan (2000) 10.3 years (the chronological ages of the respondents ranged from 51 to 86 with a mean of 59.8 years). This bias becomes more pronounced with advancing chronological age (Barak & Schiffman 1981); that is, the higher the chronological age, the wider the difference between chronological and cognitive age.

From the point of view of marketers it is interesting to know what factors are affected by cognitive age. Wilkes (1992) found that cognitively younger women had higher self-confidence, greater fashion interest, were more work oriented and were more likely to take part in entertainment and culturally related activities than their cognitively older counterparts. Stephens (1991) and Gwinner and Stephens (2001) found higher cognitive age to be negatively related to the individual's propensity to consume product information (especially advertising) and new brand trial, and positively related to cautiousness about trying new products or switching from existing product choices. Szmigin and Carrigan (2000) did not find a relationship between cognitive age and innovativeness in the domain of travel services and suggested that this might have been due to older consumers becoming more and more ageless in their consumption behaviour. It cannot, of course, be concluded from their results that cognitive age is not related to innovative behaviour in any other domains either.

Mathur et al. (1998) see cognitive age and consumer innovativeness as going hand in hand within the group of older consumers that they call "new age elderly". They describe these new age elderly both as younger in self-perceived age and as willing to accept new products and services. In an interpretive study Szmigin and Carrigan (2001b) found that their cognitively young interviewees enjoyed shopping, and also to had access to and an interest in computers. Although cognitive age has not been previously studied as an antecedent of TAM's belief constructs, the relation between younger cognitive age and new brand/service/product trial suggests that higher cognitive age could be inversely related to positive beliefs about new innovative technology-based services.

2.2.2 Technology Anxiety

Numerous terms are used to describe the concern or fear associated with technology use. Such terms include technophobia, technostress, technoangst, computerphobia, computer anxiety, technology aversion, micro phobia and cyberphobia (Scott & Rockwell 1997). Some of these are interchangeable while some describe slightly different constructs. The wide variety of these kindred terms can be seen as reflecting the magnitude of the phenomenon in question. As technology becomes more and more ubiquitous, it is natural that many people at some point will also experience more or less negative feelings towards

technology. In the following the concepts of anxiety, computer anxiety and technology anxiety are explored.

Spielberger (1966, 12) identifies two types of anxiety: state and trait anxiety. Earlier research on anxiety in the domain of technology has concentrated on the anxiety connected to personal computers (Meuter et al. 2003). This *computer anxiety* is usually considered to be a specific example of state anxiety (Cambre & Cook 1985). State anxiety is "a transitory state or condition…that varies in intensity and fluctuates over time". Anxiety states are characterised by "subjective, consciously perceived feelings of apprehension and tension accompanied by or associated with activation or arousal of the autonomic nervous system". Trait anxiety (a personality trait) refers to "the extent to which different people are characterized by anxiety states and by prominent defences against such states" and thus implies a behavioural disposition to perceive a variety of objectively non-dangerous circumstances as threatening and to react to those situations with anxiety state reactions. (Spielberger 1966, 12, 16-17.)

Raub (1981) defines computer anxiety as "the complex emotional reactions that are evoked in individuals who interpret computers as personally threatening" (cited in Cambre & Cook 1985), whereas Howard, Murphy and Thomas (1986) define it as a "fear of impending interaction with a computer that is disproportionate to the actual threat presented by the computer" (cited in Scott & Rockwell 1997). Thatcher & Perrewé (2002) define computer anxiety as "anxiety about the implications of computer use such as the loss of important data or fear of other possible mistakes". On the basis of a review of definitions Brosnan (1998, 17) defines computer anxiety as "an irrational anticipation or fear evoked by the thought of using (or actually using) computers, the effects of which result in avoiding, or minimising, computer usage". Brosnan's definition highlights the irrational nature of the affective state and its possibility to exist in people actually using computers.

Computer anxiety has been found to be a good predictor for future technology usage, for such technologies as word processing, e-mail, electronic discussion groups etc. (Scott & Rockwell 1997). Venkatesh (2000) has studied the role of computer anxiety in the nomological net of TAM. He hypothesised and found it to be a determinant of perceived ease of use. It seems that the effect of computer anxiety on perceived usefulness or enjoyment has not been investigated. Computer anxiety has been shown to have a significant impact on attitudes (Igbaria & Parasuraman 1989). As all three beliefs, that is, ease of use, usefulness and enjoyment of using mobile content services, provide an indirect measure of attitude towards this behaviour (see Ajzen 2002) it can be concluded that technology anxiety may affect not only perceived ease of use but also perceived usefulness and enjoyment.

A less researched construct termed *technology anxiety* differs from computer anxiety in that it focuses on anxiety evoked by technological tools in general, whereas computer anxiety focuses on anxiety related to personal computers (Meuter et al. 2003). In studying technological services that are not used with computers, a more general technology anxiety concept seems

appropriate. Previous research using the construct of technology anxiety (instead of computer anxiety) seems to be rather scarce. However, by showing the connection between technology anxiety and current self-service technology usage, Meuter et al. (2003) demonstrated technology anxiety to be a pertinent construct in marketing research.

General "technology-related anxieties" in the form of discomfort and insecurity are also included in a Technology Readiness Index (TRI) by Parasuraman (2000). In addition to these anxieties or inhibitors of technology usage, TRI also includes dimensions of optimism and innovativeness that are seen as drivers of technology usage. The technology-readiness construct is defined as "people's propensity to embrace and use new technologies for accomplishing goals in home life and at work". (Parasuraman 2000.) Although TRI is appealing in the sense that it includes both inhibitors and drivers of technology usage, the four dimensions included, unfortunately, are not conceptually defined, nor theoretically rationalised by its developer. Further, TRI is rather lengthy with 36 items (Parasuraman 2000). For the sake of conceptual clarity the technology anxiety concept by Meuter et al. (2003) was chosen for this study.

Examining the effect of technology anxiety on technology acceptance is especially interesting in the case of mature consumers. As Chua, Chen & Wong (1999) have noted there is a common impression that older people feel higher levels of computer anxiety than younger people. This image relates not only to computers but also to technology in general. This widespread impression is manifest, for example, in Mick and Fournier's (1998) discussion on their qualitative data on the paradoxes of technology:

> As such, technology ownership may represent a critical domain of life in which many people, *especially those in older cohorts, experience ineptitude and resignation, pointing directly to the conflict and stress* emerging from the paradox of competence/incompetence. [italics added]

Although it also has been suggested that this impression is over-generalised and does not necessarily hold true (Rosen & Weil 1994; Chua et al. 1999), it would be useful to know how crucial the role of general technology anxiety is in the formation of beliefs about specific technological applications among mature/ageing consumers.

2.2.3 Prior Similar Experience

There are results to show that older consumers rely more on their own experience than on external sources such as word-of-mouth in evaluating new products and services (Schiffman 1971; Schiffman & Sherman 1991) and thus personal experience might play a significant role in the acceptance of mobile content services among mature consumers.

In general, prior similar experience has been proved to have an effect on new technology acceptance (see e.g., Alavi & Joachimsthaler 1992; Harrison & Rainer 1992; Agarwal & Prasad 1999). However, the relationship between experience and behaviour is not entirely clear. The relationship can occur in different ways: experience could have a direct effect on behaviour, it could have an indirect effect on behaviour through intervening variables or it could moderate the effect of antecedent variables on behavioural intentions or behaviour. (Thompson, Higgins & Howell 1994.)

When the data are based on experiments or collected longitudinally experience is usually introduced as a moderating variable between belief constructs, or between antecedent variables and behavioural intentions or behaviour (e.g., Thompson et al. 1994; Taylor & Todd 1995b; Venkatesh & Davis 1996; Venkatesh & Davis 2000; Venkatesh et al. 2003). Although there is no theoretical basis for the moderating effects of experience (Venkatesh & Davis 2000), the effect of perceived ease of use on perceived usefulness has sometimes been found to strengthen over time (e.g., Davis et al. 1989; Venkatesh & Davis 1996). The direct effect of perceived ease of use on intentions has been shown to decrease over time in some studies (Davis et al. 1989), whereas in other studies it has been shown to increase over time (e.g., Venkatesh & Davis 1996).

In addition to moderating effects, direct and indirect effects of experience on usage have been tested and found (e.g., Thompson et al. 1994; Agarwal & Prasad 1999). Thompson et al. (1994) found a significant effect of PC usage experience on current PC utilisation, whereas Agarwal & Prasad (1999) found prior similar experience to affect beliefs about the ease of use of a system. Similarly, Cheong & Park (2005) found experience to have an indirect effect on attitude toward mobile Internet use through perceived ease of use and perceived enjoyment. Oddly, it seems that the effect of experience mediated through usefulness on behavioural intention has not been studied in TAM research. However, Thompson et al. (1994) found that experience had an indirect effect on personal computer usage through a variable labelled as near-term consequences. These near-term consequences were conceptualised and measured similarly to the concept of perceived usefulness, lending support thereby to the view that experience may have an effect on perceived usefulness.

In the case of mobile content services it may be expected that the majority of mature consumers will be found not to have significant amounts of experience in using mobile content services. However, experience in using the Internet or in text messaging can be considered a similar kind of experience, since using the Internet and/or text messaging include some of the same elements and benefits (e.g., time independence or access to a wide information and service base) as the usage of mobile content services. Many of the mobile content services available continue to be based on text messaging, whereas if a new third generation mobile phone is used the service interfaces may be very similar to the ones offered in a wired, that is, in a traditional Internet environment.

2.2.4 Subjective Norm

Subjective norm is defined as "person's perception that most people who are important to him think he should or should not perform the behavior in question" (Fishebein & Ajzen 1975, 302). However this perception does not necessarily reflect what the individual's important others actually think (Ajzen & Fishbein 1980, 57). Here, subjective norm was classified as a user-situational variable, since it is a combination of real social pressure as well as person's conception of this pressure. Subjective norm was discussed to some extent in the previous chapter in the context of TRA, TPB, TAM and TAM2. Here a summary of the matters briefly covered is in order. It was stated that the subjective norm is a central variable in TRA and TPB, but it was not included in the original TAM.

Later, the influence of the subjective norm was studied by Venkatesh and Davis (2000) as a variable in TAM2. They found subjective norm to have a direct effect on intention where a person has relatively little experience of the technology used and the *usage situation is mandatory*. In the case of voluntary information system settings no direct effect of subjective norm on intentions has usually been found (Davis et al. 1989; Mathieson 1991). However, these findings are inconsistent with the theoretical foundations of TAM, as one of the basic premises of the Theory of Reasoned Action is the direct effect of subjective norm on intentions. The existence of a direct effect of subjective norm on intention is thus slightly in doubt.

One logical reason for subjective norm not having a direct effect on intention in voluntary settings is that this effect is accounted for by the indirect effect through usefulness that is presented in TAM but not in TRA. Venkatesh and Davis (2000) hypothesised and found that subjective norm had a direct effect on perceived usefulness in both voluntary and mandatory situations. Venkatesh and Davis (2000) based their hypothesis on the theoretical mechanism of internalisation, referring to the process in which, when one perceives that an important other thinks that a particular technology might be useful, one may actually come to believe that it is useful and in turn form an intention to use it (Venkatesh & Davis 2000). This mechanism has also been acknowledged by Fishbein and Ajzen (1975, 304). Venkatesh and Davis (2000) found that the effect of subjective norm on usefulness was moderated by experience. Other studies have also found subjective norm to play a central role in initial adoption, while no effect of subjective norm on sustained usage decision has been found (Karahanna, Straub & Chervany 1999).

Lu et al. (2005) have argued that in the early stages of adoption the adopter's perception of ease of use cannot be exempted from social influences. Thus they hypothesised and found subjective norm to have an effect on both perceived usefulness and perceived ease of use. Apparently the effect of subjective norm on enjoyment has not been studied. However, just as users' perceptions of usefulness may increase in response to persuasive social information (Lu et al. 2005), perceptions of enjoyment may increase in response to persuasive social information.

Several contradictory aspects should be considered when assessing the relevance of subjective norm in the context of mature consumers and mobile content services. There are results indicating that older consumers rely more on their own experience than on external sources in evaluating new products and services (Schiffman 1971; Schiffman & Sherman 1991) and that older consumers are more interested in product/service characteristics, rather than in value accorded to a product by others (Moschis 2003). If this reliance extends to mobile content services it could mean that subjective norm is irrelevant in the case of mature consumers. Further, subjective norm has been shown to play a more important role when the behaviour in question is under normative control, that is, it involves other people (Ajzen & Fishbein 1980, 169; Trafimow & Fishbein 1994). The actual usage of a mobile content service does not usually involve other people and thus subjective norm may not be a particularly fruitful concept in this context.

On the other hand, the outcomes of several mobile content services (e.g., ringing tones, screensavers) are visible in social contexts. In addition, according to Poutiainen (2003) Finns do not just use mobile devices but also discuss their use. Irrespective of user type, mobile phones and their usage is an overarching, often emotional topic (Poutiainen 2003). The strong presence of mobile phone use in social interactions and discourses, at least in Finland, implies that subjective norm might play a significant role in the acceptance of mobile content services. Further, the effect of subjective norm on perceived usefulness has been shown to decrease with increased experience (Venkatesh & Davis 2000). Most people, including mature consumers, do not have very wide experience of using mobile content services and thus subjective norm could have an effect on beliefs about mobile content services.

2.3   Acceptance of Mobile Content Services

Such terms as mobile services, mobile commerce and mobile business have been used in various meanings in the literature (for definitions and interrelationships of these concepts see Niemelä 2006). In the present study the technological services of interest concern mobile content. Mobile content services can be defined as "service processes in which customers participate with their small mobile devices in order to receive some content that is provided by the service provider as an outcome and delivered to the customer's mobile device or to the customer in any other form" (Niemelä 2006). This is a technology-independent definition which is based on the notion that consumers are more interested in the actual services than in the specific technologies (i.e., SMS, MMS, WAP) that enable these services. Examples of mobile content services include mobile news, mobile banking, downloading ringing tones or logos, mobile shopping, mobile games and mobile ticketing (for the list of

services used in the questionnaire see Appendix 1). These services can be either chargeable or complimentary to consumers.

The adoption of mobile content services by consumers in Europe has not evolved without problems. In particular the failure of the mobile Internet (WAP) in Europe attracted a lot of media attention. To date the mobile Internet has not been very successful in Europe, whereas in Japan NTT DoCoMo's i-mode has become very popular among consumers. After the failures of some and the successes of others it has been obvious that there is a need for a better understanding of the factors affecting the acceptance of mobile content services. The reasons for the differences in user acceptance in Japan and the rest of the world have been analysed by researchers. Plausible factors in the success of i-mode have been identified in the technical (network technology, programming language, mobile devices), market-related (e.g., billing scheme), cultural (e.g., commuting habits, role of phone) and consumer-group-specific domains (Baldi & Thaung 2002).

Most of the theoretically based research on the acceptance of mobile content services seems to have centred on the mobile Internet. As with Internet acceptance, many of these studies have also used TAM as their starting point. Theoretical models (without empirical validation) have been proposed by some researchers. Amberg, Hirschmeier and Wehrmann's (2004) Compass Acceptance Model contains four dimensions, namely, perceived usefulness, perceived ease of use, perceived mobility and perceived costs. Lu et al. (2003) constructed a Technology Acceptance Model for Wireless Internet via Mobile Devices that connects TAM with the external variables of technology complexity, individual differences, facilitating conditions, social influences and wireless trust environment.

Empirical studies on mobile content services using TAM as a base model have also been conducted (e.g., Pagani 2004; Wu & Wang 2005; Lu et al. 2005; Cheong & Park 2005; Kaasinen 2005, Pedersen 2005). For example, Lu et al. (2005) found social influences in the form of subjective norm and image to have a positive direct impact on both TAM's perceived usefulness and perceived ease of use. As postulated by TAM they found usefulness and ease of use to be determinants of behavioural intention and ease of use to have an effect on usefulness. Cheong & Park (2005) investigated mobile Internet acceptance in Korea and connected such variables as perceived system quality, perceived content quality and Internet experience to TAM's original belief constructs and perceived playfulness (conceptualised to resemble perceived enjoyment). They also found perceived price level to affect attitude towards and intention to use the mobile Internet. Kaasinen (2005) proposed a Technology Acceptance Model for Mobile Services based on several field studies (the model was not validated with quantitative methods). Her model extends the core model (TAM) with two perceived product characteristics; trust and ease of adoption.

TAM is not the only theoretical basis used for investigating the acceptance of mobile content services. For example, Suoranta (2003) based her theoretical model of dimensions affecting mobile banking adoption on Rogers' (1995) work on the diffusion of innovations. Suoranta hypothesised and found empirical

evidence of the effect of variables such as attributes of the innovation (relative advantage, compatibility, observability, triability), time (pace of development), communication (channel and mode) and consumer characteristics (technology perceptions, age, education). Her hypotheses on the effect of complexity and risk on mobile banking adoption were not supported.

By studying the effect of four individual difference variables (cognitive age, technology anxiety, experience, subjective norm) on TAM's constructs the present study seeks to supplement the existing research on the acceptance of mobile content services. Surprisingly, only few of the earlier studies on the acceptance of mobile content services have included the belief variable perceived enjoyment (e.g., Pagani 2004; Cheong & Park 2005). Perceived enjoyment is expected to play an important role in the acceptance of consumer mobile content services and is thus part of the model tested in this study. Further, the previous research has concentrated on rather young individuals since, as stated by Cheong and Park (2005), younger age groups (20-39-year-old) are considered to be the primary users of the mobile Internet. As this is not necessarily true in the light of present knowledge on mature consumers, this study attempts to add to the knowledge of the acceptance of mobile content services among mature consumers.

2.4 Theoretical Model of the Study

In this section a theoretical model is formed on the basis of the review of the literature and discussion of the research area presented thus far. A deeper rationalisation behind each hypothesis is presented in the literature review (in Chapters 2.1 and 2.2). In this chapter the reasons for the hypotheses are briefly summarised. The model combines the Technology Acceptance Model (TAM) with age group-specific individual difference variables. TAM's key purpose has been stated to be one of providing a basis for examining the impact of external factors, such as individual difference variables, on user behaviour (Davis et al. 1989). Therefore, this study capitalises on TAM research by selecting one of the possible external variables suggested by Davis et al. (1989) and examining its impact on TAM's primary constructs. Actual usage is not measured and is thus excluded from Figure 8. Instead, usage intention, which has previously been empirically confirmed as a predictor of usage (for reviews see Fishbein & Ajzen 1975, 373-379; Sheppard et al. 1988), is assessed. Use of intention as a dependent variable is explained more thoroughly in Chapter 3.3.1.

At the core of the theoretical model of the present study is the Technology Acceptance Model (TAM, Davis 1989; Davis et al. 1992), which posits that certain beliefs about the use of a technology affects people's intention to use that technology. These beliefs are perceived usefulness, perceived ease of use and perceived enjoyment. Of these beliefs, perceived usefulness and ease of use at least are attributes that are generally valued by mature consumers (Moschis

2003). Further, perceived enjoyment is likely to play a role in the acceptance of mobile content services, many of which include entertaining elements. On the basis of the extensive TAM literature (see Chapters 2.1.4 – 2.1.7) it is hypothesised that:

H₁ Perceived usefulness of mobile content services has a positive significant influence on behavioural intention among mature consumers.

H₂ Perceived enjoyment of mobile content services has a positive significant influence on behavioural intention among mature consumers.

H₃ Perceived ease of use of mobile content services has a positive significant influence on behavioural intention among mature consumers.

H₄ Perceived ease of use of mobile content services has a positive significant influence on perceived usefulness among mature consumers.

H₅ Perceived ease of use of mobile content services has a positive significant influence on perceived enjoyment among mature consumers.
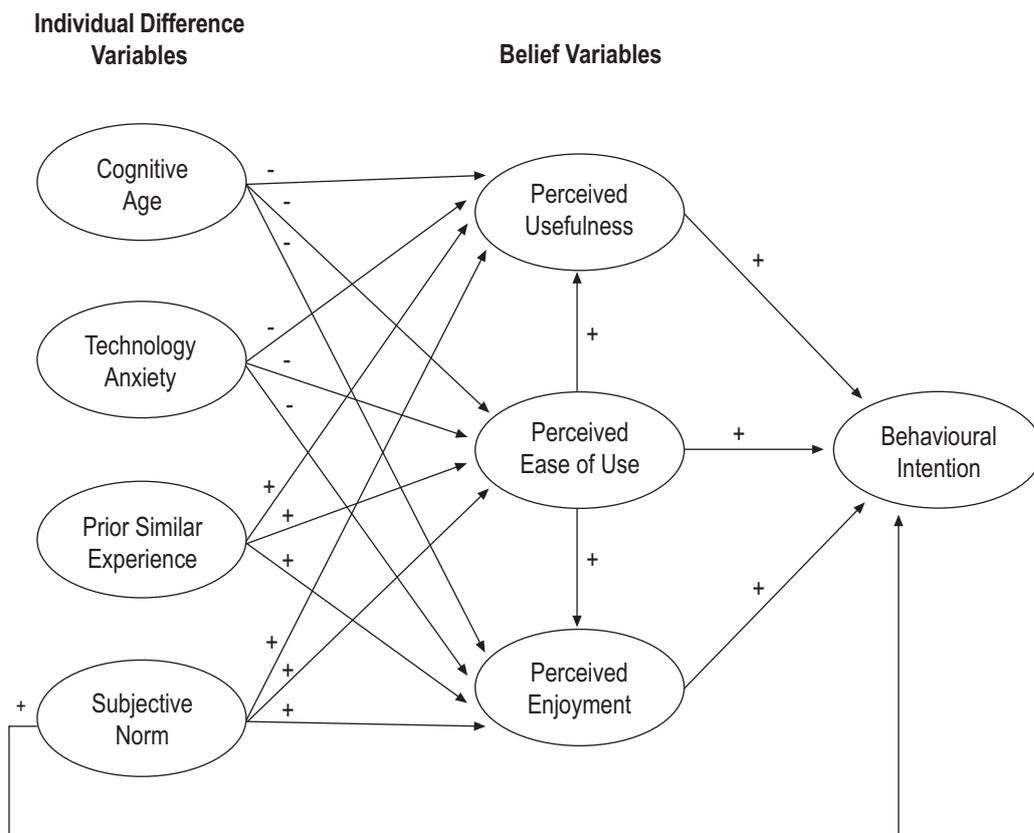
FIGURE 8   Theoretical Model of the Study

TAM posits that external variables influence behavioural intentions only indirectly through belief variables (Venkatesh 2000). This principle is followed in the model and hypothesis formation with one exception. On the basis of TRA

and TPB (Fishbein & Ajzen 1975; Ajzen 1991) subjective norm is assumed to affect intention also directly. Even though not hypothesised, the direct effects of the other external variables are tested in the empirical part. This is due to the fact that in several studies not based on the theoretical principles of TAM direct effects of these external variables on usage intentions or actual usage have also been found.

The relation between younger cognitive age and consumer innovativeness (Mathur et al. 1998), new brand trial (Gwinner & Stephens 2001) as well as interest in technology (Szmigin and Carrigan 2001b) suggests that higher cognitive age could be inversely related to positive beliefs about mobile content services. Thus it is hypothesised that:

$H_{6.1}$ Cognitive age has a negative significant influence on perceived usefulness of mobile content services among mature consumers.

$H_{6.2}$ Cognitive age has a negative significant influence on perceived ease of use of mobile content services among mature consumers.

$H_{6.3}$ Cognitive age has a negative significant influence on perceived enjoyment of mobile content services among mature consumers.

Owing to the ease of measurement of chronological age, cognitive age loses its appeal as a predictor of beliefs if similar results can be attained with chronological age. Empirical comparison of these two age variables was not found in the literature. Thus, although no specific hypotheses are set, a model with both cognitive age and chronological age will be tested. The reason for this is to verify the statement found in the previous literature that cognitive age is a better predictor of purchasing behaviour than chronological age (Barak & Schiffman 1981, Auken et al. 1993).

Computer anxiety has been found to be an antecedent of TAM's perceived ease of use (Venkatesh 2000) and computer-related attitudes (Igbaria & Parasuraman 1989). It has also been suggested that older consumers are prone to experience technology-related anxieties (e.g., Mick & Fournier 1998). Thus in this study, it is assumed that general technology anxiety negatively affects the mature consumer's perceptions of mobile content service usage. It is hypothesised that:

$H_{7.1}$ Technology anxiety has a negative significant influence on perceived usefulness of mobile content services among mature consumers.

$H_{7.2}$ Technology anxiety has a negative significant influence on perceived ease of use of mobile content services among mature consumers.

$H_{7.3}$ Technology anxiety has a negative significant influence on perceived enjoyment of mobile content services among mature consumers.

On the basis of previous technology acceptance research (Thompson et al. 1994; Agarwal & Prasad 1999; Cheong & Park 2005) and the findings regarding the

importance of firsthand experience on mature consumers' behaviour (Schiffman & Sherman 1991) it is assumed that prior similar experience effects TAM's belief variables. Following hypotheses are proposed:

> **H$_{8.1}$** Prior Similar Experience has a positive significant influence on perceived usefulness of mobile content services among mature consumers.

> **H$_{8.2}$** Prior Similar Experience has a positive significant influence on perceived ease of use of mobile content services among mature consumers.

> **H$_{8.3}$** Prior Similar Experience has a positive significant influence on perceived enjoyment of mobile content services among mature consumers.

It is possible to find arguments either supporting (Venkatesh & Davis 2000; Poutiainen 2003) or rejecting (Schiffman & Sherman 1991) the influence of subjective norm on the acceptance of mobile content services among mature consumers. Due to these conflicting arguments it is extremely important to study the effects of subjective norm empirically. Based on the cultural importance of mobile phones in Finland and the assumed low level of prior experience, it is hypothesised that:

> **H$_{9.1}$** Subjective norm has a positive significant influence on perceived usefulness of mobile content services among mature consumers.

> **H$_{9.2}$** Subjective norm has a positive significant influence on perceived ease of use of mobile content services among mature consumers.

> **H$_{9.3}$** Subjective norm has a positive significant influence on perceived enjoyment of mobile content services among mature consumers.

> **H$_{9.4}$** Subjective norm has a positive significant influence on behavioural intention of mobile content services among mature consumers.

The theoretical model describing the factors affecting the acceptance of mobile content services among mature consumers is exhibited in Figure 8. The model provides a starting point for the empirical part of the study.

Table 2 summarises the literature review and discussion of the research area presented in Chapter 2 from the viewpoint of the formation of the hypotheses. The table distinguishes between three research themes: research on technology acceptance in general, research on mobile content services acceptance and research on mature consumers. These themes also offer a temporal perspective in the sense that general technology acceptance has been a topic of interest for several decades now, whereas the acceptance of mobile content services only started to receive attention around the beginning of the present century. Similarly, the theme of mature consumers, which is a relatively new and growing theme among consumer behaviour researchers, dates from the late 1990s and early 2000s.

TABLE 2 Previous Research from the Viewpoint of Hypothesis Formation

	Hypothesised Effect	The hypothesised effect has previously been empirically established			Hypotheses of this research are grounded in…
		in Research on Technology Acceptance	in Research on the Acceptance of Mobile Content Services	in Research on Mature Consumers	
H_1	Usefulness on intention	Davis 1989	Lu et al. 2005		…TAM-based research and the notion of TAM as a general model that includes variables also considered important in the case of mature consumers (Ch. 2.1).
H_2	Enjoyment on intention	Davis et al. 1992	Cheong & Park 2005		
H_3	Ease of use on intention	Davis et al. 1989	Lu et al. 2005		
H_4	Ease of use on usefulness	Davis 1989	Lu et al. 2005		
H_5	Ease of use on enjoyment	Davis et al. 1992	Cheong & Park 2005		
$H_{6.1}$	Cognitive age on usefulness				…the relations found between cognitive age and variables related to acceptance of new technology (e.g., interest in technology) in research concerning mature consumers (Ch. 2.2.1).
$H_{6.2}$	Cognitive age on ease of use				
$H_{6.3}$	Cognitive age on enjoyment				
$H_{7.1}$	Technology anxiety on usefulness				…TAM-based research, research on the effect of computer anxiety on attitudes to computers and the suggested importance of technology anxiety in mature consumers' behaviour (Chapter 2.2.2).
$H_{7.2}$	Technology anxiety on ease of use	Venkatesh 2000 (computer anxiety)			
$H_{7.3}$	Technology anxiety on enjoyment				

NB The table is not all-inclusive. Only one reference per cell is provided.

TABLE 2 (continues)

The hypothesised effect has previously been empirically established

Hypothesised Effect		in Research on Technology Acceptance	in Research on the Acceptance of Mobile Content Services	in Research on Mature Consumers	Hypotheses of this research are grounded in…
H$_{8.1}$	Prior similar experience on usefulness	Thompson et al. 1994 (near-term consequences)			…IS research, TAM-based research and the suggested importance of firsthand experience in mature consumers' behaviour (Chapter 2.2.3).
H$_{8.2}$	Prior similar experience on ease of use	Agarwal & Prasad 1999	Cheong & Park 2005 (Internet experience)		
H$_{8.3}$	Prior similar experience on enjoyment		Cheong & Park 2005 (Internet experience)		
H$_{9.1}$	Subjective norm on usefulness	Venkatesh & Davis 2000	Lu et al. 2005		…TAM-based research, Theory of Reasoned Action, and the suggested importance of subjective norm in mature consumers' behaviour due to cultural aspects and assumed low level of experience (Chapter 2.2.4).
H$_{9.2}$	Subjective norm on ease of use		Lu et al. 2005		
H$_{9.3}$	Subjective norm on enjoyment				
H$_{9.4}$	Subjective norm on intention	Venkatesh & Davis 2000 (in mandatory settings)			

NB The table is not all-inclusive. Only one reference per cell is provided.

If an effect hypothesised in this study has previously been empirically established (with quantitative methods) a reference to *one* such study is provided in Table 2 (as such the table is not all-inclusive). The reference is located in a column presenting the research theme under which the study was conducted. The last column briefly states the grounds for setting the hypotheses of this research.

To the author's knowledge, none of the hypotheses, as they are set here, have been empirically tested in the context of the mature consumer. However, similar or related concepts and relationships have been studied and these studies have served as the basis for the formation of the hypothesis in the present study (the grounds for these hypotheses are stated in the last column of Table 2). Nine of eighteen hypotheses have not been tested in the context of mobile content services. The concept of cognitive age has not previously been studied in relation to TAM. Similarly, the concept of technology anxiety has not been connected to TAM before, although the kindred concept of computer anxiety has been found to have an effect on TAM's perceived ease of use. The effect of subjective norm on perceived enjoyment has not been tested on previous occasions either. Thus, the table reveals that this study has the possibility to make a contribution to the literature concerning mature consumers and the acceptance of mobile content services. In addition, it may contribute to the technology acceptance literature by connecting previously untested external variables to TAM.

3 RESEARCH METHODOLOGY AND DATA COLLECTION

The empirical part of the study is quantitative and cross-sectional in nature, designed to test the model of acceptance formulated in the previous chapter. In this chapter the research approach is discussed first. Next the selection criteria for the target population are described. Then the questionnaire and operationalisation of theoretical constructs are discussed. After that the process of sampling and data collection is described and some background characteristics of the respondents presented. Finally, the analytical method is introduced and the reliability and validity of the study addressed. The main analyses of the study are presented in Chapter 4.

3.1 Research Approach

The researcher must choose the processes through which he/she gains knowledge. It has been argued that marketing and consumer research (see Hunt 2003, 199, 220) as well as research in information systems (Chen & Hirschheim 2004) has been dominated by positivism. The present study also rests on many of the philosophical assumptions of positivism.

During its long history positivism has displayed many variations (Eskola 1981, 10), making it rather difficult to give a single coherent definition of positivism (Neilimo & Näsi 1980, 12). It has also been alleged that many of the conceptions commonly held about positivism have actually been misconceptions (Hunt 1991). The historical variation in positivism, let alone the misconceptions of it are beyond the scope of this study. However, certain underlying philosophical assumptions seem to appear in some form (as Hudson and Ozanne, 1988, note a range of stances exists for each of the assumptions within positivism) in the great majority of the literature discussing a positivistic approach. Here, the positivistic assumptions that are relevant to

this research are briefly presented and how these assumptions have affected this particular research is discussed.

Ontological assumptions

Ontological assumptions concern the nature of reality and social beings (Hudson & Ozanne 1988). Together with many positivists I take a realist position and assume that some sort of reality exists independently of what individuals perceive and that by measurement and observation it is possible to gain knowledge of this reality (see e.g., Neilimo & Näsi 1980, 17; Hudson & Ozanne 1988). As most contemporary positivists I believe that our knowledge of the world is to some extent subjective. However, this does not really pose a problem since in many cases these subjective perceptions of reality show considerable overlap (Williams 2006).

Often, a deterministic view of human beings is associated with positivism (e.g., Hudson & Ozanne 1988; Burrell & Morgan 1989, 3). Some argue that this association is ahistorical to begin with (Hunt 1991). My stance is that only part of human behaviour can be modelled to some extent as deterministic (one example given by Williams, 2006, is the reaction to drugs). As Williams (2006) states, probably no modern positivist would argue that people are deterministic machines in terms of social interaction. However, the assumption that there is some level of determinism in human behaviour supports the effort to identify causes of individuals' behaviour (Hudson & Ozanne 1988).

Axiological assumptions

Axiological assumptions refer to the goals of a certain world view (Hudson & Ozanne 1988). Explanation is seen as an important goal in positivism (Neilimo & Näsi 1980, 21; Lutz 1989). Explanation is achieved by the empirical demonstration of systematic association between variables underlying a phenomenon (Neilimo & Näsi 1980, 22; Hudson & Ozanne 1988). Explanation as a goal is clear in the empirical research questions posed in this study and also in the chosen method of data analysis (i.e., structural equation modelling).

Epistemological assumptions and methodology

Epistemology is the branch of philosophy that is interested in questions of knowledge (Bird 1998, 291). Positivism takes a generalising approach to research which leads to seeking out (in its extreme case) time- and context-independent knowledge (Hudson & Ozanne 1988). However, despite of this goal, no positivist has ever claimed to have found such knowledge (Williams 2006). The present study also aims at generalising but only within strictly defined boundaries; the result are seen as generalisable only to Finnish baby boomers at the particular time of the study.

Positivists rely heavily on empirical observations and measurement in knowledge creation. Although positivism is often equated with quantitative methods (Hunt 1991), a positivist is not necessarily committed to any particular research design (Phillips 1987, cited in Hunt 1991). However, positivists are sympathetic to quantification in science and hold mathematics and statistics in

high regard (Hunt 1991). With empiricism positivist have combined rationalism by means of the hypotetico-deductive method (Eskola 1981, 16). The empirical part of this research is quantitative and cross-sectional in nature. In the light of the theories (e.g., TRA, TAM) used in this study the selection of a quantitative methodology seems natural. As Hudson & Ozanne (1988) suggest: "if a researcher holds a theory that is based on one set of assumptions, s/he should use a methodology that is based on the same assumptions". In this research also the hypotetico-deductive approach is followed; that is, the hypotheses are deductively drawn from theory and then empirically tested.

Positivism assumes that it is possible for a researcher to take a neutral stance, be independent from the subject, stay objective (Neilimo & Näsi 1980, 22) and minimise his/her own influence on the subject (Hudson & Ozanne 1988). I believe that in the present instance by careful design of the survey instrument it has been possible to minimise the effect of the researcher on the respondents.

3.2   Target Population

The target population of the study comprised Finnish people born between 1945 and 1954, aged between 50 and 60 years at the moment of the survey. Those born between 1945 and 1954 in Finland are considered to belong to the generation of baby boomers (suuret ikäluokat). In Finland the baby boom was an immediate post-war phenomenon that was related to recovery from the Second World War (Karisto 1998, 145). In the US the baby boom generation has been consistently defined as including members of the population born between 1946 and 1964 (e.g., Braus 1995; Dychtwald 1997; Harmon, Webster & Weyenberg 1999; Schewe & Noble 2000). In Finland the baby boomers were born during a shorter period of time. In terms of years, there are multiple definitions of Finnish baby boomers. Strictly defined, baby boomers are members of the Finnish population born between 1946 and 1949. In those four years over 100 000 children were born each year (Statistics Finland 2003). Baby boomers have also commonly been defined as those born between 1945 and 1949 (e.g., Virtanen 2002; Haimi 2004). Those born in the early 1950s are often also considered to belong to the baby boom generation. "1945-1954" is a definition used, for example, in the special baby boom issue of the statistical journal (Hyvinvointikatsaus 2002) of the Central Statistical Office of Finland. This is consistent with the American definition of Boomers I or leading-edge boomers (born 1946-1954) (Schewe & Noble 2000) and, as stated earlier, is also the definition used in this study.

Baby boomers were selected as the target population of this study for several reasons. *First*, the age group fits in well with estimates of the beginning of mature life. Those born between 1945 and 1954 were at the moment of the survey 50-60-year-old. Previous research on mature markets has generally

defined the chronological age at which this market begins to be 50, 55 or 65 (for review see Bone 1991). Further, in Finland the public discussion on the ageing population generally concentrates on the ageing baby boom generation (Karisto 1998, 160).

Second, the baby boom generation is believed to be different from its predecessors in terms of consuming. According to Schewe and Noble (2000), consumers can be divided into cohorts, that is, into groups of individuals who are born and travel through life together. These individuals, their values, attitudes and preferences are influenced by experiences of similar external events during their early adulthood and late adolescent years (Schewe & Noble 2000). Baby boomers are the generation of change. In Finland most of them were born in the countryside at a time when there were no cars, no telephones and no television. They came of age in cities where the revolution in living conditions and technology development was evident in all facets of life. (Simpura 2002.)

The early adulthood of baby boomers certainly differed from that of their parents. In industrialised European countries they were the first television and advertising generation. They benefited from economic growth, good salaries and peace in Europe. (Senioragency 2002.) In Finland, the youth of baby boomers, the 1960s, was time of sexual revolution, rock 'n' roll, youth culture, urbanisation, modernisation and political radicalism. Baby boomers were the first Finnish generation that lived their lives as the youth in the present meaning of the word. (Karisto 1998, 149.) Because baby boomers witnessed these radical changes in living conditions, technology development and society in general, it should be safe to say that they constitute a generation of consumers that clearly differs from those before them. Retirement, grandparenting and "the golden years" are likely to assume new meanings as the baby boom generation ages (Schewe & Noble 2000).

Third, in addition to growing up in a world filled with innovations to consume, there are several other factors that make baby boomers extremely attractive to marketers; there are, most of all, their large quantity, discretionary income and discretionary time. In Finland in 2005 there were approximately 810 000 individuals aged between 50 and 59 (i.e., born between 1945 and 1954) (Statistics Finland 2006). This number constitutes approximately 15 per cent of the total population and the number of people 50-plus will grow as the rectangularisation of the ageing curve continues. The discretionary income of boomers is increasing. Most of them are in a situation where their children have already left or are about to leave home (Kartovaara 2002.) In the 1990s, baby boomers were reaching mid-life, which is usually the time when house loans are almost fully paid off (Kankaanranta 2002). Naturally this should augment the amount of discretionary income. The fact that the baby boom women have been working outside the home (Tiisanoja 2002) will mean "two-employment pension" households, which again increases the amount of discretionary income. The baby boomers are gradually approaching their retirement years. As their retirement begins, the amount of discretionary time they have is likely to increase. It is also worth remembering that since baby boomers are currently at

the beginning of their mature lives, they are likely to be part of the mature market even 30 years from now.

3.3   The Questionnaire and the Operationalisation

In this section the measures of the theoretical constructs and the background information questions that formed the questionnaire are introduced. Many, if not most, scientific constructs cannot be directly observed (Steenkamp & Baumgartner 2000). This is also the case with most of the theoretical constructs used in this study (e.g., beliefs, technology anxiety and cognitive age). Thus hypothetical constructs are measured indirectly through observable indicators that are presumed to represent the constructs adequately (Jöreskog & Sörbom 1993, 111). The measurement scales of the theoretical constructs (i.e., latent constructs) have been adapted from the IS and marketing literature. Items were translated from English to Finnish by the author for the questionnaire. All the translations were cross-checked by a colleague with both good English skills and knowledge of marketing discipline.

In measuring the theoretical constructs a seven-point Likert-scale was used. Some dichotomous and multiple choice questions were used in the background information questions. The questionnaire consisted of a covering letter page, half a page of instructions on how to complete it and six pages of questions. The questionnaire items are listed in Appendix 1.

3.3.1 The Dependent Variable – Behavioural Intention

Usage intention that is hypothesised in TAM to be a predictor of actual usage served as a dependent variable in this study. Actual usage was not measured, since the empirical part of this research was cross-sectional in nature. Clearly, when the purpose of a research is to explain behaviour the best possible dependent variable is actual behaviour. However, to measure the effect of intention on actual behaviour, a longitudinal approach would have been required. According to Venkatesh et al. (2003), the role of intention as a predictor of behaviour is critical and has been well established in IS and reference disciplines.

According to Fishbein and Ajzen (1975, 369), when the boundary condition of volitional control holds the best single predictor of an individual's behaviour is his/her intention to perform that behaviour. This does not mean perfect correlation between intention and behaviour, since there are number of factors that affect the strength of the relationship. One such factor is the degree to which the intention measure and behaviour correspond in their specificity (in terms of the action itself, target, context and time). Lack of correspondence may reduce the accuracy of the prediction. Another factor is the stability of the

intention over time. The longer the time interval between the measurement of the intention and observation of the behaviour, the greater the likelihood that events will occur that may change that intention. Intentions at an aggregate level, even in the long-term, tend to be relatively stable since intervening events happening to individuals are likely to balance each other out. This aggregate level is what market researchers are usually interested in, that is, they are interested in the proportion of people who will purchase a given product rather than the likelihood of a given person making the purchase (Ajzen & Fishbein 1980, 42- 48.)

Considerably high correlations between intentions and actual behaviour have been found in studies (for reviews see Fishbein & Ajzen 1975, 373-379, Sheppard et al. 1988). Sheppard et al. (1988) conducted a meta-analysis of 87 separate studies applying Fishbein and Ajzen's (1975, 1980) Theory of Reasoned Action (TRA) and including the intention-behaviour relationship. They found the average correlation between intention and behaviour to be 0.53. They concluded that, contrary to their expectations, although Fishbein and Ajzen's model performed better under complete volitional control, it also had a strong predictive validity even when utilised to investigate situations and activities that do not fall within the boundary condition of volitional control. As already noted, to cater for behaviours that are not under a person's volitional control the Theory of Planned Behavior (Ajzen 1985) was formulated by adding a variable called perceived behavioural control to TRA.

The usage of mobile content services should be under the volitional control of an adult person living in Finland. 93 per cent of Finnish people have a mobile phone at their disposal (Taloustutkimus Oy 2006). The uptake of services based on the latest technologies (3G) require a more advanced mobile phone and can be viewed as requiring more advanced skills in using the mobile device. However, plenty of simple services based on SMS application are available. Since text messaging is widely adopted in Finland, at least the use of such simple mobile content services should not be beyond the abilities of most people. In addition, the costs of using mobile content services are rather low (cf. purchase of a new car).

One notable problem with measuring intentions alone is the finding by Chandon, Morwitz and Reinartz (2005) that the measurement of intentions increases the association between intentions and behaviour, a phenomenon termed "self-generated validity". In other words, due to the measurement high intenders are more likely and low intenders are less likely to engage in the behaviour in question, whereas people with neutral intentions are not affected by the measurement. The finding that the predictive power of intentions is in part an artefact of their measurement suggests that studies that have measured the association between intention and behaviour on the same sample may have overstated the predictive power of intentions. (Chandon et al. 2005.) Bearing in mind that intention is not a perfect predictor of behaviour, but is probably the best single predictor of behaviour, it was decided only to measure intentions in this study.

3.3.2 Operationalisation of TAM's constructs

Perceived Usefulness and Perceived Ease of Use
Davis (1989) developed measurement scales for perceived usefulness and perceived ease of use as a step-by-step process consisting of four phases. *First*, conceptual definitions of the two concepts were used to generate candidate items (14 per construct). *Second*, based on pre-test interviews, the number of items was reduced to 10 per construct. In the pre-test interviews the items were also categorised by the participants. The perceived usefulness items fell into three main categories; the first relating to job effectiveness, the second to productivity and time-savings and the third to importance of the system to one's job. The items thus clearly reflected perceived usefulness in one's work environment. The perceived ease of use items also fell into three categories; the first relating to physical effort, second to mental effort and the third to how easy the use of a system is to learn.

Third, a field study was conducted to assess the reliability and the construct validity of the scales. At this point the scales were also further streamlined to six items per construct. *Fourth*, a laboratory study was conducted and data from the two studies were used to assess the relationship between usefulness, ease of use and self-reported usage. The 6-item scales proved to be internally consistent (Cronbach alpha for usefulness was 0.97 in study 1 and 0.98 in study 2; alpha for ease of use 0.91 in study 1 and 0.94 in study 2) and to have construct validity (convergent and discriminant). Criterion-related validity was evidenced by high correlations of usefulness with self-reported current use (0.63) and with self-predicted use (0.85), as well as by high correlations of ease of use with self-reported current usage (0.45) and with self-predicted usage (0.69). The six-item scales by Davis (1989) are presented in Table 3.

TABLE 3   Measurement Scale for Perceived Usefulness and Perceived Ease of Use (Davis 1989)

Usefulness
1. Using ___ in my job would enable me to accomplish tasks more quickly.
2. Using ___ would improve my job performance.
3. Using ___ in my job would increase my productivity.
4. Using ___ would enhance my effectiveness on the job.
5. Using ___ would make it easier to do my job.
6. I would find ___ useful in my job.

Ease of Use
1. Learning to operate ___ would be easy for me.
2. I would find it easy to get ___ to do what I want it to do.
3. My interaction with ___ would be clear and understandable.
4. I would find ___ to be flexible to interact with.
5. It would be easy for me to become skilful in using ___.
6. I would find ___ easy to use.

In the present study four of Davis's (1989) six usefulness items were used and modified to fit the context of consumer mobile content services. Items "Using ___ in my job would increase my productivity" and "Using ___ would enhance my effectiveness on the job" were left out since their wording was considered to relate heavily to work-related goals (i.e., productivity and effectiveness). Of the remaining four items one relates to possible time savings, one to performance improvements, one to the relevance of mobile content services in service consumption and one is an overall item.

Also for perceived ease of use four items were used. Items "My interaction with ___ would be clear and understandable" and "I would find ___ to be flexible to interact with" were left out. This four-item scale has been used previously, for example, by Davis et al. (1989) and has obtained a reliability coefficient of 0.91. Because mobile content services are rather new and the respondents were not expected to have a substantial amount of experience in using them it was seen as important to emphasise the ease of learning dimension of the ease of use measure. Thus two of the items used relate to ease of learning, one to controllability and one is an overall item. The modified items used in the questionnaire are presented in Appendix 1.

Enjoyment
The three items used to measure perceived enjoyment in this study were adapted from Venkatesh (2000) (see Table 4). The items were originally used by Davis et al. (1992) but they used one of the items in a semantic-differential form (i.e., The actual process of using ___ is [unpleasant / pleasant]). Davis et al. (1992) showed the measure to be internally consistent, with a Cronbach alpha of 0.81 in study 1 and 0.92 in study 2; it was also shown to be factorially distinct from the measures of perceived usefulness and ease of use. Internal reliability and discriminant validity were also established in Venkatesh's (2000) study.

TABLE 4   Measurement Scale for Perceived Enjoyment (Venkatesh 2000)

1. I find using the system to be enjoyable.
2. The actual process of using the system is pleasant.
3. I have fun using the system.

In addition to the scale by Davis et al. (1992), other scales have been suggested for measuring perceived enjoyment. For example Igbaria et al. (1995) measured enjoyment with seven semantic-differential items: fun-frustrating, pleasant-unpleasant, negative-positive, pleasurable-painful, exciting-dull, foolish-wise and enjoyable-unenjoyable. These items were also used by Teo et al. (1999). Considering the length of the questionnaire and the fact that the scale was developed by the creators of TAM, Venkatesh's (2000) modification of the scale by Davis et al. (1992) was chosen for the present study. The modified items used in the questionnaire are presented in Appendix 1.

Intentions

According to Sheppard et al. (1988) frequently when researchers report measuring intentions they actually have been measuring expectations or estimations. Behavioural intention, as defined by Warshaw and Davis (1985) is "the degree to which a person has formulated conscious plans to perform or not to perform some specified future behavior". Behavioural expectation is "based on a cognitive appraisal of one's behavioral intention and all other behavioral determinants of which one is aware" (Warshaw & Davis 1985); thus when considering expectations an individual considers a variety of factors in addition to his/her intent or plan.

The aim in this study was to measure behavioural intentions. Three items recommended by Ajzen (2002) were used (see Table 5) with completely disagree and completely agree as the anchors of the response scale. The time element of the items was set to the forthcoming year (e.g., I intend to use mobile content services during the forthcoming year). The modified items used in the questionnaire are presented in Appendix 1.

TABLE 5   Items for Measuring Intentions (Ajzen 2002)

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1. I intend to walk on a treadmill for at least 30 minutes each day
    in the forthcoming month
    extremely likely : __ : __ : __ : __ : __ : __ : __ : extremely unlikely

2. I will try to walk on a treadmill for at least 30 minutes each day
    in the forthcoming month
    definitely true : __ : __ : __ : __ : __ : __ : __ : definitely false

3. I plan to walk on a treadmill for at least 30 minutes each day
    in the forthcoming month
    strongly disagree : __ : __ : __ : __ : __ : __ : __ : strongly agree

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3.3.3 Operationalisation of Individual Difference Variables

Cognitive Age

The measurement scale for cognitive age by Barak and Schiffman (1981) consists of four items designed to reflect the four dimensions of personal age (feel-age, look-age, do-age, interest-age) suggested by Kastenbaum et al. (1972, cited in Barak & Schiffman 1981). Barak & Schiffman (1981) showed the scale to be both stable in time (test-retest reliability) and internally consistent. Also a limited form of construct validity (differential analysis with t-test) and face validity has been provided (Barak 1987). Later, for example, Wilkes (1992), although not stating it directly, showed the measure to possess concurrent validity by proving it to be related to certain other variables. Also, Auken at al. (1993) have demonstrated the measure to have good construct (both convergent and discriminant) validity. The items are displayed in Table 6. The scale relies

on age-group referral in determining an individual's cognitive age (Barak 1987). When answering the questions respondents are asked in the case of each dimension to select the age decade to which they feel they belong.

TABLE 6   Cognitive Age Measure (Barak & Schiffman 1981)

	20's	30's	40's	50's	60's	70's	80's
1. I feel as though I am in my…	—	—	—	—	—	—	—
2. I look as though I am in my…	—	—	—	—	—	—	—
3. I do most things as though I were in my…	—	—	—	—	—	—	—
4. My interests are mostly those of a person in her…	—	—	—	—	—	—	—

Responses to each of the dimensions can be either coded separately or an overall score can be counted. For an overall score each respondent's score for each dimension is assigned a midpoint value (e.g., a response of 50's is coded as 55). The overall cognitive age score is then counted as a simple average of the four midpoint values. This procedure enables a person's cognitive age to be counted in years. It also allows comparison between cognitive age and chronological age. (Barak & Schiffman 1981.) According to Stephens (1991), the age decade scale by Barak & Schiffman (1981) is the preferred measure of cognitive age for three reasons: it produces more accurate estimates than single-item scales; the four questions are easy to understand and answer; and analysis and interpretation of the age decade scale is easy.

In the questionnaire the age decades were expressed in the form of age spans (e.g., 50-59, 60-69), due to the fact that the expressions fifties, sixties etc. cannot be translated into Finnish in short numerical expressions comparable to 50's 60's etc. The scale used in the questionnaire is provided in Appendix 1.

Technology Anxiety
Of all the scales used in this study the technology anxiety scale is the newest and thus applications of it are few. The items in the scale were drawn from a computer anxiety scale (by Raub 1981, cited in Cambre & Cook 1985) that has a longer history. Meuter et al. (2003) modified nine of Raub's (1981) items to reflect general anxiety over dealing with technology. They have tested the scale for internal consistency and discriminant validity as well as shown it to possess concurrent validity. The scale consists of nine statements of which three are in reversed form (see Table 7).

Two examples were added to the item "I am sure of my ability to interpret technological output" since it was suspected that the expression "technological output" could be interpreted in different ways by the respondents. The examples added were error messages and directions. In the questionnaire, the technology anxiety items were presented successively under the same question. In this way it was ensured that the respondents realised that the items concerned technology in general, and not only mobile content services, as did

most of the other items. The scale used in the questionnaire is provided in Appendix 1.

TABLE 7   Items for Measuring Technology Anxiety (Meuter et al. 2003)

1. I am confident I can learn technology related skills.
2. I have difficulty understanding most technological matters.
3. I feel apprehensive about using technology.
4. When given the opportunity to use technology, I fear I might damage it in some way.
5. I am sure of my ability to interpret technological output.
6. Technological terminology sounds like confusing jargon to me.
7. I have avoided technology because it is unfamiliar to me.
8. I am able to keep up with important technological advances.
9. I hesitate to use technology for fear of making mistakes I cannot correct.

Experience

In cross-sectional studies experience has been assessed as a dichotomous variable (no experience - experience) (e.g., Taylor & Todd 1995b) or with a continuous item inquiring, for example, about the length of time that the respondent has been using a certain technology (e.g., Thompson et al. 1994). In this study prior experience of the Internet and SMS use were measured with the items "I have used a mobile phone for text messaging." and "I have used the Internet." Respondents assessed their experience on a 7-point Likert-scale, one indicating no experience and seven indicating a high level of experience.

Prior experience in using mobile content services was measured with a more precise question "Overall, how often have you used mobile content services during the last year?". The response alternatives were "never", "tried once or twice", "less than once a month", "1-3 times a month", "1-2 times a week", "3-5 times a week" and "daily". Also the variety of applications used by the respondents was estimated. The variety of applications used was calculated by counting the applications (listed in Appendix 1) for which the response for extent of use was "tried once or twice" or greater.

Subjective Norm

Subjective norm was measured following the instructions given by Ajzen (2002). He suggests that two types of items should be used in the measurement of subjective norm: ones that have injunctive quality and others that have descriptive quality. Items that are consistent with the concept of subjective norm, that is, items that have injunctive quality, are often found to have low variability since referents are often perceived as approving of desirable behaviours and disapproving of undesirable ones. To alleviate this problem Ajzen (2002) recommends that measures of subjective norm should include items with descriptive quality, that is, items that reflect whether important others themselves perform the behaviours in question. Ajzen's (2002) example

items are presented in Table 8. These items were modified to fit the context of mobile content services (see Appendix 1).

TABLE 8   Items for Measuring Subjective Norm (Ajzen 2002)

Items with Injunctive Quality

1. Most people who are important to me think that
   I should : __ : __ : __ : __ : __ : __ : __ : I should not
   walk on a treadmill for at least 30 minutes each day in the forthcoming month.

2. It is expected of me that I walk on a treadmill for at least 30 minutes each day
   in the forthcoming month
   extremely likely : __ : __ : __ : __ : __ : __ : __ : extremely unlikely.

3. The people in my life whose opinions I value would
   approve : __ : __ : __ : __ : __ : __ : __ : disapprove
   of my walking on a treadmill for at least 30 minutes each day in the
   forthcoming month.

Items with Descriptive Quality

1. Most people who are important to me walk on a treadmill for at least
   30 minutes each day
   completely true : __ : __ : __ : __ : __ : __ : __ : completely false.

2. The people in my life whose opinions I value
   walk : __ : __ : __ : __ : __ : __ : __ : do not walk
   on a treadmill for at least 30 minutes each day.

The item "The people in my life whose opinions I value approve/disapprove of my _____." was left out since translated into Finnish approving/disapproving is a strong statement. Because the use of mobile content services does not involve any obvious ethical considerations or other reasons why it should be disapproved of, the variation achieved with this variable was expected to be close to nothing. In addition, the items were transformed into statement form so that the response alternatives were always a seven-point Likert-scale, with completely agree and completely disagree as anchors. In items with injunctive quality the time element, that is, the time span during which the behaviour is to be performed (Ajzen 2002) was set to the forthcoming year to correspond with the time element in items measuring intention.

Trafimow & Fishbein (1994) proposed that the use of "most important others" may result in underestimation of the contribution of subjective norm, since respondents may think of general but not behaviour-specific referents. However, in this study the wording "people who are important to me" or "…whose opinions I value" was used because in the case of mobile content services there really are no behaviour-specific referents, that is, there are no other people taking part in the behaviour in question and consequently the interest was in the impact of general referents.

3.3.4 Background Information

In addition to the theoretical constructs, the following background information questions were included in the questionnaire: gender, year of birth, employment status, profession, education, whether the respondent had children or not, marital status, district of residence and gross income. To assure that the research sample adequately corresponded to the population, these background variables were compared with statistics for the whole population of 50- to 60-year-old Finnish people. Additionally, information was gathered on whether the respondents had a mobile phone in use, how long the respondent had had a mobile phone in use, the payer of the respondent's mobile phone bill, whether the respondent had WAP and/or MMS settings in his/her phone and how much experience the respondent had in making calls, sending text messages and sending picture messages. The purpose of these questions is to provide some descriptive information on the current mobile phone use of the respondents.

3.4 Data Collection and Data Description

3.4.1 Sampling and Data Collection

The data was gathered through a structured postal questionnaire during summer 2005. The practical work of buying the sample from the Population Register Centre of Finland, copying the questionnaires, mailing, follow-up of responses and optical data coding was assigned to a research company, Taloustutkimus Oy.

Originally the target population was limited to Finnish people born between 1945 and 1954. It was intended to draw a random sample of 1500 consumers from all Finnish-speaking Finns, born between 1945 and 1954. A mistake was made in the sampling phase and the sample also included those born in 1955. Unfortunately, this mistake was noticed only after the mailing process had started. The sample then included 130 people born in 1955 in addition to the 1370 people born between 1945 and 1954. Because in the covering letter it was stated that the research focus was on people born between 1945 and 1954, it was expected that those born in 1955 would not answer the questionnaire as dutifully as the others. Surprisingly, the response rate of those born in 1955 (44.6 %, 58 responses) was even greater than the response rate of those born between 1945 and 1954 (39.9 %, 547 usable responses). Since the response rate among respondents born in 1955 was comparable with the response rate at the other ages and there was no apparent reason why these respondents would dramatically differ from, for instance, those born in 1954, they were included in the data.

Prior to the actual data gathering the questionnaire was pre-tested with 9 consumers from the target group. All the pre-test respondents first filled in the questionnaire and then discussed the questionnaire with the researcher. It was explained to them that the subject is a rather difficult one because of its novelty and thus it was important to hear whether they had experienced some of the questions or items as difficult to understand. They were also given a chance to freely express other thoughts on the questionnaire and its topic. First, three of the pre-test respondents filled in the questionnaire and discussed it one at a time with the researcher. After this, some changes were made to the questionnaire. These three discussions, in particular, helped to reformulate and simplify the definition of mobile content services provided in the covering letter. After the first phase, the rest of the pre-test respondents (6 persons) filled in the questionnaire and the discussion on the questionnaire was held as a group. The second phase resulted only in a few minor changes in the wording of the items.

The data gathering started in May 2005 and ended in June 2005. A survey based on a postal questionnaire was chosen as a neutral way to approach consumers in a technology-related subject. At a time when the use of Internet-based survey tools is becoming more and more popular the exploitation of the Internet was also briefly considered. Using an Internet-based tool would have biased the results, since it is likely that those in the target population less enthusiastic about technology would not have answered the Internet-based questionnaire.

The questionnaire was sent with a prepaid envelope and a covering letter (17. May 2005). Receivers were encouraged to answer the questionnaire by a chance to take part in a lottery for a gift voucher worth 150 euros redeemable at a national business chain selling domestic appliances and other technological products. The respondents were asked to fill and return the questionnaire during the next five days. After one and a half weeks (27. May 2005) a reminder letter including the questionnaire was send to those who had not yet responded. The possibility to take part in the lottery was also included in the reminder letter. Twelve days from the mailing of the reminder letter (7. June 2005) reminder postcards were sent to 500 people randomly selected from those who had not yet responded.

In total, of the 1500 questionnaires sent, 659 were returned. Of these 13 were returned empty, 16 had only few or no answers to the items concerning the variables of the theoretical model (only the background questions had been answered), 9 persons had filled in the questionnaire twice and one reported to be born in the year 1962, thus leaving 620 usable questionnaires and a response rate of 41.3 per cent.

3.4.2 Background Characteristics of the Respondents

In this chapter the background characteristics of the respondents are described. When a comparable statistic for the whole population of 50- to 60-year-old

Finnish people is available it is presented. The purpose is to show that the sample satisfactorily corresponds to the general population despite the non-respondents.

The data consisted of 620 respondents. The demographic characteristics of the respondents are summarised in Table 9. More females (58.8 %) than males (41.2 %) returned the survey questionnaire. In the general population of 50- to 60-year-old Finns 49.9 per cent were males and 50.1 per cent were females in 2005 (Statistics Finland 2006). The respondents' ages ranged from 50 to 60 years, with an average age of 55.

Of the respondents 11.8 per cent were retired, 71.6 per cent were still working, 9.5 per cent were unemployed or temporarily laid off and 3 per cent were part-retired. In the year 2004 18 per cent of all Finns aged 50 to 59 were fully retired (calculated using statistics from Nyman 2005 and Statistics Finland 2006). Although these figures are from different years and thus not perfectly comparable they indicate that compared to those who are still working a slightly smaller portion of retired people answered the questionnaire. However, retired people are a clear minority in 50- to 60-year-old age group, and thus this small possible bias was not considered to be a problem.

Respondents categorised themselves according to their current or previous (previous to retirement, unemployment etc.) profession: 18.9 per cent of the respondents considered themselves to be higher white-collar workers, 28.7 per cent a lower white-collar workers and 52.4 per cent blue-collar workers. Of the respondents 62.4 per cent had a gross income of more than 1500 euro per month.

Most of the respondents had completed either a vocational school or equivalent (43.5 %), or elementary, middle or comprehensive school (39.6 %) education. Only 11.1 per cent had a university degree. According to Statistics Finland (2007) 73.4 per cent of 50- to 54-year-olds and 63.2 per cent of 55- to 59-year-olds had a high school diploma, a vocational school education, a higher vocational diploma or a university degree in 2005. This implies that the educational level of the respondents is comparable with the general population of 50- to 60-year-olds.

Of the respondents 87.3 per cent had children and 79.6 per cent were married or cohabiting. The respondents came from different parts of Finland: 17.4 per cent lived in the metropolitan area (Helsinki, Vantaa, Espoo, Kauniainen), 9.5 per cent in a city with more than 100 000 citizens (Tampere, Oulu, Turku), 17.8 per cent in a city with more than 50 000 citizens (Lahti, Kuopio, Jyväskylä, Pori, Lappeenranta, Joensuu, Vaasa, Kotka) and the rest, 55.3 per cent, lived in smaller towns. In 2005 of all 50- to 60-year-old Finns 16.2 per cent lived in the metropolitan area, 7.7 per cent in a city with more than 100 000 citizens, 20.9 per cent in a city with more than 50 000 citizens and the rest, 55.2 per cent, lived in smaller towns (Statistics Finland 2006). Thus the sample is geographically a good representation of the general population.

TABLE 9   Demographic Characteristics of the Respondents

	Frequency	Percentage	Valid Percentage
Gender			
Female	361	58.2	58.8
Male	253	40.8	41.2
Total	614	99.0	100.0
Missing	6	1.0	
Age			
60 years	56	9.0	9.3
59 years	58	9.4	9.6
58 years	51	8.2	8.4
57 years	58	9.4	9.6
56 years	48	7.7	7.9
55 years	54	8.7	8.9
54 years	60	9.7	9.9
53 years	46	7.4	7.6
52 years	62	10.0	10.2
51 years	54	8.7	8.9
50 years	58	9.4	9.6
Total	605	97.6	100.0
Missing	15	2.4	
Employment Status			
Employee	365	58.9	59.9
Self-employed	71	11.5	11.7
Retired	72	11.6	11.8
Part-retired	18	2.9	3.0
Unemployed or temporarily laid off	58	9.4	9.5
Student	2	0.3	0.3
Taking care of one's own household or family member	9	1.5	1.5
Other	14	2.3	2.3
Total	609	98.2	100.0
Missing	11	1.8	
Profession			
Higher white-collar	105	16.9	18.9
Lower white-collar	160	25.8	28.7
Blue-collar	292	47.1	52.4
Total	557	89.8	100.0
Missing	63	10.2	

TABLE 9 (continues)

	Frequency	Percentage	Valid Percentage
Education (Highest completed training or degree)			
Elementary, Middle or Comprehensive School	243	39.2	39.6
High school diploma	24	3.9	3.9
Vocational school or comparable	267	43.1	43.5
Higher vocational diploma	12	1.9	2.0
University degree	68	11.0	11.1
Total	614	99.0	100.0
Missing	6	1.0	
Children			
Yes	530	85.5	87.3
No	77	12.4	12.7
Total	607	97.9	100.0
Missing	13	2.1	
Marital Status			
Married	425	68.5	69.6
Cohabiting	61	9.8	10.0
Single	38	6.1	6.2
Widowed	18	2.9	2.9
Divorsed / Separated	69	11.1	11.3
Total	611	98.5	100.0
Missing	9	1.5	
District of Residence			
Metropolitan area	105	16.9	17.4
A city with more than 100 000 citizens	57	9.2	9.5
A city with more than 50 000 citizens	107	17.3	17.8
Other parts of the country	333	53.7	55.3
Total	602	97.1	100.0
Missing	18	2.9	
Gross Income			
500 euros per month or under	31	5.0	5.2
501-1000 euros per month	80	12.9	13.5
1001-1500 euros per month	112	18.1	18.9
1501-2000 euros per month	142	22.9	24.0
2001-2500 euros per month	99	16.0	16.7
2501-3000 euros per month	56	9.0	9.5
More than 3000 euros per month	72	11.6	12.2
Total	592	95.5	100.0
Missing	28	4.5	

3.4.3 Information Related to Respondents' Use of Mobile Phones

Of the general Finnish population 93 per cent had a mobile phone in use in 2005 (Taloustutkimus Oy 2006). Of the respondents of this survey 95.2 per cent had a mobile phone in use. The majority of the respondents had long experience in using mobile phones; 79.4 per cent had had a mobile phone for five years or longer and only 1.7 per cent of respondents had had a mobile phone for under a year. Approximately 80 per cent of the respondents reported paying their mobile phone bills themselves, 12.5 per cent having their bill paid by their employer and the rest reported either having someone else paying their bills or splitting the costs with their employer (or some other person).

The respondents were also asked to assess their level of experience on a 7-point scale (1 = no experience, 7 = high level of experience) in using a mobile phone for making phone calls, for text messaging and for sending picture messages (type i.e., SMS or MMS was not specified in the questionnaire). The respondents' assessments indicated a relatively high level of experience particularly in making phone calls and in text messaging. Seventy-five per cent reported a high level of experience (response option 6 or 7) whereas only 4.4 per cent indicated having no or low experience (response option 1 or 2) in making phone calls with a mobile phone. In the case of text messaging 53.7 per cent reported a high level of experience and 17.2 per cent no or low experience. Of the respondents only 10 per cent reported a high level of experience in sending picture messages and 72.2 per cent no or low experience.

When the respondents were asked if they had WAP and MMS settings in their mobile phones 53.5 per cent answered "no" for WAP and 57.2 per cent "no" for MMS. Over 20 per cent (22.5 for WAP and 23.2 for MMS) did not know if they had these settings, and thus only 24 per cent of the respondents were sure that they had WAP settings and 19.6 per cent that they had MSS settings.

3.4.4 Respondents' Current Use of Mobile Content Services

The respondents were asked to assess how often they use a set of 20 mobile content services. In the case of most of the services only a few per cent of the respondents had even tried these services. However, there were a few services that had been tried at least once or twice, or used more frequently by a considerable number of respondents (see Figure 9). These services are relatively simple services that have most likely been used as SMS-based applications (as opposed to more developed 3G services). All services that were listed in the questionnaire are presented in Appendix 1.

Thirty-nine per cent of the respondents had taken part to a contest or vote using text messages, 38.9 per cent had used search services, 27.7 per cent had downloaded ringing tones, 20.6 per cent had downloaded wallpapers or logos, 20 per cent had checked the amount of their mobile phone bill using a text messaging service, 10.6 per cent had ordered weather forecasts, 6.3 per cent had either downloaded a game to their mobile phone or played a game on-line

using their mobile phone and 4.5 per cent had used mobile banking services. The results in part resemble those obtained by Pedersen (2005). He found the five most frequently adopted services among his North American and European respondents to be 1) direct product/service downloads (e.g., ringing tones, logos), 2) search services, 3) commercial alert services (e.g., offers, warnings), 4) gaming and entertainment services and 5) ticket reservations.
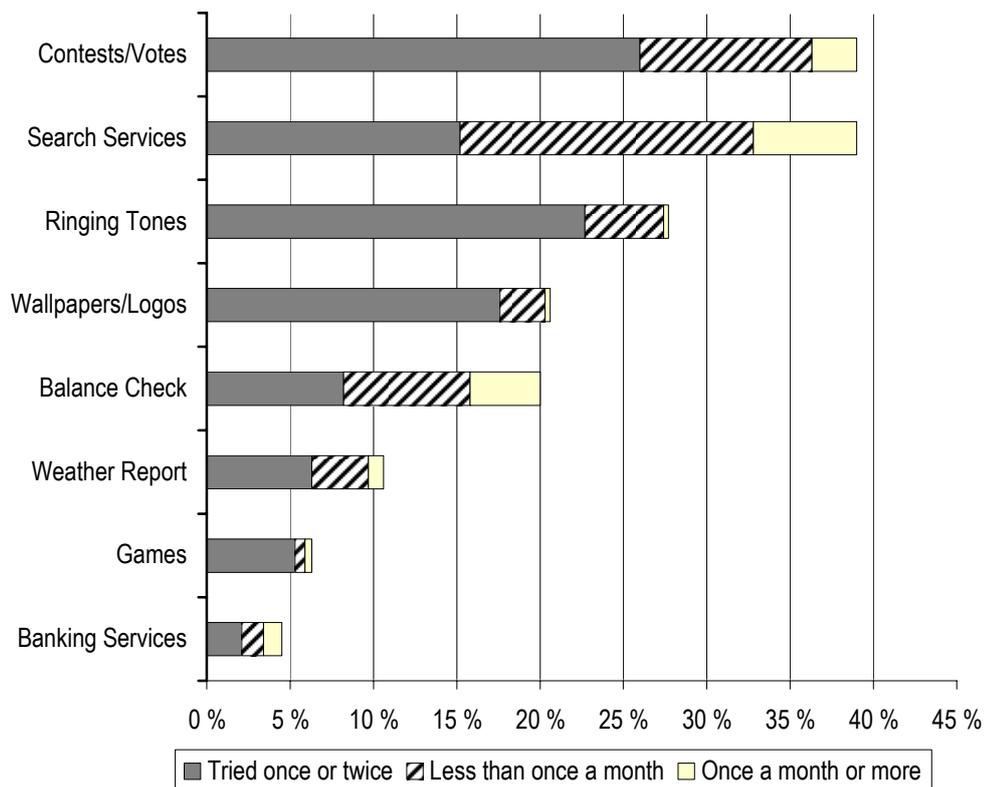
FIGURE 9   Experience of Use of Mobile Content Services among Respondents (Question: "Please assess how often you use the following services with your mobile phone?")

The variety of mobile content services used per respondent was calculated by counting the number of applications that the respondent reported having tried or used more often. Accordingly, 33.2 per cent of the respondents had never used any mobile content services and thus 66.8 per cent of respondents had tried at least one service (see Figure 10). Since only 39.9 per cent of respondents had used mobile content services *during the last year* (see Figure 11), some of the service trials must have occurred earlier.
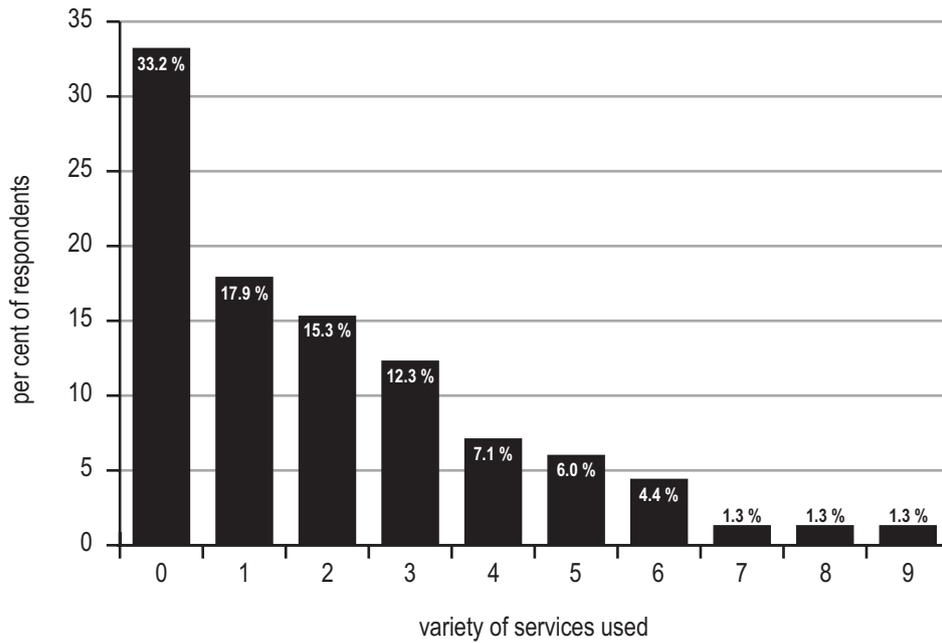
FIGURE 10   Variety of Mobile Content Services Used
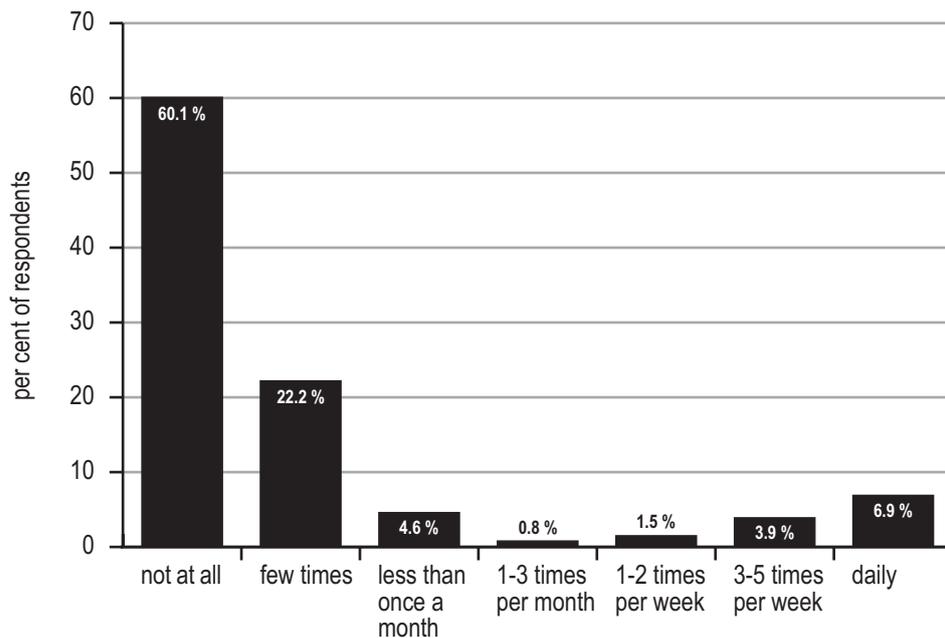
FIGURE 11   Frequency of Mobile Content Service Use during Last Year

3.5   SEM as an Analytical Method

Structural equation modelling (SEM) is a statistical methodology for analysing relationships between latent variables that are measured by one or more observed variables, and thus it is the optimal methodology for testing the

theoretical model formulated in the preceding chapter. Structural equation modelling is often referred to as LISREL modelling after the widely used LISREL (LInear Structural RELationships) computer software, which is also used in this study.

There are two parts to structural equation models (SEMs): the measurement part and the structural part of the model. The measurement part of the model (i.e., the confirmatory factor analysis) is constituted by the relationships between observable indicators and the latent construct (Anderson & Gerbing 1988; Jöreskog & Sörbom 1993, 112); in other words, it provides the link between the measurement instrument and the underlying construct that the instrument is designed to measure (Byrne 1998, 10). The structural part is constituted by the relationships between the latent constructs (Jöreskog & Sörbom 1993, 112). It specifies which latent variables directly or indirectly influence other latent variables in the model (Byrne 1998, 10). If a measurement model does not hold, that is, if the chosen indicators do not measure the construct in question, testing the structural model may be meaningless and thus it is recommended that the measurement models should be tested before testing the structural relationships (Jöreskog & Sörbom 1993, 112-113). This two-step approach will be followed in this study.

SEM is predominantly confirmatory in nature (Byrne 1998, 3), but strictly confirmatory use is very rare. A more common approach is "model generating", where the researcher specifies an initial model and if the initial model does not fit the data the model is modified and tested again with the same data. (Jöreskog & Sörbom 1993, 115.) Most applications of SEM are done through five steps, namely (1) model specification, (2) identification, (3) estimation, (4) testing fit and (5) re-specification (Bollen & Long 1993, 1-2). These five steps are also followed in this study.

Model specification and Identification
Model specification refers to the formulation of the initial model on the basis of theory or past research (Bollen & Long 1993, 2). The latent variable (i.e., structural) model specification in the present instance was done in Chapter 2.4 (Theoretical Model of the Study) and the measurement model specification in Chapter 3.3 (The Questionnaire and the Operationalisation).

Model identification focuses on whether it is possible to find unique values for the parameters of the specified model (Bollen & Long 1993, 2; Byrne 1998, 28). It concerns the transformation of the variance-covariance matrix of observable variables into the estimated parameters. If a unique solution for the parameters can be found, then the model is identified and the parameters are estimable and the model testable. If the number of data variances and covariances equals the number of parameters, the model is just-identified and yields a unique solution for the parameters but it has no degrees of freedom and thus the fit of the model cannot be tested. In an over-identified model the number of parameters is less than the number of data points and the parameters can be estimated and the model fit tested. The aim in SEM is thus to specify an over-identified model. If the number of parameters exceeds the

number of data points, the model is under-identified and the parameters are not estimable nor the model testable. (Byrne 1998, 28-29.) Identification will not be reported in detail in this study; however, all the measurement models are either over-identified or just-identified and all the full models (including the measurement and the structural part) are over-identified.

Estimation

The distributional properties of the variables being analysed often determine which estimation technique is selected (Bollen & Long 1993, 2). Also, the scale of measurement (continuous vs. ordinal) influences the selection of the estimation method (Jöreskog 2005). Generally speaking (Tanaka 1993, 27), and also specifically in marketing research (Baumgartner & Homburg 1996), the most frequently used estimation method is the Maximum Likelihood (ML). ML is also the default method in LISREL (Jöreskog & Sörbom 1993, 181). The ML estimation assumes that the observed variables are continuous and have a multivariate normal distribution (West, Finch & Curran 1995).

In the applied sciences it has been customary to treat ordinal variables (i.e., Likert-scale variables) as continuous and use ML for estimation. However, according to Jöreskog (2005) this is wrong and the use of ordinal variables in SEM requires techniques that are different from those used with continuous variables. Further, taking into consideration the fact that the normality assumption does not hold in the data of this study (see Appendix 2), and that violation of this assumption cannot be corrected with data transformations (e.g., Normal Scores procedure, see du Toit & du Toit 2001, 143), it was deemed best to follow Jöreskog (2005) and treat the observed variables as ordinal.

Weighted Least Squares (WLS) is used in this study as an estimation method. The analysis of ordinal variables in LISREL is based on the use of polychoric correlations and their asymptotic covariance matrix when WLS is used as an estimation method. For ordinal variables normality is not an issue, but for calculating polychoric correlations the assumption of "underlying bivariate normality" is needed. (Jöreskog 2005.) PRELIS gives a list of test results for underlying bivariate normality after computation of the polychoric correlation and asymptotic covariance matrix. In the present data the underlying bivariate normality holds for all variable pairs, except for two of the technology anxiety items (TECHANX1 vs. TECHANX2). The present sample size is sufficient, since a minimum sample size of 500 is usually recommended for WLS estimation.

Testing fit

The LISREL output provides a lot of information for model evaluation and assessment of fit. This information can be classified into three groups, namely examination of the solution, measures of overall fit and detailed assessment of fit. (Jöreskog 1993, 308.) Examination of the solution and measures of overall fit will be discussed next. The detailed assessment of fit is related to model modification and will be thus briefly discussed under the subheading Re-specification.

Examination of the solution includes several aspects. After the parameter estimates are obtained, their adequacy should be estimated. Estimates should exhibit a correct sign and size, that is, they should be consistent with the existing theory (Jöreskog 1993, 308). In the case of measurement models this examination concerns in particular the factor loadings and measurement errors, and in the case of structural models the structural coefficients are of interest (Baumgartner & Homburg 1996). Parameter estimates should be statistically significant (for 0.05 significance level | t-value | > 1.96) (Byrne 1998, 103-104). In this study the standardised parameter estimates and their t-values will be reported with each model estimation.

The extent to which a measurement model is adequately represented by the observed variables can be assessed with the help of squared multiple correlations (R^2) (Byrne 1998, 104). R^2 can range from 0.00 to 1.00 and it serves as a gauge of the systematic variance in an observed variable that can be explained by the latent variable (Bollen 1989, 221). These *item reliabilities* will be reported with the measurement model estimations.

The scale reliability (i.e., internal consistency) of a scale should also be assessed. Often for this purpose a Cronbach alpha score is used. However, the Cronbach alpha equals scale reliability only in the restrictive case when the elements of a multiple-item measurement are tau-equivalent, in other words, when each item measures the same construct to the same degree, as indicated by equal factor loadings (Leskinen & Lyyra 2003, 129; Raykov 1997; Adamson, Shevlin, Lloyd & Lewis 2000; Baumgartner & Homburg 1996). If the factor loadings are not equal, the Cronbach alpha underestimates scale reliability (Leskinen & Lyyra 2003, 129). In addition to the Cronbach alpha, a scale reliability of a factor score variable, S_2, will be reported in this study (for the mathematical equation of $Rel(S_2)$ see Leskinen & Lyyra 2003, 129).

Further, the squared multiple correlations (R^2) for the structural equations, that is the measures of the strength of a linear relationship, should be examined for each relationship in the model. A small R^2 suggests that the model is not good. (Jöreskog 1993, 308.) R^2s will be reported for each structural model.

In this study, the following indices are used for assessing *the overall model fit*: *Chi-square (χ^2)* is the traditional measure of the overall fit of a model to the data (Byrne 1998, 109). A small χ^2 corresponds to good fit and large χ^2 to bad fit (Jöreskog & Sörbom 1993, 122). The p-value for the χ^2 states the fit of the model: when the p-value is ≥0.05 the model fits (Nummenmaa, Konttinen, Kuusinen & Leskinen 1996, 269). χ^2 is dependent on sample size and is based on the central χ^2 distribution which assumes that that the model holds exactly in the population. Models that hold approximately in the population will be rejected by χ^2 in large samples. (Jöreskog 1993, 309.) For example if N>500, χ^2 easily rejects a model even though the difference between the estimated and observed covariance matrix is very small (Nummenmaa et al. 1996, 270). Several other goodness-of-fit measures have been proposed to reduce the dependence on sample size (Jöreskog 1993, 309).

Root Mean Square Error of Approximation (RMSEA) (Steiger 1990) is a measure of discrepancy per degree of freedom (Jöreskog & Sörbom 1993, 124).

According to Browne and Cudeck (1993, 144) a value of 0.05 of RMSEA indicates a close fit and values up to 0.08 represent reasonable errors of approximation in the population. LISREL also gives a 90 per cent confidence interval for RMSEA as well as a p-value for test of RMSEA<0.05.

Standardised Root Mean Square Residual (SRMR) is a measure of the mean absolute correlation residual (i.e., standardised covariance residual), that is, of the overall difference between the observed and predicted correlations. Values less than 0.10 are generally considered favourable. (Kline 2005, 141.)

Comparative Fit Index (CFI) by Bentler (1990) is an incremental fit index that can range from 0 to 1 (Bagozzi & Baumgartner 1994, 400) with CFI > 0.90 indicating acceptable fit (Baumgartner & Homburg 1996).

Normed Fit Index (NFI) (Bentler & Bonett 1980) assesses the effect of a large sample size on χ^2 (Nummenmaa et al. 1996, 271). It is an incremental fit index that compares the χ^2 of a model to a χ^2 of an independence (i.e., null) model (Bentler & Bonett 1980; Metsämuuronen 2003, 560). NFI can range from 0 to 1 (Nummenmaa et al. 1996, 271). If NFI is greater than 0.90 but χ^2 rejects the model, the rejection is due to the large sample size (Metsämuuronen 2003, 560).

The AIC measure (information criterion by Akaike 1974) is used where the researcher has two or more competing models and wants to select one of these. This measure takes parsimony (number of parameters estimated) as well as fit into account. Models are ranked according to the AIC measure and the model with smallest value is chosen. (Jöreskog 1993, 305-307.) In this study AIC is used whenever two or more models are compared.

If the model is consistent with the data, the analytical process is complete after the fit of the model has been tested (Bollen & Long 1993, 2).

Re-specification
If the overall measures of fit or other considerations suggest that the model does not fit sufficiently well, the sources of the lack of fit should be determined with a *detailed assessment of fit*. In this modification indices are of use. LISREL gives a modification index for each fixed parameter in a model. This index is an estimate of the decrease in χ^2 that will be gained if that particular path is included in the model (Jöreskog & Sörbom 1993, 26). Often the fit of the model can be improved through re-specification (Bollen & Long 1993, 2), that is, through modifying the model. Re-specification decisions should be done in conjunction with theory and not based solely on statistical considerations (Anderson & Gerbing 1988).

3.6   Validity and Reliability of the Research

Validity
Validity is the ability of a measurement instrument or research method to measure what it is meant to measure (Alkula, Pöntinen & Ylöstalo 1995; Eskola

1981, 77, 89; Hirsjärvi, Remes & Sajavaara 2002, 213). If a measurement measures something other than what it is meant to measure, the error will recur over and over again and this systematic error will diminish the validity of the measurement tool (Alkula et al. 1995, 89). In other words, validity is the extent to which the findings of a study are true (Seale & Filmer 2000, 134) or differences found reflect the true differences among the respondents. What the true differences are is not known, thus one has to seek other relevant evidence that can confirm the answers found with the measurement instrument. Unfortunately, there is no absolute advice on what constitutes "relevant evidence". One way to approach the question of relevant evidence is to view validity from different angles. (Cooper & Emory 1995, 149.)

Next the concepts of content validity, construct validity and criterion-related validity, and their status in this study are discussed. These types of validity concern internal validity, whereas external validity refers to the possibility of generalising the results (Cooper & Emory 1995, 149). External validity will be discussed after internal validity.

Content validity (also known as face validity, see e.g., Seale & Filmer 2000, 134) focuses on how well the domain of a characteristic is captured by the measurement (Churchill & Iacobucci 2002, 408). The issue is related to the difficulty of operationalisation, that is, to attaching abstract concepts to the empirical world. A researcher establishes content validity by employing his/her knowledge of the subject, previous research and general logic in assuring himself and others of the correctness of chosen indicators. (Alkula et al. 1995, 89-90.) In structural equation modelling content validity thus depends on the measurement model specification. The measurement scales used in this study were adapted from those used in previous research. All the scales had been successfully subjected to some validity assessments (see Chapter 3.3). Some of the scales were modified to fit the context of mobile content services and others were adapted with no changes. Since the original items were in English they were carefully translated and cross-checked by a colleague with both good English skills and knowledge of marketing discipline. To ensure the intelligibility of the items the questionnaire was also pre-tested.

Construct validity can be divided into two components: internal structure and cross-structure analysis. Internal structure analysis deals with the homogeneity of a set of indicators. (Pedhazur & Schmelkin 1991, 59, 66.) In SEM, and thus in this study, the measurement model represents a test of internal structure analysis (Adamson et al. 2000). Validity is assessed from the measurement model by determining whether each indicator's estimated parameter coefficient on its posited underlying construct is significant (Anderson & Gerbing 1988). Cross-structural analysis refers to the relationship between constructs (Pedhazur & Schmelkin 1991, 72). Support for the validity of two constructs would be gained if these two constructs were hypothesised to be highly associated and the resulting correlation between the constructs was found to be high (Adamson et al. 2000). Cross structural analysis in SEM is done with measurement models that include two or more latent variables.

In proving construct validity one should also asses convergent and discriminant validity (Churchill & Iacobucci 2002, 410). If we correlate the results of our measurement tool with the results obtained from another measurement measuring the same concept we are investigating *convergent validity* (Cooper & Emory 1995, 151). *Discriminant validity* is established by assuring that a measure does not correlate too highly with measures from which it is supposed to differ (Churchill & Iacobucci 2002, 412-413). In SEM, if a correlation between two latent variables is suspiciously high, discriminant validity may be assessed through sequential chi-square tests (see e.g., Jöreskog 1971). The assessments of construct validity are inherently present in SEM and thus in the results of this study.

Criterion-related validity (sometimes called predictive validity, see e.g. Churchill & Iacobucci 2002, 407) refers to the success of measures used for prediction or estimation. *Predictive validity* is an issue when one wants to predict an outcome and *concurrent validity* must be addressed when one wants to estimate the existence of a current behaviour or condition. (Cooper & Emory 1995, 150.) In SEM the structural model represents a test of criterion-related validity and thus in this study whenever a structural model is estimated criterion-related validity is assessed.

External validity refers to the possibility of generalising the research results (Cooper & Emory 1995, 201). It depends on the degree to which the data represents some greater population (Valkonen 1978, 53). External validity is an aspect of sampling. To be valid, the sample must represent the characteristics of the population from which it is drawn (Cooper & Emory 1995, 201). Systematic error in a sample can be originated from not using probability sampling or from a low response rate, that is, from non-responses (Valkonen 1978, 78). The original sample included 1500 Finnish consumers born between 1945 and 1955, and the response rate was 41.3 per cent. The new and challenging theme of the questionnaire might have decreased the response rate. However, for a postal survey the response rate of over 40 per cent can be considered sufficient. In addition, the demographic characteristics of the respondents compared favourably with those of the whole research population (see Chapter 3.4.2). The good generalisability is also supported by the fact that the response rate per year of birth was quite consistent across the years of birth (ranging from 35.7 % for those born in 1952 to 44.6 % for those born in 1955).

Reliability

A measurement or a research that gives non-random, that is, consistent results is reliable (Eskola 1981, 77; Cooper & Emory 1995, 153; Hirsjärvi et al. 2002, 213). Random errors diminish the reliability of a research. The more the measurement is replicated the more likely a reverse error will occur per every random error and the closer the average result of the measurement will be to its real value (Alkula 1994, 94-95). Reliability is a necessity for validity, but alone it does not make a research valid. A measurement can give systematically wrong results, thus being reliable but non-valid. (Cooper & Emory 1995, 153.)

If a measure is valid there is little need to worry about its reliability, since then the measure is not skewed by other factors, either systematic or transitory (Churchill & Iacobucci 2002, 413). Evidence on reliability in survey situations can be generated through test-retest assessment (determining stability), through the use of parallel forms of the same test administered to the same persons simultaneously (determining equivalence) or through assessment of internal consistency, that is, homogeneity among the measurement items of a concept (Cooper & Emory 1995, 153-154). In this study the internal consistency scores for each measurement scale are provided in the results.

4 RESULTS

This chapter begins with the descriptive results. For each item a mean, standard deviation and median are provided. Then the measurement models for latent variables are estimated. The full model estimation starts with the estimation of the Technology Acceptance Model (TAM, Davis 1989; Davis et al. 1992). After finding an acceptable solution, the individual difference variables are combined with TAM.

In the data the number of missing values per item (i.e., item non-responses) varied between 0 and 26. For the LISREL analysis data with no missing values are needed. Following the instructions given by Jöreskog (2005) missing values were imputed to the data by "matching on other variables", a procedure that is available in PRELIS. Ten of the 37 observed variables were used as matching variables. These matching variables (TECHANX1, TECHANX3, TECHANX4, TECHANX5, TECHANX6, TECHANX7, TECHANX8, SMS, INTERNET, VARIETY) had less than 10 missing values per variable. Sixty-five cases were gained with imputation and after imputation the effective sample size was 584. Based on this data with 584 cases the polychoric correlations and their asymptotic covariance matrix were computed in PRELIS. The polychoric correlations and the asymptotic covariance matrix are used as input data in LISREL analysis. The polychoric correlations for the observed variables of TAM are displayed in Appendix 3. In the descriptive results data with missing values are used.

4.1 Descriptive Results

The respondents assessed their perception of the usefulness, enjoyment and ease of use of mobile content services, as well as their intention to use these services during the forthcoming year on a 7-point Likert-scale. Table 10 gives the means, medians and standard deviations of the belief and intention items. A

corresponding item for each variable name can be found in Appendix 1. As shown by the means and medians, the scores for all belief and also intention variables were mainly from the low (completely disagree) end of the 7-point Likert-scale. Thus the results indicate that the respondents did not consider mobile content services to be neither useful nor enjoyable. The mean for all the items measuring usefulness is 2.4 (SD 1.3) and enjoyment 2.1 (SD 1.2). The level of perceived ease of use, although remaining below the middle point of the scale, is slightly higher than the levels of usefulness and enjoyment. The mean for all items measuring ease of use is 3.0 (SD 1.6). On average intentions to use mobile content services were very low. The mean for the intention items is 2.3 (SD 1.4).

TABLE 10   Means, Medians and Standard Deviations for Items of Perceived Usefulness, Perceived Ease of Use, Perceived Enjoyment and Intentions

| | N | | | | |
Item	Valid	Missing	Mean	Median	Std. Deviation
PU1	605	15	2.7	2	1.8
PU2	605	15	2.0	1	1.5
PU3	596	24	2.7	2	1.8
PU4	600	20	2.0	1	1.5
PEOU1	604	16	3.3	3	1.9
PEOU2	603	17	3.0	3	2.0
PEOU3	597	23	3.0	3	1.9
PEOU4	594	26	2.6	2	1.7
PE1	603	17	1.9	1	1.4
PE2	599	21	2.1	1	1.4
PE3	597	23	2.4	2	1.5
INTEN1	606	14	2.1	2	1.5
INTEN2	601	19	2.3	2	1.7
INTEN3	595	25	2.5	2	1.7

The mean cognitive age of the respondents was 49.7 and their average chronological age 55 years. Thus the difference between the average chronological and cognitive age is 5.3 years. (The greater difference between cognitive and chronological age found in previous studies is probably to some extent due to the wider age span and older samples, in terms of chronological age, used in those studies.) The respondents reported younger cognitive ages in terms of their interests (mean 48.4 years) and the way they do things (mean 48.1 years), than in terms of outlook (mean 51.4 years) or how old they feel in general (mean 50.8 years) (see Table 11).

On the 7-point Likert-scale used for technology anxiety items the higher scores indicated higher levels of anxiety (for the analysis the reverse-worded items were reverse-coded). The mean for all the technology anxiety items is 3.2 (SD 1.4). None of the items have a mean (or median) much above the middle point of the scale (4) (see Table 12). The level of technology anxiety among the respondents seems to be rather low.

TABLE 11   Means, Medians and Standard Deviations for Items of Cognitive Age

Item	Valid	Missing	Mean	Median	Std. Deviation
	N				
FEELAGE	617	3	50.8	55	7.0
LOOKAGE	615	5	51.4	55	6.4
DOAGE	609	11	48.1	45	9.7
INTAGE	612	8	48.4	45	8.6

TABLE 12   Means, Medians and Standard Deviations for Items of Technology Anxiety

Item	Valid	Missing	Mean	Median	Std. Deviation
	N				
TECHANX1	612	8	2.6	2	1.8
TECHANX2	609	11	3.0	2	1.9
TECHANX3	614	6	2.6	2	1.9
TECHANX4	611	9	2.6	2	2.0
TECHANX5	612	8	3.4	3	2.0
TECHANX6	613	7	4.1	4	2.2
TECHANX7	612	8	3.4	3	2.2
TECHANX8	611	9	4.1	4	1.9
TECHANX9	608	12	3.2	3	2.1

As is seen from Table 13 the respondents had relatively much experience of Internet and SMS usage. According to the means the respondents had slightly more experience of SMS use (mean 5.1) than of Internet use (mean 4.7). As expected, the respondents did not have considerable amounts of experience of using mobile content services, as is indicated by the measures of the overall frequency of mobile content service use (mean 2.0) and the variety of services used (mean 3.0). Both the frequency of mobile content services use and the variety of services used were described in more detail in Chapter 3.4.4.

TABLE 13   Means, Medians and Standard Deviations for Items of Experience

Item	Valid	Missing	Mean	Median	Std. Deviation
	N				
SMS	616	4	5.1	6	2.1
INTERNET	614	6	4.7	6	2.4
FREQ $_{MCS}$	609	11	2.0	1	1.8
VARIETY $_{MCS}$	620	0	3.0	2	2.1

The respondents did not feel a strong pressure from the part of their important others to use mobile content services (see Table 14). The mean of subjective norm items is 2.1 (SD 1.4). However, they reported that some of the people who are important to them use mobile content services. The mean for the subjective norm items with descriptive quality (i.e., measuring others' use) is 3.1 (SD 1.7).

TABLE 14   Means, Medians and Standard Deviations for Items of Subjective Norm

| Item | N | | Mean | Median | Std. Deviation |
	Valid	Missing			
SN1	598	22	2.1	1	1.6
SN2	595	25	2.2	1	1.6
OTHERS1	605	15	3.1	3	1.8
OTHERS2	602	18	3.0	3	1.9

4.2 Measurement Models

4.2.1 Measurement Models for TAM's Constructs

First, the measurement models for each latent variable of TAM were estimated. The measurement model for perceived usefulness is rejected in terms of exact fit ($\chi^2(2) = 9.43$, p-value=0.00894) but approximate fit is demonstrated by a RMSEA of 0.080, CFI of 0.99, NFI of 0.99 and SRMR of 0.031 (see Figure 12). Further, the 90 per cent confidence interval for RMSEA (0.034 ; 0.13) and p-value for the test of close fit (RMSEA<0.05) of 0.13 indicate adequate fit. Supporting the construct validity (internal structure) of the measurement, all factor loadings are significant and high with standardised loadings ranging from 0.79 to 0.85. Item reliabilities are high, ranging from 0.63 to 0.72. The Cronbach alpha of 0.82 and Rel(S_2) of 0.89 both indicate high scale reliability. As was expected, the Cronbach alpha seems to give a lower estimate for the internal consistency than the scale reliability of a factor score variable, S_2 (see e.g., Leskinen & Lyyra 2003, 129; Raykov 1997).

The measurement model for perceived ease of use is accepted in terms of exact fit ($\chi^2(2)$=5.80, p-value=0.05512). Fit is also demonstrated by RMSEA of 0.057, CFI of 1.00 and SRMR of 0.017 (see Figure 13). The 90 per cent confidence interval for RMSEA (0.0 ; 0.11) and p-value for the test of close fit (RMSEA<0.05) of 0.33 both indicate good fit. Construct validity (internal structure) is supported by significant and high (standardised) factor loadings ranging from 0.79 to 0.89. Item reliabilities are high, ranging from 0.63 to 0.80. The Cronbach alpha of 0.87 and rel(S_2) of 0.91 both indicate high scale reliability.

The measurement model for perceived enjoyment is just-identified, and thus the parameters could be estimated but the fit of the model could not be tested (Byrne 1998, 29). Similarly to the other belief variables the construct validity (internal structure) of perceived enjoyment is supported by significant and high (standardised) factor loadings ranging from 0.78 to 0.95 (see Figure 14). The item reliabilities are high, ranging from 0.61 to 0.90. The Cronbach alpha of 0.82 and rel(S_2) of 0.92 both indicate high scale reliability.
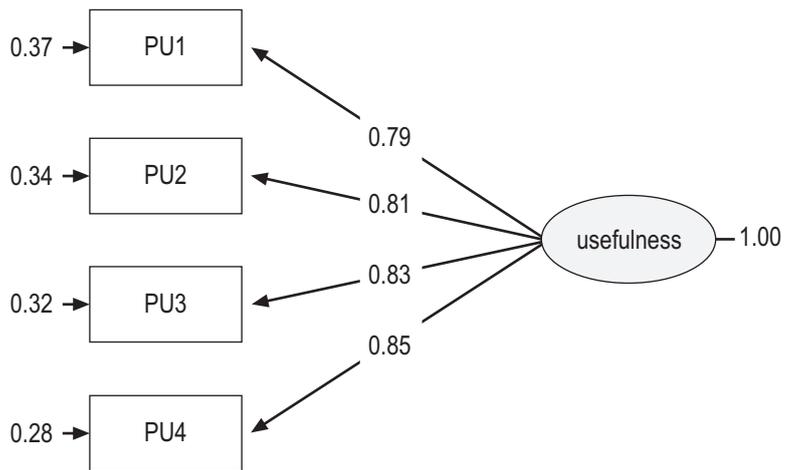
Chi-Square=9.43, df=2, P-value=0.00894, RMSEA=0.080, CFI=0.99, NFI=0.99, SRMR=0.031

FIGURE 12   Estimated Measurement Model for Perceived Usefulness (Standardised Solution)
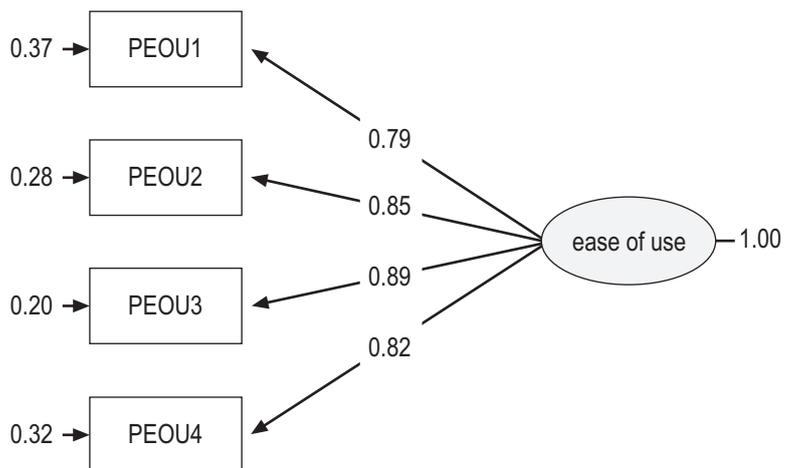
Chi-Square=5.80, df=2, P-value=0.05512, RMSEA=0.057, CFI=1.00, NFI=1.00, SRMR=0.017

FIGURE 13   Estimated Measurement Model for Perceived Ease of Use (Standardised Solution)

86
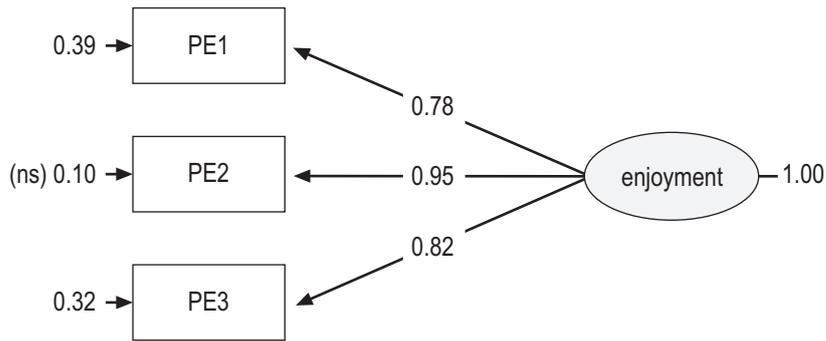
Chi-Square=0.00, df=0, P-value=1.00

FIGURE 14   Estimated Measurement Model for Perceived Enjoyment (Standardised
Solution)

The measurement model for behavioural intention, with three observed indicators, is also just-identified. Construct validity (internal structure) of intention is supported by significant and high (standardised) factor loadings ranging from 0.77 to 0.91 (see Figure 15). Item reliabilities are high, ranging from 0.59 to 0.83. The Cronbach alpha of 0.85 and rel(S_2) of 0.92 both indicate high scale reliability.
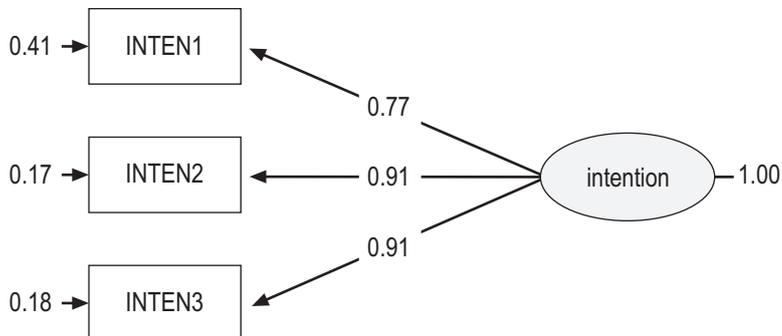
Chi-Square=0.00, df=0, P-value=1.00

FIGURE 15   Estimated Measurement Model for Intention (Standardised Solution)

The standardised factor loadings, standard errors, t-values, reliabilities of items, factor score coefficients (needed for the calculation of rel(S_2)) and internal consistency scores for the variables of TAM are presented in Table 15.

TABLE 15   Standardised Factor Loadings, Standard Errors, t-Values, Reliabilities of Items and Factor Score Coefficients for Observed Variables, and Internal Consistency Scores for Latent Variables of TAM

factor	item	s. factor loading	standard error	t-value	rel. of items	factor score c.	α	rel(S2)
	PU1	0.79	*	*	0.63	0.18		
	PU2	0.81	0.06	18.38	0.66	0.20		
	PU3	0.83	0.05	19.71	0.68	0.22		
usefulness	PU4	0.85	0.05	19.66	0.72	0.26	0.82	0.89
	PEOU1	0.79	*	*	0.63	0.15		
	PEOU2	0.85	0.05	22.29	0.72	0.21		
	PEOU3	0.89	0.05	21.69	0.80	0.31		
ease of use	PEOU4	0.82	0.05	20.30	0.68	0.18	0.87	0.91
	PE1	0.78	*	*	0.61	0.12		
	PE2	0.95	0.07	17.72	0.90	0.54		
enjoyment	PE3	0.82	0.05	19.36	0.68	0.15	0.82	0.92
	INTEN1	0.77	*	*	0.59	0.12		
	INTEN2	0.91	0.06	21.61	0.83	0.35		
intentions	INTEN3	0.91	0.05	21.72	0.82	0.32	0.85	0.92

*unstandardised loading fixed to 1

Measurement Model with Four Factors

Following the separate estimation of each measurement model, a measurement model with all four factors of TAM was estimated. Exact fit is rejected ($\chi^2(71)=178.48$, p=0.000), but approximate fit is implied by the following: RMSEA=0.051, 90 per cent confidence interval for RMSEA = (0.042 ; 0.060), p-value for test of close fit (RMSEA<0.05) = 0.42, CFI=0.98 and NFI=0.97. The correlations of the latent variables are high, particularly the correlation between perceived enjoyment and perceived usefulness (see Table 16). A sequential χ^2 test was performed to assure the discriminant validity of usefulness and enjoyment. In other words it was checked that usefulness and enjoyment do not form one but two separate factors. According to this test the factors should be kept separate ($\chi^2(1)=4.73$, p=0.0296). Also from a theoretical point of view this seems more reasonable.

The latent variable pairs of usefulness-intention and enjoyment-intention also have correlations above 0.9 (see Table 16). To assure discriminant validity sequential χ^2 tests were performed. These tests clearly show that usefulness is a distinct construct from intentions ($\chi^2(1)=35.13$, p<0.001) and that enjoyment is a distinct construct from intentions ($\chi^2(1)=36.37$, p<0.001).

TABLE 16   Correlations for Latent Variables of TAM

	usefulness	ease of use	intention	enjoyment
usefulness	1.000			
ease of use	0.782	1.000		
intention	0.935	0.722	1.000	
enjoyment	0.971	0.775	0.911	1.000

4.2.2 Measurement Models for Individual Difference Variables

Of the individual difference variables measurement models were estimated for cognitive age, technology anxiety and subjective norm. A measurement model for prior experience was not estimated since each measure (frequency of mobile content service usage, variety of services used, Internet experience, SMS experience) was used as a single indicator variable for the purpose of examining the effect of different types of experience on the variables of TAM.

The measurement model for cognitive age is rejected in terms of exact fit (χ^2 (2)=6.67, p-value=0.036) but approximate fit is demonstrated by RMSEA of 0.063, CFI of 0.99, NFI of 0.99 and SRMR of 0.11 (see Figure 16). Further, the 90 per cent confidence interval for RMSEA (0.014 ; 0.12) and p-value for test of close fit (RMSEA<0.05) of 0.26 indicate adequate fit. All the factor loadings are significant and high, with standardised loadings ranging from 0.74 to 0.87, and thus support for construct validity (internal structure) is found. Item reliabilities are high, ranging from 0.55 to 0.76. The Cronbach alpha score of 0.81 and rel(S_2) of 0.89 indicate high scale reliability.
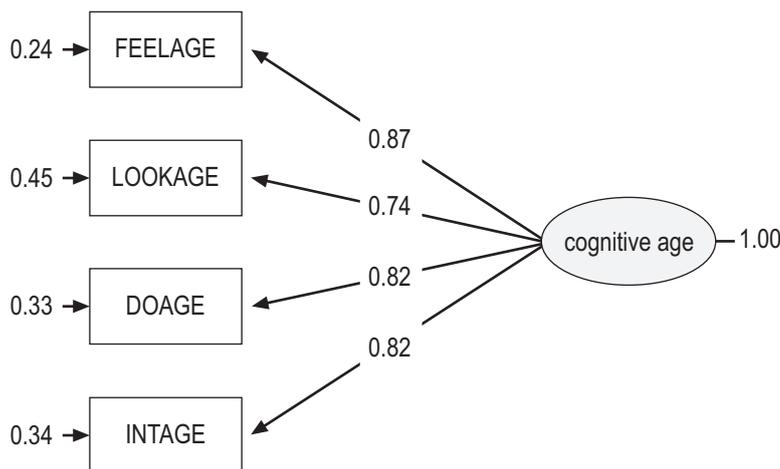

Chi-Square=6.67, df=2, P-value=0.036, RMSEA=0.063, CFI=0.99, NFI=0.99, SRMR=0.11

FIGURE 16   Estimated Measurement Model for Cognitive Age (Standardised Solution)

The measurement model for technology anxiety is rejected in terms of exact fit ($\chi^2(27)$=165.63, p-value=0.000) (see Figure 17). RMSEA of 0.094 also indicates that the model could be improved. The scale consists of nine statements of which three are in reversed form. Already on previous occasions it has been noted that the reverse-coded items actually seem to reflect confidence in technology-related actions, whereas the other six items reflect difficulty understanding or fear of technology (Niemelä-Nyrhinen 2007). The six non-reversed items thus more clearly reflect the definition of technology anxiety.
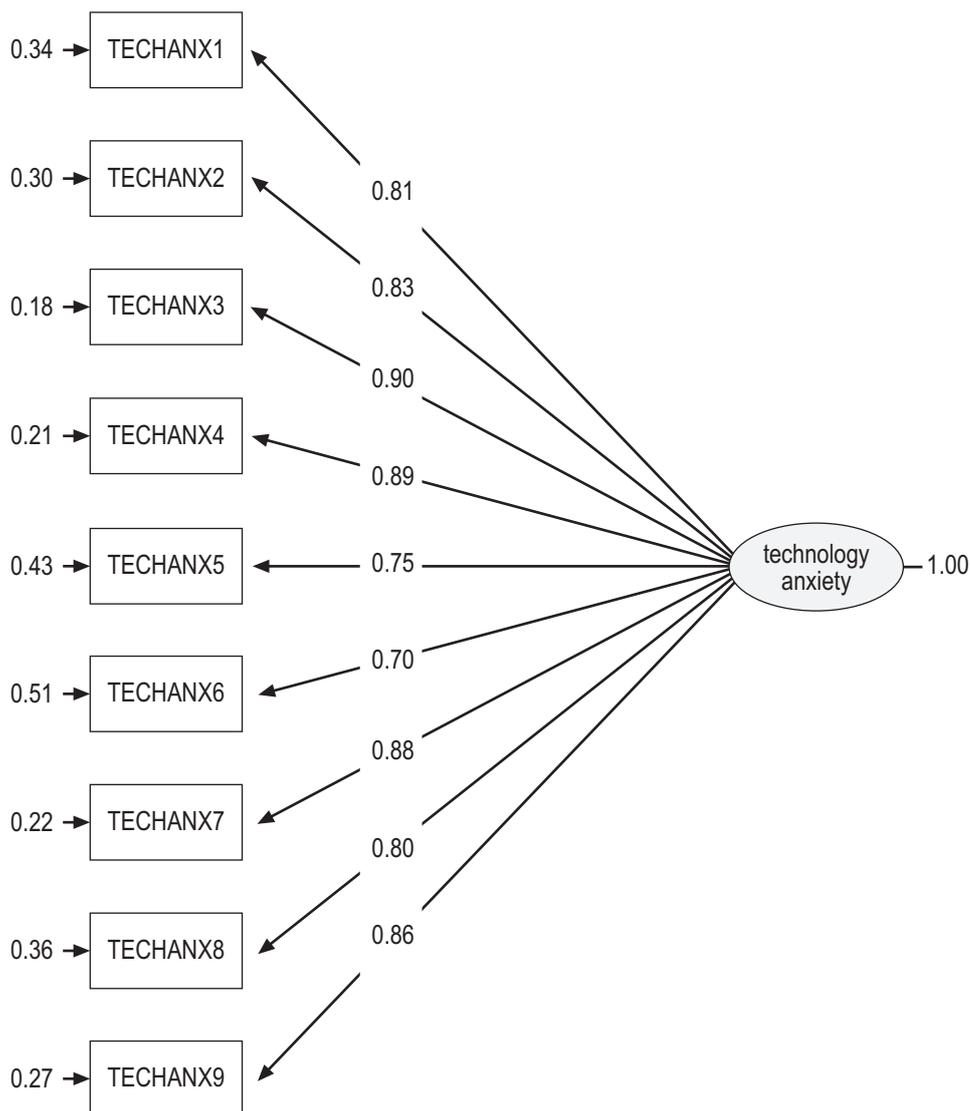
Chi-Square=165.63, df=27, P-value=0.000, RMSEA=0.094, CFI=0.95, NFI=0.94, SRMR=0.20, AIC=201.63

FIGURE 17   Initial Estimated Measurement Model for Technology Anxiety (Standardised Solution)

A two-factor model, where items reflecting confidence in technology-related actions loaded on their own factor, was estimated. This model was rejected in terms of exact fit ($\chi^2(26)$=113.26, p-value=0.000) but approximate fit was demonstrated by RMSEA of 0.076 and CFI of 0.97. The two factors had a correlation of 0.69. A decision was made to concentrate only on the technology anxiety variable, which was originally of concern, and thus the factor reflecting confidence in technology-related actions was excluded from further analyses.

Next, a measurement model with six observed indicators of technology anxiety was estimated. The model is rejected in terms of exact fit ($\chi^2(9)$=48.48, p-value=0.000) (see Figure 18). RMSEA (0.087) also slightly surpasses the cut-off value of 0.08 (Browne and Cudeck 1993, 144). On the other hand, the CFI (0.98), NFI (0.98) and SRMR (0.074) indicate acceptable fit. The factor loadings are high, ranging from 0.74 to 0.89. Item reliabilities are also high, ranging from 0.55 to 0.80. There is no indication that some of the indicators would perform more poorly than the others. The Cronbach alpha for the six indicators is 0.89 and rel(S_2) 0.95, thus indicating very high internal consistency for the scale. This measurement model was approved for further analysis.
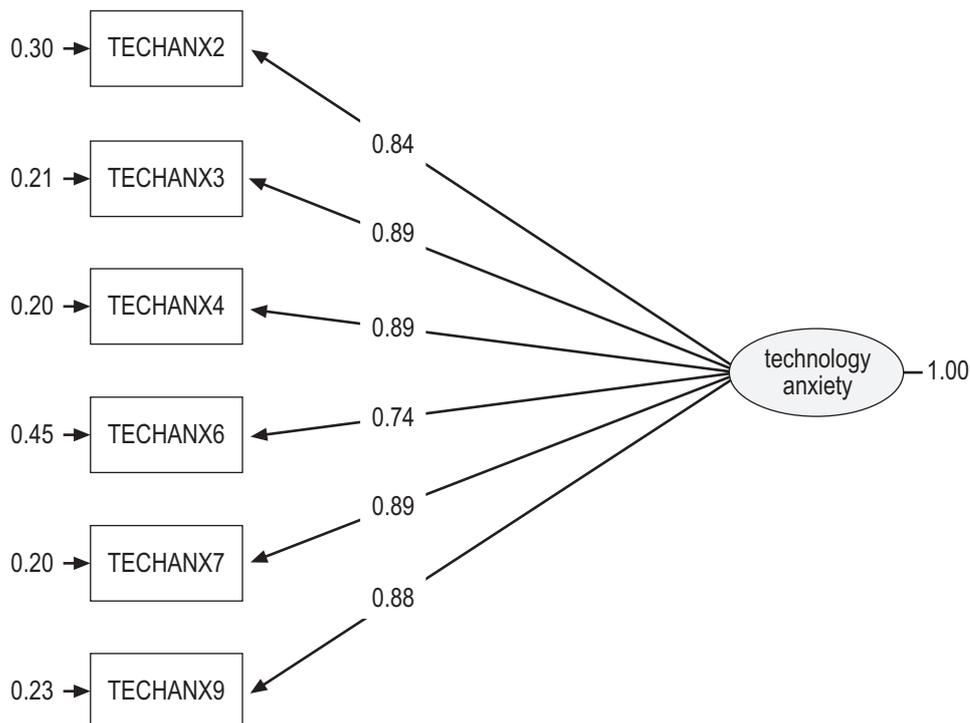
Chi-Square=48.48, df=9, P-value=0.000, RMSEA=0.087, CFI=0.98, NFI=0.98, SRMR=0.074, AIC=72.48

FIGURE 18   Final Measurement Model for Technology Anxiety (Standardised Solution)

The measurement model for subjective norm is rejected in terms of exact fit ($\chi^2(2)$=52.91, p-value=0.000). The RMSEA of 0.21 and CFI of 0.94 also indicate poor fit (see Figure 19). The measurement of subjective norm included two

types of items: items with injunctive quality and others with descriptive quality (for a discussion on injunctive and descriptive items see Chapter 3.3.3). The injunctive items reflect the extent to which respondents believe that their important others think that they should use mobile content services whereas the descriptive items measure whether these important others use mobile content services themselves. Thus it is logical to assume that instead of one factor the items would load on two factors, the first being the real subjective norm and the second reflecting others' use.

A measurement model with two factors (subjective norm and others' use) was estimated. The model is accepted in terms of exact fit ($\chi^2(1)=1.15$, p-value=0.28254). Fit is also demonstrated by a RMSEA of 0.016, CFI of 1.00 and SRMR of 0.0081 (see Figure 20). The 90 per cent confidence interval for RMSEA (0.0 ; 0.11) and p-value for test of close fit (RMSEA<0.05) of 0.56 both indicate good fit. Further, the AIC is considerably lower for the two-factor model (19.15) than it was for the one factor model (68.91). Construct validity (internal structure) is supported by significant and high (standardised) factor loadings of 0.68 and 0.93 for subjective norm, and 0.83 and 0.84 for others' use (see Table 17). Item reliabilities are 0.47 and 0.87 for subjective norm and 0.71 and 0.70 for others' use. The Cronbach alpha is 0.69 for subjective norm and 0.78 for others' use. Rel(S_2) is 0.90 for subjective norm and 0.86 for others' use. SN1 seems to be slightly weaker indicator of subjective norm than SN2; nevertheless, its factor loading and item reliability are within acceptable range. The Cronbach alpha score of close to 0.70 is also acceptable. The correlation between subjective norm and others' use is 0.67 (t-value=9.01). This indicates that the two are separate constructs but clearly related to each other.
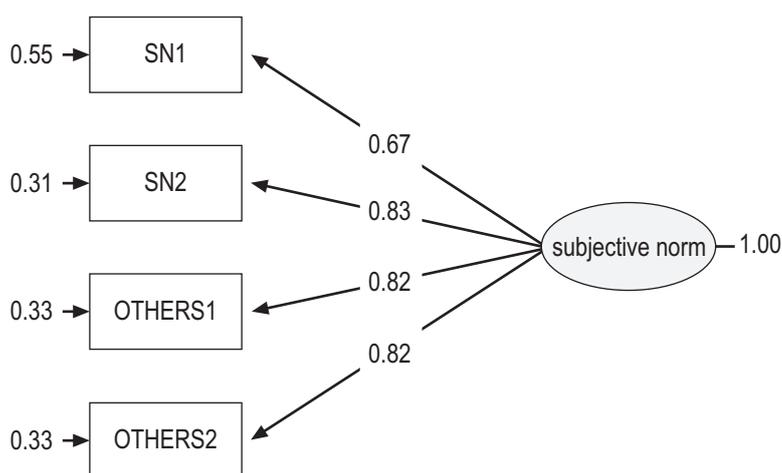
Chi-Square=52.91, df=2, P-value=0.000, RMSEA=0.21, CFI=0.94, NFI=0.94, SRMR=0.11, AIC=68.91

FIGURE 19   Estimated Measurement Model for Subjective Norm (Standardised Solution)
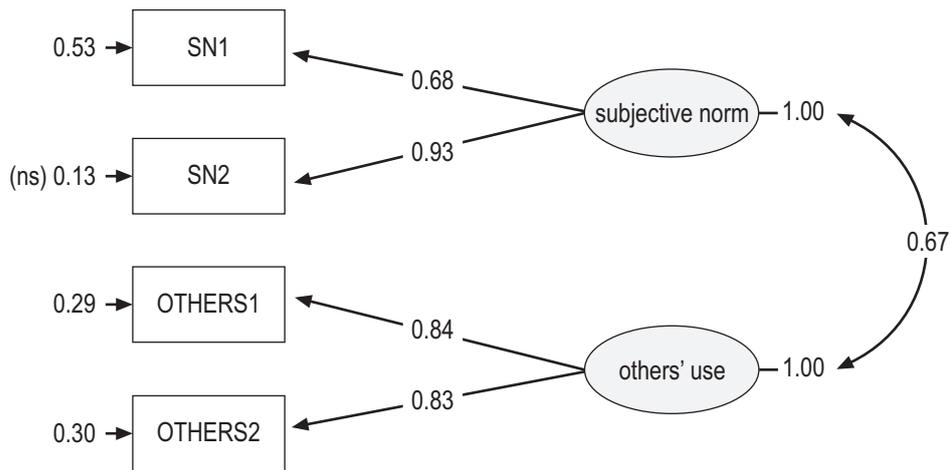
Chi-Square=1.15, df=1, P-value=0.28254, RMSEA=0.016, CFI=1.00, NFI=1.00, SRMR=0.0081, AIC=19.15

FIGURE 20   Estimated Measurement Model for Subjective Norm and Others' Use
(Standardised Solution)

Standardised factor loadings, standard errors, t-values, item reliabilities, factor score coefficients (needed for the calculation of rel(S_2)) and internal consistency scores for the individual difference variables are presented in Table 17.

TABLE 17   Standardised Factor Loadings, Standard Errors, t-Values, Reliabilities of Items and Factor Score Coefficients for Observed Variables, and Internal Consistency Scores for Latent Individual Difference Variables

factor	item	s. factor loading	standard error	t-value	rel. of items	score c.	α	rel(S2)
	FEELAGE	0.87	*	*	0.76	0.33		
	LOOKAGE	0.74	0.05	15.69	0.55	0.15		
cognitive	DOAGE	0.82	0.05	20.28	0.67	0.23		
age	INTAGE	0.82	0.06	16.64	0.66	0.23	0.81	0.89
	TECHANX2	0.84	*	*	0.70	0.12		
	TECHANX3	0.89	0.04	26.49	0.79	0.18		
	TECHANX4	0.89	0.03	30.88	0.80	0.19		
	TECHANX6	0.74	0.04	24.68	0.55	0.07		
technology	TECHANX7	0.89	0.03	32.10	0.80	0.19		
anxiety	TECHANX9	0.88	0.04	29.67	0.77	0.16	0.89	0.95
subjective	SN1	0.68	*	*	0.47	0.09		
norm	SN2	0.93	0.13	10.40	0.87	0.54	0.69	0.90
	OTHERS1	0.84	*	*	0.71	0.38		
others' use	OTHERS2	0.83	0.07	13.74	0.70	0.36	0.78	0.86

*unstandardised loading fixed to 1

NB Subjective norm and other's use were estimated in the same measurement model as separate factors

Measurement Model with All the Individual Difference Variables
To obtain the correlations between the individual difference variables a measurement model containing all the individual difference variables was estimated. In addition to cognitive age, technology anxiety, subjective norm and experience variables, chronological age is included as a variable in this analysis. For the chronological age and experience variables (that where measured with only one item) error variance was set to 0. Exact fit is rejected ($\chi^2(121)=372.25$, p=0.000), but approximate fit is implied by the following: RMSEA=0.060, 90 per cent confidence interval for RMSEA = (0.053 ; 0.067), CFI=0.97, NFI=0.95 and SRMR=0.084.

Most of the correlations are relatively low with a few exceptions. All the correlations exhibit the correct sign and when a strong relationship is not expected the correlations are very low or non-significant. All the correlations are given in Appendix 4. Here, some of the strongest or otherwise theoretically interesting correlations are presented. The correlation between chronological and cognitive age is only 0.34 (t=7.97). Of the correlations between the technology anxiety and experience variables, the highest correlation is between technology anxiety and Internet experience (-0.63, t=-20.05). The correlation between Internet experience and SMS experience is 0.53 (t=15.91), between Internet experience and frequency of mobile content service (MCS) usage 0.34 (t=8.24) and between Internet experience and variety of MCS used 0.24 (t=7.53). The correlation between frequency of MCS usage and variety of MCS used is 0.45 (t=11.20).

4.3   Estimating the Structural Relationships of TAM

In this chapter the estimation of the Technology Acceptance Model (TAM) is presented. Chi-square rejects the hypothesised model ($\chi^2(71)=178.48$, p-value=0.000) but approximate fit for the model is demonstrated by the RMSEA of 0.051, CFI of 0.98 and NFI of 0.97. Hypothesised effects are found except for the effect of ease of use on intention, and the effect of enjoyment on intention which are found to be non-significant (see Figure 21). Ease of use has a strong positive effect on both usefulness (standardised $\gamma=0.78$, t=21.76) and enjoyment (standardised $\gamma=0.78$, t=22.29). The effect of ease of use on intention is mediated by usefulness. Its standardised indirect effect on intentions is positive and strong (0.75, t=12.47). Ease of use explains approximately 60 per cent of the variance in both usefulness (squared multiple correlation, $R^2=0.61$) and enjoyment ($R^2=0.60$). Usefulness seems to have a strong positive effect on intention (standardised $\beta=0.90$, t=2.95). The absence of a significant effect of enjoyment seems dubious since the correlation between enjoyment and intention is very high (0.91) (see Table 16). The estimated covariance of the residuals of usefulness and enjoyment is 0.29 (t=9.71). In the subsequent analysis the residuals of usefulness and enjoyment were allowed to covariate.
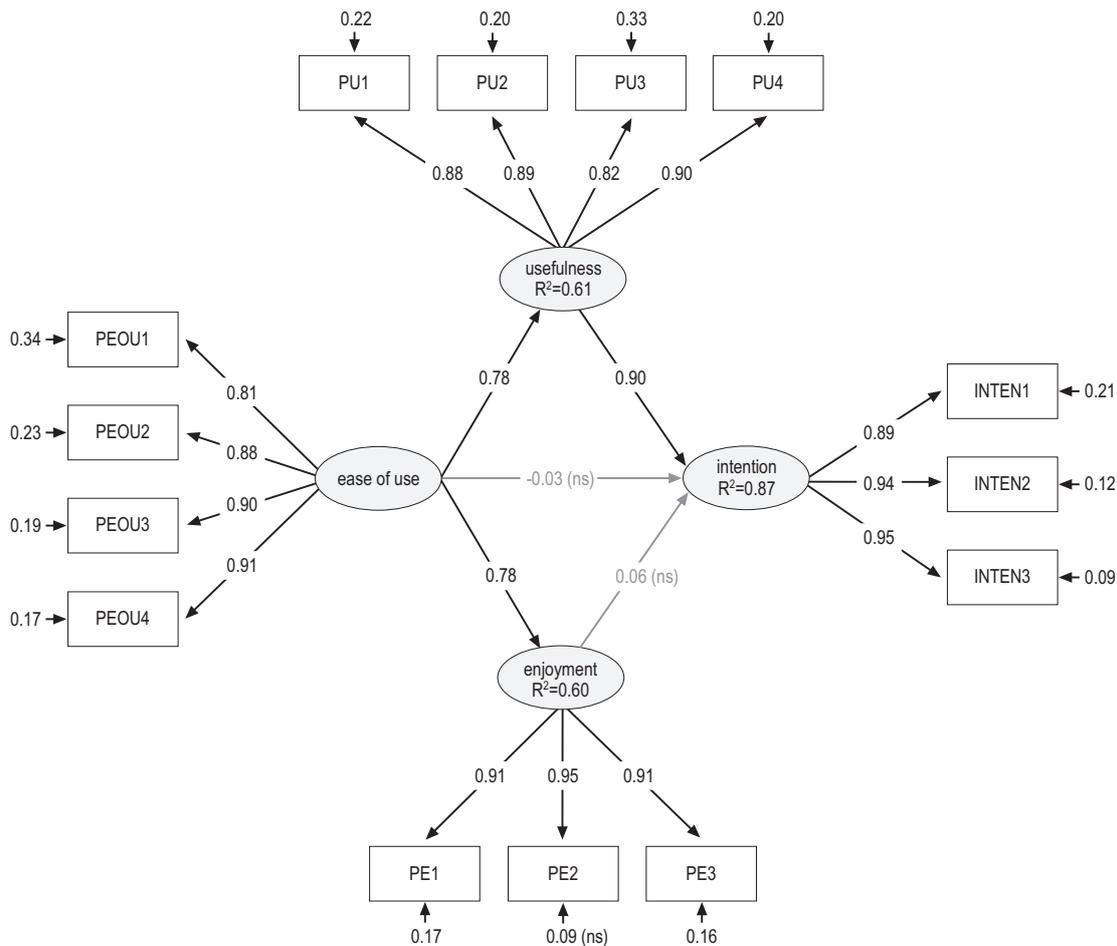
Chi-Square=178.48, df=71, P-value=0.000, RMSEA=0.051, CFI=0.98, NFI=0.97, SRMR=0.13, AIC=246.48

FIGURE 21 First Estimation of the Basic Full Model (Standardised Solution)

Next a model without the paths from ease of use to intention and enjoyment to intention was estimated (see Figure 22). Exact fit is rejected (χ^2(73)=178.82, p-value=0.000) but the model shows approximate fit (RMSEA = 0.050, CFI=0.98, NFI=0.97). The effect of usefulness on intention is 0.93 (t=36.28) (R^2=0.87).

Since the correlations of the factors (see Table 16) indicate that usefulness and enjoyment are both almost equally strong predictors of intentions, an alternative model was estimated. In this model, instead of the path from usefulness to intention, a path from enjoyment to intention was set. The fit of this model does not differ greatly (χ^2(73)=185.41, p-value=0.000, RMSEA = 0.051, CFI=0.98, NFI=0.97) from the fit of the previous model (see Figure 23). The AIC of 249.41 suggests that the fit of this model is only slightly inferior to that of the preceding model (AIC=242.82). Now the effect of enjoyment on intention is 0.93 (t=35.62). The R^2 of intention is 0.87 in both models. The second and the third model seem to be almost equally good. From a theoretical perspective this of course does not make sense and interpreting these results is

very difficult. On the basis of the second and third model as well as correlations of the latent variables, it can be concluded that the results are affected by multicollinearity (i.e., high correlation between the latent constructs/factors). Owing to the extremely high correlation (r=0.97) between perceived usefulness and enjoyment the one that is given the chance (i.e., the path that is stated in the syntax) will explain behavioural intention. If both paths are set usefulness will explain intention since it has a slightly higher correlation with intention than enjoyment. Based on a Monte Carlo simulation by Grewal, Cote and Baumgartner (2004), when multicollinearity is extreme (around 0.95), type II error (i.e., failures to detect a significant effect) rates are very high (over 80 %) and thus the multicollinearity problem encountered here is not surprising.
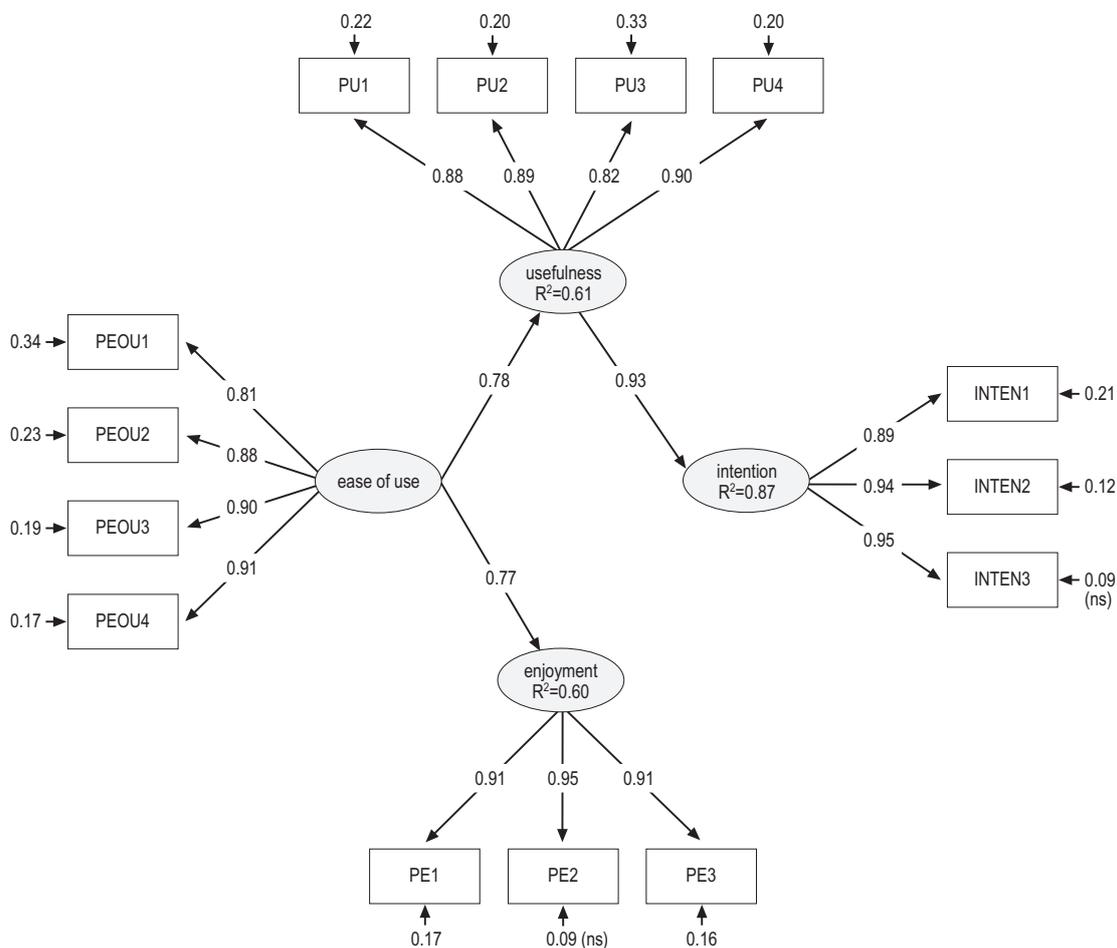
Chi-Square=178.82, df=73, P-value=0.000, RMSEA=0.050, CFI=0.98, NFI=0.97, SRMR=0.13, AIC=242.82

FIGURE 22   Second Estimation of the Basic Full Model (Standardised Solution)
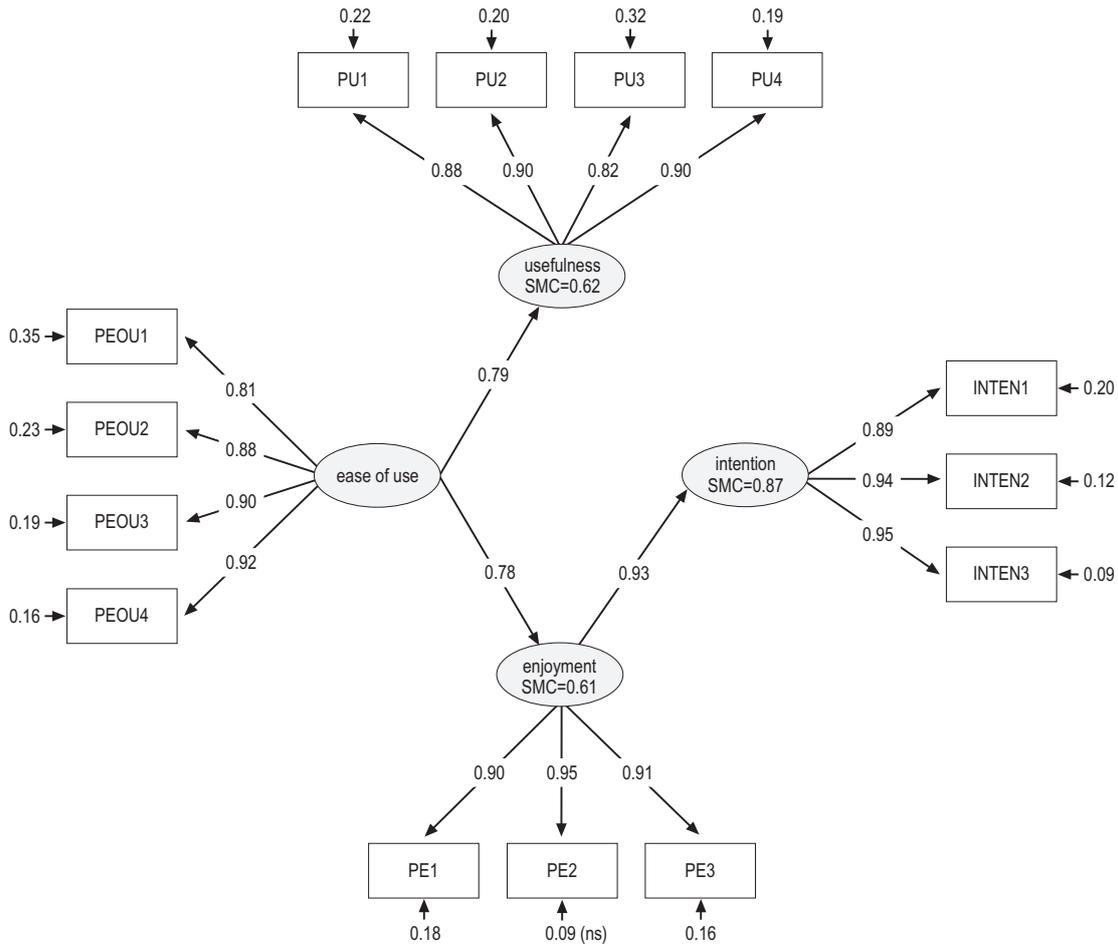
Chi-Square=185.41, df=73, P-value=0.000, RMSEA=0.051, CFI=0.98, NFI=0.97, SRMR=0.14, AIC=249.41

FIGURE 23   Third Estimation of the Basic Full Model (Standardised Solution)

Multicollinearity can be handled in two ways: The first option is to combine the variables, in this case usefulness and enjoyment, into one factor. The other option is to try to eliminate the effect of multicollinearity. The issue of multicollinearity is closely related to the issue of discriminant validity (Grewal et al. 2004). The discriminant validity of usefulness and enjoyment was of concern already in the measurement model phase. As the correlation of usefulness and enjoyment was noted to be very high, a sequential χ^2 test was conducted. The test encouraged treating usefulness and enjoyment as separate variables. Further, and most importantly, because keeping usefulness and enjoyment distinct constructs seems to be theoretically advisable and allows more explicit conclusions to be drawn, an attempt to eliminate the effect of multicollinearity on the estimation of the model was made. Possible reasons for the high correlation of usefulness and enjoyment are considered in the concluding discussion of this study.

To eliminate the effect of multicollinearity there appears to be two plausible options. The first one is to restrict the parameter estimates by fixing the paths from usefulness to intention and enjoyment to intention to equal on the basis of the fact that both usefulness and enjoyment correlate highly with intention (r=0.94 and r=0.91 respectively). The second option is to eliminate the effects of multicollinearity by using a Ridge-type estimation that has been specifically developed for dealing with this problem. Both options are implemented for the sake of assuring consistent and thus reliable results.

First the two paths were fixed to equal. The model is rejected in terms of exact fit (χ^2(73)=181.31, p-value=0.000) but approximate fit is demonstrated by the RMSEA of 0.050, CFI of 0.98 and NFI of 0.97 (see Figure 24). Further, the 90 per cent confidence interval for RMSEA (0.041; 0.60) and p-value for test of close fit (RMSEA<0.05) of 0.45 indicate good fit. AIC does not differ greatly from model to model but it is slightly lower for the model with equal paths (245.31) than for the first estimated model without the equality constraint (246.48). In this model both usefulness (standardised β=0.46, t=40.41) and enjoyment (standardised β=0.47, t=40.41) have a positive effect on intention. Ease of use has a strong positive indirect effect on intention (0.73, t=21.56). Eighty-six per cent of the variance in intention is explained by the model (R^2=0.86).

For the Ridge-type estimation the estimated correlation matrix of latent variables (factors) obtained from the measurement model that included all the variables of TAM (i.e., usefulness, enjoyment, ease of use and intention) was used as input data in LISREL. In the Ridge estimation a small positive constant k is added to the values of the diagonal in the correlation matrix. This introduces a small amount of bias into the parameter estimation (Grewal et al. 2004) but efficiently eliminates the effect of multicollinearity. A proper value for k is chosen with a help of a Ridge trace (see Figure 25). This trace was constructed by estimating the model separately 11 times using different values of k. The Ridge trace shows that moving a short distance from the k=0 point causes a rapid decrease in the coefficient of the path "usefulness to intention" and a rapid increase in the coefficient of the path "enjoyment to intention". Both coefficients seem to stabilise around value 0.1 and this is chosen to be the value of k. It should be noted that the coefficients of the paths "ease of use to usefulness" and "ease of use to enjoyment" remain stable in these estimations.
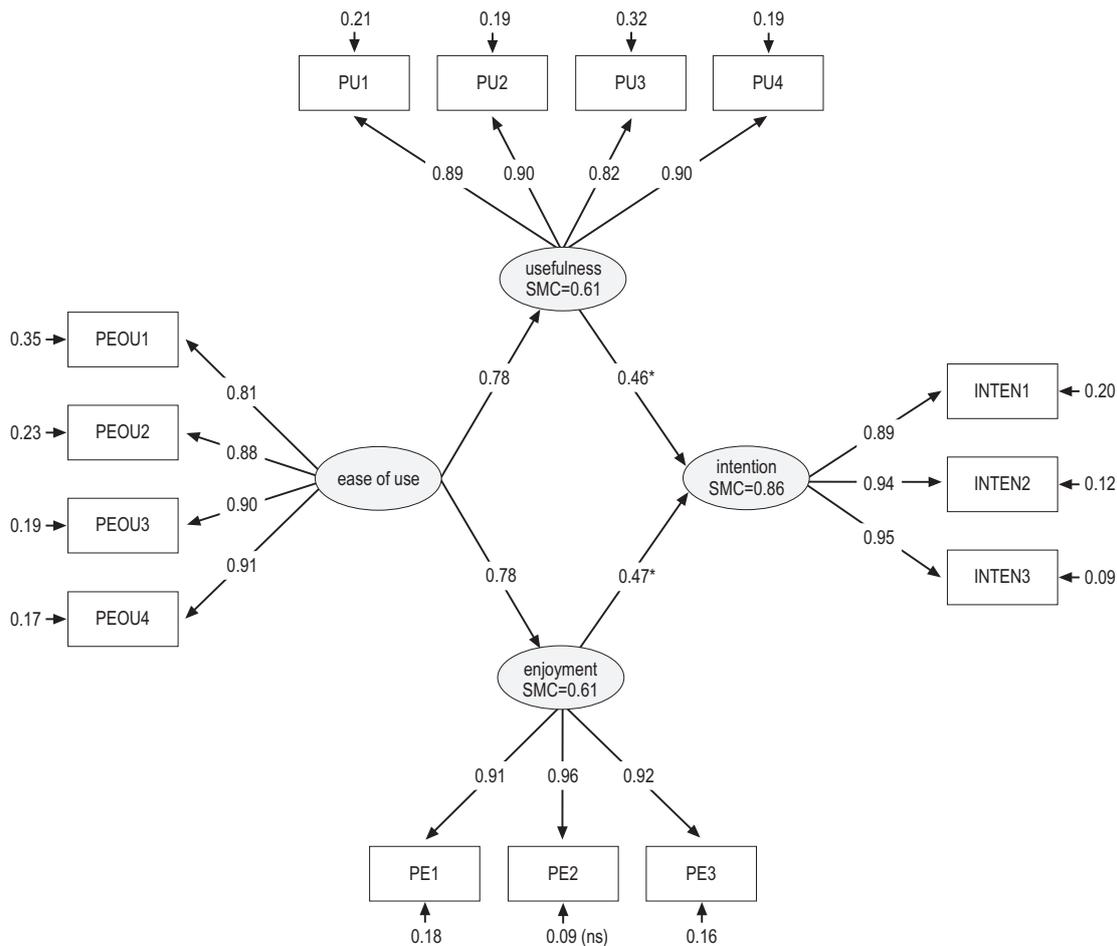
FIGURE 24   The Basic Full Model with Constrained Parameters (Standardised Solution)

The estimated model with Ridge constant (k=0.10) is presented in Figure 26. Generalised least squares (GLS) was used as an estimation method. The Ridge-type estimation produces a similar result to the one achieved by the parameter constraints in terms of interpretation. The model is accepted in terms of exact fit ($\chi^2(1)=3.17$, p-value=0.07521). Fit is also demonstrated by the RMSEA of 0.061, CFI of 0.99 and SRMR of 0.0081. The 90 per cent confidence interval for RMSEA (0.0 ; 0.14) and p-value for the test of close fit (RMSEA<0.05) of 0.28 both indicate good fit. As in the earlier models ease of use has a strong positive effect on both usefulness (standardised $\gamma=0.71$, t=24.47) and enjoyment (standardised $\gamma=0.71$, t=24.02). The effect of enjoyment on intention (standardised $\beta=0.35$, t=7.98) is slightly smaller that the effect of usefulness on intention (standardised $\beta=0.54$, t=12.25) but overall, both have a positive and significant effect on intention. The estimated covariance of the residuals of usefulness and enjoyment is 0.42 (t=14.58). Ease of use has a strong positive indirect effect on intention (0.63, t=22.00). A somewhat smaller amount of the variance in

intentions is explained by this model (R^2=0.75) than by the one with parameter constraints (R^2=0.86).
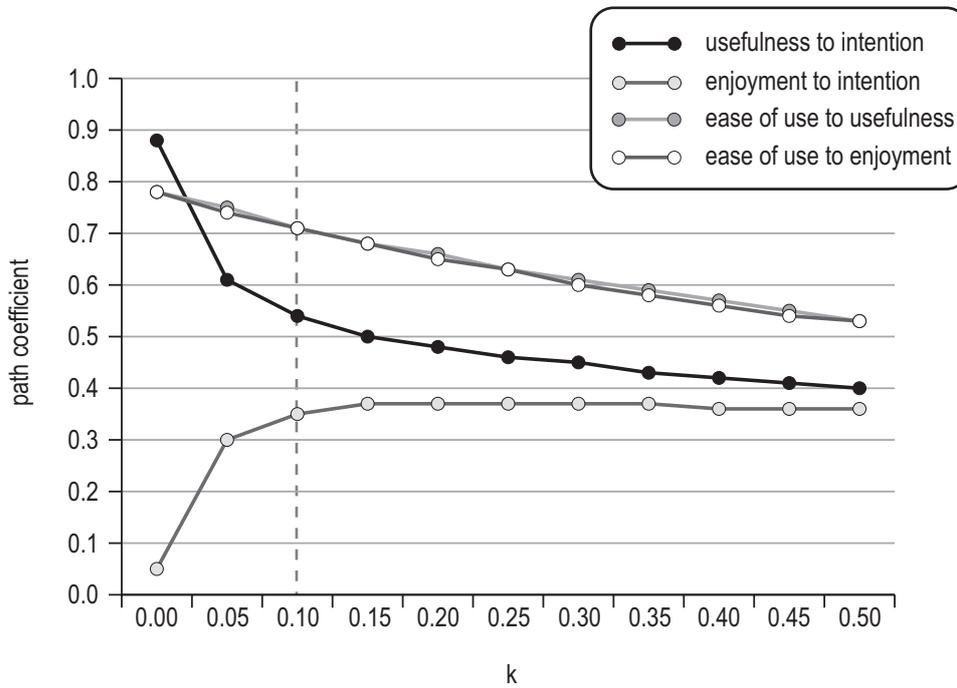
FIGURE 25   Results of the Ridge Estimation of Parameters
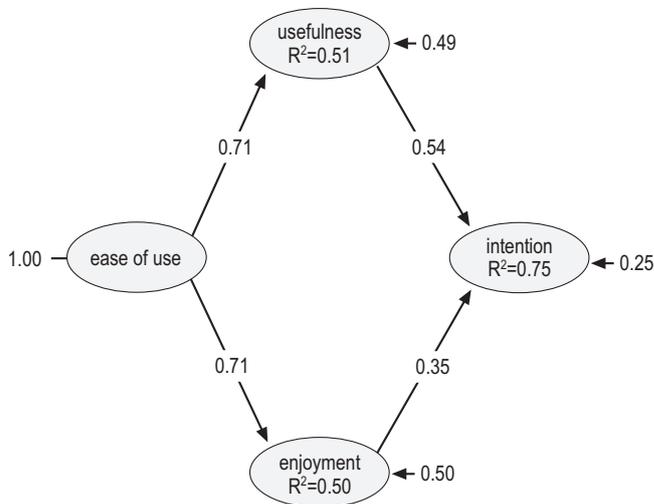
Chi-Square=3.17, df=1, P-value=0.07521, RMSEA=0.061, CFI=0.99, NFI=0.99, SRMR=0.0081

FIGURE 26   The Basic Full Model with Ridge Estimation (k=0.10) (Standardised Solution)

Both ways of eliminating multicollinearity performed well with the model and data in question. In the remaining analysis the model with parameter constraints (paths from usefulness to intention and enjoyment to intention fixed

to equal) is used. To conclude, hypotheses H_1, H_2, H_4 and H_5 were supported. H_3 was not supported since ease of use did not have a direct effect on intention. However, ease of use had a strong indirect effect on intention through usefulness and enjoyment.

4.4   Individual Difference Variables and TAM

The initial idea was to build a full model including all the variables of TAM as well as all the individual difference variables. However, this plan was regarded with slight suspicion since the model would have been excessively large and complex and SEM works best with small and medium-sized models. Several trials for the estimation of the full model were done. However, the trials seemed to result in unstable parameter estimates caused by the large number of observed and latent variables in the model. Here, the main interest is to find out how the individual difference variables relate to the variables of TAM and thus the introduction of the individual variables one at a time to TAM essentially provides the desired information. A model for each individual difference variable and TAM was estimated. In addition to the effect of each individual difference variable on the belief variables of TAM, an effect on behavioural intention was included in the model. This way the possible direct influence of the individual difference variables on intention was also checked (only subjective norm was hypothesised to have a direct effect in addition to its indirect effects).

First a model connecting cognitive age to the variables of TAM was estimated. Exact fit is rejected ($\chi^2(127)=271.97$, p-value=0.000) but approximate fit is demonstrated by the RMSEA of 0.044, CFI of 0.99 and NFI=0.98 (see Figure 27). The 90 per cent confidence interval for RMSEA (0.037 ; 0.052) and p-value for the test of close fit (RMSEA<0.05) of 0.90 both indicate good fit. Cognitive age has a negative effect on ease of use (standardised γ=-0.34, t=-8.56) and therefore hypothesis $H_{6.2}$ is supported. The direct effects of cognitive age on usefulness and enjoyment are non-significant and thus $H_{6.1}$ and $H_{6.3}$ are rejected. However, cognitive age has negative indirect effects on usefulness (-0.28, t=-7.87) and enjoyment (-0.28, t=7.78) through ease of use. A weak negative direct effect of cognitive age on intention (standardised γ=-0.06, t=-2.58) was found. The standardised indirect effect of cognitive age on intention is -0.22 (t=-6.26). The R^2 of intention is 0.87, thus the direct effect of cognitive age does not really add to the amount of the variance explained in intentions (in the TAM model 86 per cent of the variance in intentions was explained). Cognitive age explains 11 per cent of the variance in ease of use.
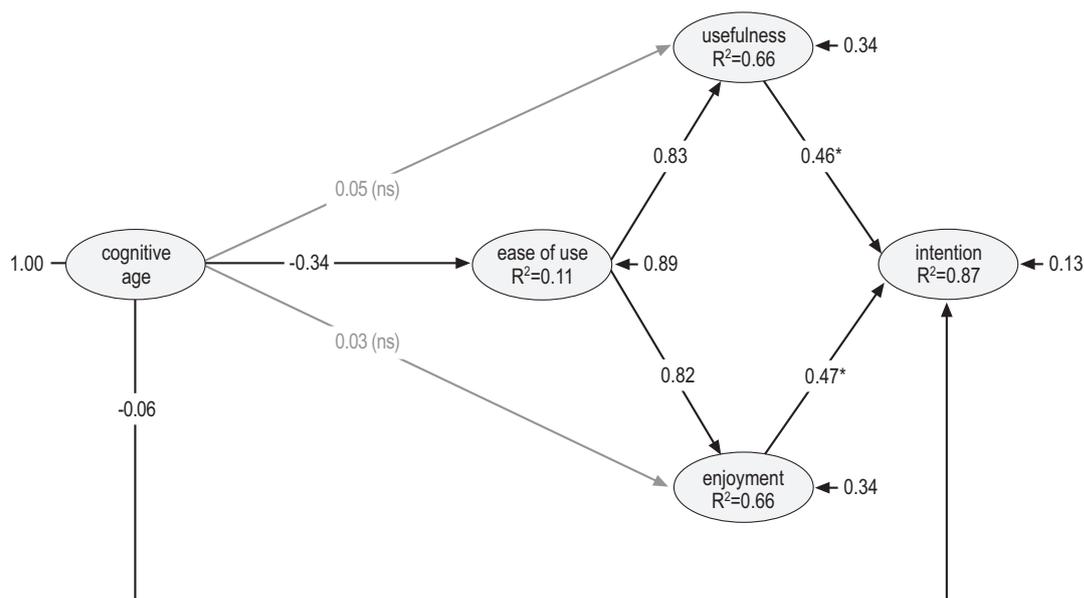
* fixed to equal

Chi-Square=271.97, df=127, P-value=0.000, RMSEA=0.044, CFI=0.99, NFI=0.98, SRMR=0.14

FIGURE 27   Cognitive Age and TAM, Standardised Solution (only latent variables are shown)

Cognitive age loses its appeal as a predictor of beliefs and intention if similar results can be attained with chronological age. Thus chronological age was added to the model above (the non-significant effects of cognitive age on perceived usefulness and enjoyment were first removed) and the model was estimated with both age variables. For this model exact fit is rejected ($\chi^2(142)=349.46$, p-value=0.000) but approximate fit is demonstrated by the RMSEA of 0.050, CFI of 0.98 and NFI of 0.97 (see Figure 28). The 90 per cent confidence interval for RMSEA (0.043 ; 0.057) and p-value of 0.48 for the test of close fit (RMSEA<0.05) both indicate good fit. Chronological age has a weak negative effect on usefulness (standardised γ=-0.05, t=-2.00), enjoyment (standardised γ=-0.06, t=-2.63) and intention (standardised γ=-0.04, t=-2.26). No indirect effect of chronological age on intention is found. The R^2 for intention is 0.87, for usefulness 0.66 and for enjoyment 0.67. Thus, chronological age does not add to the amount of the variance explained in usefulness, enjoyment or intention when compared to the model with only the cognitive age variable.

For the model connecting technology anxiety to the variables of TAM exact fit is rejected ($\chi^2(162)=419.49$, p-value=0.000) but approximate fit is demonstrated by the RMSEA of 0.052, CFI of 0.98 and NFI of 0.97 (see Figure 29). However, the paths from technology anxiety to usefulness and enjoyment have a positive path coefficient, although negative effects were hypothesised ($H_{7.1}$ and $H_{7.3}$). Technology anxiety has strong indirect negative effect on usefulness (-0.56, t=-21.98) and on enjoyment (-0.55, t=-21.08) through ease of use. Since the correlations between the observed variables of technology anxiety

and usefulness as well as between technology anxiety and enjoyment suggest that these variables should have only a very weak negative relationship (for these correlations see Appendix 5), it can be concluded that the positive connections were estimated to compensate for the strong negative indirect effects. In other words, there seems to be multicollinearity that is caused by the direct and very strong indirect effects of technology anxiety on usefulness and enjoyment. The positive effects should not be interpreted.
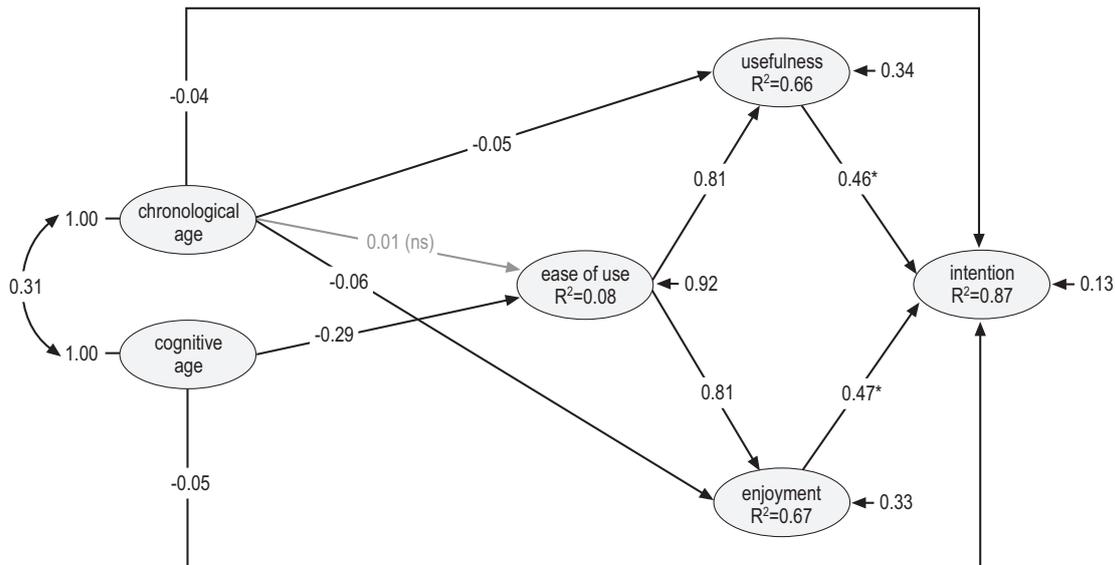
* fixed to equal

Chi-Square=349.46, df=142, P-value=0.000, RMSEA=0.050, CFI=0.98, NFI=0.97, SRMR=0.13

FIGURE 28   Cognitive Age, Chronological Age and TAM, Standardised Solution (only latent variables are shown)

A new model with only paths from technology anxiety to ease of use and intentions was estimated (see Figure 30). Exact fit is rejected ($\chi^2(164)=514.80$, p-value=0.000). Approximate fit is demonstrated by the RMSEA of 0.061, CFI of 0.98 and NFI of 0.96. This model shows worse fit than the first estimated model (this is also indicated by the increase in AIC from 515.46 to 606.80). However, it no longer gives dubious parameter estimates. A strong negative effect of technology anxiety on ease of use (standardised $\gamma=-0.69$, t=-25.21), supporting hypothesis $H_{7.2}$, is found. Technology anxiety explains 47 per cent of the variance in ease of use. Indirect negative effects of technology anxiety on usefulness and enjoyment are found. In the model the standardised indirect effect of technology anxiety on intentions is -0.52 (t=-19.06). The model explains 87 per cent of the variance in intention. The estimation of the model connecting technology anxiety to TAM is undoubtedly problematic and not completely satisfactory. However, because there is no obvious solution to this problem the model estimation is not continued any further and the model presented in Figure 30 is accepted as the final model.
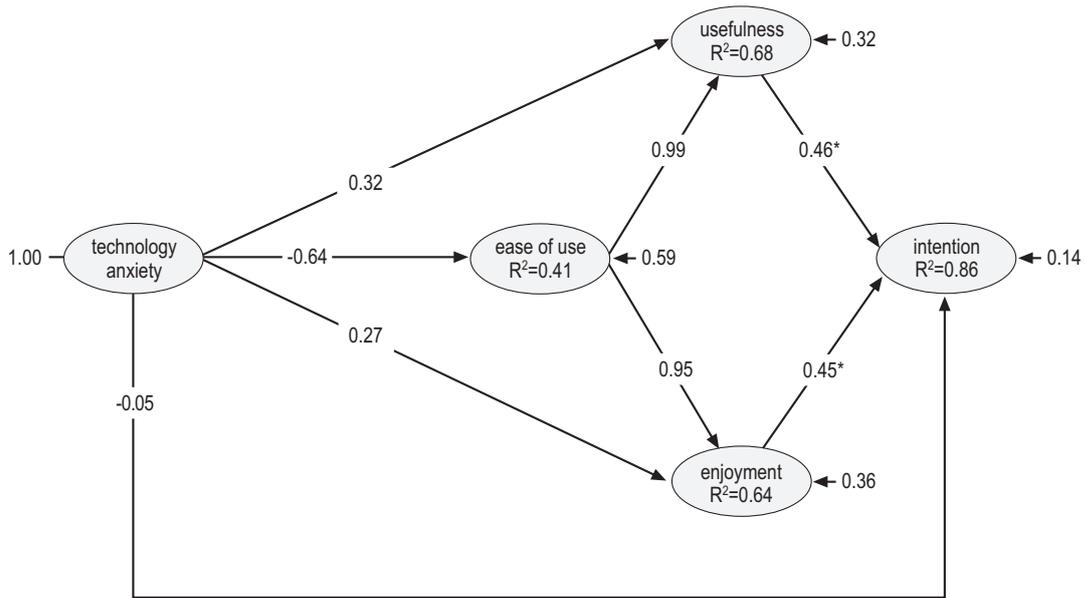
* fixed to equal

Chi-Square=419.49, df=162, P-value=0.000, RMSEA=0.052, CFI=0.98, NFI=0.97, SRMR=0.16, AIC=515.49

FIGURE 29   First Estimation of Technology Anxiety and TAM, Standardised Solution (only latent variables are shown)
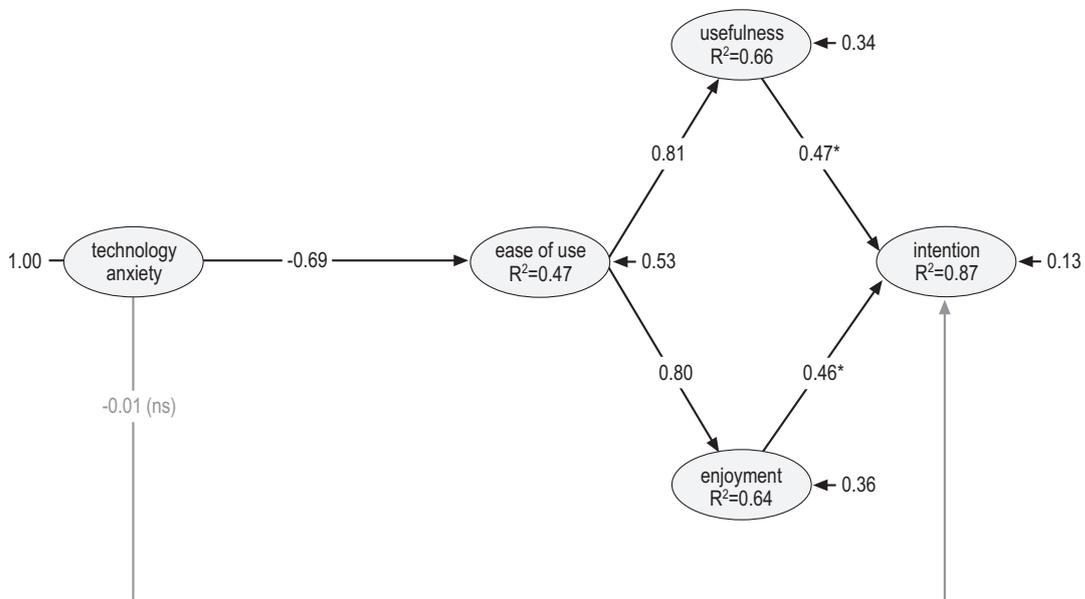
* fixed to equal

Chi-Square=514.80, df=164, P-value=0.000, RMSEA=0.061, CFI=0.98, NFI=0.96, SRMR=0.23, AIC=606.80

FIGURE 30   Second Estimation of Technology Anxiety and TAM, Standardised Solution (only latent variables are shown)

Each experience measure was analysed with TAM one at a time. This approach allowed for the investigation of the effect of different types of experiences (i.e., frequency of use of mobile content services, variety of mobile content services used, Internet experience and SMS experience). First a model including frequency of use of mobile content services was estimated. The model yielded $\chi^2(83)=194.01$ (p-value=0.000), RMSEA of 0.048, CFI of 0.99 and NFI of 0.98 (see Figure 31). The 90 per cent confidence interval for RMSEA (0.039 ; 0.057) and p-value for test of close fit (RMSEA<0.05) of 0.64 both indicate good fit. All the hypotheses are supported ($H_{8.1}$ – $H_{8.3}$). Frequency of use has a positive effect on usefulness (standardised $\gamma=0.16$, t=3.71), enjoyment (standardised $\gamma=0.20$, t=5.02), ease of use (standardised $\gamma=0.40$, t=8.47). In addition, a direct effect on intention (standardised $\gamma=0.10$, t=3.34) is found. The standardised indirect effect of frequency of use on intention is 0.41 (t=10.32). The squared multiple correlation of intention is 0.88. Frequency of use explains 16 per cent of the variance in ease of use.
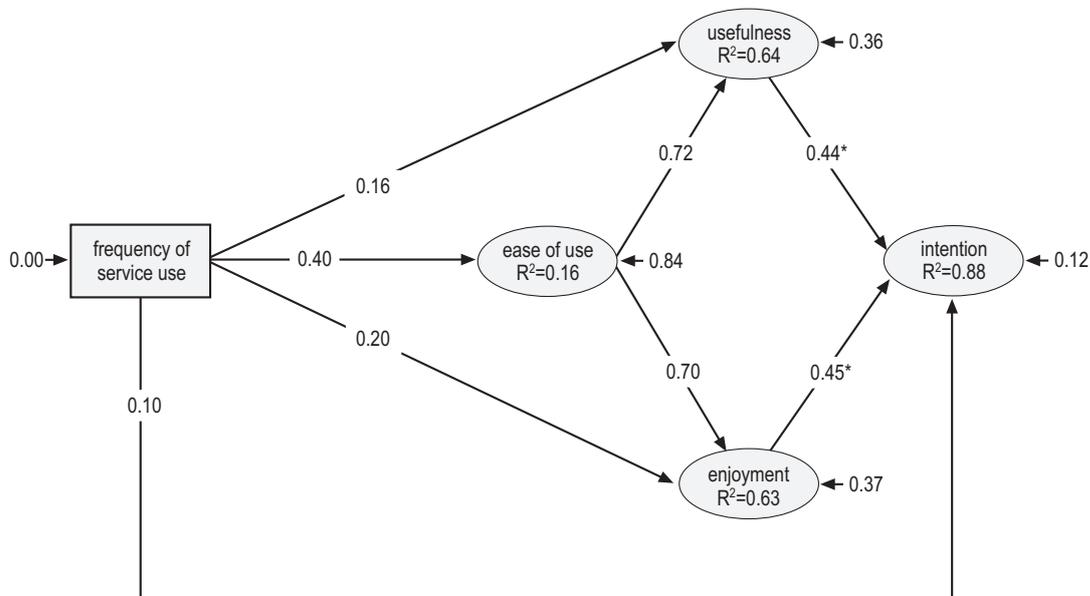
* fixed to equal

Chi-Square=194.01 df=83, P-value=0.000, RMSEA=0.048, CFI=0.99, NFI=0.98, SRMR=0.14

FIGURE 31　Frequency of Use of Mobile Content Services and TAM, Standardised Solution (for TAM only latent variables are shown)

The model which included the variety of mobile content services used was estimated. The model yielded $\chi^2(83)=193.44$ (p-value=0.000), RMSEA of 0.048, CFI of 0.99 and NFI of 0.98 (see Figure 32). The 90 per cent confidence interval for RMSEA (0.039 ; 0.057) and p-value for test of close fit (RMSEA<0.05) of 0.64 both indicate good fit. All the hypotheses are supported ($H_{8.1}$ – $H_{8.3}$). Variety of services used has a positive effect on usefulness (standardised $\gamma=0.21$, t=3.63), enjoyment (standardised $\gamma=0.22$, t=3.38) and ease of use (standardised $\gamma=0.40$,

t=7.91). Similarly to frequency of use, variety also has a direct effect on intention (standardised γ=0.17, t=2.87). Variety of services used has a standardised indirect effect of 0.41 (t=8.19) on intention. The R^2 of intention is 0.89. Variety of services used explains 16 per cent of the variance in ease of use.
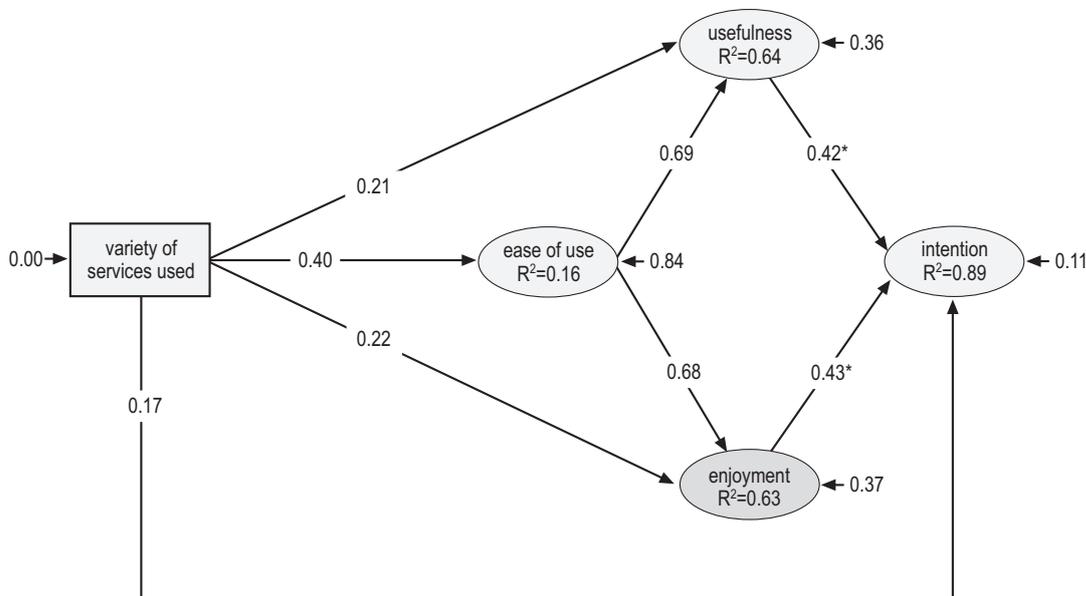
* fixed to equal

Chi-Square=193.44 df=83, P-value=0.000, RMSEA=0.048, CFI=0.99, NFI=0.98, SRMR=0.12

FIGURE 32   Variety of Mobile Content Services Used and TAM, Standardised Solution (for TAM only latent variables are shown)

The model that combines SMS experience with TAM's variables is rejected in terms of exact fit (χ^2(83)=193.01, p-value=0.000) but demonstrates approximate fit as shown by the RMSEA of 0.048, CFI of 0.98 and NFI of 0.97 (see Figure 33). The 90 per cent confidence interval for RMSEA (0.039 ; 0.056) and p-value for test of close fit (RMSEA<0.05) of 0.66 both indicate good fit. Hypotheses $H_{8.2}$ and $H_{8.3}$ are supported. SMS experience has a positive effect on enjoyment (standardised γ=0.10, t=2.51) and ease of use (standardised γ=0.42, t=9.47). The path from SMS experience to usefulness is non-significant and thus support for hypothesis $H_{8.1}$ is not found. No direct effect of SMS experience on intention to use mobile content services is found. SMS experience has a standardised indirect effect of 0.36 (t=9.15) on intention. The R^2 of intention is 0.87. SMS experience explains 18 per cent of the variance in ease of use.
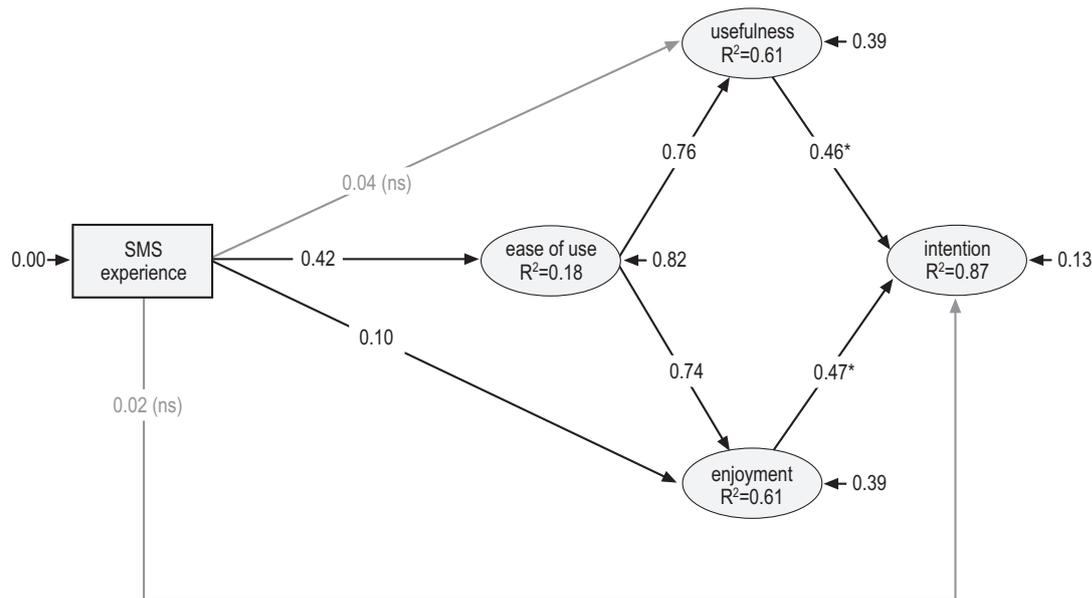
* fixed to equal

Chi-Square=193.01 df=83, P-value=0.000, RMSEA=0.048, CFI=0.98, NFI=0.97, SRMR=0.13

FIGURE 33   SMS Experience and TAM, Standardised Solution (for TAM only latent variables are shown)

The model that combines Internet experience with TAM's variables demonstrates approximate fit as shown by the RMSEA of 0.048, CFI of 0.98 and NFI of 0.97 (see Figure 34), although exact fit is rejected ($\chi^2(83)$=194.11, p-value=0.000). The 90 per cent confidence interval for RMSEA (0.039 ; 0.057) and p-value for test of close fit (RMSEA<0.05) of 0.64 both indicate good fit. Only hypothesis $H_{8.2}$ is supported. Internet experience has a positive effect on ease of use (standardised γ=0.61, t=13.81). Other paths are found to be non-significant and thus hypotheses $H_{8.1}$ and $H_{8.3}$ are rejected. No direct effect on intention is found. Internet experience has a standardised indirect effect of 0.40 (t=9.80) on intentions. The R^2 of intention is 0.87. Internet experience explains 37 per cent of the variance in ease of use.

The model connecting subjective norm with TAM's variables yielded $\chi^2(96)$=227.97 (p-value=0.000), a RMSEA of 0.049, CFI of 0.99 and NFI of 0.97 (see Figure 35). The 90 per cent confidence interval for RMSEA (0.040 ; 0.057) and p-value for the test of close fit (RMSEA<0.05) of 0.60 both indicate good fit. All the hypotheses are supported ($H_{9.1}$ – $H_{9.4}$). Subjective norm has a positive effect on usefulness (standardised γ=0.69, t=10.20), enjoyment (standardised γ=0.69, t=10.93), ease of use (standardised γ=0.73, t=18.24) and intention (standardised γ=0.44, t=3.47). The standardised indirect effect of subjective norm on intentions is 0.49 (t=4.86). The R^2 of intention is 0.92, thus subjective norm to some extent adds the amount of variance explained in intention (in the TAM model 86 per cent of the variance in intentions was explained). Subjective norm explains 54 per cent of the variance in ease of use.
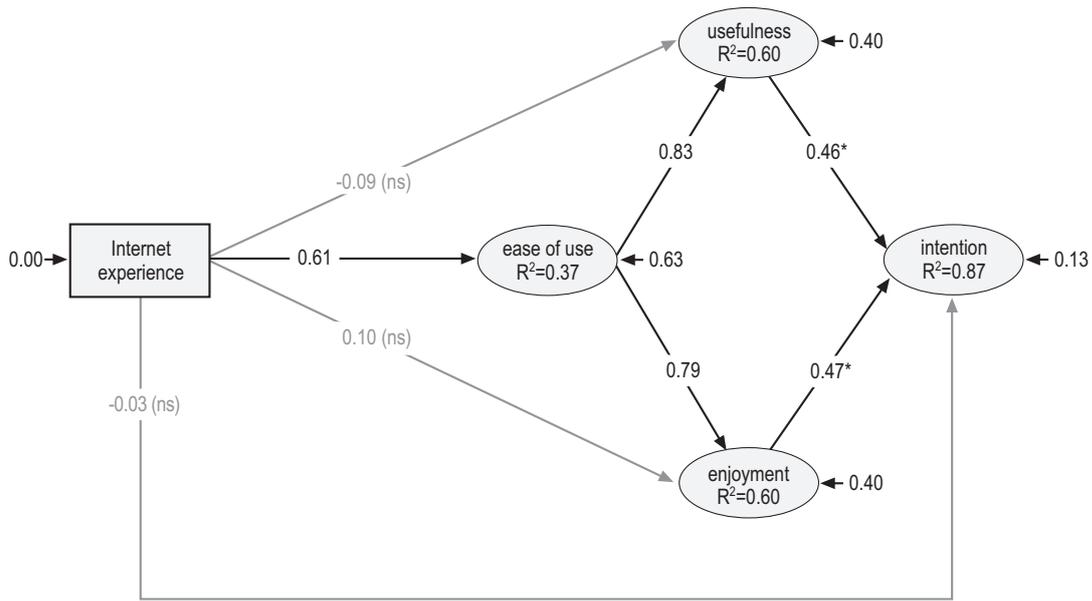
* fixed to equal

Chi-Square=194.11 df=83, P-value=0.000, RMSEA=0.048, CFI=0.98, NFI=0.97, SRMR=0.14

FIGURE 34   Internet Experience and TAM, Standardised Solution (for TAM only latent
variables are shown)
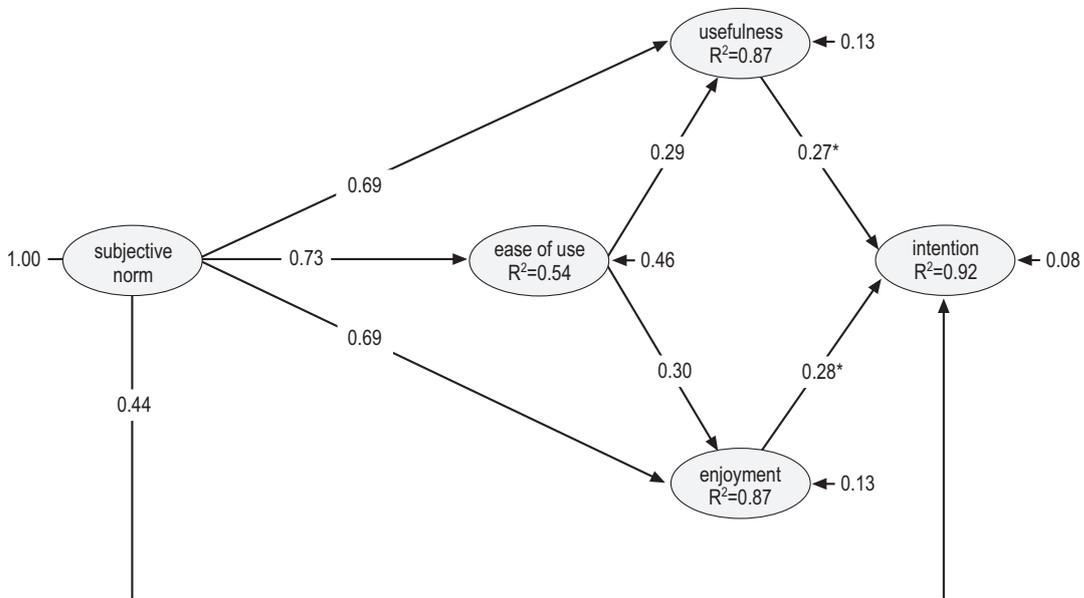
* fixed to equal

Chi-Square=227.97 df=96, P-value=0.000, RMSEA=0.049, CFI=0.99, NFI=0.97, SRMR=0.16

FIGURE 35   Subjective Norm and TAM, Standardised Solution (only latent variables are
shown)

Others' use was separated from the measurement of subjective norm in the measurement model phase. For the model connecting others' use to the variables of TAM exact fit is rejected $\chi^2(96)=242.94$ (p-value=0.000) but approximate fit was demonstrated by RMSEA of 0.051, CFI of 0.98 and NFI of 0.97 (see Figure 36). The 90 per cent confidence interval for RMSEA (0.043 ; 0.059) and p-value for test of close fit (RMSEA<0.05) of 0.39 both indicate good fit. Since the items measuring others' use were originally intended to be a part of the measurement of subjective norm, no hypotheses were set for others' use per se. Others' use has a positive effect on usefulness (standardised $\gamma=0.38$, t=9.06), enjoyment (standardised $\gamma=0.37$, t=9.60) and ease of use (standardised $\gamma=0.48$, t=11.21). No significant effect of others' use on intention is found. The standardised indirect effect of others' use on intentions is 0.60 (t=14.02). The R^2 of intention is 0.89 in this model. Others' use explains 23 per cent of the variance in ease of use.
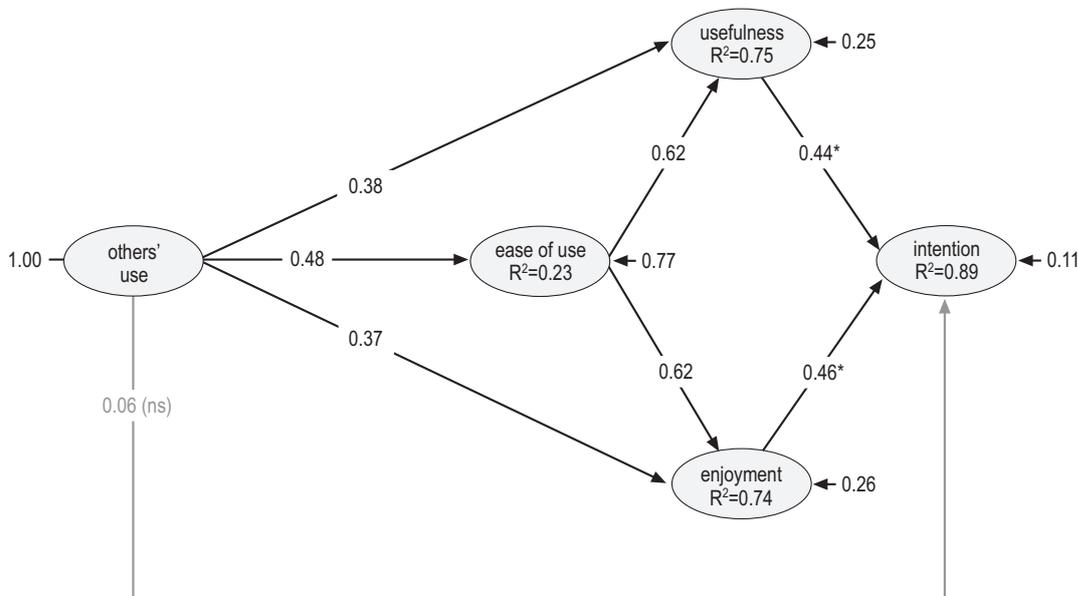
* fixed to equal

Chi-Square=242.94 df=96, P-value=0.000, RMSEA=0.051, CFI=0.98, NFI=0.97, SRMR=0.15

FIGURE 36   Others' Use and TAM, Standardised Solution (only latent variables are shown)

Table 18 summarises the results of the model estimations for each individual difference variable and TAM, that is, the effects of cognitive age, technology anxiety, different experience variables, subjective norm and other's use on the variables of TAM.

TABLE 18   Summary of the Standardised Effects of Individual Difference Variables on the Variables of TAM

	on usefulness	on enjoyment	on ease of use	on intention (direct effect)	on intention (indirect effect)
cognitive age	ns	ns	-0.34 (t=-8.56)	-0.06 (t=-2.58)	-0.22 (t=-6.26)
technology anxiety	ns	ns	-0.69 (t=-25.21)	ns	-0.52 (t=-19.06)
frequency of service usage	0.16 (t=3.71)	0.20 (t=5.02)	0.40 (t=8.47)	0.10 (t=3.34)	0.41 (t=10.32)
variety of services used	0.21 (t=3.63)	0.22 (t=3.38)	0.40 (t=7.91)	0.17 (t=2.87)	0.41 (t=8.19)
SMS experience	ns	0.10 (t=2.51)	0.42 (t=9.47)	ns	0.36 (t=9.15)
Internet experience	ns	ns	0.61 (t=13.81)	ns	0.40 (t=9.80)
subjective norm	0.69 (t=10.20)	0.69 (t=10.93)	0.73 (t=18.24)	0.44 (t=3.47)	0.49 (t=4.86)
others' use	0.38 (t=9.06)	0.37 (t=9.60)	0.48 (t=11.21)	ns	0.60 (t=14.02)

NB Individual difference variables were estimated one at a time with the TAM model

5 CONCLUDING DISCUSSION

This study is one of the first studies to explore the factors affecting the acceptance of new technological services among mature consumers. The studies done thus far have focused on acceptance of the Internet (e.g., Eastman & Iyer 2004). This study takes a further step by studying the acceptance of mobile content services that, owing to their "high tech nature" have clearly been seen as suited more to younger consumers.

The aim of the study was to increase our understanding of mature consumers as users of new technological services. More specifically, the objective was to find out what factors have an effect on the acceptance of mobile content services among Finnish baby boomers. These objectives were approached from the perspective of both marketing and information systems science. In explaining acceptance two types of psychological factors, (1) people's beliefs about the technological service in question and (2) individual difference variables (user and user-situational variables), were addressed.

The study consisted of a theoretical part and an empirical part. The aim of the theoretical part was to anchor the study firmly in marketing and information systems research traditions with the help of a review of the literature. The factors affecting technology acceptance were first explored from a general perspective, after which an age group-specific approach focusing on individual difference variables was taken and, finally the previous research on mobile content services was reviewed. In addition, on the basis of the review of the literature and theoretical discussion a model of mobile content services acceptance among mature consumers was formulated and the research hypotheses set.

The empirical part of the study was based on survey data collected in 2005. The sample consisted of 620 Finnish baby boomers (born between 1945 and 1955). The empirical research questions were the following:

> 1) Do the variables of the Technology Acceptance Model (perceived usefulness, perceived ease of use and perceived enjoyment) explain the acceptance of mobile content services among Finnish baby boomers?

2) What is the effect of the individual difference variables (cognitive age, technology anxiety, experience, subjective norm) on the perceived usefulness, perceived ease of use, perceived enjoyment and intention to use mobile content services among Finnish baby boomers?

Structural equation modelling (i.e., LISREL modelling) was used as a statistical tool in seeking to answer to these questions.

In this chapter the main results are discussed and the conclusions presented. *First*, the main empirical findings are summarised and discussed. *Second*, the theoretical contribution of the study is addressed. *Third*, implications for practitioners are suggested and, *finally*, the limitations of the study are discussed and future areas for research proposed.

5.1   Discussion on Main Empirical Findings

Explaining Acceptance with the Technology Acceptance Model
The Technology Acceptance Model (TAM), in which the variables perceived usefulness, perceived ease of use, perceived enjoyment and behavioural intention were included, proved to explain the acceptance of mobile content services among Finnish baby boomers extremely well. The model explained up to 86 per cent of the variance in behavioural intention. Hypotheses $H_1 - H_5$ addressed TAM (see Table 19). Of these all, except H_3, were supported by the data. H_3 proposed that perceived ease of use would have a direct positive effect on behavioural intention. No direct effect was found. However, perceived ease of use had a strong indirect effect on intention through perceived usefulness and perceived enjoyment, and thus plays an important role in the acceptance of mobile content services. Both perceived usefulness and perceived enjoyment had strong direct effects on behavioural intentions.

On the basis of portrayals of mature consumers as sophisticated consumers who are innovative if they truly feel that they will benefit from adopting the innovation in question (e.g., Schiffman & Sherman 1991), one might have expected perceived usefulness to be the primary factor explaining the acceptance of mobile content services and perceived enjoyment to have less if any power in explaining acceptance. However, this was not the case. The results show that all three beliefs that are widely seen to be crucial in the acceptance of new technology among younger age groups are also applicable to the 50- to 60-year-old consumers. In other words, in this respect mature consumers seem to be little different from younger consumers. This might even be interpreted as a support for the view that as far as the mature consumer is concerned we are moving towards an "ageless market" or "ageless society" (Schiffman & Sherman 1991; Szmigin & Carrigan 2000) where the chronological age of an individual can no longer be seen as an important variable explaining consumer behaviour.

TABLE 19   Hypotheses and the Degree of Support

Hypothesis		Degree of Support
H_1	Perceived usefulness has a positive significant influence on behavioural intention.	**Supported**
H_2	Perceived enjoyment has a positive significant influence on behavioural intention.	**Supported**
H_3	Perceived ease of use has a positive significant influence on behavioural intention.	Not Supported
H_4	Perceived ease of use has a positive significant influence on perceived usefulness.	**Supported**
H_5	Perceived ease of use has a positive significant influence on perceived enjoyment.	**Supported**
$H_{6.1}$	Cognitive age has a negative significant influence on perceived usefulness.	Not Supported
$H_{6.2}$	Cognitive age has a negative significant influence on perceived ease of use.	**Supported**
$H_{6.3}$	Cognitive age has a negative significant influence on perceived enjoyment.	Not Supported
$H_{7.1}$	Technology anxiety has a negative significant influence on perceived usefulness.	Not Supported
$H_{7.2}$	Technology anxiety has a negative significant influence on perceived ease of use.	**Supported**
$H_{7.3}$	Technology anxiety has a negative significant influence on perceived enjoyment.	Not Supported
$H_{8.1}$	Prior similar experience has a positive significant influence on perceived usefulness.	**Supported** (frequency, variety)
$H_{8.2}$	Prior similar experience has a positive significant influence on perceived ease of use.	**Supported** (frequency, variety, SMS, Internet)
$H_{8.3}$	Prior similar experience has a positive significant influence on perceived enjoyment.	**Supported** (frequency, variety, SMS)
$H_{9.1}$	Subjective norm has a positive significant influence on perceived usefulness.	**Supported**
$H_{9.2}$	Subjective norm has a positive significant influence on perceived ease of use.	**Supported**
$H_{9.3}$	Subjective norm has a positive significant influence on perceived enjoyment.	**Supported**
$H_{9.4}$	Subjective norm has a positive significant influence on behavioural intention.	**Supported**

NB The hypotheses in their complete form (including the context) are presented in Chapter 2.4.

An interesting and unexpected finding was the high correlation between perceived usefulness and perceived enjoyment (r=0.97). It might be that the respondents had not yet formed a clear picture of the benefits offered by mobile content services. As the data showed, the respondents did not consider mobile content services to be either useful or enjoyable. When people do not see benefits in something it seems logical that they do not separate these "non-benefits" from each other. It may be that when people begin to understand the benefits offered by mobile content services these benefits will become more distinguished from one another in people's minds as well as in a statistical sense.

Alternatively, given that most of the respondents had only infrequently tried out or used mobile content services, it might be that novelty alone is enough to create a feeling of excitement and enjoyment. Even the usage of a largely utilitarian service, such as a search service, may feel enjoyable because of the "fun aspect" of trying new things. This may be one explanation for the high correlation between perceived usefulness and enjoyment. If so, it might be hard initially to disassociate enjoyment from usefulness. As the use of these services (in the case of utilitarian services) becomes more frequent and common the enjoyment aspect may start to diminish.

Yet another explanation for the high correlation might be the fact that many mobile content services have both useful and enjoyable aspects which might cause perceived usefulness and perceived enjoyment to correlate highly even after extensive experience with mobile content services. When services appear both useful and enjoyable (or useless and un-enjoyable) it is possible that these two aspects become highly intertwined in people's minds. A simple example is a loading of a ringing tone. A ringing tone that plays a favourite melody might be very enjoyable, but at the same time the ringing tone is unquestionably useful as notifying an incoming call.

Before further empirical studies addressing this question have been undertaken the discussion on the cause of the high correlation between usefulness and enjoyment can only be speculative. In this study it was decided to keep perceived usefulness and enjoyment as separate constructs. Despite the high correlation it was possible to distinguish perceived usefulness from perceived enjoyment and show that both had an effect on intention to use mobile content services. Retaining the two variables instead combining them into an aggregate benefit variable adds more to our understanding of the acceptance of mobile content services among mature consumers. In addition, it enables comparison between the results of this study and earlier TAM studies.

The Role of Individual Difference Variables in Explaining Acceptance

In support of $H_{6.2}$ cognitive age was found to have a negative effect on perceived ease of use of mobile content services. In addition, a weak negative direct effect on intention was found. Hypotheses $H_{6.1}$ and $H_{6.3}$ were not supported. The results indicate that cognitive age mainly affects intentions to use mobile content services indirectly through its effect on perceived ease of use. In other words, those with younger cognitive ages perceive mobile content

services easier to use and are thus more likely to perceive these services as useful and enjoyable and further, are more likely to have the intention to use these services. In this study the chronological age span of the sample was quite narrow (the respondents were 50-60 years old). If a wider age span in terms of chronological age had been used then the age span in terms of cognitive age would also probably have been wider and perhaps the effects of cognitive age would have been more pronounced.

In the absence of previous research combining cognitive age with the Technology Acceptance Model the hypothesis were derived quite loosely from research that has combined cognitive age with other variables related to innovation adaptation (i.e., new brand trial, interest in computers). Thus the fact that only one of the hypotheses was supported and a direct effect on intention was found is not exceedingly surprising.

Cognitive age loses its attraction as a predictor of beliefs if similar results can be attained with chronological age, since chronological age is more easily obtainable by researchers and marketers. Thus, a model with both cognitive age and chronological age was tested. Cognitive age outperformed chronological age; chronological age had only very weak effects on perceived usefulness, enjoyment and intention and did not add to the amount of variance explained in any of these variables.

Technology anxiety was found to affect perceived ease of use and thus $H_{7.2}$ was supported. Contrary to hypotheses $H_{7.1}$ and $H_{7.3}$ no effects of technology anxiety on perceived usefulness or perceived enjoyment were found. It was hypothesised that technology anxiety would affect all three beliefs of the TAM model since these beliefs are indirect measures of attitude (Ajzen 2002), and technology anxiety (specifically computer anxiety) has been shown to have an effect on attitude (Igbaria & Parasuraman 1989). However, it seems that ease of use is the only belief component that is affected by technology anxiety. In retrospect, it also seems that the conceptualisation as well as the scale used to measure technology anxiety in this study emphasise the fear of difficulty in using technology and thus technology anxiety naturally primarily relates to the perception of ease of use. The emphasis on fear of difficulty in using technology in the conceptualisation of technology anxiety seems appropriate since, for example, Higgins and Shanklin (1992, cited in Mick & Fournier 1998) found fear of technological complexity (for a discussion on the similarity of the concepts of ease of use and complexity see Chapter 2.1.1) to be the most widespread concern among consumers in their study.

The results showed that the effect of prior similar experience on the acceptance of mobile content services among mature consumers varies according to the type of that experience. Prior experience in the use of mobile content services (both frequency and variety of services) had an effect on all three beliefs of usefulness, ease of use and enjoyment. These findings from their part supported hypotheses $H_{8.1}$ – $H_{8.3}$. In addition, experience in the use of mobile content services directly affected intention to use mobile content services. However, most consumers do not have extensive experience in using mobile content services and thus it was important to study the effects of

experience in using technological services similar in some ways to mobile content services. The effects of SMS and Internet experience were studied. SMS experience was found to affect perceived ease of use as well as enjoyment of mobile content services (support for $H_{8.2}$ and $H_{8.3}$), whereas Internet experience was found only to affect, although quite strongly, perceived ease of use of mobile content services (support for $H_{8.2}$). These results suggest that mature consumers might transfer some information related to ease of use of Internet and SMS to their perceptions of the ease of use of mobile content services. In a similar vein enjoyment involving text messaging may be transferred to perceptions about the enjoyment of mobile content services.

Neither SMS nor Internet experience, contributed to perceived usefulness of mobile content services. This is an interesting finding since several new mobile content services seem to have useful aspects resembling those of wired Internet services (e.g., time independence, easy access to information), accompanied with location independence. Mobile content services also share some of the benefits of text messaging (e.g., time and location independence). Given the high level of experience in text messaging and Internet usage among the respondents (and Finns in general) it might be concluded that SMS and Internet usage are most likely perceived as useful by most of the respondents. The results showed that mobile content services were not seen as particularly useful by the respondents. These differences in perceived usefulness are most likely related to the fact that perceptions of the usefulness of using SMS or the Internet do not transfer to perceptions of the usefulness of mobile content services.

In support of hypotheses $H_{9.1}$ – $H_{9.4}$ subjective norm had an effect on all three belief variables of TAM as well as on intention. The effects were hypothesised despite the presence of contradictory arguments in the literature suggesting that ageing consumers rely more on their own experience than on the opinions of others in evaluating new services (Schiffman & Sherman 1991). The hypotheses on the effects of subjective norm were based on the assumed low level of experience (e.g., Venkatesh & Davis 2000) and on the cultural importance of and people's interest in mobile technology in Finland (e.g., Poutiainen 2003). In line with the assumption, the respondents of this study reported relatively low levels of experience. In support of the hypotheses, the data analysis showed that the effects of subjective norm both on the belief variables and on intention were very strong, and that subjective norm also added to the explanatory power of the model as a whole. In other words, subjective norm seems to affect intention to use mobile content services among mature consumers through internalisation, that is, if an important other suggests that mobile content services might be useful/enjoyable/easy to use, a mature consumer may come to believe that these services are in fact useful/enjoyable/easy to use, and in turn form an intention to use them. However, the direct effect of subjective norm on intention suggests that mature consumers may also choose to use mobile content services, even if they do not regard them as useful, enjoyable or easy to use, if they believe that important others think they should use these services.

In the measurement model phase the items reflecting others' use were extracted from the measurement of subjective norm. A model testing the effect of others' use on the variables of TAM was also estimated. Others' use affected all three belief variables of TAM but unlike subjective norm it had no direct effect on behavioural intention. The findings suggest that mature consumers use the example of other people as a source of information in evaluating new services. Actually, much of human behaviour is learned through modelling (Bandura 1982). As verified by the results of this study, vicarious experiences achieved through observing someone else's behaviour influence people's self-efficacy appraisal (cf. perceived ease of use) (Bandura 1982) as well as outcome expectations (cf. perceived usefulness and enjoyment) (Bandura 1971, 119-126).

Overall, for the most part the individual difference variables affected intention to use mobile content services indirectly through the belief variables of TAM (direct effects on intention were very weak or non significant, except in the case of subjective norm) and contributed only marginally to the explanation of the variance in intention. This finding is consistent with the theories (TRA, TAM) used, and with findings from previous TAM studies (Legris et al. 2003).

The correlations between the individual difference variables were relatively low. The highest correlation (r=-0.63) was between technology anxiety and Internet experience, whereas the correlations between technology anxiety and the other experience variables were notably lower. This might suggest that the word "technology", used in the technology anxiety scale, relates mostly to computers (and Internet) and to a lesser extent to mobile phones (and its applications) in the minds of the respondents (for further discussion see Niemelä-Nyrhinen 2007). However, as reported, technology anxiety clearly affected perceived ease of use of mobile content services. The correlation between Internet experience and SMS experience was also rather high (r=0.53), suggesting that people who use the Internet are likely to use text messages, and vice versa. The relationships of Internet experience and SMS experience with the variables reflecting mobile content service usage were not as strong (correlations varying between 0.24 and 0.36).

The correlation (r=0.45) between the frequency of mobile content service use and the variety of services used indicated that to some extent these two dimensions of use go hand in hand. Shih & Venkatesh (2004) have developed a fourfold typology of use or users based on variety and rate of use: intense use (high variety, high rate), specialised use (low variety, high rate), non-specialised use (high variety, low rate) and limited use (low variety, low rate). The respondents of this study could be seen as belonging to the group of limited users. However, the correlation between frequency and variety and the higher median (and mean) of variety than frequency suggest that some of the respondents could also be seen as non-specialised users.

The correlation between chronological and cognitive age was surprisingly low (r=0.34). The low positive correlation indicates that as a person ages his/her cognitive age also increases but that cognitive age is mostly defined by other variables than chronological age.

In the literature review the individual difference variables were assigned to different categories according to the specificity of the domain of the variable. Cognitive age was the most general variable with no specific domain, whereas at the other end of the continuum there were variables that were mobile content service-specific (i.e., subjective norm and previous experience of mobile content services). The variables with the highest level of specificity affected all the belief variables as well as intention, whereas the variables with a lower level of specificity affected only one or two of the dependent variables. This finding is in line with the discussion by Goldsmith, Freiden & Eastman (1995) on how narrow constructs are usually better predictors of specific behaviours while broad constructs are better predictors of diverse or general behaviours.

5.2 Theoretical Contributions

In the introduction it was stated that the theoretical home of this research is in both the services marketing (particularly in the part concentrating on SST adoption) and consumer behaviour schools of thought. In addition, electronic business research was stated as relevant to the present study. The theoretical contribution of the study is a model of the acceptance of mobile content services among mature consumers. The model is founded on theories and research from both the marketing and information systems fields. Further, the theories developed in marketing and information systems are deeply rooted in psychology. Such a multidisciplinary approach is believed to result in a more comprehensive picture of the factors affecting acceptance. The model may be seen as a contribution to all of the relevant research areas (i.e., services marketing, consumer behaviour and electronic business). However, it is mainly seen as a contribution to the literature on mature/ageing markets and consumer behaviour among mature consumers.

The finding that subjective norm (as well as others' use) strongly affects beliefs about and intention to use mobile content services is in itself a contribution to the literature concerning mature consumers. Since ageing consumers are generally believed to rely more on their own experience and to be less affected by others opinions, the finding of this study challenges that earlier knowledge. The study also made a contribution to the literature on mature consumers by showing that the concept of cognitive age is a better predictor of mature consumers' belief about the ease of use of a certain technology than the traditional concept of chronological age.

Within information systems science the literature on TAM is already so extensive that to make a theoretical contribution in this specific area presents a considerable challenge. However, a contribution was made to the TAM literature by combining TAM with a variable that has not been previously studied in connection with it, namely cognitive age. Similarly, a contribution to the literature was made by combining a variable termed technology anxiety with TAM. Previously a connection between computer anxiety and TAM's

perceived ease of use has been found. However, when TAM is applied to studying technological services that are not used in conjunction with computers a broader concept of general technology anxiety is needed. Furthermore, this study contributed by hypothesising and finding subjective norm to have an effect on TAM's perceived enjoyment.

5.3 Implications for Practitioners

From the point of view of practitioners the descriptive results of this study also have importance. The results show that baby boomers feel younger than their chronological age and are not anxious about technology. This means that marketers of mobile content services as well as other technological services should recognize the potential in 50- to 60-year-old consumers as a target group for their services. There is no reason to assume that mature consumers would resent new technological services. Economically, the fact that older consumers may form an attractive target group must be acknowledged.

Achieving understanding of the consumer behaviour of the ageing baby boomers is especially important since thus far this cohort have had the largest impact ever witnessed on marketing strategies due to its size, spending power and unique attitudes (Hopkins, Roster & Wood 2006). They will continue to have an impact on company strategies and performance as they age and thus cannot be ignored. In the future, if marketers do not include 50-plus consumers in their marketing plans, they will end up with losses of sales and revenue due to the decrease in the number of younger buyers (Silvers 1997).

Although the rate of use continues to be low, Finnish baby boomers do have some experience in using mobile content services. For example, as many as 39 per cent of the respondents had taken part in a contest or vote using text messages, 38.9 per cent had used search services, 27.7 per cent had downloaded ringing tones, 20.6 per cent had downloaded wallpapers or logos, 20 per cent had checked the amount of their mobile phone bill using a text messaging service and 10.6 per cent had ordered weather forecasts to their mobile phones. These trial rates may even be considered surprisingly high, if the fact that most mobile content services are targeted at younger consumers is taken into account. These trials also serve as a good base on which to further market mobile content services.

The descriptive results also showed that baby boomers do not consider mobile content services to be either useful or enjoyable. In addition, they are not seen as easy to use. Morover, these three beliefs were found to have a significant impact (direct or indirect) on the intention to use mobile content services. In addition to focusing on usefulness, enjoyment and ease of use in service design, these aspects should also be clearly communicated to potential users.

Four individual difference variables were shown to have an effect on one or more of the variables of the Technology Acceptance Model, that is, on usefulness, enjoyment, ease of use and intention to use mobile content services. The individual difference variables were divided into user variables (cognitive age, technology anxiety) and user-situational variables (subjective norm, experience). These individual difference variables are not static or totally out of the reach of marketers. Rather these individual differences are affected by the marketer's actions and communications. Next, ideas on how practitioners may find the results related to the individual difference variables useful are discussed.

Cognitive age and technology anxiety were classified in this study as user variables. These variables, although related to an individual's personality, are not stable traits. Cognitive age changes with a person's chronological age. Different episodes of life (e.g., birth of a grandchild) may also affect one's cognitive age. The bias between chronological and cognitive age becomes more pronounced with advancing chronological age (Barak & Schiffman 1981), that is, the higher the chronological age the wider the difference between chronological and cognitive age. It is, perhaps, not advisable to try to change people's cognitive ages, although advertising is likely to have some sort of effect on people's age perceptions. However, it is certainly worth practitioners' while to realise that people often feel younger than they are according to their chronological age (in this study the difference between average chronological and cognitive age was 5.3 years). Although chronologically people might seem to get older, it might be that they do not feel they are getting older and this felt age, that is, cognitive age is likely to be the age according to which ageing people behave as consumers.

Technology anxiety, just like computer anxiety (for a meta-analysis see Chua et al. 1999), decreases as experience increases. Vicarious experiences can also be delivered in the form of planned marketing communications. Messages demonstrating rewarding usage experiences offer people an opportunity to observe someone else's behaviour and, as noted earlier, much of learning happens through this kind of modelling.

Experience in using mobile content services (both frequency and variety) positively affected beliefs about the usefulness, enjoyment and ease of use of mobile content services as well as intentions to use these services. This finding has clear implications. Marketers of mobile content services should offer consumers trial uses of their services. One way of doing this is to offer such possibilities at operators' or their resellers' service outlets. When a trial takes place in the presence of sales staff the customer is offered guidance and the possibility of achieving a satisfying experience is high. Operator outlets and resellers of subscriber connections should be supported and motivated in showing customers how services are used, since these experiences will positively affect customers' perceptions of those services and further, have a direct effect on intentions to use them in the future. From a resellers' perspective showing customers how different services (e.g., mobile bank) are used can function as an efficient sales tool for 3G mobile phones and

connections since the intention to use mobile content services is probably connected to the intention to buy a device that is more suitable for the purpose of service use.

According to their own assessment the respondents had quite a lot of experience in SMS and Internet usage. SMS experience was found to affect perceived ease of use and enjoyment of mobile content services. Internet experience was found to affect perceived ease of use of mobile content services. Although mobile content services should have utilitarian benefits similar to those of SMS and Internet use, earlier experience of the Internet or SMS does not seem to have an effect on the perceived usefulness of mobile content services. To lower the barriers to adoption marketers could use personal selling and other forms of marketing communications to emphasise the similarities between the use of SMS/Internet and the use of mobile content services.

Subjective norm was found to have very strong effect on beliefs about mobile content services and intention to use these services. In addition, others' use of mobile content services affected beliefs about mobile content services. Subjective norm was defined as "person's perception that most people who are important to him think he should or should not perform the behavior in question" (Fishebein & Ajzen 1975, 302). Thus, if a person thinks that the people who are important to him think that he should use (or learn how to use) mobile content services he is more likely to use those services than a person who thinks that the people that are important to him do not think he should use mobile content services. The formation of this perception has probably been preceded by some sort of unplanned communication (unplanned from the perspective of the service provider) such as word-of-mouth communication. Subjective norm is not the "pure" result of a communication process because it does not necessarily reflect what the important others actually think (Ajzen & Fishbein 1980, 57). However, it is reasonable to assume that in forming their subjective norm most people would take into account the opinions and recommendations (i.e., the messages) of the people they consider important to them.

There are ways for a company to enhance positive unplanned communication between customers and thus transform it into partly planned communication. One option is the use of reference campaigns where a customer is offered a reward if a new customer tries a service based on his/her recommendation. Further, taking into account the effect of experience on the acceptance of mobile content services, reference campaigns may be a very effective way to enhance acceptance. Word-of-mouth communication can also be harnessed for the purposes of service providers through the use of "word-of-mouth agents" who in return for a small compensation talk about specific services in daily social situations.

Information on the effect of both subjective norm and others' use can also be beneficial in planning advertising. Showing individuals, to which mature consumers can relate, successfully using mobile content services communicates that also people over 50 may find mobile content services useful, enjoyable and easy to use. There is clearly space for this kind of advertising.

5.4   Limitations of the Study and Suggestions for Future Research

As in the case of all research efforts, this study has some limitations that should be considered when interpreting the results. Perhaps one of the main limitations is the cross-sectional research design. In this study baby boomers' intention to use mobile content services served as a dependent variable. Although intentions are known to predict behaviour they are not in one-to-one correspondence with actual behaviour. Naturally, actual behaviour is the most interesting outcome, but intentions and behaviour should not be measured at the same point of time. For measuring the effect of intention on actual behaviour a longitudinal approach would have been required.

The study concentrated on baby boomers, aged between 50 to 60 years. A decision was made not to widen the study to include comparisons between different age groups. Accordingly, the empirical data did not allow the comparison of older consumers with younger consumers. Thus, tentative conclusions on differences or similarities between older and younger consumers can only be made by comparing the results of this study with those of earlier studies on younger populations. To verify any such conclusions, research surveying both younger and older respondents should be conducted. Additionally, future research could, for example, investigate whether the effect of enjoyment is more important among younger consumers and the effect of usefulness more important among older consumers, as might be hypothesised on the basis of stereotypical images of younger and older consumers.

When filling out the questionnaire, the respondents were given instructions to consider not only the mobile content services that they had actually used but also services they could see themselves using in the future. If they had not used any mobile content services they were asked to answer the questionnaire items solely on the basis of their mental impression of mobile content services. Accordingly, the respondents were asked to report their perceptions on mobile content services in general, instead of asking their perceptions about specific types of services, such as hedonic or utilitarian services. It might be that if only hedonic services had been studied the importance of perceived enjoyment and ease of use would have been shown to be important, whereas if utilitarian services had been studied perceived usefulness would have been highlighted. However, in the case of mobile content services a clear classification of consumer services into hedonic and utilitarian services is problematic since most consumer mobile content services could be seen as having an entertaining component built into them (see e.g., Baldi & Thaung 2002). If also business services (solely utilitarian services) had been included then there presumably would have been problems with the relative importance of perceived usefulness and enjoyment as explanatory factors.

In addition, services utilising different technological applications were included in the overall category of mobile content services used in this study.

This was done in the belief that if services are interesting and work well for the purposes for which they are used, consumers are not really interested in the specific technology behind those services. Most of the services used among the respondents appeared to be SMS applications. However, Internet experience affected perceived ease of use of mobile content services. It is assumed that the respondents were able to form a picture of mobile content services as a whole, that is, including both the SMS services that they had used and other services (possibly web-based) that they knew about and saw themselves using (or not-using) in the future. Although the decision to study mobile content services as an overall category can partially be justified, this procedure remains a limitation of this study.

The quantitative approach of this study, although effectively answering the research questions, also leaves some new, unanswered questions. One of these questions is the reason behind the extremely high correlation between perceived usefulness and enjoyment. It would be interesting to seek an explanation to this correlation through qualitative interviews.

The results of this study are generalisable to Finnish consumers aged between 50 to 60 years old. Generalisations to people from other countries must be done with extreme caution. Finland is one of the leading edge countries when it comes to mobile technology, which naturally might affect the results. Further studies are needed to resolve whether the factors affecting baby boomers' acceptance of mobile content services are similar across countries. It would be very interesting to investigate whether subjective norm plays an equally important role in acceptance in other countries. It might be that the Finnish culture has some unique characteristics regarding mobility and mobile technology, as has sometimes been suggested (see e.g., Came 2000). Finnish people do not just use mobile devices but also discuss the use of these devices. If frequent discussion on mobile phone use is a particularly Finnish phenomenon it might be that the role of subjective norm in the acceptance of mobile content services is also a culturally bound phenomenon.

In addition to being culture-bound, the results of this study are likely to be time-specific. Perceptions of ageing, especially psychological and social ageing, will most likely continue to change. The direction of the changes and the evolving meaning of old age will certainly affect mature consumers' behaviour. Ahead of us might lie a trend counter to today's quest for eternal youth. Changes in ageing and the meanings assigned to old age are themselves interesting areas of research. In addition to changes in ageing, technological development, future service offerings and changes in acceptance rates might have an influence on the importance of the explanatory factors included in the model of this study. The basic variables of TAM have been proven to be important in technology acceptance in studies conducted during the last two decades and thus no sudden change in these variables should be expected. On the other hand, cognitive age, for example, is a variable which is likely to undergo a change of role in the future.

In this study the sample of baby boomers was drawn based on their chronological age. The literature on baby boomers suggested that this

generation is attractive to marketers, among other things because both their discretionary income and discretionary time is increasing. In future research additional demographic data could be gathered, for instance, on paid-off house loans (reflecting to some extent discretionary income) and whether respondents' children have already left home (reflecting to some extent discretionary time) to verify if the sample studied really meets the assumptions of discretionary income and time.

One interesting question for future research is whether the service offerings that appeal to other age groups also appeal to mature consumers. There are some studies to show that, in the case of Internet services, mature consumers value partly the same services as do other age groups (e.g., Vuori & Holmlund-Rytkönen 2005). In addition, in the present study it seemed that the respondents had tried many of the most frequently used services available in Finland (cf. eBird Scandinavia 2005). However, it might be that mature consumers have needs that are not met by the current service offerings. As most of the services available today are mainly targeted at younger consumers, it would be interesting to find out if new services should be developed to fulfil the particular needs of mature consumers.

Although this study addressed a variety of factors, it by no means included all the possible belief or individual difference variables that could be studied in connection with the acceptance of new technological services among mature consumers. Future research should extend the mapping begun here to include the effect of other important variables on the acceptance of new technological services. For instance, in addition to perceived usefulness, ease of use and enjoyment, other characteristics of innovation suggested by the Innovation Diffusion Theory (Rogers 1995) could be studied. This study examined the effects of psychological factors, that is, beliefs and user variables related to the individual's personality, alongside user-situational variables. Of the possible demographic factors only chronological age was included in the analysis. Future studies could include a broader set of demographic factors (e.g., education, income level) as independent variables. With respect to the psychological individual difference variables, for example, involvement, that is, the degree of personal relevance assigned to a product/service by a consumer, could be studied as a predictor of technology-related beliefs and intentions in future studies.

YHTEENVETO (FINNISH SUMMARY)

Mobiilien sisältöpalveluiden omaksumiseen vaikuttavat tekijät ikääntyvien kuluttajien keskuudessa

Tämä väitöskirjatutkimus tarkastelee ikääntyviä (50–60-vuotiaita) kuluttajia teknologisten palveluiden käyttäjinä. Tutkimuksen tavoitteena on selvittää, mitkä tekijät vaikuttavat mobiilien sisältöpalveluiden omaksumiseen ikääntyvien kuluttajien keskuudessa. Tutkimus liittyy läheisesti kahteen ajankohtaiseen teemaan: teknologian jatkuvaan kehitykseen ja maailman väestön vanhenemiseen. Sekä teknologinen kehitys että maailman väestön vanheneminen vaikuttavat liiketoiminnan käytäntöihin ja luovat uusia liiketoimintamahdollisuuksia.

Teknologinen kehitys muuttaa palveluiden markkinoinnin kenttää mahdollistamalla yrityksille uusia palveluiden tarjonnan tapoja. Yksi tällainen uusia mahdollisuuksia luova informaatioteknologian osa-alue on mobiiliteknologia. Huomattava osa vaikutuksista, joita *maailman ikääntyvällä väestöllä* on liiketoimintaan, liittyy markkinointiin. Perinteisesti markkinoijien ja markkinoinnin tutkijoiden huomio on keskittynyt nuoriin kuluttajiin. Tarvitsemmekin lisää tietoa nykypäivän yli 50-vuotiaista kuluttajista, jotta pystyisimme paremmin palvelemaan tätä kasvavaa kuluttajaryhmää.

Väitöskirjassa ikääntyviä kuluttajia edustavat suomalaiset suuret ikäluokat (vuosina 1945–1955 syntyneet suomalaiset). Tutkimuksen toteutushetkellä he olivat 50–60-vuotiaita. Sana *ikääntyvä* ei kuvaa 50–60-vuotiaita kuluttajia parhaalla mahdollisella tavalla. Työn englanninkielisessä tekstissä käytetään käsitettä *mature consumers* eli kypsän aikuisiän saavuttaneet kuluttajat. Vaikka moni tämän päivän 50–60-vuotias ei pidä itseään vielä ikääntyvänä, perinteisesti markkinoinnin piirissä yli 50-vuotiaita kuluttajia on pidetty ikääntyvinä (ageing) tai jopa vanhoina (older) kuluttajina. Ikääntyviin kuluttajiin on myös liitetty stereotypioita, jotka ovat vähentäneet heidän kiinnostavuuttaan markkinoijien silmissä. Stereotypiat ovat leimanneet yli 50-vuotiaat kuluttajat muun muassa epäinnovatiivisiksi ja haluttomiksi omaksumaan uutta teknologiaa. Nykytietämyksen valossa nämä stereotypiat eivät ole todenmukaisia, vaan myös yli 50-vuotiaat ovat potentiaalisia teknologisten palveluiden käyttäjiä. Tästä huolimatta heidän uuden teknologian omaksumiseensa vaikuttavia tekijöitä ei ole juurikaan tutkittu.

Tässä tutkimuksessa mobiilit sisältöpalvelut määritellään palveluiksi, jotka sisältävät palveluntuottajien tuottamaa sisältöä, jotka ovat käytettävissä langattomissa verkoissa ja joita käytetään matkapuhelimilla. Yksityisviestintää (esim. tekstiviestien lähettämistä kuluttajien kesken) ei tässä tutkimuksessa pidetä mobiilina sisältöpalveluna. Esimerkkejä mobiileista sisältöpalveluista ovat mobiiliuutiset, mobiilipelit ja soittoäänten tilaus.

Tämän väitöskirjatyön teoreettisessa osiossa teknologian omaksumiseen vaikuttavia tekijöitä tarkastellaan ensin yleisellä tasolla esittelemällä vaihtoeh-

toisia teknologian omaksumista kuvaavia malleja. Tutkimuksen pohjaksi valitaan *Technology Acceptance Model*, TAM (Davis 1989; Davis ym. 1992). Mallin keskeisiä tekijöitä ovat käsitykset tarkasteltavan teknologisen palvelun hyödyllisyydestä, viihdyttävyydestä ja helppokäyttöisyydestä sekä aikomus käyttää kyseistä palvelua. Yleisen tarkastelun jälkeen työssä keskitytään ikääntyvien kuluttajien kannalta merkityksellisiin yksilöllisiin eroihin. Tarkasteltavia tekijöitä ovat kognitiivinen ikä (koettu ikä), teknologia-ahdistus, aikaisempi kokemus ja subjektiivinen normi (sosiaalinen paine).

Kirjallisuuskatsauksen ja teoreettisen keskustelun pohjalta työssä muodostetaan teoreettinen malli, joka kuvaa mobiilien sisältöpalveluiden omaksumiseen vaikuttavia tekijöitä ikääntyvien kuluttajien keskuudessa. Malli ja sen perusteella asetetut 18 hypoteesia testataan tutkimuksen empiirisessä osiossa. Empiiriselle osiolle asetetut tutkimusongelmat ovat seuraavat:

> 1) Selittävätkö teknologian hyväksymisen mallin (Technology Acceptance Model, TAM) tekijät (käsitys hyödyllisyydestä, viihdyttävyydestä ja helppokäyttöisyydestä) mobiilien sisältöpalveluiden omaksumista suomalaisissa suurissa ikäluokissa?

> 2) Millainen vaikutus yksilöllisillä eroilla (kognitiivinen ikä, teknologia-ahdistus, aikaisempi kokemus ja subjektiivinen normi) on suomalaisten suurten ikäluokkien käsityksiin mobiilien sisältöpalveluiden hyödyllisyydestä, viihdyttävyydestä ja helppokäyttöisyydestä sekä aikomukseen käyttää kyseisiä palveluita?

Tutkimuksen tutkimusote on kvantitatiivinen. Aineisto kerättiin strukturoidulla postikyselyllä kesällä 2005. Kyselylomake lähetettiin 1500 suomalaiselle suuriin ikäluokkiin kuuluvalle kuluttajalle. Satunnaisotos ostettiin Väestörekisterikeskukselta. Kyselyn vastausprosentti oli 41,3 (aineistossa on 620 vastaajaa). Pääasiallisena tilastollisena analyysimenetelmänä tutkimuksessa käytetään rakenneyhtälömallinnusta (Structural Equation Modelling, SEM), joka tehtiin LISREL-ohjelmalla.

Tutkimuksessa kävi ilmi, että yleinen teknologian hyväksymisen malli (TAM) selittää mobiilien sisältöpalveluiden omaksumista suomalaisten suurten ikäluokkien osalta erittäin hyvin. Käsitykset hyödyllisyydestä, viihdyttävyydestä ja helppokäyttöisyydestä ovat siis merkittäviä omaksumisen kannalta. TAM selitti jopa 86 prosenttia vastaajien aikomuksesta käyttää mobiileja sisältöpalveluja. Lisäksi kaikki neljä tutkittua yksilöllistä eroa osoittautuivat oleellisiksi teknologian omaksumisen kannalta.

Tutkimuksen tulosten mukaan *kognitiivinen ikä* vaikuttaa käsitykseen mobiilien sisältöpalveluiden helppokäyttöisyydestä. Lisäksi sillä on suora vaikutus aikomuksiin käyttää palveluja. Kognitiivinen ikä myös selittää teknologian omaksumista kronologista ikää paremmin. *Teknologia-ahdistus* vaikuttaa käsityksiin mobiilien sisältöpalveluiden helppokäyttöisyydestä. *Aikaisempi kokemus* mobiilien sisältöpalveluiden käytöstä (sekä käytön määrä että käytettyjen palveluiden määrä) vaikuttaa käsityksiin hyödyllisyydestä, viihdyttävyydestä ja helppokäyttöisyydestä. Lisäksi aikaisemmalla kokemuksella on suora vaikutus aikomukseen käyttää palveluita. Se, käyttääkö henkilö yleensä tekstiviestejä, vaikuttaa käsitykseen mobiilien sisältöpalveluiden helppokäyttöisyy-

destä ja viihdyttävyydestä. Samoin kokemus Internetin käytöstä vaikuttaa käsitykseen helppokäyttöisyydestä. Yksilöllisistä eroista voimakkain vaikutus on subjektiivisella normilla. Sillä on huomattava vaikutus sekä käsityksiin mobiileista sisältöpalveluista (hyödyllisyys, viihdyttävyys ja helppokäyttöisyys) että suoraan aikomukseen käyttää palveluita.

Työn tärkein teoreettinen anti on malli, joka kuvaa ikääntyvien kuluttajien mobiilien sisältöpalveluiden omaksumiseen vaikuttavia tekijöitä. Lisäksi tulos, jonka mukaan subjektiivisella normilla on voimakas vaikutus omaksumiseen, tuo uutta tietoa ikääntyviä kuluttajia koskevaan keskusteluun. Ikääntyvien kuluttajien ei ole ajateltu olevan alttiita muiden mielipiteille vaan heidän on uskottu luottavan pääasiassa omiin kokemuksiinsa. Tämän tutkimuksen tulokset haastavat aikaisemman käsityksen. Työssä myös todennetaan oletus, jonka mukaan kognitiivinen ikä selittää ikääntyvien teknologiakäsityksiä kronologista ikää paremmin. Teoreettisena antina TAM-malliin pohjautuvaan kirjallisuuteen voidaan pitää uusien käsitteiden (kognitiivinen ikä, teknologia-ahdistus ja osittain myös subjektiivinen normi) yhdistämistä TAM-malliin.

Käytännön toimijoiden kannalta myös työn kuvailevat tulokset ovat merkityksellisiä. Tulokset osoittivat, että suomalaisiin suuriin ikäluokkiin kuuluvat kuluttajat kokevat itsensä kronologista ikäänsä nuoremmiksi. He eivät myöskään ole perinteisten stereotypioiden mukaisesti teknologia-ahdistuneita. Näin ollen heitä ei tulisi rajata teknologisten tuotteiden markkinoinnin kohderyhmien ulkopuolelle.

Kuvailevien tulosten perusteella voidaan myös sanoa, että suomalaiset ikääntyvät kuluttajat eivät pidä mobiileja sisältöpalveluja erityisen hyödyllisinä, viihdyttävinä tai helppokäyttöisinä. Nämä käsitykset kuitenkin selittävät voimakkaasti aikomusta käyttää kyseisiä palveluja. Markkinoijien tulisikin ottaa nämä tekijät huomioon tuotteiden suunnittelun lisäksi myös markkinointiviestinnässään. Myös yksilöllisten erojen vaikutuksesta mobiilien sisältöpalveluiden omaksumiseen voidaan tehdä monia henkilökohtaiseen myyntityöhön sekä muihin markkinointiviestinnän keinoihin liittyviä käytännön johtopäätöksiä.

Tutkimuksen rajoitteista tulee mainita aikomusten käyttäminen selitettävänä tekijänä. Todellinen mobiilien sisältöpalveluiden käyttö olisi tietysti ollut selitettävänä tekijänä hyvin kiinnostava. Aikomuksia ja todellista käyttöä ei kuitenkaan voida mitata samanaikaisesti. Todellisen käytön mittaaminen olisi vaatinut pitkittäisasetelman käyttöä. Lisäksi tutkimuksen tulokset ovat jossain määrin sidoksissa sekä paikkaan että aikaan. Niinpä tulokset ovatkin suoraan yleistettävissä vain tämän päivän 50–60-vuotiaisiin suomalaisiin kuluttajiin. Erityisesti subjektiivisen normin vaikutus omaksumiseen lienee kulttuurisidonnainen ilmiö. Lisäksi käsitykset ikääntymisestä, varsinkin psykologisesta ja sosiaalisesta ikääntymisestä, ovat jatkuvassa muutoksessa. Nämä muutokset tulevat vaikuttamaan myös ikääntyvien kuluttajien kuluttajakäyttäytymiseen.

Yksittäisessä tutkimuksessa voidaan tutkia vain rajallista tekijäjoukkoa. Tulevaisuudessa on tarvetta tutkimukselle, joka jatkaa ikääntyvien kuluttajien teknologisten palveluiden omaksumiseen vaikuttavien tekijöiden kartoittamista. Lisäksi tutkimusta voitaisiin jatkaa vertailevalla otteella, jolloin selvitettäisiin ikääntyvien ja nuorempien kuluttajien eroja teknologian omaksumisessa.

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138

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Appendix 1
Questionnaire Items

The following questions and items were employed in the study. The original questionnaire was in Finnish. In the questionnaire the items measuring perceived usefulness, perceived ease of use, perceived enjoyment, intention, subjective norm and others' use were in mixed order under two questions. For these items the following instruction was given:

> Please assess the following statements regarding mobile content services on a scale of 1 to 7. (Scale: 1 = Completely disagree, 7 = Completely agree)

> While assessing the following statements you may consider the services that you have actually used as well as the services you could see yourself using in the future. If you have not used any mobile content services you may assess the statement solely on the basis of your mental impression of these services.

TAM's variables

- -

Perceived Usefulness
1) Using mobile content services makes it easier for me to use certain services. (PU1)
2) I find mobile content services useful. (PU2)
3) Using mobile content services enables me to accomplish tasks more quickly. (PU3)
4) Using mobile content services improves my performance in certain tasks. (PU4)

- -

Perceived Ease of Use
1) Learning to use mobile content services is easy for me. (PEOU1)
2) It is easy for me to become skilful in using mobile content services. (PEOU2)
3) I find mobile content services easy to use. (PEOU3)
4) I find it easy to get a mobile content service to do what I want it to do. (PEOU4)

- -

Perceived Enjoyment
1) I have fun using mobile content services. (PE1)
2) I find using mobile content services to be enjoyable. (PE2)
3) Using mobile content services is pleasant. (PE3)

- -

- -

Intentions

1)   I intend to use mobile content services during the forthcoming year. (INTEN1)
2)   I plan to use mobile content services during the forthcoming year. (INTEN2)
3)   I will try to use mobile content services during the forthcoming year. (INTEN3)

- -

Individual Difference Variables

- -

Cognitive Age

Response alternatives: 20-29, 30-39, 40-49, 50-59, 60-69, 70-79, 80-89-year-old

1)   I feel as though I am… (FEELAGE)
2)   I look as though I am… (LOOKAGE)
3)   I do most things as though I were… (DOAGE)
4)   My interests are mostly those of a person who is… (INTAGE)

- -

Technology Anxiety

Scale: 1 = Completely disagree, 7 = Completely agree

1)   I am confident I can learn technology-related skills. (TECHANX1)
2)   I have difficulty understanding most technological matters. (TECHANX2)
3)   I feel apprehensive about using technology. (TECHANX3)
4)   When given the opportunity to use technology, I fear I might damage it in some way. (TECHANX4)
5)   I am sure of my ability to interpret technological output (e.g., error messages and directions). (TECHANX5)
6)   Technological terminology sounds like confusing jargon to me. (TECHANX6)
7)   I have avoided technology because it is unfamiliar to me. (TECHANX7)
8)   I am able to keep up with important technological advances. (TECHANX8)
9)   I hesitate to use technology for fear of making mistakes I cannot correct. (TECHANX9)

- -

- -

Experience in Using Different Mobile Content Services
Scale: 1 = Never, 2 = Tried once or twice, 3 = Less than once a month, 4 = 1-3 times a month, 5 = 1-2 times a week, 6 = 3-5 times a week, 7 = daily
1) Downloading of ringing tones
2) Downloading wallpapers or logos
3) Games (downloading a game or playing a mobile online game)
4) Contests/votes (taking part to a contest/vote using text messaging)
5) Search services
 (e.g., phone number search based on name through sending a text
 message to a service provider)
6) TV-Chat (message sent as a text message, appears on the TV screen)
7) News (SMS or WAP)
8) Sports news (SMS or WAP)
9) Weather report (SMS or WAP)
10) Balance check (checking the amount of one's mobile phone bill with the
 help of a text message service)
11) Mobile banking services
12) Ticket reservations (e.g., booking tickets through a WAP service)
13) Entertainment services (e.g., horoscopes, jokes, poems, hints etc.)
14) Local Traffic tickets
15) Paying parking fees with a mobile phone
16) Vending machine payments (e.g., soft drink, car wash)
17) Timetables (SMS or WAP, e.g., air traffic, local traffic)
18) Person location service (locating another mobile phone user)
19) Service location service (locating nearby services, e.g., the nearest
 pharmacy)
20) Map services (address and route searches)

- -

Overall, how often have you used mobile content services during the last year?
(FREQ MCS)
1) Never
2) Tried once or twice
3) Less than once a month
4) 1-3 times a month
5) 1-2 times a week
6) 3-5 times a week
7) daily

- -

Other Relevant Prior Experience
Scale: 1 = No experience, 7 = High level of experience
1) I have used a mobile phone for text messaging. (SMS)
2) I have used the Internet. (INTERNET)

- -

Subjective Norm

1) Most people who are important to me think that I should use mobile content services. (SN2)
2) It is expected of me that I use mobile content services during the forthcoming year. (SN1)
3) Most people who are important to me use mobile content services. (OTHERS1)
4) The people in my life whose opinions I value use mobile content services. (OTHERS2)

Demographics

Gender

1) Female
2) Male

Year of Birth: 19___

Employment Status

1) Employee
2) Self-employed
3) Retired
4) Part-retired
5) Unemployed or temporarily laid off
6) Student
7) Taking care of one's own household or family member

Profession

1) Higher white-collar
2) Lower white-collar
3) Blue-collar

Highest Completed Training or Degree

1) Elementary / Middle / Comprehensive school
2) High school diploma
3) Vocational school or comparable
4) Higher vocational diploma
5) University degree
6) Other

Children
1)   Yes
2)   No

Marital Status:
1)   Married
2)   Cohabiting
3)   Single
4)   Widowed
5)   Divorced/ Separated

District of Residence
1)   Metropolitan area (Helsinki, Vantaa, Espoo, Kauniainen)
2)   A city with more than 100 000 citizens (Tampere, Turku, Oulu)
3)   A city with more than 50 000 citizens
      (Lahti, Kuopio, Jyväskylä, Pori, Lappeenranta, Joensuu, Vaasa, Kotka)
4)   Other part of the country

Gross Income
1)   500 euro per month or under
2)   501-1000 euro per month
3)   1001-1500 euro per month
4)   1501-2000 euro per month
5)   2001-2500 euro per month
6)   2501-3000 euro per month
7)   More than 3000 euro per month

Mobile Phone Use

Do you have a mobile phone in use?
1)   Yes
2)   No

How long have you had a mobile phone in use?
1)   Under a year
2)   1-2 years
3)   3-4 years
4)   5 years or longer

Who pays your mobile phone bill?
1) I do
2) My employer
3) Someone else

Do you have WAP settings in your mobile phone?
1) I don't know
2) Yes
3) No

Do you have MMS settings in your mobile phone?
1) I don't know
2) Yes
3) No

Experience

Scale: 1 = No experience, 7 = High level of experience

1) I have used a mobile phone for making phone calls.
2) I have used a mobile phone for sending picture messages.

Appendix 2
Univariate and Multivariate Normality for Continuous Variables*

Test of Univariate Normality for Continuous Variables

	Skewness		Kurtosis		Skewness and Kurtosis	
Variable	Z-Score	P-Value	Z-Score	P-Value	Chi-Square	P-Value
SN1	11.426	0.000	4.684	0.000	152.487	0.000
SN2	10.576	0.000	3.798	0.000	126.282	0.000
OTHERS1	5.102	0.000	-5.560	0.000	56.947	0.000
OTHERS2	5.876	0.000	-5.540	0.000	65.216	0.000
PU1	7.544	0.000	-2.382	0.017	62.592	0.000
PU2	11.668	0.000	5.428	0.000	165.615	0.000
PU3	6.953	0.000	-3.322	0.001	59.386	0.000
PU4	11.262	0.000	4.660	0.000	148.548	0.000
PEOU1	3.767	0.000	-11.124	0.000	137.942	0.000
PEOU2	5.379	0.000	-8.422	0.000	99.864	0.000
PEOU3	6.189	0.000	-3.785	0.000	52.627	0.000
PEOU4	7.954	0.000	-0.219	0.826	63.308	0.000
INTEN1	12.351	0.000	6.319	0.000	192.469	0.000
INTEN2	9.767	0.000	2.200	0.028	100.238	0.000
INTEN3	8.383	0.000	-0.133	0.894	70.290	0.000
PE1	12.174	0.000	5.829	0.000	182.180	0.000
PE2	10.278	0.000	3.970	0.000	121.390	0.000
PE3	8.040	0.000	1.496	0.135	66.878	0.000
TECHANX1	8.279	0.000	-0.536	0.592	68.826	0.000
TECHANX2	6.390	0.000	-5.344	0.000	69.397	0.000
TECHANX3	8.059	0.000	-2.027	0.043	69.060	0.000
TECHANX4	8.432	0.000	-1.606	0.108	73.676	0.000
TECHANX5	3.674	0.000	-15.058	0.000	240.247	0.000
TECHANX6	-0.063	0.950	-110.003	0.000	12100.622	0.000
TECHANX7	3.973	0.000	-22.591	0.000	526.161	0.000
TECHANX8	-0.409	0.682	-15.129	0.000	229.056	0.000
TECHANX9	5.498	0.000	-9.954	0.000	129.325	0.000
SMS	-7.272	0.000	-4.541	0.000	73.509	0.000
INTERNET	-5.503	0.000	-28.337	0.000	833.280	0.000
FREQMCS	13.769	0.000	7.046	0.000	239.237	0.000
FEELAGE	-6.429	0.000	4.778	0.000	64.160	0.000
LOOKAGE	-2.014	0.044	5.694	0.000	36.472	0.000
DOAGE	-3.678	0.000	3.187	0.001	23.682	0.000
INTAGE	-3.438	0.001	2.158	0.031	16.480	0.000
VARIETYMCS	9.214	0.000	3.074	0.002	94.351	0.000

Relative Multivariate Kurtosis = 1.205

Test of Multivariate Normality for Continuous Variables

Skewness			Kurtosis			Skewness and Kurtosis	
Value	Z-Score	P-Value	Value	Z-Score	P-Value	Chi-Square	P-Value
------	-------	-------	-------	-------	-------	----------	-------
183.367	59.736	0.000	1560.979	27.909	0.000	4347.320	0.000

*counted for imputed data with no missing values, n=584

Appendix 3
The Polychoric Correlations for the Observed Variables of TAM

	PU1	PU2	PU3	PU4	PEOU1	PEOU2
PU1	1.00000					
PU2	0.66166	1.00000				
PU3	0.62508	0.61422	1.00000			
PU4	0.61338	0.65577	0.71494	1.00000		
PEOU1	0.46102	0.39453	0.32312	0.28020	1.00000	
PEOU2	0.44862	0.51778	0.43148	0.38771	0.69400	1.00000
PEOU3	0.40096	0.42316	0.40395	0.43286	0.68533	0.73643
PEOU4	0.47959	0.47174	0.46076	0.50393	0.62200	0.67811
INTEN1	0.62433	0.65043	0.55948	0.54432	0.45698	0.47241
INTEN2	0.60940	0.64542	0.61916	0.63985	0.38996	0.44070
INTEN3	0.59724	0.66141	0.59601	0.65170	0.39429	0.48582
PE1	0.71162	0.72131	0.59128	0.64666	0.40010	0.43718
PE2	0.61558	0.69611	0.60331	0.72062	0.44161	0.46595
PE3	0.57839	0.61395	0.58649	0.65917	0.47103	0.53812

	PEOU3	PEOU4	INTEN1	INTEN2	INTEN3	PE1
PEOU3	1.00000					
PEOU4	0.74626	1.00000				
INTEN1	0.48153	0.48982	1.00000			
INTEN2	0.49088	0.51393	0.70065	1.00000		
INTEN3	0.50825	0.52588	0.69587	0.82767	1.00000	
PE1	0.42185	0.44024	0.59819	0.61331	0.62341	1.00000
PE2	0.54444	0.58936	0.62214	0.66364	0.73465	0.74196
PE3	0.61340	0.62375	0.59123	0.63975	0.70839	0.64506

	PE2	PE3
PE2	1.00000	
PE3	0.78203	1.0000

Appendix 4
Correlations between Latent Individual Difference Variables (Chronological Age Included)

	chronological age	subjective norm	others' use	technology anxiety	SMS experience
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chronological age	1.00000				
subjective norm	-0.11425	1.00000			
others' use	-0.08238	0.67612	1.00000		
technology anxiety	0.06833	0.00944(ns)	-0.09117	1.00000	
SMS experience	-0.08123	0.06970(ns)	0.16386	-0.23473	1.00000
Internet experience	-0.10190	0.16808	0.25292	-0.63033	0.53198
frequency of service use	-0.35613	0.30445	0.29490	-0.20967	0.30801
cognitive age	0.34348	-0.27342	-0.13306	0.18936	-0.17530
variety of services used	-0.13018(ns)	0.34370	0.20933	-0.10678	0.36444

	Internet experience	frequency of service use	cognitive age	variety of services used
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Internet experience	1.00000			
frequency of service use	0.34170	1.00000		
cognitive age	-0.19379	-0.35056	1.00000	
variety of services used	0.24127	0.44745	-0.21715	1.00000

Appendix 5
Correlations of Technology Anxiety Items with Items of Perceived Ease of Use,
Usefulness and Enjoyment

	PEOU1	PEOU2	PEOU3	PEOU4
TECHANX2	−0.46	−0.40	−0.38	−0.30
TECHANX3	−0.41	−0.38	−0.39	−0.25
TECHANX4	−0.43	−0.41	−0.38	−0.28
TECHANX6	−0.40	−0.37	−0.33	−0.30
TECHANX7	−0.55	−0.55	−0.51	−0.42
TECHANX9	−0.44	−0.45	−0.45	−0.38

	PU1	PU2	PU3	PU4
TECHANX2	−0.04	−0.01	0.05	0.04
TECHANX3	−0.02	−0.02	−0.02	0.02
TECHANX4	−0.06	−0.04	−0.02	0.02
TECHANX6	−0.14	−0.13	−0.08	−0.05
TECHANX7	−0.17	−0.18	−0.12	−0.08
TECHANX9	−0.12	−0.08	−0.04	−0.02

	PE1	PE2	PE3
TECHANX2	−0.03	−0.12	−0.09
TECHANX3	0.00	−0.11	−0.11
TECHANX4	0.01	−0.09	−0.16
TECHANX6	−0.09	−0.12	−0.13
TECHANX7	−0.14	−0.22	−0.25
TECHANX9	−0.04	−0.13	−0.17