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ABSTRACT

While promising appealing benefits to consumers and increased revenues for stakeholders, Mobile TV success remains very uncertain with disappointing adoption levels. The literature suggests there is no comprehensive theoretical framework for explaining and understanding the adoption of Mobile TV services, from an individual consumer's point of view.

Our research focuses on identifying the adoption determinants of Mobile TV and proposes a new theoretical framework for better understanding the adoption of new mobile services from consumers' point of view.

We conducted an extensive review of the literature on technology and innovations adoption covering the fields of IT, Marketing, Psychology and Communications and identified some gaps, namely the need for more specific and comprehensive models and the need for theory integration.

We endorsed a post-positivist research paradigm and combined qualitative and quantitative techniques for data collection and analysis. Therefore, we first carried out a two-step exploratory qualitative research consisting on a series of personal interviews with selected key industry experts and focus groups with actual adopters and potential adopters of Mobile TV.

Based on the literature review together with findings from the individual and group interviews, we presented a new comprehensive value-centric framework that integrates theories and constructs from different fields of research, fulfilling identified theoretical gaps.

Next, we carried out a quantitative study by the means of a survey, to empirically test and validate our proposed model and assess consumers' behavior towards the adoption of Mobile TV services.

We conclude by discussing our findings and their implications, outlining the study limitations, its theoretical and practical contributions and making suggestions for future research.

KEYWORDS: Mobile TV, Uses and Gratifications, Consumer Value, Technology Adoption.

JEL: M31 and L86

RESUMO

Apesar de prometer benefícios atractivos para os consumidores e aumentos nas receitas dos *stakeholders*, o sucesso da *Mobile TV* é extremamente incerto e os níveis de adopção actuais são decepcionantes. A literatura sugere não existir nenhum modelo teórico abrangente para explicar e compreender a adopção do serviço de *Mobile TV*, do ponto de vista do consumidor.

A nossa investigação centra-se na identificação dos determinantes da adopção da *Mobile TV* e propõe um novo enquadramento teórico para compreender melhor a adopção de novos serviços móveis, na perspectiva do consumidor.

Foi conduzida uma revisão exaustiva da literatura sobre a adopção de tecnologias e de inovações em geral, abarcando os domínios das Tecnologias de Informação, do Marketing, da Psicologia e da Comunicação, tendo sido identificadas algumas lacunas, nomeadamente a falta de modelos mais específicos e mais exaustivos bem como uma necessidade de integração de teorias existentes.

A nossa investigação subscreve um paradigma pós-positivista, tendo-se recorrido a técnicas qualitativas e quantitativas de recolha e análise dos dados. Assim, conduziu-se inicialmente um estudo qualitativo exploratório que consistiu em duas etapas: entrevistas pessoais com especialistas-chave da indústria e entrevistas em grupo com utilizadores actuais e potenciais do serviço de *Mobile TV*.

Com base na revisão da literatura e nas conclusões das entrevistas individuais e em grupo, apresentou-se um novo enquadramento teórico exaustivo, centrado no valor para o consumidor, e integrando teorias e constructos provenientes de diversos domínios de investigação, colmatando algumas das lacunas teóricas identificadas.

Seguidamente, conduziu-se um estudo quantitativo através de sondagem aos consumidores, com o objectivo de testar e validar empiricamente o modelo teórico proposto e de aferir sobre o comportamento do consumidor relativamente à adopção do serviço de *Mobile TV*.

Este trabalho termina com a discussão dos resultados e respectivas implicações, realçando-se as limitações do estudo, as suas contribuições teóricas e empresariais e deixando sugestões para futuras investigações.

Palavras-chave: *Mobile TV*, Usos e Gratificações, Valor Percebido, Adopção de Tecnologias.

JEL: M31 e L86

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APPENDIX C: Categorization of the Answers to Q25 e Q37 of the Survey Questionnaire**Error! Bookmark not defined.**

LIST OF ABBREVIATIONS

BI: Behavioral Intention

DOI: Diffusion of Innovations (Diffusion of Innovations Theory- Rogers, 1969-2003)

EoU: Ease of Use (variable from the Technology Acceptance Model- Davis,

EPG: Electronic Program Guide

ICT's: Information and Communication Technologies

IS: Information Systems

IT or IT's: Information Technologies

PC: Personal Computer

QoS: Quality of Service

SCT: Social Cognitive Theory (Bandura, 1986)

SEM: Structural Equation Modeling

SMS: Short Message Service

SW: Software

TAM: Technology Acceptance Model (Davis, 1989)

TPB: Theory of Planned Behavior (Ajzen, 1991)

TRA: Theory of Reasoned Action (Fishbein and Ajzen, 1975)

U&G: Uses and Gratifications (Uses and Gratifications Theory- Blumler and Katz, 1974)

UTAUT: Unified Theory of Acceptance and Use of Technology (Venkatesh et al., 2003)

1. INTRODUCTION

1.1 Research Context and Foundation

1.1.1 Background on Mobile Telephony Services

Over the last few years, the mobile telecommunications sector evolved at an incredible pace with mobile telephones and mobile service innovations quickly proliferating on a global scale, offering new and never imagined ways of communicating.

Mobile telephony is probably the ICT that experienced the faster diffusion worldwide and the sector is by far the most dynamic segment of the telecommunications industry. Mobile telephones became universal commodities, deeply rooted in individuals' lives, being the portable medium most frequently used (Wehmeyer, 2007). At the end of 2010, the penetration rate of mobile telephones in EU-27 was 124%, ranging from 154% in Italy to 94% in France; Portugal ranked in the 2nd place of the highest penetration countries with 152% penetration (source European Commission, Digital Agenda Scoreboard, 2011). Mobile telecommunications' penetration rates are currently higher than those of fixed communications in the majority of developed countries and this trend is not likely to reverse.

While originally, the main function of mobile telephony was to allow permanent accessibility through voice communication ability, much has changed since mobile phones were first launched in the 80's until the most recent third and fourth generation mobiles. Through the time, they have been added broader functionalities and services such as music, text, photography and video. The mobile phone as we know it, is much more than a tool for calling and being called. It integrates a variety of functions in a single handset and has become a lifestyle accessory that helps individuals control and enrich their lives in the spheres of work and leisure by sending and receiving text or images, playing music and games, making small payments, taking pictures or accessing the Internet.

These advanced functionalities aim to encourage users to try out new services of higher added value than voice but, for some of them, adoption did not progress as expected. Each new service or feature was once new and full of promise for producers and sellers. But many of their expectations never really came to fruition. For example, while mobile phones with an integrated camera became very popular in a short time (Bouwman *et al.*, 2007), some value-

added services like sending messages with photos or with videos or even video-calls did not take-up globally as expected by the industry. Yet, the fast explosion in the number of mobile subscribers worldwide driven by the desire to eliminate communication distance and time makes of mobile telephony one of the most successful innovations of the last decades.

Thus, it is no wonder wireless communications have received growing attention from the industry and also from the academic community. It has become increasingly common to find academic research on mobile telecommunications originating from different research fields like telecommunications, information systems, marketing, management, sociology and psychology (Shim *et al.*, 2008). For instance, some articles focus on its diffusion (e.g., Giovanis and Skiadas, 2007; Gruber and Verboven, 2001a, 2001b), others on strategic issues or business models (e.g., Braet and Ballon, 2008; Tadayoni and Henten, 2006; Whalley and Curwen, 2003, 2005), others on adoption by consumers (e.g., Carlsson, 2006; Hsu *et al.*, 2007; Pagani, 2004), on sociological aspects (e.g. Brown and Brown, 2008) or on competition in different markets (Doganoglu and Grzybowski, 2007; Kim and Kwon, 2003; Valletti and Cave, 1998).

Several reasons justify the interest in the study of the sector. From a social point of view, its relevance is undeniable, as this activity redefined the way individuals communicate and has significantly changed users' habits: more than a simple communication medium, the mobile phone became a kind of "Swiss army knife" of technological devices with a range of different functions for specific tasks (Shim *et al.*, 2008). From an economic and business point of view, its growth in the last few years has been impressive and it gave rise to a wide range of new services and revenue sources for mobile operators and other stakeholders.

1.1.2 Mobile TV Market Background

Just like voice, music, text and image, TV and video services have also migrated to the world's most popular electronic device- the mobile phone (Joint Mobile TV Group, 2006).

Mobile TV combines the two best-selling consumer products in history- TVs and mobile phones (Schatz *et al.*, 2007). Indeed, television is one of the most successful communications and entertainment media and it has influenced culture, politics and personal behavior for seven decades (IDC, 2008). On the other side, the device "formerly known as the cell phone" has become vital to over 4 billion mobile users worldwide. Thus, the potential of mobile

handsets as a media distribution and consumption platform seems obvious and Mobile TV is expected to succeed as a popular mass media service.

In the telecommunications sector, many industry studies and insights have shown indisputable confidence in mobile TV success and predicted it would become a mass-market service in few years. However, those great expectations are only an anticipation of marketers and analysts in the mobile telecommunications industry and currently, huge uncertainty, controversy and skepticism exist regarding the future of Mobile TV services.

Meanwhile, many companies around the globe, including mobile operators, mobile equipment suppliers and TV content producers and broadcasters, have spent considerable amounts of money on consumer trials and commercial launches in which diverse approaches have been taken to services, pricing, marketing and technology. Commercial Mobile TV services are available in several countries and numerous pilots and field trials took place all over the world. Those trials and effective launches have provided new experiences for operators and enabled them to collect invaluable information regarding consumer interest and acceptance, usage patterns, as well as to identify important technical and quality issues and business model directions (such as collaborations for shared mobile TV broadcast infrastructure). However, most trials have been implemented within limited conditions regarding access network/coverage, quality of service (namely transmission bit rates, reliability), limited content availability and terminals with limited features. Even many of the services currently available worldwide are not operating at optimum technical and commercial conditions leading to a very limited number of effective mobile TV subscribers. In these conditions, the results of commercial trials and launches are not fully conclusive indicators of users' potential adoption and satisfaction levels.

Mobile services' adoption depends on several factors including technological, political, regulatory, commercial, and social. Yet, consumer interest and demand is, for sure, the most critical one. The objective of our research is to provide a better understanding of the determinants of adoption of new personal mobile services (specifically, Mobile TV), in order to help telecom managers in their decision processes to minimize business risk and drive investments and resources to innovations that really worth it. At the same time, we develop and empirically test an appropriate adoption model that will hopefully lead to advance science by integrating and synthesizing previous knowledge together with new conceptual and methodological contributions.

1.2 Justification for Research

1.2.1 From a Management Perspective

Mobile telecommunications service providers in Portugal, as in the majority of developed countries with a high penetration of mobile telephony services, have been suffering sharp decreases in their traditional voice revenues due to the high maturity and competition levels attained in these markets (Jaspers *et al.*, 2007). To counter decreasing ARPUs in saturated markets, mobile operators around the world are looking for alternative revenue streams by offering higher value-added services such as third generation (3G) data and video services (Pagani, 2004), namely Mobile TV.

Currently, over 200 mobile operators around the world have launched Mobile TV services but, with the exception of very few countries like Korea and Japan, Mobile TV is still in its infancy globally with current adoption levels being disappointing. Consumers have been showing low levels of interest towards Mobile TV and industry players are skeptical regarding the demand and acceptance of these services (Pagani, 2009). Some industry studies suggest that a significant percentage of consumers are not willing to pay for this kind of service, which puts into question the validity of the business model itself: how will mobile telecommunications operators and content providers get any return from their investments?

Telecommunications is a “high-speed” industry, characterized by short product life cycles in which future demand is hard to foresee. In many instances, faced to increased pressure, companies tend to develop and launch new products/services driven by technology readiness rather than by market orientation, with consequent product failures.

There is huge uncertainty about Mobile TV future success and how it is going to develop. As previously said, this will depend on several factors of which consumer interest and demand is, for sure, the most critical one. From a market perspective, the interest of studying the adoption of Mobile TV services becomes evident: investigating the underlying drivers of Mobile TV use is crucial for service providers (and other players involved in the Mobile TV value chain) to better formulate their marketing strategy and to devise specifically tailored marketing actions to convert non-adopters to adopters. Furthermore, such investigation can provide insights into factors that service providers might leverage to promote effective and ongoing Mobile TV use. Mobile TV is a recent value-added mobile service that has not been

much investigated and any efforts to understand consumer use of this kind of services will assist business decision makers in providing products and services that are more responsive to consumers' needs while supporting them in their planning, production and marketing decisions. On the other hand, policy makers and regulatory authorities are also interested in identifying key factors affecting innovations adoption, in order to formulate policies that can foster this process.

Thus, we believe the outputs from our research will be of undoubtedly relevance for the telecommunications and media industries, for which the future of Mobile TV unveils much uncertainty, skepticism and unanswered questions. We expect the results and conclusions supplied by this study may provide orientation and support to marketers and managers in general of companies that have to deal with the development and implementation of new technological services.

Finally, we should highlight that Portugal, being one of the highest developed mobile telecommunications market in the World with a penetration rate of 158% by the end of 2011 (ANACOM, 2012), and whose diffusion rate was the highest in EU-15 (Giovanis and Skiadas, 2007), may be an emblematic case study in the context of Mobile TV services adoption.

1.2.2 From an Academic Perspective

An innovation refers to an idea or practice perceived as new by an individual, a group or an organization (Rogers, 1983). An innovation is not sufficient *per se* to achieve commercial success, economic growth and increased welfare for buyers and sellers (Gruber and Verboven, 2001). Many innovations fail even before reaching an “early adoption” phase. Uncertainty and unpredictability are both factors that add interest to the study of innovations adoption. Moreover, the fast development and increasing consumption of technological innovations brought new opportunities and challenges for citizens and organizations and introduced important social and cultural changes in the contemporary society, including changes in lifestyles, improved quality of life and faster, easier and deeper access to information and communications (Santos and Amaral, 2004).

All these factors make the adoption of technological innovations a relevant topic to research about, for several disciplines including marketing, sociology, psychology, information systems and strategic management.

A broad goal of research in this area has been to develop a general theory of innovations' adoption and diffusion. The specific field of mobile telecommunication services has been the subject of many researches, which have all provided valuable insights into the adoption of mobile technologies. Nonetheless, understanding the determinants of adoption remains only partially understood. Prior research on mobile and other technological innovations adoption has mainly subscribed one prominent model as theoretical framework and extended it with additional constructs. This and other theories have sometimes been merged into broader perspectives, which can still be criticized that important variables were neglected because few of the included predictors are fundamental or universal. In fact, we may expect different innovations to have different determinants that are significant to the adoption decision and new research is likely to uncover new predictors (Bagozzi, 2007; De Marez *et al.*, 2007).

As claimed by several renowned academicians (e.g., Bagozzi, 2007; Benbasat and Barki, 2007; Straub and Burton-Jones, 2007), through the last decades many theories and approaches have been developed to try to understand the reasons why consumers adopt technological innovations and this field of research has reached a stage of chaos with little coherent integration (Bagozzi, 2007). In spite of the wide range of alternative approaches, one model—the TAM (Davis, 1989), has occupied by far the central position in ICTs' adoption literature (Dwivedi *et al.*, 2008; Lucas *et al.*, 2007). Recently, the appropriateness of the TAM and similar models has been questioned as these models are considered too parsimonious and incomplete, more appropriate in organizational contexts, deterministic and tautological (Lopez-Nicolas *et al.*, 2008). ICTs' adoption is a field that requires a shift in focus from broad and parsimonious models to more specific and comprehensive ones, because adoption determinants of new ICTs' depend highly on the characteristics of the technology under study (De Marez *et al.*, 2007; Knutsen and Lyytinen, 2006; Ramdani and Kawalek, 2007; Shepers and Wetzels, 2007).

Moreover, extant theories are not fully adequate within the current market dynamics of consumer empowerment, in which consumers have a wide choice and a deeper knowledge of available technologies. This implies that, at the individual level, adoption decisions are likely

to be driven by product/service value criteria rather than by technology characteristics (Constantiou, 2009). In the case of Mobile TV, perceived benefits and willingness to pay are the most critical aspects that need to be explored and understood by researchers and industry players (Pagani, 2009). There is a need to understand which are the most important drivers influencing adoption, how to increase perceived value and the related willingness to pay for Mobile TV services (ibidem, 2008). Despite the rich body of research on individual adoption of technology and new mobile services, we should note that it has not yet offered a comprehensive explanation of the low demand for some services. Hence, there is room for new research to be developed that can address these limitations.

To understand the factors that influence the adoption of mobile services from a consumer point of view, there is a need to investigate and integrate theories from areas other than Information Systems, such as Marketing, Economics and Management. Several authors suggested the investigation of perceived costs and benefits associated with new mobile services in order to understand the most important drivers influencing adoption (Kim *et al.*, 2007; Kim and Han, 2009; Kleijnen *et al.*, 2007; Pagani, 2009).

Within the mobile services literature, despite an increasing number of studies based on value, they have not successfully explained how value creation mechanisms affect the adoption and consumption of mobile services and how they benefit the consumer experience (Jarvenpaa and Loebbecke, 2009). Furthermore, as suggested by several researchers (e.g., Bolton and Drew, 1991; Boksberger and Melsen, 2011), because the concept of value is context dependent, it is necessary to identify domain-specific value-antecedents and relationships (Kleijnen *et al.*, 2007). As from our literature review, previous research has not identified specific Mobile TV value antecedents that are crucial to understand consumers' adoption decisions.

Therefore, we believe our research totally justifies from an academic point of view as our choice to focus on individuals' voluntary adoption by combining inputs from the IS adoption field (e.g., ease of use; personal innovativeness) with related areas such as Marketing/Economics (consumer Perceived Value) and Communications (U&G), addresses previous suggestions of required specificity, comprehensive vs. parsimonious models and theory integration, advancing science by fulfilling previously mentioned limitations.

1.3 Research Objectives

The main general objective of our research is to provide a better understanding of consumer's adoption of Mobile TV by identifying and explaining the factors that determinate adoption of these services. In particular, our research aims to overcome limitations of existing models (as identified in the "Literature review" section) by proposing a new conceptual framework that integrates the perspectives of (1) technology and innovations' adoption, (2) television uses and gratifications, (3) consumer value and (4) quality of service.

More specific objectives of this study are:

- To provide a new model to explain consumers' intention to adopt Mobile TV services;
- To identify specific gratifications (benefits) of Mobile TV and examine their effect on consumers' evaluation of the service and consequent adoption intention;
- To identify consumers' perceived costs of Mobile TV and examine their effect on consumers' evaluation of the service and consequent adoption intention;
- To identify specific components of Mobile TV quality of service and examine how consumers' perceptions of those characteristics influence their perception of Mobile TV value and consequent adoption intention;
- To examine consumers' perceptions of the value of Mobile TV services and the effect of these perceptions on their adoption intention;

1.4 Research Questions

Our research tries to answer the general question: "Which are the determinants of Mobile TV adoption by individual consumers?"

Following to the literature review and having set the theoretical background of our research, we identified more specific research questions to address:

- Does Mobile TV bring any value to consumers and does it influence their adoption intention?
- What are the antecedents of consumers' perceived value of Mobile TV and how significantly do they contribute to consumers' Mobile TV value evaluation?
- What are the gratifications that consumers perceive from Mobile TV usage?
- Which drawbacks of Mobile TV do consumers anticipate that may slow down adoption?
- Which are the parameters of Mobile TV Quality of Service and how does it influence consumers' adoption decision?

Table 1: Summary of identified gaps, research objectives and research questions

Identified Gaps and Reasons for Research	Research Objectives	Research Questions
<p><u>Theoretical:</u></p> <ul style="list-style-type: none"> - In spite of the availability of several theories and studies related to the adoption of technological innovations, there is a need for theory integration and for shifting from broad and parsimonious models to more specific and comprehensive ones, because adoption depends highly on the characteristics of the innovation under study. - The literature suggests there is no comprehensive theoretical framework for explaining the adoption of Mobile TV services, from an individual consumer's point of view. - Extant theories are not adequate within the current market dynamics of consumer empowerment, in which consumers have a wide choice and a deeper knowledge of technologies taking decisions based more on product/service value criteria rather than on the technology characteristics. - Need to understand which are the most important drivers that influence adoption, how to increase perceived value and the related willingness to pay for Mobile TV services by investigating and integrating theories from areas other than Inf^o Systems. - Previous research has not identified specific Mobile TV value antecedents that are crucial to understand consumers adoption decisions, as the concept of value is context dependent. 	<p>To conceive a model that significantly contributes to advance scientific knowledge while at the same time, having practical relevancy and applicability.</p> <p><u>Theoretical objectives:</u></p> <ul style="list-style-type: none"> - To present a Marketing perspective of innovations' adoption that conceives the individual as a consumer rather than a technology adopter, as a better alternative to the technology acceptance and innovations' diffusion theories, traditionally used in IT literature. - To develop and empirically test a new comprehensive model to identify and explain consumers' adoption determinants of Mobile TV that integrates theories and constructs from different fields of research. - To assess consumers' perceptions of the value of Mobile TV services and the effect of those perceptions on their adoption intention; - To identify specific benefits and costs of Mobile TV and appraise their effect on consumers' evaluation of the service and subsequent adoption intention; - To identify specific components of Mobile TV quality of service and examine how consumers' perceptions of those parameters influence their service value perceptions and subsequent adoption intention; 	<p><u>General:</u></p> <p>Which are the determinants of Mobile TV adoption by individual consumers?</p> <p><u>Specific:</u></p> <ul style="list-style-type: none"> - Does Mobile TV bring any value to consumers and does it influence their adoption intention? - What are the antecedents of consumers' perceived value of Mobile TV and how significantly do they contribute to consumers' Mobile TV value evaluation? - What are the gratifications that consumers perceive from Mobile TV use? - Which drawbacks of Mobile TV do consumers anticipate that may slow down adoption? - Which are the parameters of Mobile TV Quality of Service and how does it influence consumers' adoption decision?

Table 1: Summary of identified gaps, research objectives and research questions
(continuation)

<p><u>Practical/Managerial:</u></p> <ul style="list-style-type: none"> - Mobile telecommunications service providers worldwide have been suffering sharp decreases in their traditional voice revenues and are looking for alternative higher value-added services such as Mobile TV. - Mobile operators and equipment suppliers worldwide have spent considerable amounts of money launching Mobile TV services but current adoption levels are disappointing and there is huge uncertainty regarding the future of Mobile TV services and how the companies will get any return from their investments. - Telecommunications is an industry characterized by short product life cycles in which future demand is hard to foresee. Faced to increased pressure, companies tend to develop and launch new products/services driven by technology readiness rather than by market orientation, with consequent product failures. Hence, investigating the drivers of Mobile TV use is crucial for mobile services' players to better formulate their marketing strategy in order to conquer adopters. - Mobile TV is a value-added mobile service that has not been much investigated and any efforts to understand consumer use of this kind of services will assist decision makers in providing products and services that are more responsive to consumers' needs while supporting them in their marketing decisions. 	<p><u>Practical objectives:</u></p> <ul style="list-style-type: none"> - Provide a better understanding of the determinants of consumer's adoption of Mobile TV in order to help managers minimize business risk and drive investments and resources to innovations that really worth it. - Provide orientation and support to managers regarding the success likelihood of new mobile services by helping them identify the key factors associated with consumers' adoption of those services. - Contribute to identify specific factors affecting the Mobile TV service value perceptions and subsequent adoption intentions that marketers need to take into consideration when promoting the service in order to facilitate adoption. - Help marketers conceiving a Mobile TV service that consumers more promptly adopt by identifying and taking into account the key factors that influence adoption, while also contributing to help them delineate effective marketing strategies. 	
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1.5 Research Paradigm

This project endorses the post-positivist paradigm, which has been gaining increased support in the last years (Trochim and Donnelly, 2006). Accordingly, the research design and methodology are settled in the principles and assumptions underlying post-positivism, which combines quantitative and qualitative techniques for data collection and analysis. For this purpose, the research uses a sequential multi-method approach in two phases: it combines the use of inductive qualitative data from consumers' focus groups and key industry experts interviews (more associated with the interpretive paradigm) with deductive quantitative survey data (in a second phase). In the second phase (more associated with the positivist paradigm), we developed our conceptual model by identifying different constructs that we isolated as input and output variables. Cause and effect relationships were established between them. The purpose of this approach is to test hypotheses that were specified during the conceptual model design and to form conclusions that can be generalized to other situations. We worked with quantitative techniques by applying clearly defined procedures and standardized data collection and analysis strategies, which facilitate the generalization of results. In this quantitative phase, the emphasis was upon measurement, comparison and objectivity. We proceeded to a triangulation of both techniques. Our exploratory qualitative research supplemented the quantitative survey and brought context and meaning to the quantitative study findings.

1.6 Methodological Approach

In order to pursue the objectives of this research project, we went through the following methodological steps:

- 1) Identify current market trends by examining mass media and recent industry publications;
- 2) Extensive review of the academic literature in order to identify existent gaps that we can, somehow, fulfill with our study in order to contribute to advances in the scientific domain;
- 3) Organize consumers' focus groups and key informants interviews to explore emerging issues, refine research questions, and gather impressionistic data on the specific subject of our research (which is new and highly unexplored);

- 4) Design the conceptual model and the survey instruments to capture data that will address and answer the previously defined research questions;
- 5) Field-test survey questions with members of the target groups, and refine the research instrument;
- 6) Collect and interpret final data, avoiding systematic bias to the extent possible.

This methodological approach is particularly well suited to social sciences research, namely in the marketing domain, allowing the utilization of both qualitative and quantitative techniques, gathering primary information, treating it and analyzing it in a quite efficient way.

1.7 Structure of the Dissertation

In the next chapter (chapter 2) we present the literature review, which is structured in four main sub-sections: technology and innovations' adoption, mobile services adoption, media uses and gratifications and value-based models. We close the chapter with a general critical review of the exposed theories and how our conceptual framework differs from previous research and tries to fulfill some of the identified gaps. Chapter 3 presents the exploratory qualitative research we have conducted (methodology, data collection and analysis) and its contributions to the conceptualization of the theoretical model. The proposed conceptual model with detailed constructs' definition, respective measures and research hypotheses are described in chapter 4. Chapter 5 discusses the methodology for the quantitative phase specifically: data collection procedures and criteria, sample decisions, measurement scales' decisions, questionnaire development, pre-test and final study application and, finally, the justification for the chosen data analysis techniques. Chapter 6 describes the quantitative data analysis procedures and results. Finally, in chapter 7, we present the discussion and implications of the main findings and close our research by presenting its practical and academic contributions, limitations and suggestions for future research.

2. LITERATURE REVIEW

This chapter presents the theoretical background of the dissertation and provides the foundations on which our research is built. Stemming from the literature review, industry information and our exploratory qualitative research, a conceptual model is proposed further on that guided the subsequent empirical research.

The specificity of our subject and mobile telecommunications in general has mainly been explored within the field of Information Systems/Information Technologies research. Therefore, initially, our literature review focalized for the most on this field which is deeply developed hereafter. It was not before having conducted the exploratory qualitative study that, following to participants inputs and respective conclusions, we realized the importance of other variables and fields of research and proceeded to an additional examination of the literature, namely on consumer perceived value, quality of service and the Uses and Gratifications theory.

In technologies and innovations adoption literature, several prominent models or theories were conceived based on the extension or improvement of precedent models (of which, some general consumer behavior models routed in social psychology like the Theory of Reasoned Action (Fishbein and Ajzen, 1975) and the Theory of Planned Behavior (Ajzen, 1985, 1991)). In order to fully understand the most recent models of technology adoption we found important to review their predecessors and be aware of their theoretical foundations.

As such, we begin with an overview of the most relevant general theories about consumer decision-making and behavior that have been applied in the ICT's adoption domain. Thereafter, major innovations diffusion and technology adoption theories are depicted followed by an overview of the literature regarding mobile telecommunications services, the Uses and Gratifications theory and consumer perceived value approaches.

We conclude with a global critical review of the theories that have been outlined and the gaps that our research and theoretical model intend to fulfill.

2.1 Consumer Decision-Process and Behavior Theories

As previously mentioned, though not pertaining specifically to the ICT's adoption literature, we analyze here two theories that have been particularly influent in the field. Predicting consumer behavior has been the major objective of several psychological and sociological theories and some of them have proved to be very successful within a wide diversity of contexts, namely the theory of reasoned action- TRA (Fishbein and Ajzen, 1975) and the theory of planned behavior- TPB (Ajzen, 1985, 1991) (Sheppard *et al.*, 1988; Mathieson, 1991; Madden *et al.*, 1992).

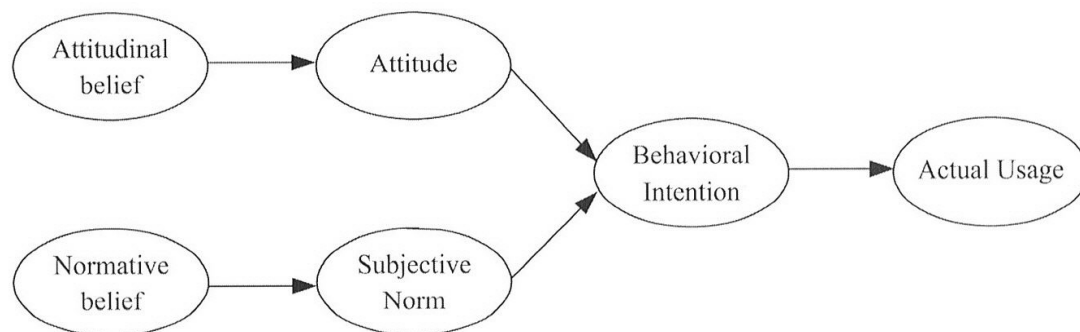
2.1.1 The Theory of Reasoned Action- TRA (Fishbein and Ajzen, 1975)

Conceptualized by Fishbein and Ajzen in 1975, the Theory of Reasoned Action aims to explain the relationship between attitudes, intention and actual behavior. It has two important assumptions (Madden *et al.*, 1992):

- The one that human beings are essentially rational and make systematic use of the information available when making decisions;
- The belief that an individual's behavior is under his total volitional control.

Stemming from these assumptions, the Theory of Reasoned Action holds that an individual's Actual Behavior is determined by his behavioral intention (BI) to perform that behavior: according to the TRA, behavioral intention provides the most accurate prediction of behavior (Fishbein and Ajzen, 1975) and is a function of two factors: one's Attitude towards the behavior and Subjective Norm. The model design is shown below:

Figure 1: The Theory of Reasoned Action- Conceptual model (Fishbein and Ajzen, 1975)



Ajzen and Fishbein (1980) define Attitude towards the behavior as a person's general feeling of favorableness or unfavorableness for that behavior. Subjective Norm is defined as an

individual's perception that most people who are important to him think he should or should not perform the behavior in question (ibidem, 1980). Attitude towards behavior results from one's attitudinal belief that performing the behavior will lead to certain outcomes, and an evaluation of those outcomes, i.e., rating of the desirability of the outcome. Variables that are external to the model are assumed to influence intentions only to the extent that they affect either attitudes or subjective norms (Fishbein and Ajzen, 1975).

The Theory of Reasoned Action has been successful in predicting human behavior and intentions applied to a large number of situations. In a meta-analysis of the TRA, Sheppard *et al.* (1988) concluded that the predictive utility of the theory was strong across different conditions. However, it fails when the behavior under study is not under full volitional control: *"actions that are at least in part determined by factors beyond individuals volitional control fall outside the boundary conditions established for the model"* (ibidem, 1988: 326). Its explanatory scope excludes a wide range of behaviors such as those that are spontaneous, impulsive, habitual, the result of cravings, or simply scripted or mindless (Benter and Speckart, 1979; Langer, 1989). Such behaviors are excluded because their performance might not be voluntary, or because engaging in the behaviors might not involve a conscious decision from the individual (as it is assumed by the TRA).

Sheppard *et al.* (1988) pointed out two other limitations: first, the fact that behavioral intention is predicted only by attitude and subjective norm is problematic because a variety of other factors determine whether the behavior is performed. Second, the model doesn't take into consideration the probability of failing to perform one's behavior or the consequences of such failure in determining one's intentions.

To try to overcome the limitation concerning "volitional control", Ajzen (1991) extended the Theory of Reasoned Action by adding another construct to predict behavioral intention and actual behavior: perceived behavioral control (PBC). The extended model is the Theory of Planned Behavior.

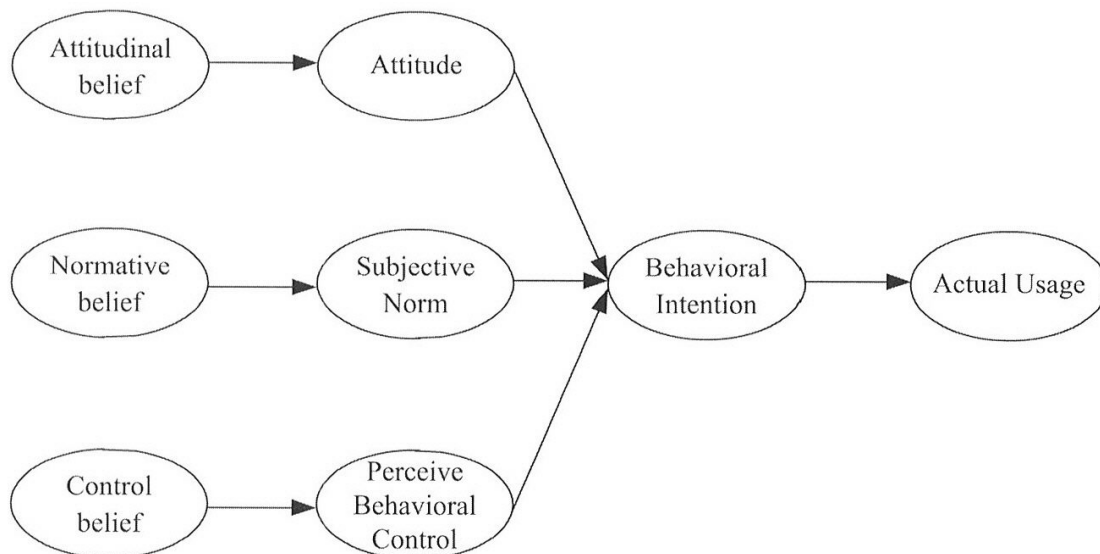
2.1.2 The Theory of Planned Behavior- TPB (Ajzen, 1985; 1991)

As stated above, the Theory of Planned Behavior is an extension of the Theory of Reasoned Action. Like TRA, it aims to explain the relationship between attitudes, intention and actual

behavior. Both theories postulate that actual behavior is determined by behavioral intention to perform that behavior which, in turn, is a function of attitude and subjective norm. The difference between the two is that, based on the assumption that not all the behaviors are under complete volitional control, the TBP includes the constructs of “perceived behavioral control” as an additional determinant of “behavioral intention”, as well as “control beliefs” which affect “perceived behavioral control” (see Figure 2).

Perceived Behavioral Control refers to an individual’s perception of how easy (or difficult) it is to perform a certain behavior (Ajzen, 1991). It is a function of control beliefs, which are the perception of the presence or absence of requisite resources and opportunities needed to carry out the behavior.

Figure 2: The Theory of Planned Behavior- Conceptual model (Ajzen, 1991)



In order to perform a certain behavior, one needs to have the resources and opportunities to do it. The perception of whether someone has the necessary resources or conditions will affect his intention to perform the behavior, as well as the successful performance of the behavior. If two individuals have the same level of intention to engage in a behavior, but one of them is more confident in his/her abilities, he/she is more likely to succeed than the one who doubts (Azjen, 1991).

The Theory of Planned Behavior has proved its robustness across various situations in predicting the performance of intentions and behavior. It has been used in many specific studies in the information systems literature (e.g. Mathieson, 1991; Taylor and Todd, 1995;

Harrison *et al.*, 1997; Morris *et al.*, 2005), in which it proved its validity to predict individual use and adoption of automated tools in the workplace. The TRA and the TPB have also supported several studies on Internet adoption behavior (e.g., Bhattacharjee, 2000; George, 2002; Oh *et al.*, 2003). When compared to the TRA, Madden *et al.* (1992) found that the Theory of Planned Behavior had a better predictive power.

Meta-analytic evidence from the health care setting indicates that the TBP explains about 41%-50% of the variance in intention and 28%-34% of the variance in behavior (Morris *et al.*, 2005). In a technology adoption study comparison, Taylor and Todd (1995) concluded that the TPB explained 57% of the variance in intention and 34% of the variance in behavior. These figures show that, in spite of the strong predictive power of the TPB, a large proportion of the potentially explainable variance remains unexplained. To overcome this limitation, Conner *et al.* (2000) suggest the inclusion of “additional variables” and “moderator variables” in further research based on the Theory of Planned Behavior.

The TPB is a general model of behavior developed in psychology, which has been applied and sometimes adapted to study technology adoption (Morris *et al.*, 2005). As a general theory, the TPB does not specify the particular beliefs that are associated with any particular behavior so, determining those beliefs is left up to the researcher.

According to Morris *et al.* (2005: 71), “*While there has been a number of studies of individual adoption and use of technology using the TPB, the vast majority of this research has not examined the potential dynamic influences of individual user differences*”. The original TPB model, doesn’t take into account individual differences (for example, demographic or psychographic). Consequently, most studies in the technology adoption domain suggest that demographic characteristics are less important than characteristics of the technology itself in determining if the technology will be accepted or rejected by potential adopters. There has been further work that adopted a more “consumer-centric” perspective by testing the role of demographic characteristics, namely age and gender (e.g. Venkatesh, 2000; Venkatesh *et al.*, 2000; Morris *et al.*, 2005). Results provided evidence that the relationships posited by the Theory of Planned Behavior can benefit from the inclusion of moderators that are relevant to the behavior in question: those studies concluded that extending the TPB to include the moderating effects of gender and age significantly increases the understanding of the

underlying phenomenon and that demographic differences matter when implementing new technology in organizations.

Another criticism that has been emphasized concerns the fact that the framework of the TPB is one-dimensional thus, the theory cannot achieve a uniform standard with attitude, subjective norm or perceived behavioral control neither can it provide a complete understanding of the formation of those beliefs (Taylor and Todd, 1995). Consequently, in an attempt to provide a more complete understanding of technology usage, Taylor and Todd (1995) proposed the Decomposed Theory of Planned Behavior, which combines the TPB with the TAM and innovations diffusion literature. The DTPB is explained further on.

2.2 Technology Acceptance and Innovations Adoption and Diffusion Theories

Predicting technology and innovations adoption is one of the most widely investigated topics in information systems research (Venkatesh, 2006). This is often described as the most mature research area in contemporary information systems literature (Venkatesh *et al.*, 2003). The work that has been done in this domain gave rise to several theories and models, which have been drawn from multiple scientific areas such as psychology, sociology and information systems (ibidem, 2003). We review the prominent models and discuss their strengths and weaknesses.

There are two main theories from which the majority of competing models are derived: the Diffusion of Innovations Theory- DOI (Rogers, 1962; 1975; 1983; 1995; 2003) and the Technology Acceptance Model- TAM (Davis, 1989).

2.2.1 The Diffusion of Innovations Theory-DOI (Rogers, 1962; 1975; 1983; 1995; 2003)

The Diffusion of Innovations Theory was first formalized in 1962 by Everett Rogers and has subsequently been revised four times by its author. Besides its successive revisions, the core theory, model and constructs remained essentially unchanged over time.

Rogers' theory attempts to answer the questions of how, why and at what rate new ideas are adopted and spread through a social system. It is centered on the concepts of **innovation** and

diffusion. *“Diffusion is the process by which an innovation is communicated through certain channels, over time, among the members of a social system”* (Rogers, 2003: 35).

Rogers’ definition of “diffusion” is composed of the four main elements underlined above that, together, form the Diffusion of Innovations Theory. We briefly describe each element.

“An innovation is an idea, practice or object that is perceived as new by an individual or other unit of adoption” (ibidem, 2003: 12). Rogers identifies five general characteristics of innovations: relative advantage, compatibility, complexity, trialability and observability. He posits that these attributes, depending on how they are perceived by potential adopters may facilitate or inhibit the adoption process.

Relative advantage is the degree to which the innovation is perceived to be better than prior alternatives fulfilling the same needs (ibidem, 2003). **Compatibility** is the degree to which an innovation is perceived as being consistent with the existing values, past experiences and needs of potential adopters. **Complexity** is the degree to which an innovation is perceived as being difficult to understand and use. **Trialability** is the perceived degree to which an innovation may be tried on a limited basis. **Observability** is the perceived degree to which results of innovating are visible to others.

The higher are the relative advantage, compatibility and observability of an innovation, the higher is the adoption level and rate of diffusion. The more complex is an innovation, the slower it will diffuse. Trialability can accelerate acceptance because the possibility to test the innovation without engagement reduces risk.

The second element of Rogers’ Diffusion of Innovations’ Theory is communication. According to Rogers (2003), the diffusion of an innovation relies on effective communication. Communication channels between two units of adoption (individuals or organizations) can be either mass media or interpersonal channels involving one-to-one communication. Rogers claims there is an important relationship between the communication source and the rate of adoption of an innovation, which is faster when the source of information is perceived by potential adopters as being similar to their beliefs, status and education. This is more important than the technical aspects of the innovation (Rogers, 2003).

The third element of Rogers' theory is time. Time is structured into three different components (Rogers, 2003):

- The characterization of rate of adoption or adopters' distribution over time;
- A "typology" of innovativeness and adopters' categories;
- A five-stage model for the adoption of innovations (the innovation-decision process).

Characterization of Adopters' Distribution over Time

Rogers states that adopters of an innovation can be classified into five categories, based on their innovativeness characteristics that determine the degree to which an individual adopts new ideas earlier than the other members of a social system (ibidem, 2003). The time-to-adoption depends on each adopter's willingness and ability to adopt an innovation. This leads to the five categories of adopters, as defined by Rogers (2003): innovators (2.5% of individuals in a social system), early adopters (13.5% of individuals), early majority (34%), late majority (34%) and laggards (16%).

A "Typology" of Innovativeness and Adopters' Categories

Stemming from the previous characterization of adopter's distribution over time, Rogers (2003) establishes a "typology" of adopters, which identifies each category's individual characteristics. The main characteristics of each category include:

- Innovators: venturesome, ability to understand complex technical knowledge, greater propensity to take risks;
- Early adopters: opinion leaders, respected by peers;
- Early majority: deliberate, innovation-decision period longer than innovators and early adopters;
- Late majority: skeptical, lower socio-economic status;
- Laggards: traditional, suspicious of innovations and change agents, precarious economic position, extremely cautious in adopting innovations.

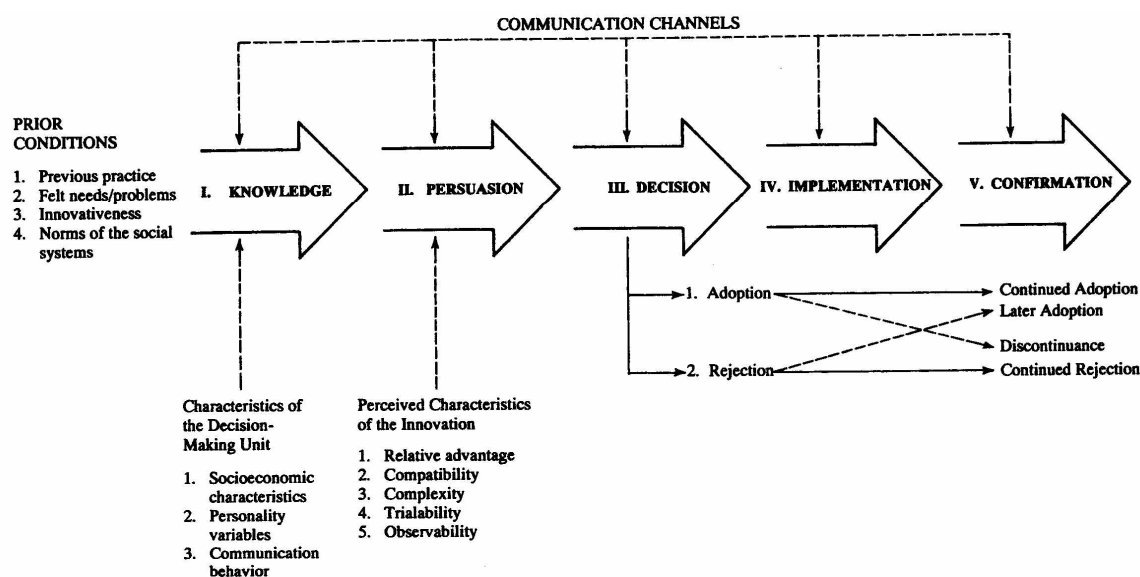
A Five-Stage Model for the Adoption of Innovations

Rogers conceptualized a five-stage model for the adoption of innovations, known as the Innovation Decision Process Model. While "diffusion" is a macro process concerned with the

spread of an innovation from its source to the public, the “adoption process” is a micro process focused on the stages individuals go through when deciding to accept or reject an innovation. The five stages consist of: awareness/knowledge, persuasion, decision, implementation and confirmation.

The departure point is (1) knowledge, which consists of an individual becoming aware of the innovation’s existence and beginning to gain some understanding of its functionalities. Then (2) persuasion occurs, when an individual begins to form a favorable or unfavorable attitude towards the innovation. After that, a (3) decision is consciously made as whether to adopt or reject the innovation. In case adoption occurs, the (4) implementation stage begins, where the individual puts the innovation into use. Finally, (5) confirmation occurs when the individual seeks reinforcement to its adoption decision; however, he may reverse his previous decision if exposed to conflicting messages about the innovation.

Figure 3: Five-stage model for the adoption of innovations (Rogers, 2003)



Finally, the last element of the DOI theory is the social system. According to Rogers (2003), the diffusion of any innovation takes place within a certain social system, whose members may be individuals, groups, organizations or subsystems that share a common goal. Within a social system, there are some elements that have the ability to influence the diffusion of an innovation: these are opinion leaders and change agents. They are at the center of

interpersonal communication networks and can serve as a model to be imitated regarding the adoption of an innovation (ibidem, 2003).

To summarize, we can say that Rogers' theory describes the interaction between an innovation's characteristics, individuals (potential adopters and influencers), the communication channels and the role of the social system as context for adoption (Lundblad, 2003). The DOI is the most cited theory regarding innovations adoption as a multitude of studies in different sectors empirically supported this theory. However, Rogers' model has been criticized by several researchers.

Onkvisit and Shaw (1989) made one of the most extensive critiques to DOI, from a practical perspective. Although two revisions of the theory were published since then (in 1995 and 2003), their considerations deserve special attention as most of them still apply to the latest version of the theory (as previously said, the core theory, model and constructs remained essentially unchanged over time).

According to Onkvisit and Shaw (1989), although diffusion theory has gained great acceptance among marketing scholars, it has not been the case within marketing practitioners. They argue that the DOI made great contributions to understanding consumer behavior towards adoption and that it has good explanatory power but it fails in its prediction and control functions. Onkvisit and Shaw (1989) point as DOI's most serious weakness the lack of marketing applicability as the theory lacks marketing mix strategies that are oriented towards the innovator. "*Future research should attempt to find out why marketers resist promoting to innovators*" (Onkvisit and Shaw, 1989: 48). Another important limitation is that Rogers' model is not suitable for the prediction of behavior in some specific markets and future research should include additional product attributes like Price, and Perceived Risk. They also suggest to rank the innovation's characteristics in terms of their degree of importance and check whether they vary across product categories (ibidem, 1989).

While focusing exclusively on adopters, Rogers completely overlooks the non-adopters' group which should deserve more attention in future studies, in order to understand their non-adoption behavior.

Finally, Onkvisit and Shaw (1989) point out a measurement problem related to the adopters classification system due to several, vague and divergent definitions of "innovator". The

percentages used to define the different categories of adopters) are “*liberally and arbitrarily chosen, without much regard for its justification*” (ibidem, 1989: 51). Moreover, innovators are assumed to possess an innate innovativeness characteristic that distinguishes them from other individuals and are expected to consistently adopt new products, which is questionable: from over 228 studies, more than 50% indicate a lack of relationship between age and innovativeness (as often claimed) while others show that any overlap between new products and innovativeness tends to occur only for related products- a “generalized innovator” may not exist; innovativeness should be related with the appropriateness and compatibility with the adopters’ lifestyles and should not be expected across product categories unless they are closely related. Thus, “*researchers need to justify the operational definition to be used in their studies*”.

Bayer and Melone (1989) also made important suggestions to enhance DOI’s usefulness and validity in assessing some kind of innovations, namely (and among many others) that:

- The five adopter categories should be re-conceptualized and empirically justified as they appear to be arbitrary (in line with Onkvisit and Shaw);
- Discontinuance (the decision to reject a technology after it has been “adopted”) should be integrated into the theory by considering expectancies disconfirmation (turning to literature from psychological science such as cognitive dissonance theory and also to experimental economics literature);
- A more appropriated research design (for example, a longitudinal panel study that solicits data on a variety of innovations and demographic factors) should be used to test implied causal linkages for innovation’s diffusion over time.

Surry (1997) concurs that the DOI is not a well-defined, unified, and comprehensive theory, but rather a large number of theories, from a wide variety of disciplines, each focusing on a different element of the innovation process (in fact, Rogers’ work over more than forty years incorporated the work of many other innovations’ diffusion scholars into a diffusion of innovations theory).

In 2001, Lyytinen and Damsgaard conducted a critical study on Rogers’ theory. Their findings suggested that IT innovations should be understood as networked, malleable, and learning intensive artifacts, which are socially constructed. Moreover, the diffusion arenas were volatile and dependent on political and other institutional influences with different

interests and concerns which deeply shape the direction and pace of the diffusion process. They suggested that diffusion researchers should trade generalization ability against accuracy in their theoretical accounts of IT diffusion, arguing that knowing better and deeper is more important than knowing broader.

Larsen (2001) and Lundblad (2003) tested the applicability of the DOI in organizational settings and concluded that the diffusion of innovations' theory had only limited validity and there was an opportunity to more fully extend Rogers' work into the organizational domain.

In recent years, Rogers' theory has been widely used to study the adoption of ICTs. Nevertheless, although providing a good tool for descriptive research, the theory hasn't been successful in adequately providing a basis for predicting outcomes or in providing guidance for accelerating adoption rates (Minishi-Majanja and Kiplang, 2005).

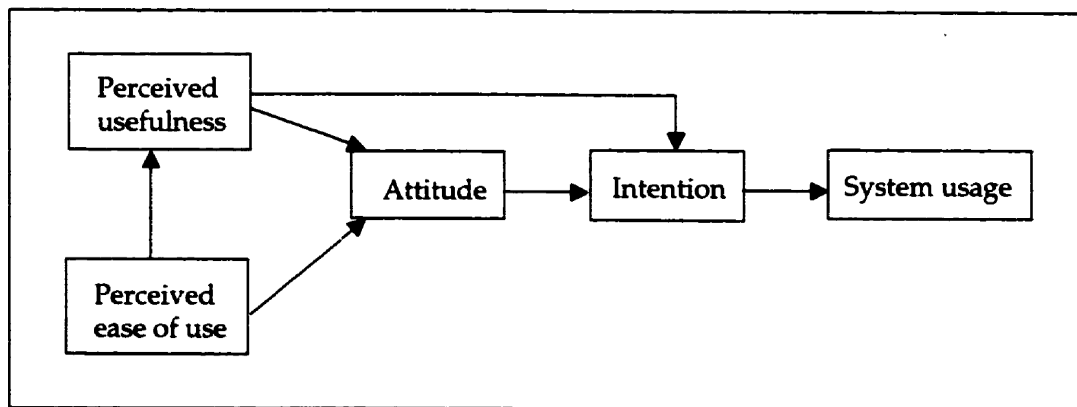
As a final remark, we can add that the DOI theory doesn't take into account the fact that an innovation may change in nature from the early adoption phase to the adoption by the majority of users and this may radically change the diffusion patterns (this happens particularly with technological innovations (like Mobile TV) in which the pace of innovation and replacement by successive improved versions of a product/service is extremely fast).

2.2.2 The Technology Acceptance Model- TAM (Davis, 1989)

The Technology Acceptance Model (Davis, 1989) provides an explanation of the determinants of new technologies acceptance by end users (the original model focused on computer systems usage in the workplace). TAM is based on Fishbein and Ajzen's Theory of Reasoned Action- TRA (1975). Like the TRA, the TAM assumes that when an individual forms an intention to act, he will be free to act without limitation or constraint. In the real world there are many constraints that limit the freedom to act, such as limited ability, time constraints, environmental or organizational limits, or unconscious habits (Bagozzi *et al.*, 1992).

The TAM theorizes that the actual usage of a technology is determined by the behavioral intention to use it, which is determined by individual attitude towards using the technology. Attitude is, in turn, determined by the individual perceptions of usefulness and ease of use (see Figure 4).

Figure 4: Technology Acceptance Model (original version), Davis (1989)



Perceived usefulness (PU) is defined by Davis (1989:320) as "*the degree to which a person believes that using a particular system would enhance his or her job performance*".

Perceived ease-of-use (PEOU) is "*the degree to which a person believes that using a particular system would be free from effort*" (ibidem, 1989: 320).

Perceived usefulness influences usage indirectly through attitude and directly through intention. On the other hand, perceived usefulness is influenced by perceived ease of use, as the latter has an inverse relationship with the complexity in the use of technology: a system that is difficult to use is less likely to be perceived as useful (Davis, 1989).

Although “attitude” is included in the original version of TAM, the authors conducted another study in voluntary context (Davis *et al.*, 1989:995-6) and concluded that the model’s explanatory power was equally good without that mediating construct, while rendering it more parsimonious. Since then, for the huge majority of TAM replications, the norm is to exclude the attitude construct, although in mandatory contexts attitude is likely to have more influence and deserve consideration (in voluntary settings attitudes have been shown to correlate highly with behavioral intentions (e.g., Davis *et al.*, 1989) while in organizational settings, the correlation between attitude and intentions is smaller, as employees may intend to use a system regardless of their positive or negative attitude towards it (Yousafzai *et al.*, 2007).

The TAM is the most cited model for understanding technology acceptance (Garfield, 2005) and has received strong empirical support in the context of Information Technology (IT) adoption through several replications of Davis’s work (e.g. Adams *et al.* 1992; Davis *et al.*, 1989; Dishaw and Strong, 1999; Hendrickson *et al.*, 1993; Karahanna and Straub, 1999;

Szajna, 1994; Venkatesh, 1999; 2000). More recently, a number of modified TAM models have been proposed to suit new technologies in individual contexts including the Internet (e.g. Gefen *et al.*, 2003; Moon and Kim, 2001; Pavlou, 2003; Sanchez-Franco and Roldan, 2005) and mobile services (e.g., Kim *et al.*, 2007; Koivumaki *et al.*, 2006; Lu *et al.*, 2003; Pagani, 2006; Wu and Wang, 2005). The model proved its robustness across different environments and technologies.

One of the TAM's strengths is its parsimony: simply put, a technology that is perceived as being easy to use and useful will lead to a positive attitude and intention towards using it. The main advantage of this model over other ones is that the two related beliefs can generalize across different settings. Thus, some authors argue that it is the most robust, parsimonious and influential model in explaining information technology adoption behavior (Teo and Pok, 2003; Venkatesh *et al.*, 2003). However, parsimony is also TAM's major weakness, as the model shows some limitations in explaining users' acceptance of complex services/technologies (Venkatesh and Davis, 2000). Consequently, many authors criticized the measurement model used, postulating improved models that extended TAM with additional constructs, such as effectiveness (Segars and Grover, 1993); subjective norm (Teo and Pok, 2003; Venkatesh and Davis, 2000); enjoyment (e.g., Davis *et al.*, 1992; Igbaria *et al.*, 1996; Lee *et al.*, 2005); behavioral control (Nysveen *et al.*, 2005), facilitating conditions (e.g. low price offerings and prepaid schemes- Pedersen, 2005), perceived entertainment and perceived flexibility (Bouwman *et al.*, 2007).

Mathieson (1991) and Taylor and Todd (1995), criticize the fact that the TAM doesn't explicitly consider any social variable. To fill this gap, Venkatesh and Davis (2000) extended the original TAM to explain perceived usefulness and usage intentions in terms of social influence, by showing that image, job relevance, output quality and result demonstrability have a significant impact in perceived usefulness. The extended model, referred to as TAM2 is described further on.

Another important limitation of the TAM that has been empirically evidenced by several studies is that it doesn't take into account the importance of intrinsic motives in technology acceptance and usage (Sanchez-Franco and Roldan, 2005). Motivation to interact with technologies can be either intrinsic or extrinsic (ibidem, 2005). The former emphasizes internal rewards such as pleasure and satisfaction from performing the behavior, while the

latter focuses on external/social rewards (e.g., incentives, gratifications, job promotion). The TAM only accounts for extrinsic motives, while intrinsic motivation has been proven to impact technology adoption (e.g. Venkatesh, 2000).

A major theoretical limitation of the TAM is the “*exclusion of the possibility of influence from institutional, social, and personal control factors*” (Dillon and Morris, 1996:49). Thus, the suitability of the model for predicting individual acceptance needs to be re-assessed, as the TAM constructs do not fully reflect the specificities of technological and usage-context factors that may alter user acceptance (Taylor and Todd, 1995).

To fill these gaps, a large number of studies and modifications to the original TAM model have been made. The Motivational Model (Davis, Bagozzi and Warshaw, 1992), the Decomposed Theory of Planned Behavior (Taylor and Todd, 1995) and the Unified Theory of Acceptance and Use of Technology (Venkatesh *et al.*, 2003) are important examples.

2.2.3 The Motivational Model (Davis, Bagozzi and Warshaw, 1992)

The Motivational Model (Davis *et al.*, 1992) derives from motivation theories rooted in psychological research. These theories distinguish between extrinsic and intrinsic motivation in attempting to understand individuals’ acceptance of information technology (Davis *et al.*, 1992; Igbaria *et al.*, 1996).

Extrinsic motivation refers to the performance of an activity as a means to achieve certain goals or valued outcomes (Davis *et al.*, 1992). The individual’s motivation to act or behave in a certain way is due to external incentives and rewards, rather than motivation for the activity itself. For example, the decision to use an information technology like Mobile TV may be determined by the extrinsic motivation to achieve another goal (e.g., to improve personal status by impressing others).

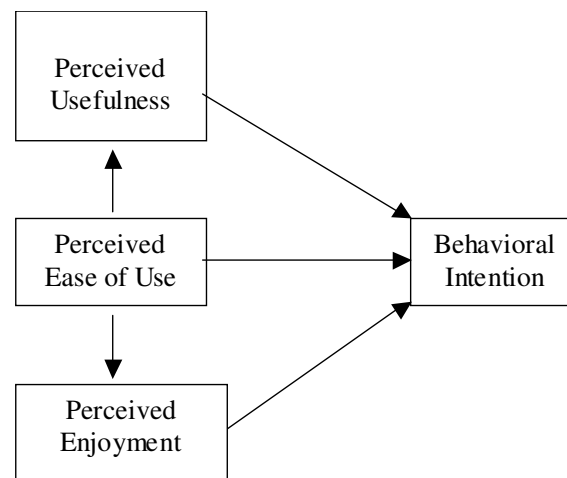
Intrinsic motivation refers to performing an activity for its own sake, in which the individual himself is interested, engaged or pleased by performing that activity (Deci and Ryan, 1985). It is related to the enthusiasm and enjoyment of performing the activity itself and is more emotion-based (Rao and Troshani, 2007). Using again the example of Mobile TV, an

individual may decide to use such service motivated by an intrinsic and hedonic motive (e.g., to relax during work breaks by watching his/her favorite soap or sport's match).

According to Davis *et al.* (1992), perceived usefulness is an extrinsic source of motivation, while perceived enjoyment and perceived playfulness (Moon and Kim, 2001) are intrinsic sources of motivation. Both motives affect adoption intention and actual usage in the context of technology adoption (e.g., Davis *et al.*, 1992; Hwang, 2005; Igbaria *et al.*, 1995; Lee *et al.*, 2007; Wu *et al.*, 2007).

Davis, Bagozzi and Warshaw's Motivational Model (1992) is an extension of the traditional Technology Acceptance Model (Davis, 1989) into which they incorporate an intrinsic motivation construct- perceived enjoyment. The authors preserved perceived usefulness and perceived ease of use, as extrinsic motivators. Figure 5 shows the conceptual model design.

Figure 5: The Motivational Model- Conceptual model (Davis, Bagozzi and Warshaw, 1992)



Davis *et al.* (1992) postulate that perceived enjoyment depends positively on perceived ease of use. The rationale is that a fundamental understanding of the nature and characteristics of the technology is critical to the formation of a feeling of preference for that particular technology; if one has a higher degree of self-competence in using a new technology (and thus, perceives it as being easy to use), he/she is more likely to have a feeling of enjoyment in using it (Bandura, 1977). On the other hand, they hypothesize that perceived enjoyment has a positive effect on intention to use: if one perceives the use of a certain technology as being pleasant and enjoyable to him, it is likely that his intention to use it will increase.

As in the original TAM, Davis *et al.* (1992) empirically observed that, if users perceive a technology as being useful and easy to use, they are more likely to adopt it. Results from their studies also suggested that an individual's perceived usefulness increases with his perceived ease of use. Prior and subsequent research on technology acceptance revealed that the effects of perceived usefulness and perceived ease of use on technology adoption and usage remained consistent and significant across different settings. Therefore, these two factors are widely employed in research on technology acceptance (e.g., voice mail (Chin and Todd, 1995); online shopping (Gefen, Karahanna and Straub, 2003; Koufaris, 2002); television commerce (Yu *et al.*, 2005).

Regarding intrinsic motivation, Davis *et al.*'s 1992 study results confirmed that perceived enjoyment had a significant effect on users' intention to use word-processing software. Numerous subsequent studies demonstrated the need to include intrinsic motivation to explain IT acceptance (e.g. Hong *et al.*, 2006; Lee *et al.*, 2005).

However, the Motivational Model (Davies *et al.*, 1992) has a number of limitations. Results from the authors' empirical research lead to usefulness and enjoyment explaining together "only" 62% of the variance in usage intentions, which suggests that some important predictors may be missing. Possibly, most of these predictors are individual factors, as suggested by subsequent research, including computer self-efficacy (e.g., Venkatesh and Davis, 1996; Lewis *et al.*, 2003); personal innovativeness (e.g., Lewis *et al.*, 2003; Robinson, 2005); perceived expressiveness (e.g., Nysveen *et al.*, 2005) and perceived service level (e.g., Liu and Ma, 2005). Some researchers theorize that social influence also plays a role in determining behavioral intention (e.g., Robinson *et al.*, 2005). Other external factors include availability of support services (e.g., Robinson *et al.*, 2005) as well as individual cultural background (e.g., Choi and Geistfeld, 2004).

Venkatesh and Speier (1999: 3) criticize Davis *et al.*'s 1992 model by stating that, "*while there is empirical support for the motivational model of technology usage, little is known about the underlying factors influencing extrinsic and intrinsic motivation, the key drivers of technology usage*".

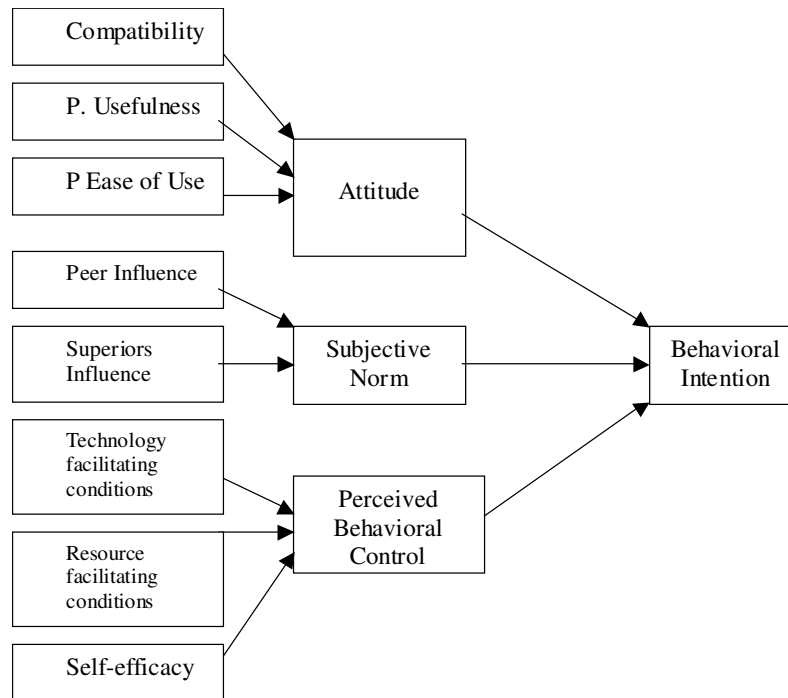
To conclude, several studies incorporated the motivational perspective into the study of Information and Communications Technologies' acceptance (e.g., Igbaria *et al.*, 1995 and

1996; Atkinson and Kydd, 1997; Teo *et al.*, 1999; Venkatesh *et al.*, 2002; Yi and Hwang, 2003; Yu *et al.*, 2005; Lee *et al.*, 2007). Those studies demonstrated that both intrinsic and extrinsic motivation influence usage intention and actual usage. We should expect the same pattern to apply to the mobile communications' context, where information technologies are used both for work and for play/fun (Moon and Kim, 2001; Rao and Troshani, 2007).

2.2.4 The Decomposed Theory of Planned Behavior- DTPB (Taylor and Todd, 1995)

The Decomposed Theory of Planned Behavior (DTPB) was formulated by Taylor and Todd (1995) by decomposing the independent variables of the TPB (see section 4.1.2): attitude, subjective norm and perceived behavioral control, into multi-dimensional belief constructs that include items derived from the TAM and from innovations' diffusion literature. The authors' aim was not to improve the TAM or the TPB in terms of explaining variance in intentions or use of technology, but rather to identify additional components of the belief structures that would provide more explanation of the antecedents of attitude, subjective norm and perceived behavioral control. Specifically, the "attitude" construct is decomposed into "compatibility", "perceived usefulness" and "ease of use". The "normative belief" is decomposed into "peers" and "superiors' influence". The "control belief" construct is decomposed into "self-efficacy", "resource facilitating conditions" and "technology facilitating conditions". The conceptual model design is shown in Figure 6.

Figure 6: The decomposed theory of planned behavior- Conceptual model (Taylor and Todd, 1995)



Taylor and Todd compared the three models (the TAM, the TPB and the DTPB) by conducting a study based on the usage of a computing resource center by business school students. The empirical test of the models supported most of the hypothesized relations in the DTPB and demonstrated that this multidimensional approach had higher predictable power in understanding behavior than did one-dimensional approaches (like the TAM and the TPB). The DTPB accounted for 36% of the variance in behavior and 60% in intention (vs. 34% and 52% with the TAM, and 34% and 57% with the TPB).

Taylor and Todd's model offers several advantages over the TPB and is considered more complete and management-relevant by focusing on specific factors that may influence adoption and usage (Teo and Pok, 2003).

More recently, in trying to understand consumers' intention to shop online, Park and Jun (2003) compared the TPB, the TAM, the Decomposed TPB and also the TRA, in terms of their predictive power to explain consumers' online shopping behavior. Their findings indicated that the TRA provided an inadequate model fit to the data; the TPB provided a better model-fit and a better explanatory power than the TRA (consistent with prior research

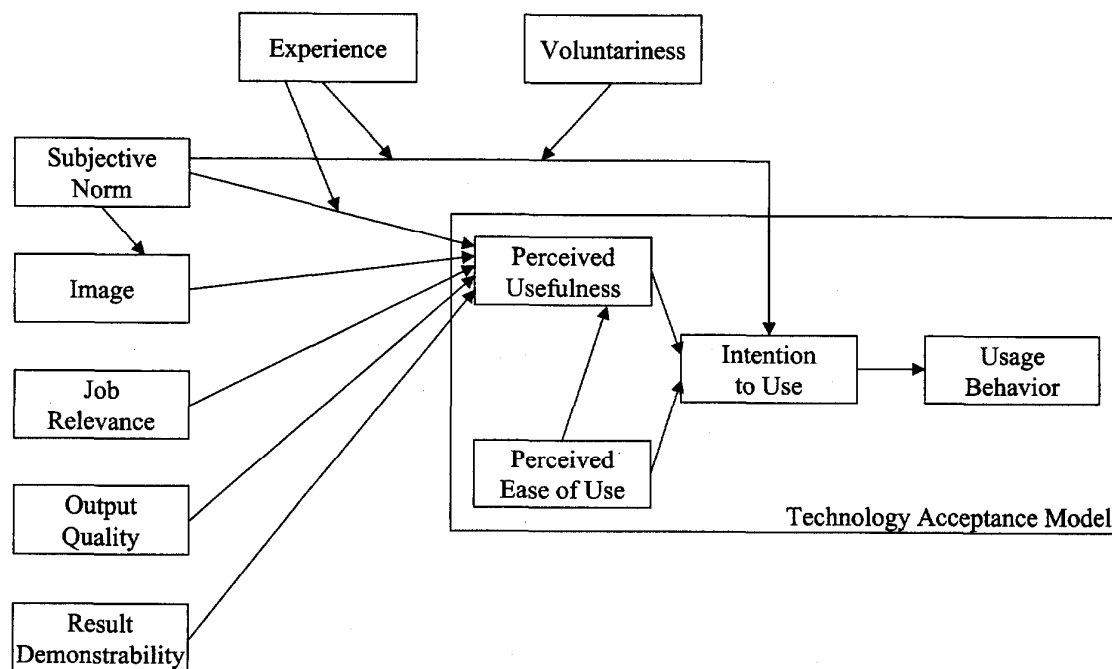
from Ajzen and Maden, 1986; Chang, 1998; Madden *et al.*, 1992) suggesting that the inclusion of perceived behavioral control is important and increases predictive power and model robustness. The TAM showed the same explanatory power for intention as the TPB ($R^2 = 0.43$) although it was slightly better in explaining actual behavior. The Decomposed TPB had the same explanatory power for intention as the TPB and the TAM but explained more variance in terms of attitude, subjective norm and perceived behavioral control. Thus, the DTPB may be more interesting as it delivers more detailed information than the original TPB. Previous comparisons of the TAM and the TPB revealed disparate results: Mathieson (1991) and Chau and Hu (2001) found the TAM to have stronger explanatory power regarding behavioral intention than the TPB, while Taylor and Todd (1995) found the opposite, although differences were minor. These results make it difficult to choose which model to apply to practical situations: the DTPB provides more information but is more complex, while the TAM is more parsimonious but explains only attitudinal components. The question is the one of a trade-off between the information delivered by the models and their parsimony (ibidem, 1995). As both models accounted for the same amount of variance in intention (Park and Jun, 2003), the choice of which model to apply will depend on the research interests. The DTPB will be preferable if the research focus encompasses social and non-volitional determinants of behavior/usage.

To conclude, the complexity of the Decomposed TPB is an important limitation of this theory. Another limitation- a methodological one, is that the subjects in Taylor and Todd's sample were familiar with the technology in question. Thus, the reported perceptions, attitudes and intentions were subject to biases of retrospective justification (cognitive dissonance). This methodological issue does not address the primary goal of technology and innovations acceptance models which is to understand how consumers will react to new and emerging technologies (and if they will likely adopt them and/or use them); it simply helps to understand which model is better in predicting user intentions when the subjects have already experience in using the technology. It is more useful (at least, to the purposes of our research) to compare the models in terms of predicting intentions to use "new and emerging technologies" in which the respondents are not very experienced.

2.2.5 The Technology Acceptance Model 2- TAM 2 (Venkatesh and Davis, 2000)

As previously mentioned, Venkatesh and Davis (2000) extended the original TAM to gain a better understanding of perceived usefulness and usage intentions in terms of **social influence** and **cognitive instrumental processes**. They accomplished this by adding **subjective norm** and **image** to assess the impact of social forces. Regarding cognitive instrumental processes, they theorize that **job relevance**, **output quality**, **result demonstrability** and **perceived ease of use** have an impact on **perceived usefulness**. They also include **voluntariness** and **experience** as moderating variables to **subjective norm**. The extended model is referred to as the TAM2, and was tested through longitudinal research designs, in both voluntary and mandatory settings (but always in organizational context). The extended version of the TAM, as proposed by Venkatesh and Davies in 2000 is shown below.

Figure 7: Technology Acceptance Model 2- Venkatesh and Davis (2000)



Consistent with the TRA (see section 4.1.1), **subjective norm** is defined as “a person’s perception that most people who are important to him think he should or should not perform the behavior in question” (Fishbein and Ajzen, 1975:302). The TAM2 theorizes that the direct effect of subjective norm on intention occurs in mandatory but not in voluntary contexts. Voluntariness is introduced as a moderator to this relationship to distinguish between mandatory and voluntary settings. **Voluntariness** is the individual’s perception of his

decision as being non-mandatory (Venkatesh and Davies, 2000, based on Agarwal and Prasad, 1997; Moore and Benbasat, 1991). Regarding the effect of subjective norm on perceived usefulness, the TAM2 hypothesizes that this will occur both in voluntary and in mandatory contexts because *“users’ perceptions about usefulness may still increase in response to persuasive social information”* (ibidem, 2000: 189).

Image is defined as *“the degree to which the use of an innovation is perceived to enhance one’s status in one’s social system”* (ibidem, 2000, citing Moore and Benbasat, 1991: 195). Venkatesh and Davies theorize that subjective norm positively influences image as, if important members of an individual’s socio-professional group support a certain behavior, then adopting it will tend to increase his status within the group. This effect of identification with the group is assessed in TAM2 by the positive influence of subjective norm on image together with the positive effect of image on perceived usefulness (elevated status may lead to improvements in job performance).

To finish on the social influence processes, let us explain the moderating role of **experience**. Based on evidence from prior research, Venkatesh and Davis (2000) hypothesize that experience has a negative effect on the relationships between (1) subjective norm and intention to use and, (2) Subjective norm and perceived usefulness.

The reason is that increased experience with the technology will provide the user with concrete sensory information thus, weakening the impact of subjective norm on intentions and on perceived usefulness.

Beyond the influence of social processes, Venkatesh and Davis (2000) add to the original TAM three cognitive instrumental determinants of perceived usefulness: job relevance, output quality and result demonstrability. They argue that individuals form judgments of perceived usefulness by cognitively comparing the capabilities of a system to what they need to get done in their job.

Job relevance is defined as one’s perception of the degree to which a technology is applicable to his/her job; it exerts a direct cognitive effect on perceived usefulness, independent from social influence processes (ibidem, 2000). **Output quality** is the perception of how well a system performs the tasks it performs. It is assumed to positively influence

perceived usefulness. **Result demonstrability** is defined as the tangibility of the results of using the innovation (it is based on Moore and Benbasat (1991) definition). The rationale is that even effective systems may fail to gather user acceptance if individuals do not associate improvements in their job performance directly to the use of the system. Thus, this construct is hypothesized to have a positive effect on perceived usefulness: the more one can perceive the results of using a system, the more he/she will perceive it as being useful.

To summarize, the TAM2 includes social influence processes and cognitive instrumental processes as determinants of perceived usefulness and usage intention. Venkatesh and Davies (2000) tested their model by conducting four longitudinal field studies that involved different industries, different organizational contexts and different types of systems.

The results from the empirical tests strongly supported the TAM2 against the “original” TAM. Specifically, subjective norm exerts a significant effect on usage intention, above perceived usefulness and ease of use for mandatory contexts but not in voluntary situations. Image, job relevance, output quality and result demonstrability have a significant impact in perceived usefulness.

Overall, the two main versions of the TAM [several other extended versions of the original TAM exist (e.g., Cheng *et al.*, 2006; Dishaw and Strong, 1999; Gefen and Straub, 1997; Shih, 2004; Stern *et al.*, 2008; Venkatesh and Morris, 2000; Wu and Li, 2007; Wu and Wang, 2005)] explain about 40% of systems’ actual usage. Empirical research using the TAM shows that the results are not totally consistent, suggesting that significant factors are not included in the models. The conclusion is that the TAM is a useful model but needs to be improved by including additional variables (e.g., related to the diffusion of innovations model (trialability, relative advantage, compatibility, observability), as well as to human and social change processes (the latter is important in organizational context)).

In a meta-analysis of empirical research using the TAM, Legris *et al.* (2003) assessed the different components of the model and discussed the results. They pointed out some limitations: firstly, they noticed that the majority of studies examined the acceptance of new technologies in organizational contexts; secondly, most of the studies do not measure system actual use but rather, the variance in self-reported use. The problem is that self-reported use is not a precise measure (respondents often report what they think they should answer rather

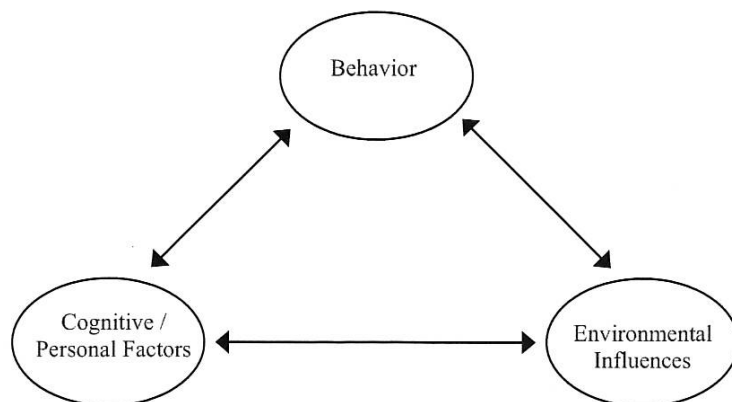
than their actual behavior). Finally and very important, they found out that, even if established versions of the TAM included additional variables, the model hardly explained more than 40% of the variance in use (in any of its extended versions).

Another meta-analysis of the TAM (King and He, 2006) suggests that moderating effects and additional variables should not be generalized to all kind of technologies and contexts but rather, adapted by technology and/or context specificity.

2.2.6 The Social Cognitive Theory- SCT (Bandura, 1986)

The Social Cognitive Theory (Bandura, 1986) is one of the most accepted theories of human behavior. It provides a framework for understanding, predicting and changing human behavior by postulating that behavior is explained in terms of a triadic relationship between (1) Behavior, (2) Environmental Influences and (3) Cognitive and Other Personal Factors, where these three factors reciprocally interact and are determinants of each other.

Figure 8: Bandura's triadic reciprocal causation model of human behavior



Environmental Influences include influences that derive from the social environment like family and friends and/or the physical environment. Cognitive and Other Personal Factors include the influence of factors such as personality or demographic characteristics. The relative influence of behavior, environment and cognitive or personal factors depends on which factor is the strongest at a given moment.

The core of the SCT lies in Observational Learning which occurs when an individual observes the actions of another person and the reinforcement that the person receives from his/her behavior (Bandura, 1986). The theory posits that people learn by watching what others in

their environment do and this influences their behavior (Environmental Influences). Depending on whether people are rewarded or punished for their behavior and respective outcome, that behavior may serve as a model and be replicated by others. However, the personal factors and cognitions are equally important in determining behavior.

The essence of Observational Learning is “modeling”, which consists on learning from observing others’ behaviors and replicating those “model” behaviors. The models can be those of personal relationships or media sources. The SCT postulates that observational learning and modeling will most likely occur if there is a close identification between the observer and the model and if the observer also has a good level of self-efficacy (i.e., if the observer feels that he/she has the ability to follow through with the imitated action (Bandura, 1988). The most noticeable example of the application of the Social Cognitive Theory is the use of celebrities in advertising to introduce and endorse the use of certain products or the performance of certain behaviors.

The Social Cognitive Theory has been applied in many different areas like mass media, public health, education and marketing. In the academic literature, Compeau and Higgins (1995) applied and extended the SCT to the context of computer utilization. They proposed a model which included some of the concepts of the SCT and assessed the relationships between cognitive factors (self-efficacy, performance-related outcome expectations and personal outcome expectations), affective factors (affect and anxiety), environmental factors (encouragement by others, others’ use and support) and usage of computers. However, the data analysis showed that some of the correlations among the constructs were not valid and the initial model was restructured. Hence, in 1999, Compeau et al. conducted a similar study but only some of the previous constructs were analyzed. Yet, once again, the results from the data analysis suggested that some correlations among the constructs were not valid namely, personal outcome expectations had no effect on affect and had only a weak and negative effect on usage while anxiety had no effect on usage.

Despite the modeling problems previously stated, the Social Cognitive Theory proved to be a useful model for predicting computer use and showed that self-efficacy and outcome expectations are important determinants of IT use. Besides, it has accumulated an impressive research record in different fields, where it has successfully contributed to explain human social behaviors.

However, some limitations have been pointed out to the Social Cognitive Theory. The main one is that the SCT is not a fully systematized, unified theory: it is slackly organized, based solely on the dynamic interplay between the person, the behavior and the environment and it is unclear the extent to which each of these factors influence actual behavior and if one is more influential than another. Hence, it is easily subject to be distorted. Furthermore, the theory assumes that changes in the environment will automatically lead to changes in the individual's behavior, when this may not always be true. Additionally, the theory assumes that behavior is largely learned and disregards biological factors that may influence behaviors, regardless of conditioning or observation. Finally, the SCT neglects that, as human beings mature and move through their lives, their behavioral patterns can change drastically with little change in their environment.

2.2.7 The Model of PC Utilization- MPCU (Thompson et al., 1991)

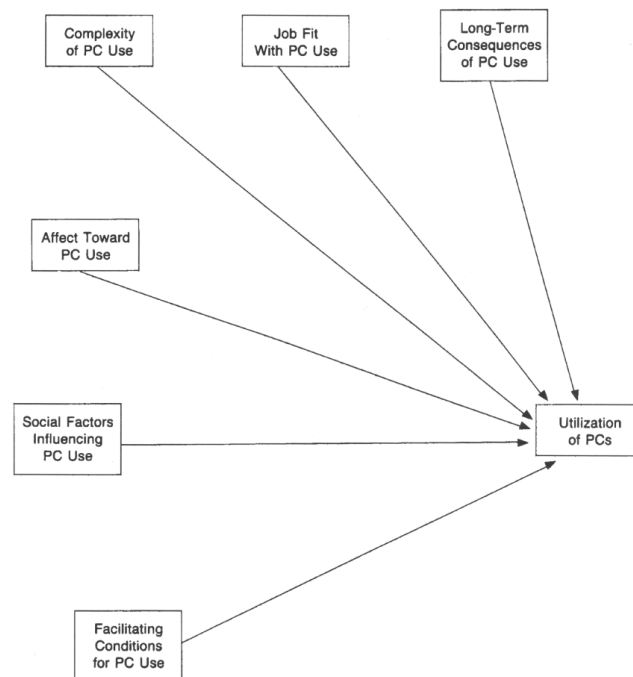
The Model of PC Utilization (Thompson et al., 1991) is based on a psychological theory of behavior proposed by Triandis (1971; 1980). It was conceptualized with the aim to predict PC utilization by knowledge workers in optional use environments by modifying a specific subset of variables of the Triandis' model.

Triandis (1980) posited that social factors, affect and perceived consequences influence behavioral intentions. Behavioral intentions, facilitating conditions and habit, in turn, determine behavior. Furthermore, habits have a direct and indirect effect on behavior. Triandis' model included additional variables (namely, culture, social situation and genetic biological factors) that can influence behavior but, as they were not considered relevant for the context of PC utilization, they were not considered in the MPCU.

Moreover, the MPCU makes four adjustments to Triandis's (1980) model. First, three components of perceived consequences were used (complexity, job fit and long term consequences). Second, direct effects of social factors, affect, complexity, job fit and long term consequences on behavior were studied. Third, behavioral intentions were excluded once the authors considered actual behavior instead. Fourth, habits were eliminated as in Triandis's (1980) model, they were measured by the frequency of occurrence of the behavior and this was identical to Thompson et al.'s measurement of PC utilization.

The MPCU included the following variables: Social Factors, Affect, Complexity, Perceived Job Fit, Long-Term Consequences of Use and Facilitating Conditions. The dependent variable was PC Utilization. Social Factors was defined as the individual's internalization of his reference groups' subjective culture, and specific interpersonal agreements that the individual had made with others in specific social situations (Triandis, 1980). Affect (Triandis, 1980) referred to the emotional feelings associated by an individual with a particular act (e.g., joy, pleasure, disgust, hate). Complexity corresponded to Rogers' (1983) definition of the degree to which an innovation is perceived as relatively difficult to understand and use. Perceived Job Fit (Thompson et al., 1991) measured the extent to which an individual believes that using a PC can enhance his job performance. Long-Term Consequences of Use (Thompson et al., 1991) were defined as being outcomes that have a pay-off in the future (like increasing the flexibility to change jobs or increasing the opportunities for more meaningful work). Finally, Facilitating Conditions (Triandis, 1980) were defined as being objective environmental factors that can make an act easy to do, such as training or technical support. Figure 9 shows the variables in the MPCU and their theorized relationships.

Figure 9: Model of PC Utilization (Thompson *et al.*, 1991)



The findings of the study conducted by Thompson et al. (1991) showed that social factors, complexity, job fit and long-term consequences had a significant impact on PC utilization

while affect and facilitating conditions did not influence PC use. The results suggested that future research on computer utilization within the IS context can effectively use Triandis' work as a frame of reference.

We point out some limitations of their work: the respondents were all from the same organization; the variable "utilization" was operationalized based on the perceptions of the respondents; some of the measures that were used required further revision namely, the items chosen for the affect construct did not measure all possible facets of affect towards PC use. The results also suggested that other types of facilitating conditions should have been included.

2.2.8 The Unified Theory of Acceptance and Use of Technology- UTAUT (Venkatesh *et al.*, 2003)

As previously shown, there is a significant set of models that attempt to explain technology acceptance and adoption. As Venkatesh *et al.* (2003:426) point out "*Researchers are confronted with a choice among a multitude of models and must "pick and choose" constructs across the models or choose a "favored model" and largely ignore the contributions from alternative models*". In an attempt to progress towards a unified view of user acceptance theories, Venkatesh *et al.* (2003), reviewed and synthesized eight prominent models and developed a Unified Theory of Acceptance and Use of Technology (UTAUT). The eight models integrated in the UTAUT are:

- 1) The Theory of Reasoned Action- TRA (Fishbein and Ajzen, 1975);
- 2) The Technology Acceptance Model- TAM (Davis, 1989; Venkatesh and Davis, 2000);
- 3) The Motivational Model- MM (Davis *et al.*, 1992; Vallerand, 1997);
- 4) The Theory of Planned Behavior- TPB (Ajzen, 1991);
- 5) The Decomposed TPB (Taylor and Todd, 1995);
- 6) The Model of PC Utilization- MPCU (Thompson *et al.*, 1991);
- 7) The Innovations Diffusion Theory- IDT (Moore and Benbasat, 1996 based on Rogers, 1995);
- 8) The Social Cognitive Theory- SCT (Bandura, 1986; Compeau and Higgins, 1995).

The UTAUT is one of the most recent and prominent theories of technology acceptance. It integrates adoption determinants across these eight competing models. Venkatesh *et al.*

(2003) empirically validated the theory and found it to have superior explanation power over the eight individual models: it explained 70% of the variance in usage intention.

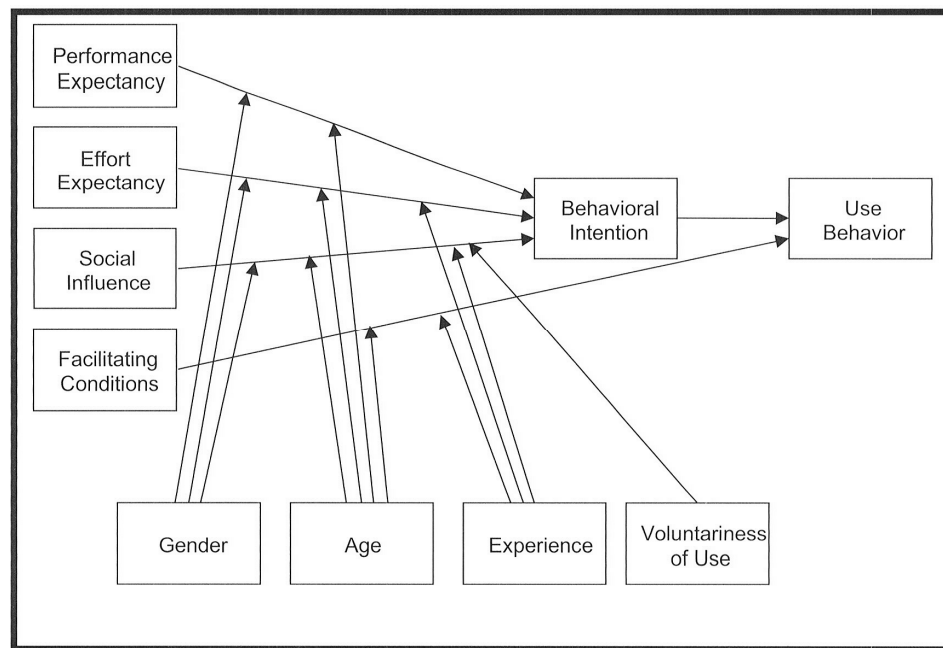
Like the TAM, the TRA and the TPB, the UTAUT assumes that actual usage behavior is determined by behavioral intention to use the technology: *“the role of intention as a predictor of behavior (e.g., usage) is critical and has been well-established in IS and the reference disciplines (see Ajzen, 1991; Sheppard et al., 1988; Taylor and Todd, 1995 b)”* (Venkatesh et al., 2003: 427).

The UTAUT weights up three direct determinants of intention to use (**performance expectancy**, **effort expectancy** and **social influence**), and two direct determinants of usage behavior (**behavioral intention** and **facilitating conditions**).

The influences of four moderator variables are also measured: **gender**, **age**, **experience** and **voluntariness of use**, which contribute to a better understanding of the complexity of technology acceptance by taking into account individual differences.

The **UTAUT conceptual model** is shown in Figure 10.

Figure 10: UTAUT- Conceptual Model (Venkatesh et al., 2003)



Performance expectancy measures how an individual perceives that using a technology is useful in achieving his goals in terms of increased job performance. This construct (which is similar to “perceived usefulness” in TAM, “extrinsic motivation” in the MM, “job-fit” in the MPCU, “relative advantage” in DOI and “outcome expectations” in the SCT) was found to be the strongest predictor of intention to use the technology. The authors theorize that its effect on behavioral intention is moderated by gender and age, as explained further.

Effort expectancy is the degree of ease associated with the use of the technology (Venkatesh *et al.*, 2003). It measures how much one feels comfortable and finds it easy to adopt and employ the technology. This predictor has also been prevalently employed throughout technology adoption literature (corresponding to “perceived ease of use” in TAM, “complexity” in MPCU and “ease of use” in DOI). Its significance lessens with time, becoming non-significant over periods of extended and sustained usage of the technology (ibidem, 2003). The effect of effort-expectancy on behavioral intention is moderated by gender, age and experience.

The last antecedent of behavioral intention is **social influence**, i.e. the influence of others’ opinions regarding a particular technology adoption (it corresponds to “subjective norm” in the TRA, the TAM2 and the TPB, to “social factors” in the MPCU and to “image” in DOI). The findings about the effect of social influence on intention have been mixed through the results of several studies, as the concept of social influence is somehow complex: it may involve compliance related to social pressure in organizational settings, as well as identification related to self identity, standing for social status gains in individual settings (Venkatesh and Davis, 2000). Thus, it has been noted that the effect of social influence depends on environmental characteristics such as mandatory or voluntary contexts or, from another perspective, organizational based or individual based adoption (Hartwick and Barki, 1994; Karahanna *et al.*, 1999; Venkatesh and Davis, 2000). Specifically, the compliance concept comes up in mandatory settings where other individuals’ opinions weigh more to the inexperienced ones and conversely, the identification concept shows up in voluntary settings where one is under social pressure to follow its peers or opinion leaders. According to Venkatesh *et al.* (2003), social influence is moderated by the four moderator variables: gender, age, experience and voluntariness of use.

Facilitating conditions refer to one's beliefs that organizational and technical infrastructures exist to support the use of the technology, when needed. This construct embodies the concepts of "perceived behavioral control" (TPB/DTPB), "facilitating conditions" (MPCU) and compatibility (DOI). The UTAUT theorizes that facilitating conditions do not have a significant influence on behavioral intention but have a direct influence on usage behavior, beyond that explained by behavioral intention alone. Thus, this construct is modelled as a direct antecedent of actual use behavior and is moderated by age and experience.

The Moderators in the UTAUT

Gender, age, experience, and voluntariness are the four variables that moderate the relationships in UTAUT, in order to reflect individual differences.

The UTAUT proposes that **gender moderates** the effect of **performance expectancy**, so that males are more likely to rely on performance expectancy when determining to accept a technology, because of men highly task-oriented nature (Venkatesh *et al.*, 2003 based on Minton and Schneider, 1980). Gender is also suggested to influence **effort expectancy**, so that it is more salient for women. Finally, based on prior research from Miller (1976) and Venkatesh *et al.* (2000), the UTAUT suggests that women tend to be more concerned about others' opinions than men; therefore, they rely more on **social influence** than males do.

The moderating effect of gender has been replicated by several studies in the area of technology acceptance applied to a variety of technologies [e.g., e-commerce (Slike *et al.*, 2002); e-mail (Gefen and Straub, 1997); Internet banking (Lichtenstein and Williamson, 2006)]. But recent empirical researches show that the gap between genders is diminishing, as the technologies are more widely diffused (e.g., Zhou *et al.*, 2007). Li and Kishore (2006) tested the robustness of the UTAUT with university students in Hong Kong and found out that performance expectancy, effort expectancy, and social influence were invariant between gender groups. Specifically pertaining to mobile technology acceptance, Bigne *et al.* (2005) found out that men and women did not show significantly different behaviors towards mobile commerce for users in Spain.

Age is theorized in the UTAUT to **moderate performance expectancy**, so that the effect is stronger for younger individuals. Regarding **effort expectancy**, the effect of age is that it is

stronger for older individuals, as “*increased age has been shown to be associated with difficulty in processing complex stimuli*” (Venkatesh *et al.*, 2003:450). Age also moderates **social influence** in a way that the effect is stronger for older individuals because of their increased affiliation needs (ibidem, 2003). Finally, age influences the relationship between **facilitating conditions** and usage behavior so that the effect is stronger for older individuals, which attach more importance to receiving help and assistance on the use of technology.

In the UTAUT, **experience** is assumed to **moderate** the impact of **effort expectancy** on intention to use so that it will be stronger at early stages of experience. Moreover, experience tends to increase the effect of **social influence** on intention in early stages (the effect is expected to decrease in time, as experiences related to the technology usage are accumulated). Finally, experience moderates the relationship between **facilitating conditions** and usage behavior so that the effect is stronger for more experienced individuals.

Finally, **voluntariness of use** impacts the relationship between **social influence** and behavioral intention so that the effect will be stronger in mandatory settings. This is because the compliance mechanism leads the individual to change his behavioral intention in response to the social pressure, especially when the referent others have the power to reward or punish a certain behavior (Venkatesh *et al.*, 2003).

Strengths and Limitations of the UTAUT

As previously mentioned, Venkatesh *et al.* (2003) empirically tested the UTAUT and the results provided strong empirical support to their theory, as it explained 70% of the variance in intention to use a technology. This is a significant improvement over each of the original eight models and their successive extensions (which explained up to 42% of the variance).

Subsequent research based on the Unified Theory have confirmed most of its assumptions and credited it with having superior explanatory power for “intention” and “actual use” than preceding models (e.g., Anderson *et al.*, 2006; Carlsson, 2006; Chiu and Wang, 2008; Garfield, 2005; Hennington and Janz, 2007; Park *et al.*, 2007).

One major contribution of the UTAUT was its success in integrating a wide array of key elements posited in eight prior alternative models into a model that establishes relationships

between four main antecedents and four moderators. Thus, while synthesizing previous knowledge, it retains a relatively parsimonious structure (Venkatesh *et al.*, 2003).

By including four moderator variables, the UTAUT provides a refined view of how the determinants of intention and actual behavior evolve over time and the empirical results confirmed that the moderators influenced most of the key relationships in the model (ibidem, 2003). Gender and age are the most influent moderators in the UTAUT; still, the authors didn't attempt to identify the underlying influential mechanisms (for example, computer literacy, cultural background, social and psychological basis, etc.). This is left over as a suggestion to future researchers.

In subsequent researches using the UTAUT, part of the main and moderating relationships were not confirmed (e.g., Bedford, 2005) found lack of support for the moderating effect of gender, while those of age and experience could not be fully tested; Carlsson *et al.* (2006) found social influence and facilitating conditions did not influence the use of mobile services; Park *et al.* (2007) found lack of significance for the roles of performance expectancy and experience).

Thus, like other models and in spite of its generally higher predictive power, the UTAUT cannot be generalized to all contexts and technologies; it can be used as a starting point to find some explanations for the adoption of certain technologies but its constructs and hypothesized relationships need to be re-assessed and adapted according to the specific technology under study.

One methodological limitation of the UTAUT regards the scales used to measure the four main constructs (the independent variables), which were all new as they were a combination of a number of prior scales and the measurement invariance of those new instruments had not been tested previously. The constructs were operationalized by selecting the highest-loading items from each scale, which resulted in the elimination of some facets of the constructs. Li and Kishore (2006) conducted a study to assess the invariance of the UTAUT scales across different population subgroups. The results showed that those instruments had invariant scores across most, but not all the subgroups. Thus, caution is required when interpreting results from studies conducted using the UTAUT scales. Li and Kishore (2006) findings suggest the need for more invariance studies about the measurement tools for the UTAUT

constructs. Even Venkatesh *et al.* (2003) stated their scales needed to be reviewed in future research in order to revalidate the model or to extend it according to new measures.

Another important limitation of the UTAUT is that, although it has 41 independent variables for predicting intentions and at least 8 independent variables for predicting behavior, it can still be criticized that important independent variables have been left out, because few of the included predictors are fundamental, generic, or universal, and future research is likely to uncover new predictors (Bagozzi, 2007). Indeed, as Chiu and Wang (2008) point out, the UTAUT ignores the impact of value for the consumer. Bandura (1986) has also suggested that an individual with high self-efficacy and outcome expectations might have low intention to act if he or she thinks that the behavior has low benefits and high cost. Chea (2006) highlights the fact that emotional/affective drivers of adoption are not taken into account in the UTAUT and that they are understudied in IS adoption literature. Rosen (2005) alerts to the need of including personal innovativeness, in order to improve the predictive ability of the model. Other examples could be given and, as stated by Bagozzi (2007), new research applied to different contexts and technologies would probably reveal additional relevant constructs that have not been taken into consideration by the UTAUT.

Furthermore, related to the predictive validity of technology acceptance models in general, is the question of the role of behavioral intention as a key predictor of actual usage/behavior. Venkatesh *et al.* (2003:470) suggest future research to “*investigate other potential constructs such as behavioral expectation (Warshaw and Davis, 1985) or habit (Venkatesh et al., 2000)*”. Evidence suggests that actual usage/behavior may not result from deliberated cognitions but may be simply routinized or automatic responses to stimuli (Venkatesh *et al.*, 2000).

Finally, we should highlight that, like the TAM, the UTAUT describes and explains the acceptance of technology at an organizational level. Despite the robustness of the model, it has received fundamental criticisms about the problem of applying it beyond the workplace and/or organization for which it was originally created (Carlsson *et al.*, 2005). We believe this criticism fairly applies to mobile services, whose context is different from the one of the UTAUT (ibidem, 2005): mobile telephones and services are used across the spheres of work, home/family and leisure of consumers; their acceptance is on an individual level and the context is the mass use of a technology. In their study of the adoption of mobile services,

specifically MMS, search services and icons and ring tones, Carlsson *et al.* (2005) found justification for performance expectancy and effort expectancy but not for social influence neither to facilitating conditions (they have not tested the moderator variables). Their results did not support in all cases the original UTAUT hypotheses. This may be due to the fact that the UTAUT was developed to explain organizational adoption of information technologies while mobile technology adoption is more individual, more personalized and focused on the services made available by the technology (Carlsson *et al.*, 2005).

Venkatesh *et al.* (2003) had suggested further research should attempt to identify and test additional boundary conditions of the model, namely by applying or extending it to different technologies, different user groups and different contexts.

2.2.9 The Unified Theory of Acceptance and Use of Technology 2- UTAUT2 (Venkatesh *et al.*, 2012)

We highlight that this theory was published in 2012 when our study had already been conducted. Hence, we include here a summary description of the theory and its main differences vs. the original UTAUT but we stress that we did not take it into consideration for our model development neither in subsequent phases of our research. This is simply a brief *a posteriori* description of the theory because we acknowledged its existence before closing the thesis.

The UTAUT2 was developed as his authors found the need to apply the original model to a consumer use context (vs. in organizational context). Hence, the UTAUT2 identified key additional constructs and relationships to be integrated into the original UTAUT to allow its application in a consumer use context (Venkatesh *et al.* 2012).

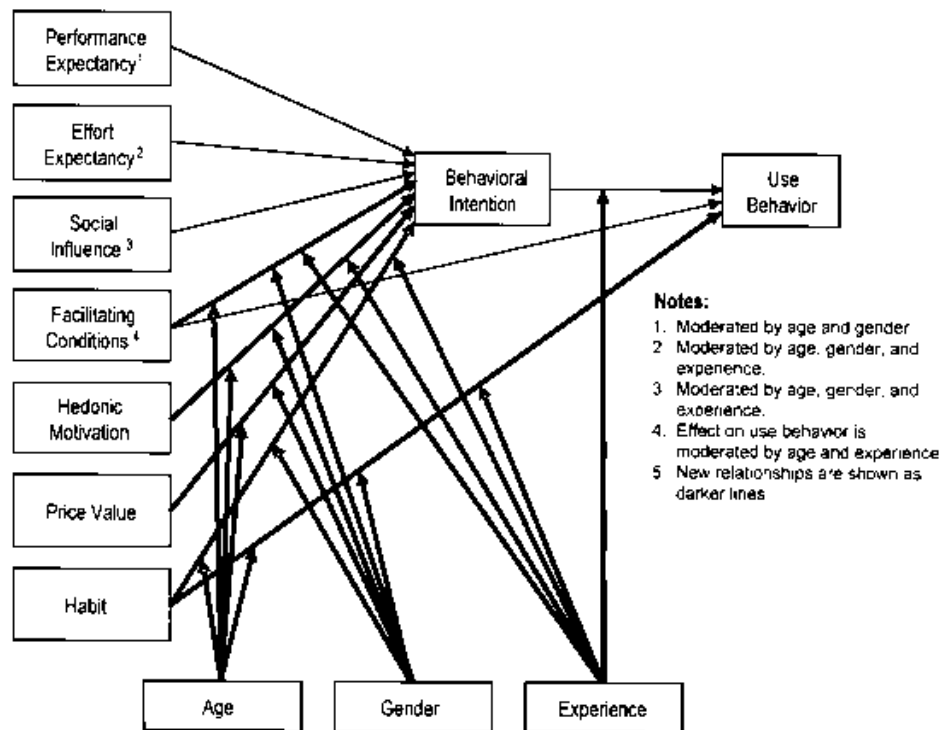
Three additional key constructs were identified: hedonic motivation (the fun or pleasure due to the use of a technology), price value (consumers' cognitive tradeoff between the perceived benefits of the applications and the monetary cost for using them) and habit (the extent to which people tend to perform behaviors automatically because of learning). Hedonic motivation and price value were added as predictors of consumers' behavioral intention to use a technology, while "habit" was added as a predictor of consumers' behavioral intention and also as a predictor of use behavior. These additional key constructs are all hypothesized to be moderated by age, gender and experience.

In spite of the three additional constructs, other adaptations had to be done to the original UTAUT in order for it to be applicable to the consumer acceptance and use context. Therefore, the definitions of the four key constructs of the UTAUT had to be adapted. In the UTAUT2, “performance expectancy” is defined as the degree to which the use of a technology will provide benefits to consumers in performing certain activities; “effort expectancy” is the degree of ease associated with consumers’ use of the technology; “social influence” is the extent to which consumers perceive that important others (e.g. family and friends) believe they should use a particular technology; “facilitating conditions” refer to consumers’ perceptions of the resources and support available to perform a behavior (Venkatesh et al. 2012).

Beyond the previous changes to the original UTAUT, “voluntariness”, which was one of the moderators, was dropped and a link between facilitating conditions and behavioral intention was added. As in the consumer context there is no organizational pressure, most consumer behaviors are completely voluntary, resulting in no variance in the voluntariness construct.

Figure 11 shows the research model of the UTAUT2. The lighter lines show the original UTAUT without considering the voluntariness variable, as stated before.

Figure 11: UTAUT2- Conceptual Model (Venkatesh *et al.*, 2012)



To extend the original UTAUT to the consumer context, additional hypotheses were incorporated, namely those related with the moderating effects of age, gender and experience on the added variables “hedonic motivation”, “price value” and “habit”.

The empirical test of the model was done by means of an online survey conducted in Hong Kong, in the context of consumer use of Mobile Internet. All the scales were adapted from prior research. In order to measure Actual Use, the survey was conducted in two stages: first, the data were collected on the exogenous variables and intention to use mobile Internet (4,127 respondents); second, four months later, the previous respondents were contacted, to assess their mobile Internet use (2,220 answers were received). As respondents with no prior experience of mobile Internet were removed because they could not answer the questions about habit and experience, at the end, the final sample had 1,512 consumers.

The model was tested using the partial least squares (PLS) technique. The majority of the new hypotheses were supported and the study confirmed the important roles of hedonic motivation, price value and habit in influencing technology use in the consumers’ context.

Despite the important limitation of the original UTAUT that the new theory has filled (regarding its application beyond the organizational context), the UTAUT2 has still some limitations that should be addressed in future research. The first one regards the generalization ability of the results, as the study took place in Hong Kong and the findings may be different in other countries less advanced technologically. Besides, the sample was composed by young respondents with a mean age around 31 years old and, the results may be different for a significantly older population. Finally, the empirical study was applied only to one type of technology (mobile Internet). Hence, future studies should assess the application of the UTAUT2 in other countries, with different age groups and with different technologies and should identify other relevant constructs that may increase the applicability of the original UTAUT to consumer technology use contexts.

Table 2 (next page) synthesizes the major strengths and weaknesses of the main theories presented on technology and innovations adoption.

Table 2: Most prominent theories and models used in ICT's adoption and explored in our Literature Review

Theory/Model	Main Constructs	Main Strengths/Limitations
<p><u>Theory of Reasoned Action- TRA (Fishbein & Ajzen, 1975)</u></p> <p>The Theory of Reasoned Action has been successful in predicting human behavior and intentions applied to a large number of situations. It holds that an individual's <u>actual behavior</u> is determined by his <u>behavioral intention</u> to perform that behavior. According to Fishbein & Ajzen, a person's intention to perform a behavior is predicted by his/her attitude towards that behavior and how he/she thinks other people would view him/her if he/she performed the behavior.</p>	<p>Behavior: an individual's observable response in a given situation with respect to a given target.</p> <p>Behavioral intention (BI): measures an individual's readiness to perform a given behavior. According to the TRA, BI provides the most accurate prediction of behavior and is a function of two factors: one's <u>Attitude</u> towards the behavior and <u>Subjective Norm</u>.</p> <p>Attitude (towards the behavior): is defined as one's general feeling of favorableness or unfavorableness towards the performance of that behavior (Ajzen and Fishbein, 1975).</p> <p>Subjective Norm: is defined as an individual's "perception that most people who are important to him think he should or should not perform the behavior in question" (Ajzen and Fishbein, 1975).</p>	<p>Strengths: the predictive utility of the theory is strong across different conditions.</p> <p>Limitations: the TRA fails when the behavior under study is not under full volitional control. Its explanatory scope excludes behaviors such as those that are spontaneous, impulsive, habitual, the result of cravings, or simply mindless (Langer, 1989). Such behaviors are excluded because their performance may not be voluntary, or because engaging in the behaviors may involve an unconscious decision from the individual.</p>
<p><u>Theory of Planned Behavior- TPB (Ajzen, 1991)</u></p> <p>The Theory of Planned Behavior is an extension of the TRA, developed by Ajzen to try to overcome the limitation concerning "volitional control". Ajzen extended the TRA by including another construct to predict behavioral intention and actual behavior: <u>perceived behavioral control</u>.</p>	<p>Behavior: the same as in TRA.</p> <p>Behavioral intention: the same as in TRA.</p> <p>Attitude (towards the behavior): the same as in TRA.</p> <p>Subjective Norm: the same as in TRA.</p> <p>Perceived Behavioral Control: refers to "people's perception of the ease or difficulty of performing the behavior of interest" (Ajzen, 1991). It is a function of control beliefs, which are the perception of the presence or absence of requisite resources and opportunities needed to carry out the behavior.</p>	<p>Strengths: The TPB proved its robustness across various situations in predicting intentions and behavior (including within IT's literature). The TPB has a better predictive power than the TRA (Madden <i>et al.</i>, 1992).</p> <p>Limitations: The TPB doesn't account for individual differences. Thus, most studies in ICTs adoption that used the TPB, suggest demographic characteristics are less important than characteristics of the technology itself in determining adoption. Several authors demonstrated that the TPB could benefit from the inclusion of moderators that are relevant to the behavior in question (e.g. Venkatesh <i>et al.</i>, 2000; Morris <i>et al.</i>, 2005).</p>

Table 2: Most prominent theories and models used in ICT's adoption and explored in our Literature Review (continuation)

Theory/Model	Main Constructs	Main Strengths/Limitations
<p><u>Technology Acceptance Model- TAM (Davis, 1989)</u></p> <p>TAM was developed to provide an explanation of ITs acceptance by end users in the workplace. It is based on the TRA and assumes that when an individual forms an intention to act he will be free to act without limitation, although in the real world there are many constraints that limit the freedom to act. TAM theorizes that the <u>actual usage</u> of a technology is determined by <u>behavioral intention</u> to use, which is determined by individual <u>attitude</u> towards using the technology. Attitude is, in turn, determined by individual perceptions of <u>usefulness</u> and <u>ease of use</u>. TAM has been widely applied to a diverse set of technologies and several extensions to the original model have been proposed.</p>	<p>Behavior: the same as in TRA.</p> <p>Behavioral intention: the same as in TRA.</p> <p>Attitude (towards the behavior): the same as in TRA.</p> <p>Perceived Usefulness: is defined by Davies as "the degree to which a person believes that using a particular system would enhance his or her job performance".</p> <p>Perceived ease-of-use: is "the degree to which a person believes that using a particular system would be free from effort" (ibidem, 1989).</p>	<p>Strengths: TAM has received strong empirical support in the context of IT adoption. Recently, a number of modified "TAMs" have been proposed to suit new technologies including Internet and mobile services. The model proved its robustness across different environments and technologies. TAM's major strength is its parsimony: simply put, a technology that is perceived as being easy to use and useful will lead to a positive attitude and intention towards using it.</p> <p>Limitations: parsimony is also TAM's major weakness; the model shows limitations in explaining users' acceptance of complex technologies. Thus, many authors have extended the TAM with additional constructs, such as subjective norm, behavioral control, facilitating conditions, perceived entertainment and flexibility. TAM doesn't explicitly consider any social variable neither does it consider the importance of intrinsic motives in technology acceptance.</p>
<p><u>Motivational Model- MM (Davis, Bagozzi and Warshaw, 1992)</u></p> <p>The Motivational Model derives from general motivation theories, rooted in psychological research. These theories distinguish between extrinsic and intrinsic motivation in attempting to understand individuals' acceptance of information technology. Within ICTs domain, Davis <i>et al.</i> (1992) applied motivational theory to understand new technology adoption and use by adding an extrinsic source of motivation (perceived enjoyment) to the original TAM.</p>	<p>Extrinsic Motivation: refers to the performance of an activity as a means to achieve certain goals or valued outcomes. Motivation to act or behave in a certain way is due to external incentives and rewards, rather than motivation for the activity itself. TAM's Perceived usefulness construct is considered as an extrinsic source of motivation.</p> <p>Intrinsic Motivation: refers to performing an activity for its own sake, in which the individual himself is interested, engaged or pleased by performing that activity.</p> <p>Perceived enjoyment is a construct added to the original TAM, as an extrinsic source of motivation.</p>	<p>Strengths: the Motivational Model confirmed the need to include intrinsic motivation to explain IT acceptance. Davis <i>et al.</i>'s study results demonstrated that perceived enjoyment had a significant effect on users' intention to use technology.</p> <p>Limitations: Like TAM, the Motivational Model is probably too parsimonious and may omit important constructs. Possibly, most of these predictors are individual and social factors (as suggested by subsequent research).</p>

Table 2: Most prominent theories and models used in ICT's adoption and explored in our Literature Review (continuation)

Theory/Model	Main Constructs	Main Strengths/Limitations
<p><u>Decomposed Theory of Planned Behavior- DTPB (Taylor and Todd, 1995)</u></p> <p>The Decomposed TPB was formulated by decomposing the independent variables of TPB: attitude, subjective norm and perceived behavioral control, into multi-dimensional belief constructs that include items derived from the TAM and from innovations' diffusion literature. The aim was to identify additional components of the belief structures that would provide more explanation of the antecedents to attitude, subjective norm and perceived behavioral control.</p>	<p>The Attitude construct (similar to the TRA and the TPB) is decomposed into compatibility (DOI), perceived usefulness (TAM) and perceived ease of use (TAM).</p> <p>Subjective norm (TPB) is decomposed into normative influences from peers and from superiors.</p> <p>The Perceived behavioral control construct (TPB) is decomposed into self-efficacy (one's competence in using the technology) and facilitating conditions (the degree to which an individual believes that organizational and technical infrastructures exist to support the use of the technology).</p>	<p>Strengths: The Decomposed TPB offers several advantages over the TPB and the TAM and is considered more complete and management-relevant by focusing on more specific factors that may influence adoption and usage.</p> <p>Limitations: complexity is the major limitation of DTPB. When compared to the TAM, the question is of a trade-off between the information delivered by the models and their parsimony: DTPB delivers much more detailed information but has the handicap of being too complex.</p>
<p><u>Bass Model- (Bass, 1969; Mahajan <i>et al.</i>, 1990)</u></p> <p>(We excluded the detailed description of the Bass Model from the main document but decided to keep its synthesis here).</p> <p>The Bass model of diffusion of innovations was developed to describe and assess the adoption process of new products as the result of an interaction between actual users and potential users. It is essentially a mathematical model, widely applied in marketing and forecasting to estimate new product and technology adoption and diffusion. Bass contributed to the literature on innovations diffusion by adding some mathematical ideas that are explained in the next column.</p>	<p>"m": the number of potential consumers for a certain product or innovation (i.e., the potential market).</p> <p>"N(t-1)": the number of individuals who have already adopted the product/innovation before time "t".</p> <p>"p": a fixed factor that reflects one's likelihood to adopt the new product (because of one's intrinsic tendency, advertising coverage or other external factors). "p" is called the coefficient of innovation, external influence or advertising effect;</p> <p>"q": variable factor that reflects the likelihood of someone who has not adopted the product yet to start using it because of "word of mouth" or "social contagion". "q" is called "coefficient of imitation, internal influence or word-of-mouth effect".</p> <p>"m - N(t-1)": the number of people who have not adopted the innovation before time "t".</p> <p>"p + qN(t-1)/m": the rate at which new individuals will adopt the innovation.</p>	<p>Strengths: the Bass model is a convenient model to measure the speed of diffusion and applies to almost all new products despite a wide range of variable managerial decisions (e.g. pricing and advertising). Its main strengths are that it is clear, simple and compact, captures valid basic market dynamics and often provides a good fit to diffusion data for successful innovations in stable environments (Ferguson, 2003).</p> <p>Limitations: Bass model's major limitation is its excessive simplicity. The model doesn't take into account the interaction between innovations' providers and consumers; it doesn't allow for market/products' failure; it provides little insight into the causality of market environments and decisions and it is very limited in allowing the incorporation and exploitation of specific information. The Bass Model doesn't consider short life of innovations (thus, its interest decreases if an innovation does not achieve a good performance and market share soon enough). When data is scarce and markets are turbulent, the model may provide inaccurate and unrealistic forecasts (Ferguson, 2003).</p>

Table 2: Most prominent theories and models used in ICT's adoption and explored in our Literature Review (continuation)

Theory/Model	Main Constructs	Main Strengths/Limitations
<p><u>Diffusion of Innovations Theory- DOI (Rogers, 1962)</u></p> <p>Rogers' theory attempts to answer the questions of how, why and at what rate innovations are adopted and spread through a social system. It is centered on the concepts of "innovation" and "diffusion": "an innovation is an idea, practice or object that is perceived as new by an individual or other unit of adoption"; "diffusion is the process by which an innovation is communicated through certain channels, over time, among the members of a social system" (Rogers, 1983).</p> <p>DOI became widely accepted in ICTs adoption research. It suggests that adopters of an innovation can be categorized as innovators (2.5%), early adopters (13.5%), early majority (34%), late majority (34%) and laggards (16%), based on a Bell curve distribution. An "S shaped curve" shows the cumulative percentage of adopters over time.</p>	<p><u>Characteristics of an innovation</u></p> <p>Relative advantage: the degree to which an innovation is perceived to be better than prior alternatives fulfilling the same needs (Rogers, 1983); it can be in the form of economic, social status or satisfaction aspects of the innovation.</p> <p>Compatibility: the degree to which an innovation is perceived as being consistent with the existing values, past experiences and needs of potential adopters (ibidem, 1983).</p> <p>Complexity: the degree to which an innovation is perceived as being difficult to understand and use.</p> <p>Trialability: the degree to which an innovation can be tried on a limited basis.</p> <p>Observability: the perceived degree to which results of innovating are visible to others.</p> <p><u>Five-stage model for the diffusion of innovations</u></p> <p>1. Knowledge: consists of an individual becoming aware of the innovation's existence and beginning to gain some understanding of its functionalities.</p> <p>2. Persuasion: occurs when an individual begins to form a favorable or unfavorable attitude towards the innovation.</p> <p>3 A Decision is then consciously made to whether adopt or reject the innovation.</p> <p>4. Implementation begins (in case adoption occurs), where the individual puts the innovation into use.</p> <p>5. Confirmation occurs when the individual seeks reinforcement to its adoption decision.</p>	<p>Strengths: a multitude of studies in different domains empirically supported DOI, which proved to be a robust theory across different settings, particularly in ICTs adoption studies.</p> <p>Limitations: Several criticisms have been pointed out in the literature:</p> <ul style="list-style-type: none"> - DOI doesn't consider the fact that an innovation's nature may change from early adoption phase to the adoption by the majority of users; - Disruptive technologies may radically change the diffusion patterns for the established technology by starting a new competing S-curve; - DOI characterizes the adoption process as being binary, i.e., either the innovation is adopted or not (the theory doesn't recognize transition or intermediary phases that can occur while an individual passes from a non-adopter condition to that of an adopter); - Rogers' model is not suitable to predict behavior of new brands in some specific markets; - Future research should include "price" and "perceived risk" when analyzing an innovation's characteristics; - Distinction should be made between adoption of an innovation at the organizational level and at the individual level; - The 5 adopter categories should be re-conceptualized and empirically justified; - Discontinuance should be integrated into the theory and a more appropriated research design should be used to test implied causal linkages; - Rogers doesn't consider expectancies disconfirmation and rescinding of adoption.

Table 2: Most prominent theories and models used in ICT's adoption and explored in our Literature Review (continuation)

Theory/Model	Main Constructs	Main Strengths/Limitations
<p><u>Unified Theory of Acceptance and Use of Technology- UTAUT</u> <u>(Venkatesh <i>et al.</i>, 2003)</u></p> <p>The UTAUT results from an attempt to progress towards a unified view of user acceptance theories. Venkatesh <i>et al.</i> (2003) reviewed and synthesized eight prominent models, discussed their similarities and differences and developed a Unified Theory of Acceptance and Use of Technology. UTAUT is one of the most recent and prominent theories of technology acceptance. It integrates adoption determinants across eight competing models. The theory has been empirically validated and was found to have superior explanation power over the eight individual models.</p> <p>In UTAUT, three constructs (based on the most influential constructs of previous theories) are the main determinants of intention to use ITs and one construct directly influences usage behavior. These are described in the next column.</p>	<p>Performance Expectancy- Refers to the degree to which the user expects that using the system will help him improve his job performance. Five constructs from prior theories contribute to performance expectancy: <u>perceived usefulness</u> (TAM/TAM2 and DTPB), <u>extrinsic motivation</u> (MM), <u>job fit</u> (MPCU), <u>relative advantage</u> (DOI) and <u>outcome expectations</u> (SCT).</p> <p>Effort Expectancy- Refers to the degree of ease associated with the use of the technology. Corresponds to three constructs from prior theories: <u>perceived ease of use</u> (TAM/TAM2), <u>complexity</u> (MPCU), and <u>ease of use</u> (DOI).</p> <p>Social Influence - The degree to which an individual perceives that important others believe that he or she should use the new system. Three constructs from prior theories attempted to measure social influence: <u>subjective norm</u> (TRA, TAM2, TPB and DTPB), <u>social factors</u> (MPCU) and <u>image/observability</u> (DOI).</p> <p>Facilitating Conditions - The degree to which an individual believes that organizational and technical infrastructures exist to support the use of the technology. It corresponds to <u>perceived behavioral control</u> (TPB, DTPB), <u>facilitating conditions</u> (MPCU) and <u>compatibility</u> (DOI).</p> <p>Gender, age, experience and voluntariness are moderators in the UTAUT model.</p>	<p>Strengths: UTAUT is a very powerful predictive model that relies on relevant constructs from eight prior theories/models used to predict ICTs adoption and use. Its explanation power for technology acceptance behavior is up to 70%, significantly above each of the prior models. Although synthesizing eight models, UTAUT retains a relatively parsimonious structure. UTAUT includes four moderator variables that provide a refined view of how the determinants of intention and behavior evolve over time (the empirical results confirmed that the moderators influenced most of the key relationships in the model).</p> <p>Limitations: The shortcomings of UTAUT are few but significant. One methodological limitation regards the scales used to measure the core constructs, which were all new scales that had not been previously tested. UTAUT scales need to be reviewed in future research in order to revalidate the model or to extend it according to new measures (Venkatesh <i>et al.</i>, 2003).</p> <p>Related to the predictive validity of technology acceptance models in general, is the question of the role of “behavioral intention” as a key predictor of actual usage/behavior. Future research should “investigate other potential constructs such as behavioral expectation (Warshaw and Davis, 1985) or habit (Venkatesh <i>et al.</i>, 2000)”.</p> <p>Finally, an important issue is that (like other models) the UTAUT explains technology acceptance at the organizational level (be it mandatory or voluntary). Despite the robustness of the model, a fundamental criticism concerns the problem of applying it beyond the workplace and/or organization for which it was originally created (Carlsson <i>et al.</i>, 2005).</p>

2.3 Academic Literature on Mobile Telecommunications' Services

Adoption

As mentioned in the Introduction chapter, the mobile telecommunications industry is reaching a critical stage in developed markets. Growth rates are stagnant and industry estimates regarding the adoption of new services are daunting. From the industry side, there has been an intense effort to develop new value-added services (in order to counter decreasing revenues in traditional voice services) but consumer adoption has not progressed as expected (e.g. mobile commerce, mobile Internet, mobile TV). According to Carlsson *et al.* (2006), there is a supply and demand mismatch, more exacerbated in the European markets. And even in Japan and Korea, which have traditionally been at the forefront of new mobile services adoption, some advanced services (like Mobile TV) have not yet reached mass adoption and the business case didn't prove its robustness. This is a challenging situation for both industry and academic researchers, since the "magic formula" for adoption and use is still missing. Thus, the challenge is to understand why people adopt or do not adopt specific mobile services (ibidem, 2006). Bowman *et al.* (2006) claim that extensive research into consumers' attitudes towards innovations is important to understand future behavior. On the other hand, De Marez and Verleye (2004) suggested that a more marketing oriented perspective that brings insight into customer needs and wants is important.

In recent years, mobile communications have received increased attention from the academic community, with a growing number of publications that analyze the issues behind the adoption and/or diffusion of mobile services (e.g., Bruner and Kumar, 2005; Constantiou *et al.*, 2007; Giovannis and Skiadas, 2007; Ha *et al.*, 2007; Hong *et al.*, 2006; Kim *et al.*, 2007; Kim, 2008; Lee *et al.*, 2007; Vlachos and Vrechopoulos, 2008; Wang *et al.*, 2008).

Within the mobile services adoption literature, mobile commerce (e.g., Bhatti, 2007; Bigné *et al.*, 2007; Pedersen, 2005; Wu and Wang, 2005; Yang, 2005) and mobile Internet (Cheong and Park, 2005; Kim *et al.*, 2007; Shin, 2009; Teo and Pok, 2003) have been the most studied services while little academic research is available regarding the adoption of Mobile TV (although a few studies have emerged since we have started our research).

Lately, an increasing number of studies on advanced mobile services (including Mobile TV) have been published. For example, Bina and Giaglis (2007), Hong *et al.* (2008), Kim and Han

(2009) on mobile data services; Kim *et al.* (2009), Tan and Chou, (2007); Wong and Hiew (2005) on mobile entertainment; Choi *et al.* (2009), Constantiou and Mahnke (2010), Jarvenpaa and Loebbecke (2009), Pagani (2011) on Mobile TV; Chandra *et al.* (2010), Lu *et al.* (2011), Schierz *et al.* (2010) on mobile payments. This is probably due to the mature state of development of the mobile services market and intense industry efforts to launch new value-added mobile services. Yet, in spite of mobile service providers' optimism about customer acceptance of advanced mobile services, the actual use of those innovations has not progressed as expected. These sophisticated services have a low penetration rate and have not yet reached mass adoption.

In the academic field, besides valuable insights provided by previous research, the challenge remains to understand why consumers adopt or do not adopt specific mobile services. Mobile communications literature has traditionally relied on the IS/IT literature to try to explain the adoption of mobile services and devices. As with other technologies, the TAM and its derivatives is the main framework that researchers have endorsed, in trying to identify and understand the factors that influence mobile services' adoption (e.g., Cheong and Park, 2005; Pagani, 2004; Teo and Pok, 2003; Wu and Wang, 2005; Yan *et al.*, 2006).

However, although perceived usefulness and perceived ease of use have proven to be relevant determinants in many studies, there has been increased concern about the appropriateness of the TAM and similar theories, considered to be too parsimonious and incomplete, more appropriate in organizational context, deterministic, tautological and lacking ability to explain consumers' intentions" (Lopez-Nicolas *et al.*, 2008).

As pointed out previously, technology acceptance models originate from organizational contexts and their applicability to personal/consumer settings is highly questionable, as some constructs do not fit this context at all (e.g., voluntariness, job relevance, superiors' influence, performance expectancy) while other constructs that influence individual adoption are missing and require further research.

For example, Lopez-Nicolas *et al.* (2008) suggested that the role of social influence helps to explain mobile service adoption and need to be explored. In 2005, Bruner and Kumar explored the role of hedonic motives/benefits and concluded this was an important determinant of the adoption of mobile Internet devices that should be taken into consideration

in further adoption studies. In a meta-analysis of the TAM, Shepers and Wetzels (2007) concluded that the technology under consideration had a significant moderating effect on user behavior, pointing to the development of more technology-specific models. De Marez *et al.* (2007) suggest that, depending on the specific innovation being studied, we may expect different determinants to be the significant ones to the adoption decision and thus, should not start from generalizing assumptions from previous research. Even within the mobile context we can find services that have very different characteristics and, motives to adopt and/or use them are different. *“Therefore, the antecedents of customers’ intentions to use mobile services should be studied across service categories”* (Nysveen *et al.*, 2005:331). Because adoption determinants depend highly on the characteristics of the technology under study, an increasing number of authors (e.g., De Marez *et al.*, 2007; Knutsen and Lyytinen, 2006; Nysveen *et al.*, 2005; Shepers and Wetzels, 2007) call for a shift in focus in ICT’s adoption, from broad and parsimonious models to more specific and comprehensive ones.

Moreover, extant theories do not fully address the current market dynamics in which consumers have a wide choice and a deeper knowledge of technologies. The increasing use of ICT’s is leading to “consumer empowerment”, i.e., a shift in market power from suppliers to consumers (Pires *et al.*, 2006). Currently, successful marketing strategies need to be focused on consumers’ perceptions of value and embodied in targeted consumer benefits, (ibidem, 2006). Constantiou (2009) concurs that consumer adoption decisions are likely to be driven by product value criteria. Therefore, perceived benefits and willingness to pay for mobile TV are critical aspects that need to be explored by researchers and industry players in order to understand the most important drivers influencing adoption (Pagani, 2009). Past research on adoption of mobile services has not yet offered a comprehensive explanation for the low demand for some services. As shown by Kim *et al.* (2007), Kim and Han (2009), Kleijnen *et al.* (2007) and Pagani (2009), there is a need for additional research on the specific costs and benefits associated with new mobile services and the way these influence consumer value perceptions.

Even though some recent research has emerged on the subject of Mobile TV (e.g., Constantiou and Mahnke, 2010; Jarvenpaa and Loebbecke, 2009; Soscia *et al.*, 2011), a clear understanding of the motivations and circumstances that determine consumers’ adoption of Mobile TV services is still missing. We consider there is a need for a specific insight into the

adoption determinants of Mobile TV as the literature has not yet offered a comprehensive explanation of the (low) demand for these services.

Mobile TV has very particular characteristics (it is both a new technology and a new media) and we reckon extant models from ICT's adoption domain do not fully apply to this innovation whose adoption is expected to be essentially voluntary, for personal use and very much related to hedonic/entertainment benefits and to the way consumers value the service. As such and inspired from suggestions and work from previous telecommunications adoption research, we propose a new theoretical framework that attempts to fill some of the identified gaps by integrating in a new model constructs from several different theories and domains, namely the TAM and the DOI (from the IS/IT domain), the Uses and Gratifications theory (from the communications field) and a value-based approach (from the marketing and economics fields). The latter are briefly explained next.

2.4 The Uses and Gratifications Theory (Katz *et al.*, 1974)

The Uses and Gratifications theory- U&G (Katz *et al.*, 1974) is a psychological theoretical perspective from the field of mass communications research that attempts to identify and explain the factors that motivate use (particularly, media use). The U&G assumes people use media to gratify their needs or desires (Papacharissi and Rubin, 2000). On the other hand, individual psychological characteristics, social context, attitudes and perceptions influence one's motives and behavior (Rubin, 1993; 1994).

The terms "uses" and "gratifications" refer slackly to media use activities that arise from unmet needs in audience members (uses), and the gratifying need-satisfaction process that results from engaging in motivated media use activated by some need (gratifications). The uses and resulting gratifications are generally interrelated (as far as media consumption is concerned), since the need-satisfaction effect occurs simultaneously with the media-consumption act (Matthews & Schrum, 2003; Ruggiero, 2000).

Rubin and Rubin (1985) highlight three main objectives of the Uses and Gratifications theory: 1) to understand how individuals use the mass media to gratify their needs; 2) to identify the motives and gratifications of individuals for specific media use; 3) to explore the functions or consequences of media use in order to better understand the communication process. The

U&G theory assumes that individuals are aware of their social and psychological needs and actively seek the media to fulfil them (i.e., it assumes an active audience that is aware of its needs and motivations (Katz *et al.*, 1974; Palmgreen and Rayburn, 1984). The underlying assumption is that individuals are self-motivated, as opposed to random or mindless, in their media use (Katz, 1959). This also differs from the major technology adoption theories that were conceptualized within the context of organizations in which the motivation to use a system is often extrinsic rather than intrinsic and voluntary.

The Uses and Gratifications theorists argue that people's needs influence how they use and respond to a medium: a medium will be adopted and used more when the existing motivations to use it lead to more satisfaction. Gratifications are defined as "some aspect of satisfaction reported by users, related to the use of the medium in question" (Stafford and Gillenson, 2004). Knutsen and Lyytinen (2006:56) define it as "pleasures, delights and fulfilments users imagine or experience while using a technology". In fact, gratifications correspond to motivations or reasons for which somebody uses a medium to satisfy his needs and preferences. According to McQuail (1987), personal social circumstances and psychological dispositions influence media use: different individuals may have different expectations about the benefits offered by the media and also different assessments of the value of the usage experience, which shapes specific choices and consumption of media.

In terms of methodology, a typical approach in U&G research is to use qualitative interviews and quantitative surveys to collect data. Additionally, ethnographic and sociological research through observations and interviews with users is sometimes used (Wei, 2008).

Past research based on the U&G theory identified gratifications sought from a given medium including information seeking, social interaction, reinforcing status and personal identity, entertainment, relaxation, filling time, escaping from problems (McQuail, 1987).

A few shortcomings have been pointed out to the U&G theory. Some scholars contend that the U&G is not a rigorous social science theory because individuals report on their subjective experiences with media (Baran and Davis, 2000). In the opinion of some researchers, behavior is not driven by motives but rather by experience that forms interpretive frameworks (Babrow, 1988). Others claim that media choices simply spring from reflexes and habits with no true motivations (Rubin, 1984). Furthermore, some authors criticized the U&G of being

“a-theoretical” arguing it was impossible to create testable hypotheses and to provide successful prediction or causal explanation for media choice and use (e.g., Elliot, 1974; Swanson, 1977). Nevertheless, since the 80’s, an emphasis on theory development namely by applying sophisticated statistical techniques, has advanced the understanding of U&G research and answered some of those criticisms.

Uses and Gratifications of Mobile Services

Studies based on the U&G theory are expanding as some researchers believe it is a theoretical perspective suited to study the Internet and new multimedia technologies because of its media-like characteristics (e.g., Lin, 2002; Ko *et al.*, 2005; Peters *et al.*, 2007, Stafford, 2008). While it has traditionally been a popular paradigm to study the motivations and behaviors of media consumption, the advent of new ICTs has revived the utilization of the U&G theory, which has been successfully applied by several researchers to assess consumers’ motivations and choices of newly popularized media and telecommunications’ technologies like the Internet (e.g., Chen and Corkindale, 2008; Nysveen *et al.*, 2005; Papacharissi and Rubin, 2000; Stafford *et al.*, 2004; Ruggiero, 2000; Wei and Lo, 2006), mobile telephony (e.g., Choi *et al.*, 2009; Chua *et al.*, 2012; Lee *et al.*, 2010; Leung and Wei, 2000; Tao *et al.*, 2010; Wei, 2008) and social media (e.g., Chen, 2011; Coursaris *et al.*, 2010; Dunne *et al.*, 2010; Park *et al.*, 2009; Shao, 2009; Zhou *et al.*, 2011).

Previous research found that gratifications like entertainment, enjoyment/pleasure, social interaction, information seeking, escape, time filling, status/fashion, mobility and immediate accessibility were related to the mobile phone use (e.g., Hoflich and Rossler, 2001; Leung and Wei, 2000; Nysveen *et al.*, 2005; Ozcan and Koçak, 2003; Wei, 2008). In a study on motivations for using the mobile phone for mass communication and entertainment, Wei (2008) concluded that gratifications of mobile phone use explained the utilization of mobile phones for services beyond voice and that different gratifications predicted different uses of the mobile phone.

Because Mobile TV is both a new mobile technology and a new media, we concur that the U&G theory is an appropriated paradigm to study the factors that influence Mobile TV adoption namely by capitalizing on the findings from researchers that applied the U&G theory to the mobile technologies context (e.g., Leung and Wei, 2000; Nysveen *et al.*, 2005; Wei and

Lo, 2006; Peters, Amato and Hollenbeck, 2007; Lee, Goh, Chua and Ang, 2010) together with those that stem from TV and other traditional medium research (e.g., Conway and Rubin, 1991; Donohew *et al.*, 1987; Elliott and Rosenberg, 1987; Heeter and Greenberg, 1985).

2.5 Consumer Perceived Value Approaches

Perceived value has attracted extensive attention in academia in recent years and the literature offers multiple conceptual approaches for value. There is little consensus regarding its definition and the concept became one of the most misused in social sciences and particularly, in the marketing literature (Khalifa, 2004). Value perspectives and theories have been mainly emphasized in the fields of economics, marketing, finance and psychology giving rise to different conceptualisations, generally differentiating by context the same underlying concept: consumption value (Sheth *et al.*, 1991, acquisition and transaction value (Thaler, 1985), customer value (Woodruff, 1997), consumer value (Holbrook, 1999) and perceived value (Zeithaml, 1988).

The lack of agreement among scholars with respect to the conceptualization and measurement of ‘perceived value’ is a consequence of its somehow ambiguous nature, which has been described as ‘complex’ (Lapierre, 2000), ‘multifaceted’ (Babin *et al.*, 1994), ‘dynamic’ (Parasuraman and Grewal, 2000; Woodruff *et al.*, 1996), and ‘subjective’ (Zeithaml, 1988).

Consumer’s perception of value has been defined in many different ways: “value is low price”; “value is whatever I want in a product”; “value is the quality I get for the price I pay” and “value is what I get for what I give” (Zeithaml, 1988). Zeithaml (1988) captures the essence of these four expressions into a global definition: “*perceived value is the consumer’s overall assessment of the utility of a product based on perceptions of what is received and what is given*” (ibidem, 1988: 14).

This utilitarian perspective is one of the more commonly used; it considers the benefits and costs associated with consumption and combines the acquisition and transaction value of a product/service. According to Zeithaml’s definition, Perceived Value is the result of a trade-off between the “benefits” (i.e., what is received) and the “costs” components (i.e., what is given), of a product/service. When evaluating the value of a product, consumers usually consider attributes other than price, like its perceived quality. Some researchers focused on

perceived quality and monetary price as the “benefit” and “sacrifice” components of value (e.g., Chang and Wildt, 1994; Dodds *et al.*, 1991; Grewal *et al.*, 1998). In any case, these views consider ‘perceived value’ as a uni-dimensional construct that can be measured by asking respondents to rate the overall value that they received in making their purchases.

Other authors have suggested that this conceptualization of ‘value’ (as simply a trade-off between benefit and sacrifice) represents a narrow approach to the concept and have argued that ‘perceived value’ is a multidimensional construct that has more than a functional aspect. For example, Sheth *et al.* (1991) explained consumption behavior in terms of functional value, social value, emotional value, epistemic value and conditional value (each of them may influence consumption behavior depending on the situation). Holbrook (1999) suggested that perceived value comprises eight different aspects: convenience, quality, success, reputation, fun, beauty, virtue and faith. These behavioral perspectives treat the construct more comprehensively and attempt to explain perceived value more in depth than utilitarian benefits and sacrifices. However, although these typologies thoroughly explain the benefits that consumers get from consumption, they neglect the associated costs (Kim *et al.*, 2007).

Subsequent research adopted the idea of a multidimensional conceptualisation and proposed different typologies of perceived value in a number of different contexts (e.g., Pura, 2005; Sweeney and Soutar, 2001, Turel *et al.*, 2010; Wang *et al.*, 2004). In particular, Sweeney and Soutar (2001) developed a multiple item scale based on the consumption values’ framework of Sheth *et al.*’s (1991).

The cognitive and utilitarian conceptualization of value, in which value is defined as a trade-off between benefits and sacrifices (e.g., Cronin *et al.*, 2000; Dodds, 1991; Zeithaml, 1988) has been prevalent in the literature.

The lack of agreement among scholars regarding the definition and conceptualization of perceived value leads to inconsistent and incommensurable empirical measures and, although certain approaches dominate the literature, all the scales and theories are the subject of multiple criticisms (Boksberger and Melsen, 2011).

The Operationalization of Perceived Value

Both qualitative and quantitative, as well as uni-dimensional and multi-dimensional methods have been used to measure perceived value.

According to the uni-dimensional approaches, perceived value is an overall concept that can be measured by a self-reported item (or set of items) that evaluates the consumer's perception of value (e.g. Agarwal and Teas, 2002; Brady and Robertson, 1999; Chang and Wildt, 1994; Dodds, 1991; Cronin *et al.*, 2000). This perspective assumes that consumers' evaluation of value may be a consequence of the effects of multiple antecedents (but not components), implying that the give-get "components" are not integral parts of the construct. Thus, although value is formally defined in terms of the costs–benefits relationship, its empirical operationalization treats these elements as antecedents.

The second approach conceives perceived value as a multi-dimensional construct composed of several interrelated attributes or dimensions that form a holistic representation of a complex phenomenon (e.g. Babin *et al.*, 1994; Holbrook, 1999; Sheth *et al.*, 1991; Sweeney and Soutar, 2001). In this perspective, the benefits and sacrifices components (each of which is manifested by multiple reflective indicators) act as formative components of perceived value. The give-get components are emphasized to be causal indicators of perceived value and are integral parts of the construct (rather than antecedents or external causes).

Compared with the uni-dimensional approach to perceived value, fewer studies have pursued a multi-dimensional approach. Some findings have shown that a multi-dimensional measurement approach explains the perceived value of services better than a single item "value for money" scale (Boksberger and Melsen, 2011). However, critics have contended that multi-dimensional constructs are conceptually ambiguous, explain less variance than explained by their dimensions taken collectively, and confound relationships between their dimensions and other constructs, while uni-dimensional approaches possess the merit of simplicity.

Research has proven that both the uni-dimensional and the multi-dimensional perspectives have worthwhile contributions to make to the study of value. They are not radically different but rather, they represent 'simple' and 'complex' approaches to the nature of the construct in question (Sanchez-Fernandez and Iniesta-Bonillo, 2007)

More important than the choice between a uni-dimensional and a multi-dimensional value approach is that, there may be determinants which are context and consumer specific (Boksberger and Melsen, 2011). As such, what is relevant is to identify and understand which measures of perceived value and its direct antecedents or components are most valid for the product/service in question. This will ensure practical relevancy by providing the answer to a key industry question: “what are the dimensions of value that customers care about”?

Perceived Value of Mobile Services

Value-based approaches have raised increased interest and debate in the mobile services literature (e.g., Kim *et al.*, 2007, Kim and Han, 2009, Kleijnen *et al.*, 2007, Pihlström and Brush, 2008), namely because mobile technologies are seen to create consumer value through different mechanisms than other technologies (Jarvenpaa and Loebbecke, 2009). The predictors of adoption of personal mobile services differ from those of traditional Information Systems in the workplace (Hong and Tam, 2006; Pederson *et al.*, 2002). As suggested by Lee *et al.* (2007), perceived value plays a determinant role in mobile data services adoption, regardless of different service categories and different cultural backgrounds. Moreover, a study from Hong and Tam in 2006 suggested that mobile services adoption determinants depend on the nature of the service and of its usage context. Their results showed that monetary value had a strong effect on adoption. Likewise, Kim *et al.* (2007) found that costs had a stronger explanatory power in terms of consumer value than benefits. Other researchers (e.g., Kleijnen *et al.*, 2004; Kleijnen *et al.*, 2007; Nysveen *et al.*, 2005) have identified that both hedonic and utilitarian benefits were significant antecedents of the value of mobile services. Turel *et al.* (2007) investigated user acceptance of SMS and concluded perceived value was an important predictor of consumers’ intentions. They considered several value tradeoffs namely price, social, emotional and quality. Only social value was found not to impact users overall perceived value of SMS. Kim and Han (2009) proposed a value-based framework to study the drivers of adoption of mobile data services. Their findings suggested utilitarian, hedonic and social value were key drivers of adoption intention. Yet, in spite of an increasing number of studies based on value, previous research has not successfully explained how value creation mechanisms affect the adoption and consumption of mobile services and how they benefit the consumer experience (Jarvenpaa and Loebbecke, 2009). Furthermore, as suggested by several researchers (e.g., Bolton and Drew, 1991; Boksberger and Melsen, 2011), the concept of value is context dependent and in value-centric models (like the one we

propose), it is necessary to identify domain-specific value-antecedents and relationships (Kleijnen *et al.*, 2007). To the best of our knowledge, previous research has not identified specific Mobile TV value antecedents; these are crucial to understand which dimensions of the service do consumers care about when making an overall evaluation of the value of Mobile TV that will, ultimately, lead to adoption decisions.

2.6 Conclusions from the Literature Review

In this section, we will not restate already mentioned limitations of particular theories but we will draw a general conclusion of the literature review, outlining major gaps we have identified and how our research approach will be different and innovative by fulfilling some of them.

In the previous sections, we extensively reviewed the literature on technology and innovations adoption and, for each theory we pointed out the major strengths and limitations. In spite of the wide range of alternative approaches, the TAM (Davis, 1989) has occupied by far the central position in ICTs' adoption literature (Dwivedi *et al.*, 2008; Lucas *et al.*, 2007). We highlight that the greatest strength of models such as the TAM and the DOI stands on their general application across a wide range of technologies and settings over several years (Venkatesh, 2006). Yet, concern has risen about the appropriateness of the TAM and similar models, which are considered too parsimonious and incomplete, more appropriate in organizational contexts, deterministic and tautological (Lopez-Nicolas *et al.*, 2008).

Within the ICT's adoption theories, Venkatesh *et al.*'s UTAUT (2003) is the more comprehensive one, synthesizing eight prior models and outperforming all of them. Even though, it can still be criticized that important variables were neglected, because few of the included predictors are fundamental or universal and, new research is likely to uncover new predictors (Bagozzi, 2007). In fact, depending on the specific innovation being studied, we may expect different determinants to be the significant ones to the adoption decision (De Marez *et al.*, 2007).

Moreover, those theories do not fully address the current market dynamics, in which consumers have a wide choice and a deeper knowledge of available technologies. At the

individual level, adoption decisions are more likely to be driven by different determinants such as product/service value criteria (Constantiou, 2009).

We also reviewed specific literature on the adoption of mobile telecommunication services. During the past few years, mobile services adoption research has grown dramatically and a large number of studies have covered the topic from different angles.

We realized the majority of studies have been conducted using traditional adoption models and theories from the IS field such as the Technology Acceptance Model (TAM), the Theory of Planned Behavior (TPB) and the Diffusion of Innovations (DOI) theory. Based on these theories researchers studied the effects of factors such as usefulness, ease of use, enjoyment of using a service, system quality, impact of technical issues, among others.

However, many authors (e.g., Yu *et al.*, 2003; Kim, Chan and Gupta, 2007) have concluded that traditional adoption models are insufficient to gain a comprehensive explanation of the factors that dictate individuals' intentions to adopt or reject the use of mobile services. One of the major reasons for this insufficiency is that they rely on the role of the consumer essentially as a technology user, through his interaction with the technology itself and as an organization member (under influence of hierarchical superiors or professional colleagues).

Yet, personal mobile services users are more than just technology users. They play a triple role: as technology users, as informal social network members (vs. organizational and business contexts) and as individual consumers. The role of mobile services adopters as consumers (instead of purely technology users) makes a key difference between mobile services adoption research and adoption research of more traditional technologies. The majority of adoption determinants that influence individual acceptance of traditional technologies (such as PCs) mostly lie in the interaction of the user with the technology and/or with people around him/her. The case with personal mobile services is different. Mobile service users are normally the final customers of a business and pay fees in order to receive the services. Price (or cost of the technology) is a major factor that has been given scant attention in prominent ICT's adoption models and that, in personal context, plays a major role (as the consumer financially supports the cost).

Consequently, the perspective of mobile services adopters as consumers opens the door to a wide range of adoption determinants that might not be as crucial for traditional technologies

adoption such as cost/price, value perceptions and individuals' exposure to different marketing efforts. Few studies have investigated the adoption factors of mobile services from the perspective of product/service consumers. While some studies included factors related to this role along with other technology-user determinants, the level of emphasis given to this perspective is minimal.

To understand what factors influence individuals based on this perspective, there is a need to investigate and integrate theories from areas other than Information Systems, such as Marketing, Economics, Consumer Behavior and Management. Unless this kind of theory integration is made, there will always be a lack of a complete understanding of consumers' adoption of personal mobile services and the recommendations and practical implications provided by researchers to mobile stakeholders will be incomplete and inadequate (AlHinai *et al.*, 2007).

While past research has not yet offered a comprehensive explanation for the low demand for some services (namely Mobile TV), several authors suggested the investigation of perceived costs and benefits associated with new mobile services in order to understand the most important drivers influencing adoption (Kim *et al.*, 2007; Kim and Han, 2009; Kleijnen *et al.*, 2007; Pagani, 2009).

Guided by these suggestions together with the results from our exploratory qualitative study, we decided to explore other theories and constructs from other research streams that would constitute alternative or complementary approaches to ICT's adoption models in ascertaining the determinants of Mobile TV adoption. We identified the Uses and Gratifications theory (Katz *et al.*, 1974) and consumer perceived value as suitable approaches.

Mobile TV has very particular characteristics: it is both a new ICT and a new media. The U&G theory proved to be robust and useful in the development of theoretical dimensions representative of consumer motivations for media use and, mobile specific measures developed from the U&G framework are useful for assessing consumers' likely uses of Mobile TV. The recognition of consumers' Mobile TV uses and sought gratifications when designing market offerings to address consumer needs, will lead to a greater level of consumer value and will result in greater benefits for users and stakeholders.

Furthermore, when studying the intention to adopt/use mobile technologies in the context of everyday life (as is typically the case with Mobile TV), technology and innovations adoption theories need to be complemented by other perspectives that include non-utilitarian motives. The U&G has an instrumental foundation that is equivalent to utilitarian theories but it also embodies non-utilitarian motives (Nysveen *et al.*, 2005). U&G research suggested that several non-utilitarian and intrinsic motives (e.g., enjoyment, fun seeking, entertainment, fashion, status, sociability) were significant motivations to use mobile services. Thus, we found it would be an interesting and valuable perspective to integrate in our study of consumer adoption of Mobile TV.

Past research on consumer choice perspectives (e.g., Kahneman and Tversky, 1979; Neuman and Morgenstern, 1953; Thaler, 1985; Zeithaml, 1988) suggested that consumers take decisions about their adoption/consumption behavior based on judgements they make on the value of a product/service by weighting all relevant benefit and sacrifice components. Value represents an overall estimation of the object to adopt. Contrastingly to value approaches, the TAM (Davis, 1989) does not have a construct that represents an overall estimation of the adoption object/technology but only a broad attitudinal construct. According to Chang and Wildt (1994), instead of a broad attitudinal construct, “value” may be a more significant determinant of consumers’ behavioral intentions.

We found “value”, in Zeithaml’s utilitarian perspective, would be appropriate within the context of our research because it is a general definition comprising both costs and benefits that replaces the usefulness construct from the TAM which, based on previous research (Kim *et al.*, 2007; Pagani, 2011) and results from our exploratory study, has proven not to be a significant driver influencing the adoption of Mobile TV services.

Within the mobile services literature, despite an increasing number of studies based on value, they have not successfully explained how value creation mechanisms affect the adoption and consumption of mobile services and how they benefit the consumer experience (Jarvenpaa and Loebbecke, 2009). Furthermore, as suggested by several researchers (e.g., Bolton and Drew, 1991; Boksberger and Melsen, 2011), because the concept of value is context dependent, it is necessary to identify domain-specific value-antecedents and relationships (Kleijnen *et al.*, 2007). Previous research has not identified specific Mobile TV value antecedents that are crucial to understand consumers’ adoption decisions. We believe a value-

based approach, integrated with the U&G theory and other constructs from the ICT's adoption field, will contribute to a comprehensive understanding of Mobile TV services acceptance.

To conclude, based on the previous discussion it can be seen that there is a lack of a complete understanding of the factors that influence personal mobile services adoption and, specifically, Mobile TV. While the existent literature has given a lot of attention to factors affecting adopters in their role of technology users, less attention has been given to the consumer role.

Studying individuals' adoption of personal mobile services is different than investigating its adoption by businesses in terms of the theories, concepts and perspectives that have to be considered. Many studies exist on each of these two lines. Our choice was to focus on individuals' voluntary adoption by combining inputs from the IS adoption field (e.g., ease of use; personal innovativeness) with related areas such as Marketing/Economics (consumer Perceived Value) and Communications (U&G), addressing previous suggestions of required specificity, comprehensive vs. parsimonious models and theory integration.

Moreover, the unique context and characteristics of mobile TV services required the addition of several new determinants such as privacy/secret use, battery consumption, content availability, connection speed, reliability and other issues that we identified in our exploratory qualitative study. This means that we went beyond the theoretical and conceptual bases of the explored theories.

We believe our approach and proposed conceptual framework will provide us and practitioners a complete understanding on the factors that influence Mobile TV adoption intentions and decisions.

3. EXPLORATORY QUALITATIVE STUDY

As stated in the Introduction chapter, our research subscribes a post-positivist methodological approach combining the use of inductive qualitative data (more associated with the interpretive paradigm) with deductive quantitative methods (associated with the positivist paradigm).

In this first empirical phase, we carried out an exploratory qualitative study to improve our understanding of the possible determinants and issues surrounding consumer adoption of Mobile TV. We conducted and analyzed the results of semi-structured interviews with key industry experts as well as focus groups with users and potential adopters of mobile TV.

3.1 Objectives

Since there was a gap in the scientific literature regarding a systematization of the adoption determinants of mobile services in general and, at the same time, the specific literature on Mobile TV was not rich enough and did not provide a sound conceptual framework, exploratory research was needed to help us identify and understand the most relevant factors that influence consumers' adoption of Mobile TV. The purpose of this fieldwork stage was to identify and synthesize those variables from a "theory generation" perspective, in order to progress towards the theoretical model development.

Therefore, we carried out a two-step exploratory qualitative research to gain perspectives, enlightenment and insight into the potential determinants of Mobile TV adoption. We used personal individual interviews and focus groups as these techniques are useful in exploratory research, namely in generating new ideas for constructs and hypotheses. By allowing participants to reveal their perspectives on general topics in which the researcher is interested, individual interviews and focus groups are helpful in the elicitation of a variety of views related to a particular issue and in gaining insights about markets and products (Flick, 1998; Neuman, 1997; Sudman and Blair, 1999). They are appropriate for exploring areas where theories are at formative stages.

This exploratory qualitative approach is consistent with procedures recommended for marketing theory development (e.g., Zeithaml *et al.*, 1993; Deshpande, 1983; Peter and Olson, 1983).

The general objective of our exploratory study was to help us define a conceptual model and theoretical background that was pertinent to the mobile telecommunications sector from an industry and consumer point of view.

Specifically, we aimed to:

- understand what do industry experts think about consumers' Mobile TV adoption determinants;
- understand what do current and potential consumers think about Mobile TV;
- acquire relevant knowledge that would allow us to better judge and decide on the relevant theoretical framework and constructs for our proposed model, taking into account its practical adequacy to the mobile telecommunications sector.

It is important to highlight that, by the time we conducted the qualitative study, we had extensively reviewed the literature on ICT's adoption and diffusion, we had identified the Uses & Gratifications as an interesting theory to explore but we had not uncovered additional theoretical possibilities.

The exploratory study revealed us the importance of some variables and its antecedents and led us to further explore the literature (triangulation), namely by reviewing previous research on Consumer Value and Service Quality.

3.2 Interviews with Key Industry Informants

In a first phase of this exploratory field study that took place in the second half of 2008, we conducted semi-structured personal interviews with key industry experts from different organizations, significant within the Mobile TV market. The aim of these interviews was to collect industry experts' opinion regarding Mobile TV adoption determinants (from a consumer perspective), to gather insights about the Mobile TV market and current

experiences and, to establish fruitful contacts for the quantitative phase (e.g., access to client databases, support for the quantitative survey).

Experts' selection was done based on their expertise level and significance as decision makers within the Mobile TV market. In order to capture distinct perspectives, we tried to assure the inclusion of heterogeneous industry players (including mobile operators, equipment suppliers, content producers and aggregators, etc.). Table 3 summarizes the backgrounds of the interviewees, their significance and their organizations.

Table 3: Key industry informants interviewed in our study and their significance

Organization	Role in Mobile TV market	Interviewee Name	Interviewee Title
Vodafone Portugal	Mobile operator	Eng.º Antonio Carriço	Director of Innovation and Global Products
TMN	Mobile operator	Dr. Mario Sousa	Director Data and Mobile Contents
Optimus	Mobile operator	Eng.º Rui Mascarenhas	Responsible for Sonaecom Mobile and IPTV Business Unit
RTP Mobile	Content aggregator	Carlos Vargas	General Director
Sportinveste	Content producer	Dr. Diogo Caldas	General Manager
Ericsson Portugal	Equipment supplier (handsets+network)	Eng.º Rodolfo Correia	Director Media Competence Center Iberia
Nokia Portugal	Equipment supplier (handsets+network)	Eng.º Luis Peixe	Director New Products and Services
Alcatel Portugal	Equipment supplier (network)	Eng.º Givé Shaffai	Responsible Multimedia and Applications Division
IDC Europe	Leading ICT's industry research company	Johnattan Arber	Senior Analyst Mobile Services

3.2.1 Methodology of the Interviews

All interviews were personal and face-to-face, with the exception of one expert from a leading ICT's market research company based in London (this one was conducted by telephone). Interviewees were very cooperative which allowed us to collect rich information. Each interview took approximately 60 minutes. As the interviews were semi-structured, we had a list of themes and questions to be answered but interviewees were free to express themselves whenever they felt appropriate (the interviews' script can be seen in the Appendices). Thus, each interview was different although the structured questions were asked in the same manner to all informants. Four interviews were audio-recorded with the experts' agreement while the other ones were intensive note-taken on interview sheets.

Each interview was divided into three parts. In the first part, interviewees were asked, based on their experience and deep market knowledge, to spontaneously evoke which were, in their opinion, the key determinants of Mobile TV adoption (from a consumer point of view). All interviewees enumerated a list of three to five main factors and supported their answers based on their experience and the context of their businesses. In a second part, interviewees were invited to evaluate a list of possible adoption determinants drawn from the literature review

on technology and innovations adoption and the Uses and Gratifications theory. The constructs were chosen among a multitude of factors commonly used in ICTs' adoption literature (at that time, we had not reviewed consumer value based theories which stemmed from the conclusions of this exploratory research). We selected the constructs that we considered more likely to be relevant for Mobile TV adoption based on other mobile services' studies and on our solid market knowledge. Interviewees were asked to rate those factors according to their level of importance to the adoption of Mobile TV services (from "1" meaning "Not important at all" to "5- Very important") and made some additional comments on the given answers.

The third part was essentially an informal and unstructured discussion about the experts' experiences related to Mobile TV adoption, market trends and market evolution expectations. This allowed for the interviewees to report on their companies' actions and results and to emphasize points of perceived relevance.

Data from the interviews was explored and analyzed based on tape and note-based content analysis without a predetermined theoretical framework.

3.2.2 Results and Conclusions from Key Industry Informants Interviews

3.2.2.1 Major outputs from key informants' interviews

We highlight in the next pages the major aspects that emerged from the interviews with key industry informants regarding Mobile TV adoption.

Spontaneously elicited key factors for adoption

The most important adoption factors spontaneously mentioned by the interviewees were: price (advanced by 7 out of 9 interviewees); quality of service (7 out of 9) and content (6 out of 9). Below, we present a summary of the factors that interviewees spontaneously elicited as being important adoption determinants.

Table 4: Mobile TV adoption determinants spontaneously elicited by key informants

Spontaneous Factors/Interviewees	A	B	C	D	E	F	G	H	I
Price (of the service)		X	X		X	X	X	X	X
Quality of Service	X	X	X		X		X	X	X
Content	X			X	X	X	X	X	
Ease of Use			X		X			X	X
Awareness/Marketing Communications			X	X	X	X	X		
Devices availability and price		X		X	X	X			
Image/Status				X					
Age			X						

The price that consumers have to pay to access the Mobile TV service (a daily, weekly or monthly fee) was considered by key industry informants as a major barrier to consumer adoption. With one exception, all the informants thought that the current monthly fee (around 7,5€) was expensive for consumers, as they evaluate the price by comparing it with their monthly mobile phone bill (of around 15-20€ on average). Therefore, although the current price is not interesting enough for service providers to invest more in Mobile TV, it would be considered expensive by consumers, when compared to their average monthly bill. One informant had a different point of view and opinioned that the service was not expensive at all and that consumers should use as reference for comparison the cost of their monthly cable TV subscription, although he recognized that they rather tend to compare it with their expenses in other mobile services.

Next to price, all the interviewees emphasized the importance of Quality of Service (QoS) to Mobile TV adoption. We asked them to develop on this theme and precise what they considered to be the characteristics of service quality in the specific case of Mobile TV. Their answers were uneven and each interviewee stressed different QoS dimensions but they were unanimous in considering it as a multitude of attributes or dimensions of the service, of which the main one is technical quality but it doesn't confine to it. They distinguished between the handset technical QoS (including the screen size and definition, the user interface, the audio quality...) and the network or transmission technical QoS (transmission quality, network availability and reliability, no cuts or freezes, no pixelized image...). They also referred to the variety and quality of proposed contents, the easiness of use and consumers' expectations as having an impact on the quality of service perceptions and usage experience.

Regarding “content”, experts tended to agree that news, sports, entertainment (soaps, series), cartoons and adult programs are the most successful contents for Mobile TV. Specifically, mobile operators’ representatives were unanimous about the success of adult/erotic content: it is the most watched type of content; one expert mentioned it accounted for almost 50% of its Mobile TV revenues (we should highlight it is a premium paid content, not included in standard price packages and is, therefore, easy to evaluate its contribution to revenues and usage trends). Related to the subject of adult contents, interviewees suggested that one major advantage of Mobile TV was “secret use”: the possibility to watch a desired content in some situations not socially allowed or well accepted and that, the success of adults’ content was one expression of this benefit. Generalist channels are the second most watched type of program (they are the first most watched if we consider the three national channels together¹). Cartoons were referred as the second most watched (parents use it to occupy children while waiting for something). Experts asserted that entertainment channels, namely AXN channel (essentially series) and Canal Historia (documentaries) were within the most successful (above news), together with live sports. One expert mentioned documentaries were the content-type that consumers watched for longer periods. This highlights the utilization of Mobile TV for entertainment purposes and not only for “passing time”.

Although experts considered Information Awareness as an important driver for Mobile TV use, “news” was not mentioned within the most watched contents. They argued that, by the time we conducted the interviews, there were no Portuguese specific news channels available on Mobile TV (only international ones like BBC and CNN) and that consumers were likely to watch the news on Portuguese generalist channels (when watching generalist channels, the content-type is not specified; consumers may be watching news or any other type of program).

Content was emphasized by almost all the informants as a major driver for Mobile TV adoption. Namely, they stressed it was important to offer a large choice of channels and content-types adapted to different segments of consumers and also, formats adapted to watch in a mobile phone (in terms of program length and image/subtitles size).

One expert mentioned that specific “made for mobile” content had been quite successful (a specific program created in Portugal that was transmitted in loop several times per day).

¹ Although four generalist national channels exist, the second channel is not currently available in Mobile TV.

However, the majority of key informants suggested that consumers would be more interested in traditional content that they are used to watch in their fixed TV and less interested in “mobisodes” and specific “made for mobile” content; one expert stated that traditional, generalist channels would drive mass adoption although specific mobile programs would be important for early adopters and heavy users; two experts highlighted the importance of sports and special live events in driving adoption: they mentioned that the audiences had significantly increased when the European football cup had been transmitted live on Mobile TV, leading to new subscriptions, even if only daily or weekly subscriptions (some matches were transmitted at early hours, when the majority of consumers were not at home and didn’t have other alternative to watch them than by using Mobile TV). Experts stressed the interest of some types of live content like sports, important news or special events. All these insights suggest that content is a relevant factor for adoption.

Five informants mentioned awareness or consumer knowledge of the service, as being a key factor for adoption. They called it “marketing communications”, “advertising” or “consumer education”. Although with different names, we classified these aspects under the same category as we consider they all relate to “consumer awareness”. Interviewees emphasized the importance of Marketing/Media communications in creating awareness and encouraging trial; they suggested that sending SMS’s to consumers with alerts about special events that would be transmitted or about special promotions (for example, announcing Mobile TV free trial for one day) is very important and increases audiences significantly.

Ease of Use was spontaneously elicited by 4 experts. They mentioned specifically that it was not straightforward to have access to Mobile TV on a mobile phone. First, very few mobile phones were compatible with the Mobile TV service and, even those that were compatible did not come with a Mobile TV access pre-installed by default (by the time we conducted the interviews). This means that, if the person wants to watch TV on his/her mobile either for a specific interest at that time or only by curiosity to try, he/she needs to download the Mobile TV application first i.e., the user has to go to the mobile operator website, read the instructions for downloading the Mobile TV application, proceed to the download (via mobile Internet access using his/her mobile) which is a bit timely due to the size of the application/software and only after that can he/she start using the service. Hence, this is the first difficulty with using the service and several potential users give up at this first step that requires time and effort. After this and once the Mobile TV application is installed and available

on a mobile phone, the user still has to understand how it works: when connecting to the service, the application displays some instructions like telling which are the handset keys that should be used to control the sound volume and to switch channel. Although requiring only a “one time learning effort”, as the user will then know how to use the service as he/she becomes experienced in using it, it is never so easy as when using a fixed TV which has a remote control with specific keys for each user instruction; in a mobile phone there is a limited number of keys hence, one has to use the same keys for several different actions and this is not always intuitive.

Another factor referred by 4 experts was device availability (availability of compatible mobile phones). Interviewees observed that consumers are not willing to buy a premium mobile phone with the purpose of using Mobile TV because they are expensive. Thus, either consumers own already a compatible handset or it is very unlikely that they will buy one to that specific end (the current price is high and consumers are not willing to spend that money to the purpose of watching Mobile TV). For industry informants, mobile phones’ price and renewal period (which is about 1,5 years) play an important role; previous possession of a compatible mobile phone is a requirement to Mobile TV adoption.

Suggested adoption factors drawn from the academic literature

We recall that, by the time the interviews took place, we had conducted an extensive review of the literature focused essentially on technology acceptance and innovations’ adoption and diffusion (hence, mainly coming from the IT/IS field); it was only after and deriving from this exploratory qualitative study that we pursued a literature review more centered on other themes that emerged.

Table 5 shows the interviewees’ evaluation of the suggested factors drawn from the literature in a 1-5 scale where “1” meant “not important at all” (for the adoption decision) and “5” meant “very important”.

Table 5: Interviewees' evaluation of 12 potential Mobile TV adoption determinants drawn from previous literature review

Factors from literature/Interviewees	A	B	C	D	E	F	G	H	I
Price	3	4	3	4	4	5	5	5	4
Perceived Ease of Use/Complexity	5	4	5	5	4	4	4	5	5
Social Influence/Subjective Norm	3	3	4	3	2	3	3	3	3
Image/Status	2	3	4	4	1	3	3	3	2
Perceived Enjoyment/Fun	5	4	4	5	4	4	4	3	4
Perceived Usefulness	4	3	3	3	2	2	3	4	4
Personal Innovativeness	3	3	4	4	4	3	5	2	4
Afinity with TV viewing (compatibility)	5	3	2	3	1	5	4	4	1
Age	3	3	3	4	5	2	5	2	4
Gender	2	2	1	1	1	1	2	2	2
Information Awareness	5	4	5	5	4	5	5	5	4
Social Interaction/Companionship	2	3	2	2	4	2	3	3	2

Regarding the list of factors drawn from the literature review, the ones that were considered more relevant by key industry informants were Information Awareness, Perceived Ease of Use, Perceived Enjoyment and Price. Gender, Companionship/Social Interaction and Image/Status, were considered as the less important factors to adoption.

Compatibility (with TV viewing), which is related to consumers' TV viewing habits (i.e., if they regularly watch fixed TV or not) raised uneven opinions. Four interviewees considered it was an important factor (≥ 4):

"If consumers do not usually watch TV at home, they will probably not watch it on their mobiles."

Conversely, three respondents considered it was not important because even if consumers do not watch TV at home, they may still watch it on their mobiles:

"Perhaps they do not watch TV at home because they arrive late, don't have time or family members want to watch different programs; but if they had the possibility to watch on their mobile phones the programs they are interested in when they wanted, maybe they would do it".

Image/status was not considered a relevant driver of Mobile TV adoption. Moreover, we should highlight that whenever image /status was considered important, it was more related to the mobile phone possession than to the services it enables consumers to use (i.e., image/status may be more relevant in choosing a premium mobile phone model but not so

relevant to the adoption of the Mobile TV service itself). Yet, one informant suggested that “show-off” was one of the motivations for Mobile TV use, at least in this early stage of the market:

“We are in a stage where Mobile TV is a “nice to have” product rather than being a “must have”; current adopters find it “nice” and “cool” to have Mobile TV and to show it to their friends”.

In a general manner, “age” was considered an important factor. Four interviewees considered it was a very important factor and that it was related to personal innovativeness characteristics, having a young and open-minded spirit and also to physical abilities (from a certain age, people usually have lower vision abilities than when they are younger, which influences the likeliness of using Mobile TV).

Interviewees in general had an unclear opinion about the construct “social influence/subjective norm”. They considered influence from peers less important than media influence; they tended to minimize peers’ role as a source of information about the service. However, we believe they were thinking more in a perspective of the service diffusion rather than individual adoption: some experts find that, in this early stage of the market, there are so few Mobile TV adopters that their influence is less relevant than mass marketing communications.

Finally, the construct “Perceived Usefulness” raised some discussion and controversia. In a first instance, interviewees unanimously stated it was not an important factor because they associated “usefulness” exclusively with functional and extrinsic utility, with something that is really important to accomplish a certain objective or task. And

“Mobile TV is not an essential service from the consumer point of view”.

Some interviewees suggested that usefulness could be considered important only if interpreted in a broader and more subjective sense related to the advantages of using the service in specific situations. One expert opinioned that “benefits” would be a better term to use than “usefulness” and two other informants suggested that the service “value proposition” was of greater interest than “usefulness”.

Other relevant themes that emerged from interviews with key informants

Mobile operators' representatives referred that peak times occurred in the morning and in the evening. As Mobile TV peak times do not always coincide with those of fixed TV, experts foresee that Mobile TV will increase the total television viewing time and, should not be seen as a substitute for fixed TV but rather as an extension of it because

"People will watch Mobile TV in periods and situations in which they didn't watch television before".

Experts referred that the duration of a Mobile TV watching session was generally short (less than 10 minutes) but there were exceptions (for example, when watching a football match).

In order to help us define the age range of the target population of our survey, we asked experts advice on this question. The majority suggested an interval from the late teens to the fifties (one expert mentioned their target group for Mobile TV were the 20's and the 30's age groups).

One interviewee suggested that it was important to expand consumers' perceptions of how Mobile TV can be used, namely at home by connecting the mobile phone to the fixed TV instead of having a cable subscription (i.e., to watch TV in a large traditional TV screen but using the mobile operator as TV service provider). Yet, although we recognize this can be an interesting use of Mobile TV in specific situations (like on holidays in a holiday flat or hotel), we are skeptical about consumers using Mobile TV to replace their fixed TV operator in their main residences.

To conclude, interviews with key industry informants were an important and very useful step in our research as they contributed to identify new variables to include in our model, namely quality of service, price and content; these would be important determinants of Mobile TV adoption. They prompted us to consider the inclusion in our model of several factors that we further tested in Focus Groups' interviews. Besides the aforementioned quality of service, price and content, we acknowledged the relevance of other possible adoption determinants such as age, device availability, privacy/secret use and specific gratifications like information awareness and fun. Together with the conclusions from the focus groups, we should highlight the contribution of these interviews to the development of our theoretical model, namely to incite us subscribing a value-based perspective of Mobile TV adoption, in which consumers'

perceived benefits (rather than perceived usefulness, widely used in technology adoption literature but not relevant in this context, according to key informants), are hypothesized to influence adoption intention, together with price and quality of service. Also, the insights provided by key industry informants induced the inclusion in our model of the “quality of service” variable. Although already existent in the literature, key informants were very helpful to our conceptualization of this construct within the specific context of mobile services and Mobile TV. Prompted by the exploratory study, we further reviewed the literature on consumer value and quality of service which clearly helped us defining our research direction and considering a different approach and theoretical perspective to address our research problem (vs. technology adoption theories).

3.3 Focus Groups with Consumers

Following to the interviews with key industry informants and, given the lack of previous empirical work addressing consumers’ perceptions and experiences with Mobile TV, we decided to use focus groups as an information-gathering technique. By conducting focus groups with Mobile TV adopters and potential adopters, our specific objectives were:

- 1) That they constituted a source of ideas regarding variables and hypotheses to be integrated in our conceptual model and further tested empirically;
- 2) To improve our understanding of consumers’ perceptions and feelings about Mobile TV and their interest in using this service.

Focus groups have been suggested as a suitable method for exploratory studies (Calder, 1977) and allow gathering useful insights on consumers’ needs, requirements and perceptions, which is essential in an early phase of mobile services development.

Moreover, using focus groups has a number of advantages. First of all, it is a relatively time-efficient approach, the output is easy to understand, the information that comes available is relatively rich and, information that may otherwise have remained hidden tends to emerge (Langford and McDonagh, 2003; Ulwick, 2002). Second, focus groups allow researchers to explore a topic from the user’s point of view (Ulwick, 2002). Some disadvantages are that focus groups are more difficult to manage (vs. individual interviews), that individual participants may either be very dominant or silent, that participants may respond in a socially

desirable manner (Wooten and Reed, 2000) and that they may be unwilling to discuss sensitive or personal issues (Morgan, 1997).

Finally, although the participants are not really representative of the larger target market, focus groups have considerable potential in research when we want to construct meaning. Through the elicitation of a wide variety of views in relation to a particular issue, participants provide elaborated perspectives on the general topics in which the researcher is interested.

3.3.1 Method

We conducted four focus groups with adopters and potential adopters of Mobile TV (32 consumers altogether). Participants were selected by convenience and we tried to create groups that were diverse with respect to age, gender and Mobile TV experience. Our sample included participants aged 17 to 46. Each focus group of eight participants (including a total of eight Mobile TV users in two of the groups) lasted about 1h30 to 2 hours. The interviews took place in the first quarter of 2009. A 5€ shopping coupon was offered to each participant as an incentive for his/her collaboration.

Because a main objective of the focus groups was to generate new constructs and theoretical understanding, they were conducted in a non-directive manner, as recommended by Calder (1977). During the focus group sessions, the researcher played the roles of observer and moderator at the same time. Although playing a dual role of observer and moderator, the researcher only intervened to allow the focus groups to realize their objectives i.e., to ensure that the main topics in the discussion guide were covered and to facilitate the discussion (there was no personal interest in the results or in specific answers). Despite the generally non-directional nature of the discussions, certain common main themes were used to guide the debate.

Our moderator's guide contained a general introductory discussion about participants' possession and usage of new technologies in general followed by specific questions on the types of mobile services used and then, Mobile TV.

Each session had a similar structure: first, the participants were invited for a general talk on new technologies with an emphasis on mobile ones. As the conversation flew, we started using more probing questions directed to particular aspects of the conversation, to explore

responses that were significant to our research topic. As such, we conducted the discussion more specifically to mobile phones and mobile services. Participants were encouraged to talk about their mobile phone usage, the services and mobile phone functionalities they use, in which circumstances, for which needs, the advantages and disadvantages they find in the “mobile lifestyle”, what they would like to be able to do with their mobile phones (that they currently cannot), etc.

After the introductory questions about mobile services and when the subject of Mobile TV had not spontaneously emerged, participants were asked if they had already heard about Mobile TV and if they knew what it was. Once the Mobile TV subject was introduced, the moderator provided a brief explanation regarding the Mobile TV service. Then we started discussing about participants’ interest in Mobile TV service and the reasons for their interest or not, respective motives and possible utilization contexts. Some questions were: “Would you be interested in having this service? Why would you be interested/not interested? How much would you be willing to pay for it? In which circumstances would you use it? What would be the motivations for using it? For how long would you watch Mobile TV?

In a second part of the focus groups sessions and, based on the results of key informants interviews, we wanted to explore the subject of Quality of Service, namely to assess if it was also considered important by consumers and specifically, which quality of service dimensions were relevant to include in our model. Accordingly, we carried out PC-based and live Mobile TV demos showing different levels of quality (a premium and a low range handset were used and also different transmission technologies- streaming and broadcasting), which allowed to roughly illustrate and assess the effect of different quality of service parameters on consumers judgements of the service as suggested by key informants (e.g., screen size, image resolution, user interface, loading and zapping time, transmission quality).

The focus groups’ sessions were recorded and note-taken by the researcher. Tape-based and field notes analysis was performed and an abridged transcript was prepared with specific quotes relevant to the objectives of our research.

According to Vala (1986), there are no ideal models in content analysis (especially in exploratory studies) but rather, the rules should be dictated by the theoretical grounding and

by the researcher's objectives. Therefore, we tried to be as much synthetic and pragmatic as possible, taking into account the objectives of our exploratory study.

We applied human non-automated coding in which the text/quotes were classified according to a specific set of classification categories related to Mobile TV adoption and usage. The coded segments included specific words, themes or issues that occurred within the discussion groups. Quotes or excerpts that had similar patterns or characteristics were grouped into the same category (Miles & Huberman, 1994).

We developed a classification scheme that included elements from theories of technology adoption and use, the Uses and Gratifications theory and consumer perceived value² namely: gratifications/benefits/positive aspects of Mobile TV; costs/negative aspects; quality of service aspects; use situations/use habits; social influence; personal innovativeness; other drivers of adoption.

The data were analyzed in two stages. First, all statements relating to drivers and barriers of Mobile TV adoption were extracted and classified into broad categories drawn from the above-mentioned theories. The drivers were separated into *benefits or gratifications*, *personal/individual characteristics (like age, personal innovativeness, gender, etc.)* and *external influences (like social influence)*. The barriers were separated into *monetary* and *non-monetary costs*. Service quality and performance related comments were categorized under *Quality of Service*. Comments that did not concern adoption determinants directly but that could still be relevant to understand consumer behavior towards Mobile TV were also extracted and categorized under *use situations or use habits* and *other relevant aspects*. Secondly, within these broad categories, a more refined analysis was performed by identifying sub-categories without a pre-determined conceptual framework (for example, all comments related to the image and sound quality were categorized under *multimedia quality* (a sub-category of Quality of Service) regardless of the fact that it already existed or not as a construct in the academic literature. The overall process was one of relating categories of information to the central phenomenon category.

² As this phase was subsequent to the interviews with key industry informants, we had already taken into account the conclusions from that first phase, namely concerning the inclusion of perceived benefits and a consumer value approach.

The results of the study are reported in the following manner: the more prominent identified categories and sub-categories are briefly described based on the participants' points of view and some illustrative quotes are cited to show the participants' exact wording. Secondly, we highlight the relevance and contribution of these findings and identified categories to our theoretical model conceptualization (although the details and justification for the inclusion of each construct and hypothesized relationships are presented only in the next chapter- the conceptual model chapter).

3.3.2 Results

Regarding the introduction section of the group interviews related to the use of mobile services in general, we noted all the participants had over 5 years experience in using mobile telephony services (the majority had over 10 years experience). The use of mobile phones and services was quite similar between the interviewed groups. Mobile phones were mostly used for communication either by calling or sending SMS. Premium services were less frequently used. Yet, participants used a large number of mobile services ranging from standard voice services to mobile gaming, mobile commerce and mobile Internet and they provided explanations about why they used mobile devices and services. Consumers generally perceive the mobile phone as essential to modern life. Although this perception was stronger for some participants than others and the precise functionalities and services that were seen to be crucial varied, the opinion that the mobile phone is absolutely essential was common to nearly all participants.

3.3.2.1 General Aspects to Highlight Regarding the Mobile TV Service

By the time we conducted the focus groups (first quarter of 2009), several participants were not aware of Mobile TV offers in terms of content, service possibilities and price schemes. At a first stage, many participants showed some skepticism towards Mobile TV because of the screen size and related expected (low) image quality. Some of them could hardly conceive watching TV on a mobile phone, especially those that had never heard of it before. One participant stated "*we can hardly see something in such a small screen*"; others agreed that "*even if it is possible, it is surely not a good experience*". Yet, in general, after being introduced to the service, participants showed interest in Mobile TV (20 out of 32 "spontaneously"; 26 after trial/demo and depending on the handset characteristics, quality of

service and price). Six participants stated that they would definitely not be interested in Mobile TV, even if it was for free. The reasons they evoked were that they just don't like or don't have the habit to watch TV (even at home) or they only use their mobile phones for basic communication services (phone calls and SMS's) or because they avoid watching too much television. Participants that possessed more advanced mobile terminals and that used more diverse mobile phone services and functionalities showed higher interest in Mobile TV, when compared with others. Men showed slightly higher interest than women, mainly due to their interest in watching live sports programs such as football matches (some mentioned they could watch a whole 90 minutes match in their mobile, if they had not a better alternative). Young consumers (students) showed strong interest in the Mobile TV service in general, although they were financially dependent and constrained so, the service had to be free or they should have their parents paying for it.

The main motives referred by participants that would motivate them to use Mobile TV were: to kill time when waiting for something or someone, to watch live events important to them (sports, music or cultural events, an important official communicate...), to watch the news, to entertain/occupy children in boring situations (for example, waiting in a restaurant), to get entertained in short breaks (work, school), to watch desired TV programs in circumstances in which they don't have access to a fixed TV or to their favorite channels (for example, in a holiday flat, abroad in a hotel) and for privacy or secret use reasons (just want to watch TV alone in their room or as a diversion in a boring meeting or class).

The type of contents that raised the higher interest were news, sports, cartoons and series. Participants would like to access their preferred programs when they want and independently from linear TV time schedules.

Regarding viewing times, the majority of participants referred lunch breaks and other work/school breaks as more likely use situations but actual users mentioned they also use Mobile TV frequently in the evening. As for session duration, with the exception of football "addicted" that stated they could watch a whole match using the Mobile TV service, the majority of participants suggested they would probably watch about 15-20 minutes maximum per day (actual users said they were watching 20-30 minutes per day).

Participants are not willing to pay much for the Mobile TV service but they had difficulty in eliciting specific values that they would consider acceptable. They stated it depended on the content that would be available to watch (number, variety and interest of the channels). A maximum of 5€-7€ per month for unlimited access to a wide range of channels (20-30) was generally agreed as a fair price but a whole majority were not willing to pay for a monthly subscription as they would use the service only in sporadic situations; hence, they would prefer a pay-per-view system or a daily fee. However, they showed interest in receiving mobile advertising as a way to reduce or totally sponsor the cost of Mobile TV.

In the two focus groups in which there were actual users participants, we noticed that as they started participating in the discussion and sharing their own experiences, other non-user participants' interest in Mobile TV raised. However, when asked about the role of social influence, participants suggested that social/peer influence was not important for their adoption decision. They could take into account friends' opinions and experience with the service as an information source but it would not exert any kind of influence (such as social pressure, group identification or image/status) in their adoption decision.

“High quality of service” confirmed to be a very important factor for developing positive feelings towards Mobile TV (as suggested by key industry informants). The results observed after the demos and brief individual trial suggested that, when confronted with a premium device and service quality, some of the consumers' pre-conceived low expectations were disconfirmed; they were positively surprised with service quality aspects such as the screen size, image definition, clear sound, intuitive/user-friendly interface and a wide variety of available content and this increased their interest in having access to the service; it even seemed to “convince” some skeptical participants (about the interest of the service but not necessarily to pay for it). Moreover, while the group discussion progressed and benefits and use situations of Mobile TV were evoked, some participants showed increasing interest for the service:

“I had never thought about that before but it really sounds interesting and now I'm curious to try the service”.

This suggests that there might be an important role for marketers to promote the service and create awareness that would stimulate trial and possible subsequent adoption.

Yet, even when the Mobile TV visioning experience was good, participants still considered it was inferior to TV at home and the majority showed reluctance to pay for the service, except in very specific situations and contexts. Consumers conceived as Mobile TV major advantage

the fact that it can be accessed immediately in any location and, although having enjoyed the short trial experience, many respondents indicated they would only be interested in adopting it if it was cheap enough or free.

In the next paragraphs, we will focus on the characteristics and factors that emerged as major determinant factors for Mobile TV adoption and use, which was our primary objective. Various factors such as the gratifications or benefits of Mobile TV use, perceived costs and quality of service related issues were identified as important determinants influencing the acceptance of Mobile TV. We report the most prominent and some illustrative quotes.

3.3.2.2 Mobile TV Benefits or Gratifications

Filling time/ Killing time

Focus groups' participants suggested that Mobile TV would be beneficial in providing a diversion and filling time. This was mentioned in all the groups and elicited by several participants. For example, one participant talked about how watching Mobile TV would be a form of occupation that she could use to fill up her unused time throughout the day, suggesting that Mobile TV would gratify consumers' needs for occupation and filling time:

“Let's imagine I'm sitting outside on a work break (for example, at lunch) and I don't really have much to do. I might use that time to switch on my mobile to watch TV, just like someone would look in a newspaper during its free time. I would probably flip through my phone and see what's going on at TV at that time. I can imagine this becoming habitual.”

When “bored” or “lacking something to do for a few minutes”, informants described spontaneously seeking stimulation. For example, browsing through magazines in a doctor's waiting room or flipping through television stations at home. The benefit of using Mobile TV to kill time in a doctor's waiting room and other waiting situations emerged in all focus groups with no exception. As stated by one participant:

“I often have to wait over half an hour (for the doctor's appointment) and the kinds of magazines usually available in the waiting rooms don't interest me at all. Having the possibility to watch TV on my mobile in those moments could help me pass that time quicker”.

Another one said that:

“... Sometimes there is a TV in the doctor’s waiting room but the channels they put it in are usually nasty such as those middle afternoon talk shows or soaps which I really can’t stand! And if there are other people around me, I cannot switch to other channels. If I could watch something that interested me by using my mobile, it could be an appealing service; I might use it!”

A frequent traveler and Mobile TV user stated:

“I travel a lot for my job and pass much time in airport lounges. Sometimes I work a bit on my laptop but there are moments where I just want to relax and watch the news or something else. I often use the Mobile TV service in those occasions.”

The ubiquity of the Mobile TV service provides an advantage over alternatives that are limited by time and/or space constraints. Moreover, Mobile TV differs from motivations to use a newspaper, a magazine or a book because the mobile medium appears to be particularly appealing for filling brief periods of time that are too short for most other leisure activities. Several participants explained that they often have only 15 minutes breaks (between professional appointments or classes), which is not enough time to go anyway or do something that requires more concentration (like reading a book chapter or a newspaper or open a textbook to study), so this time is optimal for checking what’s going on at TV using the mobile phone.

Entertainment

Potential Mobile TV users appear to be motivated primarily by a desire to kill time and to a lesser extent, to be entertained. For participants, the benefit of entertainment derives from the perceived interest of the content provided by Mobile TV (rather than the use of the medium *per se*). Like the enjoyable content of “traditional television” programs, Mobile TV entertainment gratification depends on the available content. Mobile TV users that are more “goal-directed” may check what’s going on TV more often, at any time and any place. For example, a person who is attached to some specific programs like series and soaps, the evening news or other, can watch his/her favorite programs when he/she wakes in the morning, at lunch time or when leaving work without being constrained to a specific location. Some users referred watching TV on their mobiles for entertainment purposes at home when the main TV is “occupied” by other member/s of the family:

“I really enjoy sitting on the sofa after dinner and watch one of my favorite series but sometimes my husband is watching the late evening news as he never arrives home before the 8 o’clock news. So, I just turn to my mobile and watch what I want in the living room, close to him, or in the bedroom”.

Another participant said:

“We have a house in the countryside where we go sometimes for a weekend or holidays. But we don’t have cable TV there and when I want to watch my favorite programs like Doctor House or Emergency, I use the Mobile TV service”.

The benefit of entertaining/occupying children was also referred several times:

“When we take our children with us to a restaurant, we often have to wait a bit for the service or we just want to take our time after the meal but children become impatient. We use the Mobile TV service to entertain children with cartoons and it works like magic!”

We considered the benefit of entertainment to be slightly different from the one of killing time in that the user motivation is really to watch a specific content that interests him/her at a specific moment (and not necessarily while waiting), instead of watching “anything” just to kill time. That’s why we created two distinct categories.

Information Awareness/ Anytime access to cutting-edge information

Participants frequently mentioned the need for relevant and timely information as a motivator for adopting Mobile TV. Being well informed is not only useful for decision making but can also give consumers an increased sense of power and distinction among their peers, as they are perceived as being on the forefront and distinct people that others want to imitate. One participant expressed a need for information that would give her supremacy over others:

“I like the idea of being able to have the latest information. When I arrive at the office and comment on something that nobody else is aware, I feel like being the center of all attentions”.

Participants in the four focus groups expressed the motivation to be aware of the latest important news and events for the sake of keeping informed and up-to-date and the discussions suggested this would be one of the main advantages of having TV on their mobile:

“Having access to updated news with images throughout the day would be important for me to use Mobile TV. News on the radio are always too short and sometimes uninteresting, while on the Internet they are more complete but have no images. That would definitely be an advantage of Mobile TV”.

News was also identified as the most interesting content type for mobile consumption because the typical length of a news bulletin fits well with use of Mobile TV in time breaks of less than 20 minutes. The timeliness, conciseness and “snack-like” character of news content match well with the intended dead time usage of Mobile TV.

Privacy

In the introduction of the focus groups regarding mobile services in general, a few participants viewed their mobile devices as essential elements of their intimate, personal space, being part of their own identity. This is somehow related with some Mobile TV benefits that were elicited like the possibility to watch TV quietly in one’s personal/intimate space. The following quotes illustrate this benefit:

“If I had TV on my mobile, I could watch it quietly in my room instead of being in the living room with my younger brothers making noise and my parents harassing me to change channel. It’s not that I have something to hide but it would just be more peaceful and calm”.

“There are times in which I would really enjoy watching a bit of TV lying in my bed before falling asleep. We could have a second TV in the bedroom but we chose not in order to avoid “addiction” and distraction. But sometimes I really miss it and I would prefer to watch TV lying in the bed than in the living room. So, Mobile TV would probably be useful in those occasions”.

“I like watching my favorite soap in the evening but my husband and son always blame on me claiming it is ‘trash programs’ and how can it interest me and so on. Sometimes I feel ashamed because I recognize it is not interesting at all but I find it relaxing. I think if I could just go away to my room and watch it on my mobile, it would be great; it would avoid me those ironic comments from the rest of the family and I could watch what I want in peace!”

These quotes illustrate how Mobile TV can provide some privacy benefits by allowing consumers to watch TV in more peaceful and quiet spaces, far from disturbances, interruptions or others’ approval.

The subject of using Mobile TV to watch adult/erotic content (which was highlighted by several industry specialists) did not emerge in the focus groups discussions and we did not

raise it neither because of its sensitive character. However, other “secret use” situations were evoked in which Mobile TV seemed to be of interest:

“Sometimes I’m in class and it’s just so boring... but I can’t miss classes because it accounts for the final evaluation. I can send SMS’s or play games in my mobile but it’s not very discreet as a diversion. Some colleagues were already ‘caught in the act’ but Mobile TV would probably be a more prudent activity, as far as I use my bluetooth earphone, because we don’t have to touch the mobile phone all the time (like when playing games or sending messages)”.

Young professionals also elicited the same advantage in the context of professional meetings or conferences. Although slightly different, we grouped these two “types” of benefits (secret use and intimacy/personal use) in the same category that we called Privacy.

Ubiquity/Convenience

Participants discussed how Mobile TV convenience appeared superior to other forms of media, suggesting that traditional means including newspapers, magazines and television don’t have the advantages provided by the ubiquitous nature of Mobile TV. The size and portability of a mobile phone is ideal for getting the right type of information at the right time:

“I’m not going to carry around the weekend newspaper in my bag so that I can pull it out and look at it when I have a few free minutes. I can’t carry around my computer, even if it is a laptop- it’s kind of burdensome. But I always carry around my mobile phone”.

For participants, the major advantage of watching TV on the mobile phone vs. alternative channels is that the mobile phone offers immediate access in any location. However, when referring this feature, some participants expressed that they did not feel the need for immediate access to television. Mobility and immediate access is not equally important for everybody. As stated by two participants:

“I’ve got the Internet at the office and television at home if I need to look up something. Nothing’s that desperate that you need to use your phone to watch TV”.

“I don’t want to have mobile access to the TV. When I am away from home or the office, I don’t think that I really need that service. Actually, I don’t really want it at all. We are already overwhelmed with information.”

But other participants counter-argued:

“Well, that might be true in the majority of situations but sometimes I really feel the need to have immediate access to images and not only to text or audio information. I remember when there were the September 11th attacks, I was at my office and we got the information through the radio but were desperate to watch the images. Some colleagues even left earlier to go home watch the news on the TV”.

“That’s also true with football matches. Even if I can hear the report on the radio, it’s not the same thing as watching the images.”

Thus, the ubiquitous nature of Mobile TV is particularly appealing and convenient: it offers the possibility of immediate access to television contents, independently of time and place. As people carry mobile phones with them most of the time, convenience and ubiquity were judged by participants as a major advantage of the Mobile TV service.

3.3.2.3 Costs

Costs represent potential barriers for Mobile TV users. We identified two primary costs associated with Mobile TV usage: monetary costs and “service performance” costs. Monetary costs denote the price of the service and, service performance costs symbolize the possible drawbacks that result from the use of Mobile TV like battery exhaustion and self-distraction.

Monetary Costs/Price

Focus groups’ participants elicited that they prefer a free service, even if it should be sponsored by advertising, than a paid subscription. Several interviewees suggested that they would be interested in Mobile TV only in the absence of monetary costs. Others conveyed that they would be willing to pay a small monthly fee (5€-7€) for the service if the content delivered to their wireless devices was of their interest or if it was specific content that they had chosen to receive and, in that case (if they pay for it), they don’t want to have advertising. Given the fairly negative general sentiment towards spending money on Mobile TV, we were a little surprised at how strongly this sentiment shifted when we discussed options for accessing Mobile TV for free like having advertisers paying for the provision of the service. In general, the response to the idea of receiving ads on their mobiles in exchange for access to the Mobile TV service was very favorable. Although some individuals were not interested in Mobile TV at all (not even free) and some were very negative towards receiving any kind of

targeted advertising on their mobiles, the majority of the participants liked the idea of having free access to Mobile TV in exchange for receiving a limited amount of advertising.

A female participant stated she might be willing to pay a small fee for contents that matched her specific interests:

“I think it should be the advertising industry to support the cost of Mobile TV! If it is a specific content that I download or ask for, then yes, I might pay a small fee but it would have to be a minimal cost. I don’t think I would be willing to pay 10€ or even 5€ for watching TV on my mobile a couple of times per month”.

Another male participant provided a similar argument. He believes that

“Mobile TV should be sponsored by advertising and, if it was free, I would very likely use it”.

Furthermore, if the service costed less than 5€ per month, he might be willing to use it if it matched his interests. Other participants also supported the “advertisement paid model” although

“advertisements should be in less quantity than in traditional TV because if one has a 20 minutes break to be filled by watching TV on his mobile and advertisements last for 15 minutes, then it isn’t worthwhile; I would just switch off the service and might be discouraged of using it again.”

Another perspective that attracted prospective consumers was that of paying a lower pay-per-view or daily fee (vs. paying a monthly subscription) to access Mobile TV only in very specific and occasional situations.

Since they have other choices that are inexpensive and often available in dead time situations (paid for or free newspapers and magazines, Internet access, etc.), consumers are quite reluctant to pay for the Mobile TV service. Having Mobile TV for free was clearly seen as a relevant criterion for consumer adoption. Mobile TV brings value to consumers if it is relatively low in cost. One participant referred the following:

“For me, it’s not the price per se that is determinant for my decision but rather the price when compared to the advantages and functionalities of the service. And I can see some advantages but nothing so important that would convince me to pay, for example, 10€ per month to have Mobile TV.”

Other participants concurred that it was a question of costs vs. benefits pointing to the relevancy of the global service value for the consumer (as suggested by key industry informants):

“I may not be willing to pay 8€ or 10€ per month every month but, if at a particular occasion there is some program (important news or football match) that I really don’t want to miss, I may be willing to pay €5 to watch it only for that day or couple of hours”.

Another aspect to highlight is that, as also suggested by key industry informants, the money spent on mobile TV content is categorized together with money spent on the communication functions of the mobile phone. And 70% of participants had an average monthly bill of only 15€ in mobile telecommunications. Because of the strong perception of the mobile phone as being a communication device, the willingness to spend money on TV content comes far behind the one to spend it on voice calls and SMS’s. The fact that the money spent on Mobile TV has to compete with the voice and SMS spending together with the fact that, as an entertainment or information tool the mobile phone is seen as inferior to fixed television and the Internet, consumers are not predisposed to spend money on Mobile TV. The majority of our respondents did indicate, however, that they would enjoy having Mobile TV if it was cheap enough or free.

Finally, we should stress that the possession of a compatible and adequate mobile handset to watch Mobile TV is a pre-requisite for using the Mobile TV service. Our findings from the focus groups’ interviews indicate that no single participant would be willing to buy a premium mobile phone with the purpose of subscribing to the Mobile TV service. Therefore, we do not consider the handset cost as a cost of the Mobile TV service as this would be too penalizing when studying the service adoption. However, consumers are attracted by premium phones for a diversity of functionalities and some participants suggested they would be willing to pay/subscribe the Mobile TV service for 24 months (for example) in exchange for a free or cheap subsidized premium handset, a common practice in the mobile telecommunications market (we believe in this case, the main motivation is to have a specific mobile phone for an attractive price, rather than the associated services that consumers must subscribe for a certain period).

Non-monetary costs

Adding to monetary costs, some participants were also concerned about potential additional costs associated with the use of Mobile TV, especially the high consumption of battery power. This issue was raised by some participants in two of the groups. These participants were more knowledgeable of advanced mobile services; they possessed premium phones and were regular users of Mobile TV and other value-added services like mobile Internet and mobile video-on-demand. They raised that question because they had previous experience with those services and had found out they were intensive power consumption.

“Sometimes, my I-phone battery doesn’t even last the whole day for normal use. If I use it for playing games, long-time Internet access, photos or video watching, I know for sure that I have to recharge the battery in the middle of the day or will run out of battery”.

“When I travel, I often use skype in my mobile to make free calls but I cannot keep skype always on because it drains a lot of battery very quickly. I’m afraid it would be similar with a Mobile TV service”.

“If the battery is finished I cannot do anything else with my telephone and I may need it for really important purposes so, I try to save battery power as much as I can”.

“The battery runs down quickly. It doesn’t even last 5 hours. I wish it would last for 24 hours.”

Mobile TV power consumption was a concern raised by some interviewees who were worried that the mobile phone's battery could run out in the middle of the day in circumstances in which they would not have their charger or could not fully charge the battery, while they would still need the mobile phone for communication purposes; the battery consumption of Mobile TV was perceived as a threat to more important communication needs. Less informed participants (those that possessed more basic handsets and used only more basic functionalities and services) were not very concerned with this issue and they didn't even think about it before the subject emerged (probably their batteries last for longer periods because they only use more basic services and functionalities).

Another non-monetary cost that emerged during the focus groups sessions was *disturbance*:

“There is no peace any more in trains and other public places... phones are always ringing and people are talking on their mobiles which personally annoys me. If it would be used in public spaces to watch TV, I’m afraid it would cause even more disturbance around people that share the same space”.

“I don’t like having to listen to someone else’s private conversation. It breaks my concentration. I think people shouldn’t use their phones in public places. I personally don’t do it and would not like others to do it.”

Finally, one participant evoked the fact that, while *distraction* can add value when an individual is bored or has spare time, distraction can also be deemed a cost when important activities are neglected. One participant elicited this possibility:

“I am concerned that Mobile TV may affect my performance negatively because I get distracted so easily. Especially if I’m in a class and it’s really boring or if I’m in a meeting or supposedly working and I get an alert on my phone about a program that interests me, I will be tempted to stop what I am doing and begin watching TV on my phone.”

Another participant elicited a different negative facet of distraction:

“The most serious problem is your lack of attention. Especially while driving. It is a risk to yourself if you switch on your mobile to watch TV while in traffic jams but if other drivers do it, it’s also a risk for us.”

Some participants were concerned that the fact of watching TV in their mobile would prevent them from receiving inbound calls. They stated it would be important to be aware of an inbound call and to be able to take it and interrupt the Mobile TV service in case they were using it. Few participants voiced this concern but they agreed that if this form of entertainment would interfere in any way with their communication needs (incoming call not noticeable), they would hesitate to use it.

A global view of the data suggests that a consumer value approach would be appropriated to consider in our model as participants seem to weight monetary and non-monetary costs against the potential benefits of Mobile TV when evaluating the service and their interest in adopting it or not.

3.3.2.4 *Quality of Service*

Content

Quantity and variety: Participants frequently mentioned the need for a significant variety of interesting content as a motivator for adopting Mobile TV. When asked what they consider a “significant variety”, the answers resembled regarding the number of channels but diverged regarding the types of contents that fulfill individual interests. In general, consumers agreed that having a choice of 20-25 channels available in their mobile would be enough, as far as their favorite channels are included:

“For me, even 10 channels would be enough as long as it would be the 10 channels that I watch the most. I hardly ever watch other channels”.

“If I should pay for a standard package of channels, I would like to have a wide choice, let’s say at least 25 channels, to make sure I would find something that interested me at a specific moment. Sometimes I may be interested in news, other times in series and other times in cartoons. But if I could have the option to pay less and chose only my favorite channels, 10 or 15 would be enough”.

The choice of channels differed significantly by participant. Men were usually pretty much interested in sports and news channels while women were more interested in entertainment channels with films and series and cartoons’ channels (to entertain their children).

Participants evoked throughout the group interviews’ sessions that customized content would be important and some of them stressed they would only be interested in Mobile TV if it provided contents that match their interests or hobbies. They felt that customized Mobile TV contents (meaning “a customized choice of channels”, not “made for mobile” content) would enable them

“to avoid the displeasure of having to sift through numerous channels for programs they were not interested in”.

A participant suggested that she would only accept the service if it was customized:

“I’d have to see what kind of programs would actually be part of the Mobile TV service and if they interested me. If they were not interesting from my point of view, then I would cancel the service right then. But if I liked the contents, this service would be nice. I’m not willing to pay a cent for stuff that I don’t even care about”.

Notifications/reminders: Some participants revealed that receiving notifications/alerts regarding specific programs in which they are interested in, would be an appealing incentive for switching on to the Mobile TV service. Potential adopters would like to receive information about the programs that they most enjoy and frequently watch. One participant suggested that with Mobile TV notification services, relevant information is less likely to be forgotten:

“If I’m mobile (for example, waiting for my children at the gym club), I often forget about interesting TV programs that are transmitted at that time. So, if I could get reminder messages over my phone, no matter when it is or where I am, I could take advantage of those periods to be entertained by watching my favorite programs”.

Other participants agreed that reminder services about programs they are interested to watch, would help them to make better use of their time and would be a welcomed component of Mobile TV services. Unlike other media sources, Mobile TV allows to receive reminders on the mobile phone by means of SMS, which is seen as a convenient functionality of the service.

Some participants also pointed out that pausing and resuming a program, as is currently available in fixed TV, should also be possible in Mobile TV. Another point that was evoked was the interest of having contents passing as loop streams: the same programs should pass several times per day in order to increase the chances that a user switches on to the Mobile TV and finds one of his favorite programs.

Lack of interest despite provided content: In spite of the perceptions of “interesting Mobile TV content”, some participants only attach importance to their mobile phones as a communication tool but do not associate it with a media or an entertainment channel and respective purchase of content. The following statement from one participant is very explicit:

“To me, a telephone is just a telephone. It’s not a walking television. And as far as I’m concerned, you only use a telephone for one thing and that’s to make calls. That’s how I think”.

Another participant agreed:

“Mobiles are great for communicating but they are not good mediums for entertainment. There are better alternatives for that. The mobile phone does not really offer anything that cannot be accessed through other means, both cheaper and better”.

The mobile phone was viewed above all as a tool for communication and was evaluated as inferior to other mediums for the purposes of accessing information, accessing entertainment and spending leisure time. Mobile TV content was perceived by some participants to compete with other means of entertainment and information and, in general, it did not compare favorably owing mainly to its small screen size and relatively high access costs.

Appearance / Multimedia Quality

These characteristics refer to visual and audible sensations that consumers perceive when using the Mobile TV service. Audiovisual quality seems to affect consumers’ acceptance of

Mobile TV, although the quality requirements vary between different types of consumers, their contents' preferences and usage contexts. Important aspects referred include visual service quality and clarity and the quality of sound. Participants were especially concerned with the small screen size and the image quality (in terms of size and "graphical rendering"), which influence the multimedia experience. Those that had never tried or seen the service initially were doubtful that the screen size would be large enough to enjoy TV content and that they might miss parts of the content. On the other hand, they would not be willing to increase significantly the size and weight of their handsets, especially women. Participants would like the largest possible screens for watching TV but they don't want their mobile phones to be too large and heavy. Landscape oriented use of the display (vs. the typical portrait mode) was referred as a way to improve the weakness of a small screen size.

Text legibility was also mentioned as affecting the acceptability of the overall video quality. The most frequent concerns regarded image/video quality, namely identifying or distinguishing details such as text, small objects and facial features. Fewer comments were made about the audio quality (consumers were knowledgeable that one can have a very good audio quality in a small mp3/mp4 device, for example; hence, the size of a mobile phone did not really raised concerns about its audio quality).

Another point related to multimedia quality is that the quality requirements seem to vary according to the context of use: consumers are more tolerant in certain contexts and situations than in other ones. For example:

"If I'm watching the news in Portuguese, it is mostly the audio quality that is important for me and I don't care so much about text legibility. But if I'm watching a program in English with subtitles, it is very important that I can read the subtitles clearly."

"I've already watched a football match in my mobile but it was a bit of frustrating experience. It was OK to more or less follow the match and be aware of the goals but I could hardly see the ball moving".

In a general manner, although participants expect to watch the same contents that are proposed for standard television, this content would need to be adapted for the small screen and viewing conditions. For example, in a football match, it is necessary to see the whole scenery of the match in order to understand what is going on but, on the other hand, it is important being able to see very small details like the ball, to be able to follow the game and

enjoy the experience. While text size from news tickers and subtitles is an easy to solve issue from a technical point of view, this is not so obvious for other types of content like the example of the football match (in order to be able to see the ball and the whole scenery at the same time).

Technically, this represents a compromise between shot types and image resolution. In the football match example, very large shots have to be used to enable the user to follow the game but large shots have the drawback of showing less detail, therefore the ball cannot be identified in many cases. Another technical solution relates with the encoding parameters and choice between full picture quality and smooth motion. This compromise depends on the content in question: in some cases the fluid motion is more important than detailed picture quality and vice versa.

Besides, it was suggested that carrying out simultaneous tasks may have an effect on the quality requirements in different usage contexts. For example, if one is at work but using the Mobile TV service as background for hearing the news or follow up a football match, the audio quality may be more important than the image.

The provision of good-quality graphics, pictures, images, moving objects and zooming effects were all considered important elements for Mobile TV service quality. The size of the screen is an important factor in multimedia quality judgments:

“I’d prefer to use the PC”; “The screen size is a bit small for watching TV”.

Focus groups’ participants repeatedly emphasized their preference for larger screens. Oversized images or having to zoom in to be able to read or view something didn’t seem appealing to consumers.

Finally, after our demo with a premium mobile phone, most of the non-users in all four groups were highly surprised with the (good) multimedia quality of the Mobile TV service.

“I am amazed by how good the picture quality is. It has nothing to do with my old-fashioned mobile phone. With a phone like this one it is not a problem to see video and pictures; it (Mobile TV) sounds much more appealing when realizing the quality can be that good”.

There was some variation in feelings and appreciations towards the image appearance and global multimedia quality. This seems to be a personal and subjective determinant, with the same level of quality appearing acceptable or even good to one participant but being regarded as unacceptable by another.

Audiovisual characteristics such as the size and amount of spacial details and movement and the sound quality emerged from our focus groups' discussions as important factors assessed by consumers and contributing to the overall Mobile TV service quality perceptions.

Ease of Use/ Interface characteristics/ User friendliness

When talking about quality of service issues, namely multimedia quality, participants appeared in general quite forgiving of physical limitations of the system due to network and technological constraints that they are used to even when using voice services, but they were less “indulgent” regarding some flaws in the logical interface of the devices, as pointed out by someone that had previously tried the service:

“It was not very easy to navigate in the Mobile TV menus and find all the options available, namely the EPG. They need to make it easier for normal people to use, not just technology nutters.”

During the discussions it was suggested that, ideally, there should be dedicated keys to allow users to access the Mobile TV service, switch channels easily and volume control. People are not willing to navigate through menus for such basic functions and therefore, the need for special TV buttons on the phone has been expressed. Participants have also suggested that Electronic Program Guides (information on what is currently playing and what will come up next) might be valuable and should be easy to access.

As suggested by industry informants, the complexity of “before usage” procedures also emerged in the focus groups' discussions as a barrier to trial and adoption. An issue that received heavy critique from some interviewees was the one of having to install a specific application/software to be able to use the Mobile TV service. One participant stated that he had previously wanted to try Mobile TV but the procedures he had to go through were not straightforward so, he just dropped the idea:

“One day I received a SMS from my operator advertising free Mobile TV service for one week. I wanted to try it and I searched all the menus and options in my phone but couldn't find any Mobile TV option. I

called the (mobile) operator and they told me I had to download the Mobile TV application and install it on my mobile. I found that operation boring. I intended to do it later but the free trial period just got to the end and I never tried the service because of that. They have not made it easy...”

However, in general participants did not seem much concerned with Ease of Use. Maybe because they implicitly assume they will not have difficulties to understand how the system works until trying it (the majority of participants had never tried the service before) or, because people are getting more and more used to learn using new technological products by themselves and with no special difficulty as they become more and more intuitive and user friendly.

Service efficiency /speed

Speed or efficiency of the service was mainly referred in two focus groups by the participants that were current Mobile TV users, although some non-users also cited this issue after having quickly “tried” the service in the interview session. But it was not spontaneously mentioned by non-users. Several experienced users commented that the service often takes too much time to load and channel switching is not immediate as in the fixed TV. We list some important quotes that were elicited about service speed and efficiency from current users and consumers that have tried the service before:

“It is a bit frustrating to sit and wait for a screen to build up. Sometimes channels are slow to load; I give up and do something else but presumably... maybe I just need a bit more patience”.

“I have tried Mobile TV and was very disappointed. Firstly, I had to download the Mobile TV application from the service provider website which is a bit discouraging. Then I think that loading the service and the navigation within the Mobile TV menus is much too slow. Somehow the connection seems very slow- it takes time for each step I go through. Whenever I am at home or at work, I am always near a TV or a computer and it is much quicker to access information.”

“I wonder if it is a network availability problem or if the network is overloaded with users or if it is just a question of slowness of the Mobile TV application”.

We acknowledged from the focus groups’ discussions that long waiting times connecting to the service or after a requested channel switch may result in lower user satisfaction and respective perceptions of the value of the service. Switching delays should be as short as possible because users are accustomed to immediate reactions on standard TV and that is their

point of reference. One participant suggested that long waiting times should be accompanied with progress bars (like in the Internet) to help users assess the remaining time.

Once the service speed question was raised, there was complete agreement among respondents about the need for an efficient service i.e., fast connection to the Mobile TV service and, once logged on to the service, fast reaction to consumers instructions namely channel switching.

Reliability/ Network capabilities

Poor network coverage or availability was mentioned as a potential inhibitor to using Mobile TV. For example,

“I always take the underground to go to work and it might be an occasion where I could take advantage of the Mobile TV service. But the problem is that there is no network coverage through the major part of the journey. If I can’t use the service in the few situations in which I would eventually be interested in it, what’s the point of having Mobile TV?”

“When I try to access the web from the train, the transmission is interrupted every time the train goes through a tunnel. It would be the same with Mobile TV.”

A participant that had tried the service said:

“I tried to use Mobile TV several times when we were visiting my parents at the countryside but it crashed quite a lot or the image just got freezed. Of course it also happens when I’m only talking on the phone. I found the reliability of the service not to be good enough to attract me because when I’m home, I don’t need it”.

The lack of network coverage in many areas tend to reduce the sense of ubiquity and “anytime, anywhere availability” that is a major advantage of the Mobile TV service in many subjects’ minds. The limited reach of mobile technology due to lack of (or limitations in) network coverage or capability may dampen the use process and enthusiasm for adoption. Finally, the lack of reliability and reduced responsiveness of the network (downtime) may also contribute towards eroding the users’ trust and interest in using Mobile TV. Service reliability was a concern among the interviewees who were worried that the network connection could fail in the middle of watching an important football match or news announcement, creating a feeling of frustration.

3.3.2.5 *Use situations: where and when?*

The fact that we had eight actual users' participants in our focus groups allowed us to collect some information about their usage patterns of the Mobile TV service which was useful to complement the information on adoption determinants.

The typical Mobile TV user in our sample was a well-educated and financially comfortable man aged between 25 and 40. The main motivations to use the service were to shorten waiting times, to be up to date with the daily news and for entertainment purposes.

The most cited "prime times" for Mobile TV utilization were "at lunch" and "late in the evening, after dinner". The evening prime time, coincident with traditional fixed TV, seems in agreement with the use of Mobile TV for the benefit of privacy and intimacy (already mentioned by key industry informants).

Only one of the eight current users' participants referred to use public transportation and access Mobile TV while commuting.

Users pointed out that the optimal length of viewing was from 5 to 20 minutes.

The most commonly mentioned physical environments/contexts for watching Mobile TV were in waiting halls or lounges, at work, at home, in cafes and vehicles such as public transportation and private cars. Some specific trends have also been reported like: people do not watch mobile TV during short journeys; in noisy environments textual information is preferred over video while in motion audio is preferred; during stationary reception, consumers like to have audio and video simultaneously and with equally good quality.

In general, consumers that had usage experience of Mobile TV raised few interface/ease of use issues. They did not find it difficult to use neither were they too concerned with the size of the screen; they had premium phones and the screen and user interface was seen as sufficient given their "amount" of TV watching. They had defined their own usage occasions and perceived a trade-off between the size of the screen and the benefit of having a compact, all-in-one communications' tool. However, they suggested that the battery should last longer and the device should have increased memory capacity to allow for video recording.

Users were asked to report the positive and negative aspects they had experienced from using the Mobile TV service. The responses varied. On the positive side: *“it allows timely access to information”*, *“it is a good entertainment source”*, *“it is great for watching TV while commuting”*, *“it allows for better time management”*, *“it is convenient as it provides access to TV programs anytime and anywhere”*, *“mobility”*, *“high quality reception”*. On the negative side were referred: *“a good compatible device is expensive”*, *“there are reception problems”*, *“high consumption of battery limits usage duration”*.

3.3.3 Conclusions

From the focus groups discussions, we inferred there are several motives for users to consume Mobile TV. As a global picture, consumers want to use Mobile TV to:

- Kill time when waiting
- Staying up to date with important news or popular events
- Create a private sphere and relax at home on their bedroom
- Be entertained by watching specific contents when they cannot do it in a standard TV
- Have immediate access to TV contents (anytime and anywhere).

Besides the service price, limited battery life has been identified as a barrier to Mobile TV adoption because high battery consumption of Mobile TV compromises other mobile phone functionalities.

The service quality showed up to be an important factor for the acceptance and adoption of Mobile TV. It is a combination of the number, variety and interest of available channels (content), network and handset characteristics (including screen size, image definition and user friendliness of the handset and specific Mobile TV application/software). The final result is perceived as a unity by the end users: consumers' evaluation of service quality depend on how well these factors together support the overall experience.

Based on the results of the focus groups and key informants' interviews, we acknowledged a wide range of technical and non-technical quality of service aspects that need to be considered by service providers in order to propose a valuable service for consumers such as: screen size, image and audio quality, service reliability, ease of use, speed or efficiency and satisfaction with the available contents.

The findings from our focus groups (based, obviously, on our participants' sample) suggest that, the major factors taken into consideration for the adoption decision are:

- Price of the service (against its benefits)
- Satisfaction with the content
- Image and sound quality (including both screen size and cellular device characteristics as well as network/service provider related characteristics)
- Technical performance and reliability
- User friendliness of the handset and Mobile TV service

According to participants, the main advantage of Mobile TV is easy immediate access from any location- ubiquity and convenience- which is challenged primarily by monetary cost, short battery life, imperfect coverage and image size.

Mobile TV appeared to be very suitable for accessing information and entertainment, especially when the user would seek to fill a time slot that would otherwise be lost (while waiting, while commuting). Yet, the adoption intention seems to be highly influenced by economic considerations. Even though the advantages of mobile TV were apparent and desirable, for many participants, convenience is not enough and is not worth the additional expense. The prevalent opinion across all groups was that aside from anytime and anywhere immediate access to TV in unexpected situations, Mobile TV is not offering any new significant consumer benefits for which they would be willing to pay substantial fees.

In fact, the mobile phone is associated primarily with the function of communication and it is difficult for many people to associate it with other functions. The fact that the mobile phone is viewed primarily as a communication tool clearly has consequences for the uptake of Mobile TV. Although the mobile phone plays a central role in people's lives, the importance that they attach to their mobiles as a communication tool does not seem to transfer to the use of the telephone for watching TV. Indeed, our analysis suggests that there is a very high level of resistance for paying to watch TV on the mobile phone. The focus groups' discussions suggested that consumers are wary of the cost of their mobile communications and an additional cost for the Mobile TV service must not interfere with more important communication needs in order to be successful.

Furthermore, there are some major differences between traditional television and Mobile TV: the device itself (its small size) and the mobile transmission technology that has implications in terms of service reliability and overall quality. In our discussions with consumers, the mobile phone was evaluated as being inferior to other mediums for the purposes of accessing information, accessing entertainment and spending leisure time. For example, both television and personal computers have bigger screens and provide information and entertainment “without charge”; magazines and newspapers offer the reader an experience of relaxing into a comfortable chair with a coffee or drink; the radio can be played in background at work, etc. Thus, Mobile TV is perceived in competition with other means of entertainment and information and, generally, it does not compare favorably owing mostly to its small screen size and relatively high access costs. Only when mobility really makes a difference did some participants indicate demand for the Mobile TV service.

Hence, the impact of use situations should not be neglected. It was often highlighted in participants’ comments that the advantages of Mobile TV are dependent on situational factors such as waiting situations, lack of alternative TV watching technologies, immediacy and unanticipated need. Participants perceived mobile TV as being more advantageous in these situations and considered it as a second alternative choice for existing entertainment and information awareness means.

We should still highlight that, independently from the previously mentioned adoption determinants (including benefits, costs, quality of service issues and impact of use situations) some participants were definitely not interested in Mobile TV for two main reasons: because they just don’t like/don’t have the habit of watching TV (even at home/in a fixed TV) or because they only use their mobile phones for communication purposes (calls and SMS’s) and are not interested at all in other mobile phones’ services or functionalities, be they free or paid for.

In summary, many prospective consumers find that the mobile phone is not very effective to watch TV when compared to other mediums (fixed TV, PC’s). They associate the mobile phone with the possibility of accessing TV content anytime, anywhere for killing time or entertainment purposes but don’t feel the benefits are worthwhile enough to be willing to pay for the service on a regular basis. Some technical limitations of mobile devices and

technology contribute to a relatively low perception of Mobile TV quality of service and overall product value.

To conclude, the qualitative study contributed to develop the theoretical model and respective research hypotheses, as well as to increase the probability of producing valid measures (namely regarding new constructs or those adapted to the specific context of Mobile TV). Common themes emerging from the focus groups and individual key industry experts' interviews together with insights from previous research led to the development of our conceptual model of adoption of Mobile TV, as explained in detail in the next chapter.

We found out the existing adoption constructs in ICT's literature were not fully capable to capture the interest of Mobile TV for consumers and new constructs highlighting the benefits and costs of Mobile TV were needed.

Therefore, it is proposed that the intention to adopt Mobile TV derives from consumers' value perception of the service which is a consequence of the perceived benefits or gratifications, the perceived costs associated with the use of the service and the perceived service quality. Although focus groups' participants placed different emphasis on each element, the nature and determinants of Mobile TV adoption and use were quite similar across the groups. The findings from the focus groups' study implied that these three value dimensions would be important determinants of Mobile TV adoption intention.

The focus groups' interviews provided relevant qualitative information regarding consumers' perceptions about the benefits and costs of using Mobile TV, both from prospective and actual users' perspectives. Unlike mass surveys asking specific questions, participants were encouraged to talk to one another: asking questions, exchanging anecdotes and commenting on each others' experiences and points of view. The focus groups were particularly useful for exploring people's perceptions and experiences regarding Mobile TV and to examine not only what people think but also why they think that way.

This information alone, however, is not sufficient to achieve the objectives of our study and to allow for generalization since the responses may be subjective, the sample size was too small and the demographics of the subjects were very biased. As such, we decided for a quantitative survey study to complement the qualitative study results and empirically test the proposed

conceptual model. The focus groups and key industry informants' interviews were particularly useful in providing insights for interpretation of the quantitative data analysis' results.

4. CONCEPTUAL MODEL

In this chapter, we present our proposition of a new model to assess and understand the determinants of adoption of Mobile TV services.

Taking into account major limitations identified in the literature review section, we put forth a comprehensive model of adoption that integrates theories from three different fields of research: Information Systems, Communications and Marketing.

Moreover, following to our exploratory qualitative study, we identified unique characteristics of mobile TV services that required the addition of several new or not widely explored constructs such as privacy/secret use, battery consumption, content availability, connection speed, reliability. As a result, we went beyond the theoretical and conceptual bases of the explored theories.

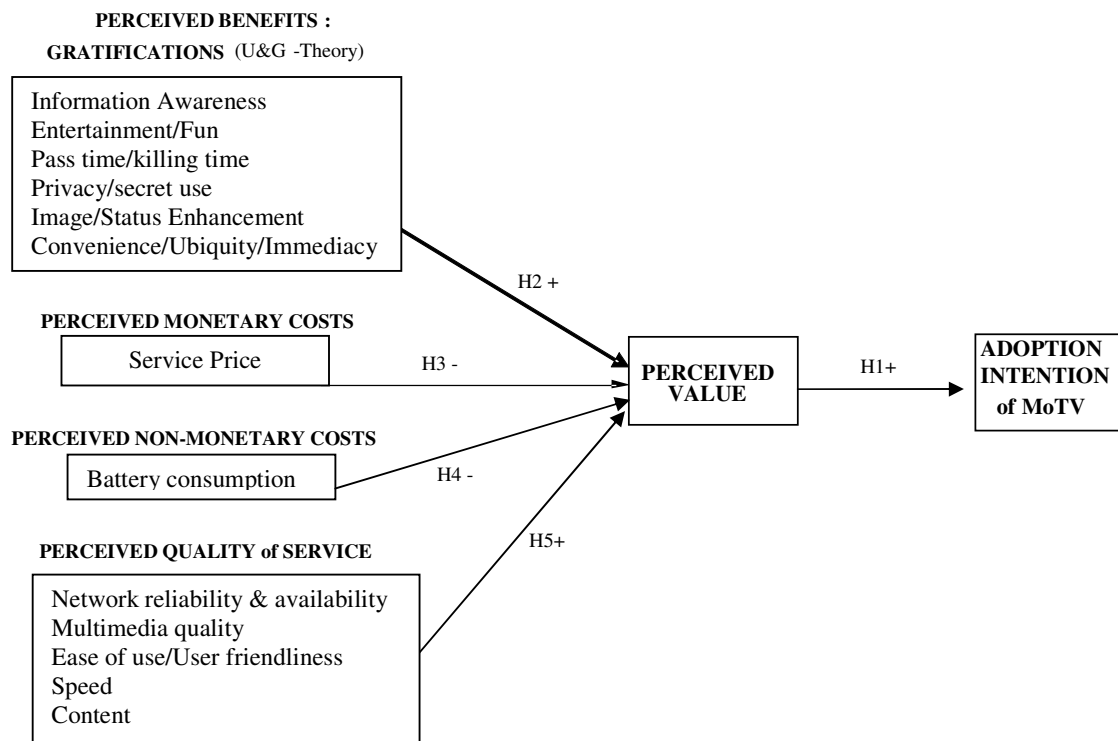
Notwithstanding, we define all the constructs of our proposed model based on relevant available theory and operationalize these constructs through previously tested measures with high degrees of validity and reliability, attempting to respect as much as possible, principles and procedures that assure solid theory development.

Finally, because the Mobile TV market is still in its infancy and the majority of the survey population never had any experience of Mobile TV services, the focus is on consumer **perceptions** and how the perceptions of using Mobile TV are relevant to explain potential adoption. Measuring potential adopters' perceptions of innovations has been a tradition in innovations' adoption literature (Moore and Benbasat, 1991). It is important to distinguish between a product/service attributes and consumers' perceptions of these attributes. It is the perception that affects behavior and not the attribute itself (Howard, 1977).

4.1 The Conceptual Model Design

As discussed and duly justified in previous chapters, we subscribe a consumer value perspective of adoption. Hence, our model (Figure 12) theorizes that consumer *perceived value* leads to *adoption intention*. Based on the literature review and results from our exploratory qualitative study, we identified three multidimensional direct determinants of *perceived value*: *perceived gratifications*, *perceived costs* and *perceived quality of service*. The model also contemplates a moderating effect of *personal innovativeness* on the relationship between *perceived value* and *adoption intention*. A detailed explanation and theoretical justification for our model, with respective constructs definition and related hypotheses development is presented next. Measurement scales for each construct are presented in the method section in next chapter.

Figure 12: Individual adoption of Mobile TV services- Conceptual model



4.2 Constructs Definition and Hypotheses Development

4.2.1 Behavioral Intention

Behavioral intention is defined as the “degree to which a person has formulated conscious plans to perform or not perform some specified future behavior” (Warshaw and Davis, 1985:

214). It is a measure of the degree to which a person is willing to perform a specific behavior (in our study, the adoption/usage of Mobile TV). The origins of *behavioral intention* date back from the Theory of Reasoned Action (Fishbein and Ajzen, 1975). According to the TRA, *behavioral intention* provides the most accurate prediction of behavior. Previous research in the field of psychology (see Ajzen, 1991 for a review; Ajzen and Madden, 1986) has extensively supported the role of intention as a predictor of actual behavior across a wide range of domains. Based on a meta-analysis of 87 studies, Sheppard, Hartwick, and Warshaw (1988) confirmed the strong positive relationship between intention and behavior.

In the IS/IT domain, behavioral intention has been widely used as a key adoption determinant and was found to be a fairly good predictor of technological innovations' acceptance and/or usage (e.g., Davis, 1989; Davis, Bagozzi and Warshaw, 1989; Gefen and Straub, 2000; Goldsmith, 2002; Hansen *et al.*, 2004; Hsu *et al.*, 2007; Lee *et al.* 2007; Mathieson, 1991; Shih, 2004; Taylor & Todd, 1995; Van der Heijden *et al.*, 2003; Venkatesh and Davis, 2000; Venkatesh and Speier, 1999; Venkatesh *et al.*, 2003).

Accordingly, we expect *behavioral intention* to be a strong predictor of Mobile TV adoption and *actual behavior* is not considered in our model (we excluded the TPB's intention-behavior link). Besides the strong empirical evidence confirming the intention-behavior relationship, adoption intention is used as the dependent variable also because actual behavior is difficult to measure, especially in the nascent stage of the Mobile TV market in which the number of current adopters is extremely limited.

Based on all the previous arguments, we believe the use of adoption intention as the dependent variable in our model is theoretically justifiable. As suggested by the literature, it is directly preceded by Perceived Value (described next) which is an overall assessment based on affective responses and cognitions thus, replacing the need for a mediator like Attitude (moreover, in voluntary settings attitudes have been shown to correlate highly with behavioral intentions and the norm is to exclude the attitude construct).

4.2.2 Perceived Value

We define Perceived Value based on Zeithaml (1988) as the consumer's overall assessment of the utility of a product or service, which is determined by his/her perception of what is

received and what is given. This perspective combines all the benefits and costs associated with the product/service consumption and acquisition.

As mentioned in previous chapters, based on the literature review and our exploratory study, we strongly believe the success of Mobile TV services will be shaped by consumer choices rather than by technology readiness and supply side strategies. Consumer acceptance of media and communication services is determined by the extent to which they satisfy consumer needs and desires, as well as consumers' willingness to pay for service subscriptions and to use their time differently (Picard, 2005), i.e., new ICT's must provide value to consumers. As stated above, *value* results from a balanced evaluation of benefits and costs. The basic benefit of mobile telephony is the ability to communicate with others while not being limited to a fixed location. The basic benefit of TV broadcasting is providing entertainment and information. When put together, the essential benefit of Mobile TV is to communicate and watch TV anytime, anywhere, in a single portable device (ibidem, 2005). The question is whether these benefits are significant enough to gain consumer interest, when compared with the costs of acquiring equipment and services. The answer depends on consumers' perceptions of all the relevant benefits and sacrifices they gather from using Mobile TV services (Kim *et al.*, 2007; Picard, 2005; Zeithaml, 1988).

As stated in the Literature Review section, Value represents an overall estimation of an object, based on which consumers make decisions about their consumption behavior. Models like the TPB (Fishbein, 1991), the TAM (Davis, 1989) and its derivatives do not include constructs that represent an overall estimation/valuation of the adoption technology. Chang and Wildt (1994) suggest that value may be a more significant determinant of consumers' behavioral intentions than broad attitudinal constructs. Value-based models have recently raised much interest in mobile services literature and perceived value has proved to play a determinant role in adoption intention, regardless of different service categories and different cultural backgrounds (e.g., Jarvenpaa and Loebbecke, 2009; Kim *et al.*, 2007; Kim and Han, 2009; Kleijnen *et al.*, 2007; Kuo *et al.*, 2009; Lee *et al.*, 2007; Nysveen *et al.*, 2005; Pura, 2005; Turel *et al.*, 2007). Researchers have identified that hedonic, utilitarian and social benefits were significant antecedents of the value of mobile services (e.g., Kim and Han, 2009; Kleijnen *et al.*, 2004; Kleijnen *et al.*, 2007; Nysveen *et al.*, 2005).

Based on the literature review and the results from our exploratory qualitative research, we established that a value perspective, integrated with other theories and constructs, would provide a comprehensive understanding of Mobile TV services acceptance.

In our model, we assume that an overall assessment of value is a key determinant of behavioral intention to adopt Mobile TV. Therefore, we adopt Zeithaml's general definition of value and we explore the antecedents of this overall value assessment. Supported on the literature review and our exploratory study, we hypothesize Perceived Value is preceded by three multidimensional antecedents: Perceived Benefits (or the Uses and Gratifications of Mobile TV), Perceived Quality of Service and Perceived Costs. Within these constructs we can identify several dimensions of value as the ones suggested by Sweeney and Soutar's value approach (2001): quality value (in perceived QoS), emotional value (in Perceived Benefits), monetary value (in Perceived Costs) and social value (in Perceived Benefits)³.

We highlight that, although Zeithaml (1988) includes Quality of Service as a component of Benefits, we consider it as an antecedent of Value independent from Benefits and Costs. This is because we do not consider Quality of Service as a Benefit *per se* but rather as a functional requirement. Secondly, due to the importance of Service Quality to Mobile TV adoption, as suggested by the results of the exploratory qualitative research, we intended to give special prominence to this construct. Previous research on Value has also highlighted the significant role of Service Quality (e.g., Baker *et al.*, 2002; Brady and Robertson, 1999; Chang and Wildt, 1994; Dodds *et al.*, 1991; Sweeney *et al.*, 1997) which was considered by some authors as the only "benefit" component of value.

The (positive) relationship between Perceived Value and Behavioral Intention has found extensive and consistent support in the literature through the means of empirical studies (e.g., Brady *et al.*, 2005; Kim *et al.*, 2007; Kim and Han, 2009; Kleijnen *et al.*, 2007; Turel *et al.*, 2007) . Therefore, we hypothesize:

H1. The higher the Perceived value of Mobile TV, the higher its Adoption Intention (or Perceived Value is positively related to Mobile TV adoption intention).

The literature suggests that in value-centric models, it is necessary to identify domain-specific value-antecedents and relationships (e.g., Bolton and Drew, 1991; Boksberger and Melsen,

³ The quality dimension is a functional value that captures the utility resulting from quality perception and performance expectation. Emotional value is the utility derived from the feelings or affective states generated by a product. Monetary value is related to the monetary costs involved in using the product/service. Social value was defined as the enhancement of a person's selfconcept/image provided by the product usage (Sweeney and Soutar, 2001).

2011; Kleijnen *et al.*, 2007). Grounded in previous research and the insights from our exploratory qualitative study, we identified relevant specific Mobile TV value-antecedents to include in our theoretical model and to empirically test subsequently. We describe them next.

4.2.3 Perceived Benefits

We conceptualize perceived benefits as a multidimensional construct composed by several gratifications of Mobile TV use. The foundations for this correspondence (between benefits and gratifications) are described next.

According to Zeithaml (1988), the benefit components of Value include salient intrinsic attributes, extrinsic attributes, perceived quality and other relevant high level abstractions. Some of these abstractions can be, for example, convenience, variety, time saving, or whichever subjective measure of the usefulness or wants satisfaction that results from the consumption of a product or service (Zeithaml, 1988).

According to the Uses and Gratifications theory, gratifications are defined as “some aspect of satisfaction reported by users, related to the use of the medium in question” (Stafford and Gillenson, 2004). Knutsen and Lyytinen (2006: 56) define it as “pleasures, delights and fulfillments users imagine or experience while using a technology”. The U&G theory captures both utilitarian and non-utilitarian motives for media consumption (Peters *et al.*, 2007). We can therefore establish a parallel between these *gratifications* definitions and *benefits* as described above (namely “salient attributes, high level abstractions and subjective measures of the needs or wants satisfaction that result from the use of a product/service” (benefits) and “pleasures, fulfillments, some aspect of satisfaction related to the use of the medium in question” (gratifications). We further support this established parallel with concrete examples; some of the gratifications recently identified in the context of mobile technology studies correspond to benefits identified in Value-Adoption models. Specifically, the gratifications “status/image”, “sociability” and “reassurance” (Hoflich and Rossler, 2001; Leung and Wei, 2000) correspond to identified dimensions of “Social Value” (Kim and Han, 2009; Sweeney and Soutar, 2001); the gratifications “enjoyment/fun” (Leung and Wei, 2000; Nysveen *et al.*, 2005) correspond to the concepts of “Hedonic Value” (Kim *et al.*, 2007; Kim and Han, 2009), “Entertainment Value” (Kim and Forsythe, 2008) and “Emotional Value” (Turel *et al.*, 2007; Sweeney and Soutar, 2001); the gratifications “mobility” (Hoflich and Rossler, 2001) and “immediacy” (Hoflich and Rossler, 2001; Leung and Wei, 2000) correspond to “time convenience benefit” (Kleijnen *et al.*, 2007) and to “Utilitarian Value” (Kim and Han, 2009).

Perceived Benefits as an antecedent of consumer Perceived Value has been extensively tested in several consumer value-based studies and the relationship has proven to be positive (e.g., Jarvenpaa and Loebbecke, 2009; Kim et al., 2007; Kim and Han, 2009; Kleijnen et al., 2007; Kuo et al., 2009; Lee et al., 2007; Nysveen et al., 2005; Pura, 2005; Turel et al., 2007). Hence, we hypothesize:

H2: The higher the Perceived Benefits of Mobile TV, the higher its Perceived Value (or, the Perceived Benefits of Mobile TV are positively related to Mobile TV Perceived Value)

Furthermore, based on the previous theoretical justification (for the parallelism between benefits and gratifications) together with the results from our exploratory study, we propose the following gratifications as dimensions of Perceived Benefits and theorize the following relationships:

Information Awareness

Information awareness has been identified as a gratification of traditional TV use (e.g., Bantz, 1982; Conway and Rubin, 1991; Levy and Windahl, 1984) but also as a gratification of the Internet (Ko et al., 2005; Lin, 2002; Stafford et al., 2004) and of mobile data services use (Knutsen and Lyytinen, 2006). Conclusions from our focus groups suggested that news was the type of content/program that consumers were more interested in watching if they were to use Mobile TV, because it allows them to keep up to date with the latest relevant events. Previous studies and pilots on Mobile TV usage have also identified the need to stay informed as an important driver for Mobile TV acceptance and, accordingly, news as one of the most interesting contents for mobile consumption (e.g., Mäki, 2005; Knoche and Mc Carthy, 2004; Knoche and Sasse, 2006) Therefore, we hypothesize

H2a) Greater perceived Information Awareness is associated with greater Perceived Value of Mobile TV (or Information Awareness is positively related to Perceived Value)

Entertainment/Fun

Hedonic benefits (e.g., Babin et al., 1994; Kim et al., 2007; Kim and Forsythe, 2007; Verkasalo, 2008) like enjoyment, fun and entertainment were found to be gratifications of the Internet (Ko et al., 2005; Lin, 2002; Stafford et al., 2004), mobile services (Höfllich and

Rössler, 2001; Knutsen and Lyytinen, 2006; Lee *et al.*, 2010; Nysveen *et al.*, 2005) and traditional TV (Conway and Rubin, 1991). Focus groups participants elicited that watching television on a mobile phone could be “funny” (process gratification) and that they would potentially use Mobile TV for entertainment purposes like entertaining children or themselves in specific situations by watching cartoons, soaps, series and music contents (content gratification). We therefore hypothesize:

H2b) Greater Perceived Entertainment is associated with greater Perceived Value of Mobile TV (or Perceived Entertainment is positively related to Perceived Value)

Pass Time/Killing Time

Pass time has been identified as a gratification of the mobile phone (Leung and Wei, 2000; Wei, 2008). It has also proved to be a gratification of traditional TV use (Rubin, 1984), playing online games (Huang and Hsieh, 2011), reading online press (Flavián and Gurrea, 2009), using social networks (Shu and Chuang, 2011) and using Instant Messaging online (Flanagin, 2005). Pass time/killing time was also suggested to be one of the major benefits of Mobile TV by focus groups’ participants: Mobile TV would allow consumers to “relieve boredom” and help to “pass their time quicker” in “boring” or “uninteresting situations” such as when waiting (for a doctor, for a meeting, in a queue, in a restaurant, etc.) or when commuting in public transportation. Several previous studies and industry pilots on Mobile TV have highlighted the benefit of its use to pass time (e.g., Cui *et al.*, 2007; Lejealle, 2008; O’Hara *et al.*, 2007). Thus, we hypothesize:

H2c) The higher consumers’ perceptions of Mobile TV as a way to (better) Pass their Time in slack periods, the greater is the Perceived Value of Mobile TV (or Pass Time is positively related to Mobile TV Perceived Value)

Image/Status Enhancement

Personal status, fashion and image enhancement have been identified in several Uses and Gratifications studies applied to mobile telecommunications services or devices (e.g. Choi *et al.*, 2009; Lee, Goh, Chua and Ang, 2010; Leung and Wei, 2000). In the Marketing literature, social value, defined as the social approval or enhanced social self-concept generated by service use (Sweeney and Soutar, 2001, p. 211) has been proved to influence the use of

mobile entertainment services, as they are often used in a social environment that involves interpersonal influence (Pihlström and Brush, 2008). In our exploratory qualitative study, key industry informants were uneven in evaluating the relevance of this factor to consumers' Mobile TV adoption while focus groups' participants did not recognize "status" to be a relevant criterion in the (self) adoption decision (probably because this is a "sensitive" point to assume publically). However, some participants suggested that Mobile TV can be viewed as a status symbol by others. Several participants also elicited examples regarding friends or colleagues that had acquired premium mobile phones (namely Smartphones) only because it was trendy and fashionable and that this could also be the case with a service like Mobile TV. We therefore hypothesize:

H2d) The higher the perception of Mobile TV as a Status and image enhancement symbol, the higher the Perceived Value of Mobile TV (or Personal Status enhancement is positively related to Perceived Value of Mobile TV)

Privacy:

To the best of our knowledge, the concept of Privacy as a benefit does not exist in the academic literature (nor does it exist with a different name like "secrecy", "secret use" or "intimacy"). Privacy exists in the literature and has been extensively studied, namely related to technology adoption, but with another meaning: the one of being a risk, a threat (e.g. Dimitriadis and Kyrezis, 2010; Featherman et al., 2010; Ha and Stoel, 2009; Li and Unger, 2012; Swilley, 2010; Zhou, 2012). In our study, we conceptualize Privacy as being something positive, a benefit that derives from the utilization of Mobile TV.

Our conceptualization of Privacy as a benefit stems mostly from findings from our exploratory qualitative study and from previous Mobile TV working papers, conference proceedings (e.g., Chipchase et al., 2004; Loebbecke et al., 2008), industry analysts' reports (e.g. ABI Research "Mobile TV Services", 2007) and experimental studies (e.g. FinPilot2, 2008) which suggested Mobile TV would provide the benefit of privacy/intimacy/secret use. For example, findings from our interviews with key industry experts evidenced that one of Mobile TV's most watched types of content are adult channels. This is in line with Schuurman et al.'s (2008) findings from interviews with industry experts. Furthermore, several industry pilot studies in Europe have shown that the evening period was also a prime time for Mobile TV (just like with traditional TV), not necessarily to watch adult contents

(which, according to our key informants, is accessed mostly during day time) but rather because users enjoy watching Mobile TV in the evening at home, isolated from other members of the family (to gratify the need for privacy moments). Consistent with the results of our focus groups' interviews, in their 2004 study, Chipchase et al. found out that even when larger televisions are available in the home space, users like to have control over what they watch and where they watch without the need to negotiate with other family members. Teenagers' participants in their qualitative study had stated Mobile TV provided the benefit of allowing them to watch contents that their parents don't like them to watch. Watching comfortably and privately in their room was an important part of the experience; these benefits being amplified when the rest of the TV's in the home are under control of other members of the family. In the same study, the authors highlighted the benefit of "secret use" that users perceived in contexts where the viewed contents were not socially or legally acceptable. In their 2008 study about adoption of Mobile TV and the case study of 3Italia, Loebbecke et al. concluded that users turn to their mobile devices at home in order to assure private viewing and that, even in other contexts, due to the small screen size, users could watch adult entertainment contents without threatening their privacy. Industry analysts ABI Research found out in their 2007 study (based on trials) that: on one hand, consumers also watched Mobile TV when they were not in mobile circumstances and had a superior TV format close by; at home, they used it mostly in their bedrooms, alone and in privacy. On the other hand, they found out Mobile TV was used for secret use and this transcended age groups: younger consumers secretly watched Mobile TV at school while adults secretly watched Mobile TV at the office. We therefore hypothesize:

H2e) The higher the perception of Mobile TV as a means of providing privacy moments, the greater the Perceived Value of Mobile TV (or Privacy is positively related to Perceived Value of Mobile TV)

Convenience/Ubiquity/Immediacy

Based on Berry, Seiders and Grewal (2002)'s conceptualization, convenience can be defined as a customer's perception of the time and efforts saved by using Mobile TV. The convenience that arises from the process of mobile devices usage, in particular the immediacy and direct access to communications anytime, anywhere (ubiquity) is a recurrent theme in Uses and Gratifications research [e.g., Choi *et al.*, 2009 (permanent access); Leung and Wei,

2000 (mobility); Ko *et al.*, 2005; Papacharissi and Rubin, 2000; Stafford and Gillenson, 2004 (convenience)]. The use of mobile phones on buses, cars, trains, malls and restaurants is strongly linked to mobility and immediate access gratifications. Convenience has also resorted in mobile technology adoption literature as a major benefit of the mobile medium (e.g., Laukkanen, 2007; Park *et al.*, 2011; Püschel *et al.*, 2011), which is inherent to the characteristics of the mobile device itself. Conclusions from the exploratory qualitative research suggested that the possibility to watch a certain TV program at any desired time and place (whether outside of the home or at home) was one of the major benefits of Mobile TV. Several Mobile TV studies have also highlighted the convenience and ubiquity of the mobile medium as a major driver for Mobile TV adoption (e.g., Cui *et al.*, 2007; Knoche and Mc Carthy, 2004; Picard, 2005; Shim *et al.*, 2008). Consequently, we hypothesize:

H2f) The higher consumers' perception of Mobile TV as being Convenient, the higher the Perceived Value of Mobile TV (or Convenience is positively related to Perceived Value).

4.2.4 Perceived Costs

As mentioned above, value has generically been conceptualized as a cost/benefit trade-off. In the services literature, the cost or sacrifice component has been represented as a multi-dimensional construct that includes monetary and non-monetary costs. The monetary cost corresponds to the actual price of the service and is usually measured based on consumer's perceptions of the monetary amount paid for the purchase and consumption of the product or service (Kim *et al.*, 2007). Non-monetary costs include other non-monetary expenses or sacrifices that the consumer incurs to purchase and/or consume the product or service like effort and risk perceptions (Kim *et al.*, 2007, Kleijnen *et al.*, 2007, Zeithaml, 1988).

Different findings on the sacrifice-value relationship have been reported in the literature; some found insignificant impacts (e.g., Cronin *et al.*, 2000) while others found cost/sacrifice was a strong predictor of value across different services (e.g., Brady *et al.*, 2005).

Perceived Monetary Costs (Price)

Price is frequently used as the key measure representing what consumers have to pay in money to obtain a product/service. Our study considers perceived price as the internalization of the objective selling price of Mobile TV or the monetary sacrifice of adopting and using

Mobile TV service. It corresponds to the price of the service itself (the fee paid to the mobile operator). The fee structure of Mobile TV services consists on both a pay per view scheme (daily or weekly) and subscription-based pricing (monthly subscription)⁴.

Conclusions from our exploratory qualitative research suggest that consumers tend to make judgments on Mobile TV price by comparing the cost of a monthly subscription to the monthly amount they pay for the mobile phone services they use (although it was also suggested (to a much lesser extent) that one can use as reference the cost of a cable TV subscription instead of the mobile phone bill). This is in line with the patterns identified by previous researchers (e.g. Grewal *et al.*, 1998; Kim *et al.*, 2007) that, having any or few experience with a new technology, consumers can hardly judge whether its price is high or low; hence, they compare the objective price with an internal reference price, which is the overall price level or range that consumers perceive for the product category (in the case of Mobile TV, they would compare either with the mobile services category or with fixed TV services category; the first one is more likely). This behavior has first been analyzed through the lenses of the Adaptation Level theory (Helson 1964) which states that, instead of having a clear perception about prices, customers possess internal reference prices and make comparisons with these prices. The result of this comparison forms the customers' perception of the price. Subsequent research has subscribed this perspective (e.g., Erickson and Johansson 1985; Grewal *et al.*, 1998; Kim *et al.*, 2007; Winer 1986).

Perceived price is presumably the most important component of the sacrifice/costs construct (Nejad *et al.*, 2009; Varki and Colgate, 2001; Voss, Parasuraman, and Grewal, 1998) and the one that has a stronger effect on Perceived Value (within the Perceived Costs construct). As mentioned in the literature review section, price has received little attention in the IT's adoption literature because in organizational contexts consumers do not have to pay themselves for the technology. But in the context of individual personal adoption and use, price plays a major role. Economically rational consumers generally see price as an important financial cost component (Zeithaml, 1988). Previous studies in Marketing have found that as price increases, perceptions of value decline, i.e., perceived price directly and negatively

⁴ In our empirical study, we used the monthly subscription price in the final survey questionnaire, following to the results of the questionnaire pre-test (in which we had included questions for three different price schemes: monthly, weekly and daily, the results had shown no significant differences in consumers price evaluations among the three alternatives) and the interviews with key industry informants (for whom the interest is continued use and adoption, hence, monthly subscriptions and not punctual daily "pay per view" schemes).

influences perceived value (e.g., Cronin *et al.*, 2000; Dodds, 1999; Kim *et al.*, 2007; Kwon and Schumann, 2001; Thaler, 1985; Turel *et al.*, 2007; Zeithaml, 1988). Therefore, we theorize:

H3: Consumers' Perceived Monetary Costs of Mobile TV is negatively related to consumers' Perceived Value of Mobile TV (or Mobile TV Price is negatively related to Mobile TV Perceived Value).

Perceived Non-Monetary Costs (Battery Consumption)

In the technology acceptance domain the non-monetary component usually consists on technical factors related to the technology ease of use and the effort required to learn how to use it (Kim *et al.*, 2007). In our model, the ease of use component is accounted for as a dimension of Perceived Quality of Service and not of Perceived Costs. Nevertheless, following the suggestion to identify domain-specific value-antecedents and relationships, which was one of the objectives of our exploratory qualitative research, we identified battery consumption as a specific perceived cost of Mobile TV.

We found out that battery consumption was perceived by some focus groups' participants as a Mobile TV performance risk. The battery consumption "issue" emerged in the focus groups discussions, where some participants elicited they feared that watching TV on their mobiles would consume too much battery power (increasing the risk of running out of battery too quickly). High battery consumption while using Mobile TV may compromise the use of the mobile phone for other functionalities namely the more essential ones of communication and being "always on". Several research articles and industry reports support consumer fear of battery consumption as being an obstacle to Mobile TV adoption (e.g., Buchinger *et al.*, 2009; Chipchase *et al.*, 2007; Goodmann, 2000). The increase of battery lifetime and the decrease of battery consumption is a subject of current technical research (e.g., Liu *et al.*, 2011; Xiao *et al.*, 2008), as it affects the usability and performance (and consequently, consumers' interest and potential adoption) of several advanced mobile services that can be a source of additional revenues to service providers. In order to operationalize this construct, we propose it to be considered as a perceived performance risk. Perceived risk can be defined as "the subjective expectation of a loss of some degree" and it has two dimensions that negatively influence customer value: financial and performance risk (Sweeney *et al.*, 1999). The financial risk

dimension is reflected in our Price construct. Perceived risk has found further support in the literature (e.g., Lee and Allaway, 2002; Shamdasani *et al.*, 2008; Snoj *et al.*, 2004). Specifically, battery consumption has been identified as a perceived performance risk by Sääkjärvi and Lampinen (2005). Therefore we hypothesize:

H4: The higher the Perceived Non-Monetary Costs of Mobile TV (meaning the performance risk of high Battery Consumption), the lower the Perceived Value of Mobile TV (or Battery Consumption is negatively related with Perceived Value).

4.2.5 Perceived Quality of Service (QoS)

As previously said, we decided to consider Quality of Service as an antecedent of Value independent from Benefits and Costs due to its importance in the adoption decision, as suggested by the results of our exploratory qualitative research. Previous research on Value has also highlighted the significant role of Service Quality to the elaboration of consumer value assessments (e.g., Baker *et al.*, 2002; Brady and Robertson, 1999; Dodds *et al.*, 1991; Chang and Wildt, 1994; Sweeney *et al.*, 1997). As we did not develop the Quality of Service subject in our Literature Review section, we will elaborate a bit more on the Quality of Service construct hereafter.

Service Quality can be defined as the overall excellence or superiority that consumers perceive from a product or service (Zeithaml, 1988). Two main conceptualizations of service quality exist in the literature: one based on the disconfirmation approach, and the other based on a performance-only approach. Early conceptualizations of service quality were usually based on Oliver's (1980) disconfirmation model in which service quality was understood to be a measure of how well the service level delivered matched customer expectations. According to this perspective, perceived service quality is usually defined as the outcome of a comparison between customer expectations and perceptions of the level of service he received (e.g., Grönroos, 1984; Parasuraman *et al.*, 1985; Parasuraman *et al.*, 1988).

More recently, there has been criticism in the literature towards the disconfirmation approach and claims that a performance-only measure (or direct-effect model) is superior because it is more reliable and defensible (Page and Spreng, 2002). Moreover, based on the results of several empirical studies, it is argued that such a model explains more variance and is more effective than the disconfirmation perspective (Cronin and Taylor, 1992, 1994; Babakus and

Boller, 1992; Brown *et al.*, 1993 Parasuraman *et al.*, 1994; Dabholkar *et al.*, 2000; Tse and Wilton, 1988; Teas, 1993, 1994; Peter *et al.*, 1993). Therefore, the disconfirmation approach is unnecessary and a perception-only measure is sufficient. For researchers, a perception-only measure means that detailed service quality studies can be made through simpler, more efficient, cross-sectional designs (Dabholkar *et al.*, 2000). According to these arguments, service quality is defined as the overall evaluation of service performance (similar to Zeithaml's (1985) definition that quality is judged in terms of excellence and superiority).

In our study, we subscribe the perspective of a performance-only measure and service quality is therefore considered to be an overall evaluation of excellence and superiority of service performance.

Despite the disconfirmation *vs.* performance-only discussion, it is generally agreed that service quality is a multi-dimensional concept that might mean different things to different people (Mersha and Adlakha, 1992; Dabholkar *et al.*, 1996; Brady and Cronin, 2001).

Researchers have highlighted that relevant service quality dimensions vary across different industries, emphasizing the need to develop multiple service quality dimensions that provide adequate measures in a particular context (Bolton and Drew, 1994). Although there is a considerable amount of literature on service quality in the field of marketing, the theories used in the IS domain were mainly applied to the Internet and only a handful of recent academic research has looked at service quality in the mobile services context, particularly as it relates to mobile services adoption (e.g., Deng, Lu, Wei and Zhang, 2010; Tan and Chou, 2008; Vlachos and Vrechopoulos, 2008). Moreover, several studies exist in the IT/IS literature that only explore the technical dimension of mobile service quality but neglect the functional dimension. Therefore, besides the main hypothesis proposed for the relationship between Perceived Quality of Service and Perceived Value, we draw on the insights of our exploratory qualitative research together with the conclusions of previous studies to propose the set of dimensions of Mobile TV service quality indicated below and their respective relationships with perceived value.

H5) The higher the Perceived Quality of Service of Mobile TV, the higher its Perceived Value (or Perceived Quality of Service is positively related to Perceived Value)

Reliability

Reliability can be defined as the ability to perform and deliver the promised service accurately and consistently from a technical point of view (Parasuraman *et al.*, 2005; Santos, 2003). Several studies have found reliability to be important in determining service quality (Bressolles, 2006; Chae *et al.*, 2002; Kuo *et al.*, 2009; Parasuraman *et al.*, 1988; Parasuraman *et al.*, 2005; Wolfinbarger and Gilly, 2003; Zeithaml and Bitner, 2000). Consumers may be especially concerned about the reliability of a new service because if the system is not reliable, the service characteristics may not perform well, i.e., may not deliver a good level of quality. In the case of Mobile TV, this corresponds specifically to network availability and coverage everywhere, continuous signal and transmission, no interruptions or cuts. From the user point of view, as suggested by our qualitative study, Mobile TV is commonly understood as an “any time, any place” service; it should be available anywhere at any time with at least “acceptable” quality. If being on the move or outside of home leads to uneven levels of reception experienced and service discontinuities, this poses a problem. Excessive delay and loss during transmission affects the image resolution, skipping frames and freezing pictures. The way the Mobile TV content is delivered has a major effect on the quality of the service. Despite the evidence from Marketing research literature, several studies in the mobile telecommunications field suggest reliability to affect Quality of Service (e.g., Chipchase, Yanqing and Jung, 2004; Goodman, 2000; Sarker and Wells, 2003). Therefore, we hypothesize:

H5a) The higher the Reliability of the Mobile TV service, the higher the Perceived Value of Mobile TV (or Reliability is positively related to Perceived Value)

Multimedia Quality

Multimedia quality regards the level of audio and video quality perceived by the consumer when using the service. The results from our exploratory qualitative research suggested that image and sound quality were important components of Mobile TV service quality and were considered determinant to the adoption decision. Consumers expect an image quality which is not significantly inferior to the standard established by traditional TV, even if the screen is much smaller. A common first reaction of consumers when confronted with the subject of Mobile TV is “but the screen is so small!” Specifically, two major points raise concern: text

legibility (for example news tickers or subtitles) and object details in particular when watching sports contents (“can we see the ball in a football or tennis match?”). Whereas users want the screen to be as large as possible, they do not want their phones to increase in size and weight. Audio quality is equally important but consumers are much less “anxious” about it (because the screen size of a mobile phone raises much more suspicions than a mobile phone capacity to deliver good sound quality- even if multimedia quality is far from being an issue related only to the mobile device characteristics). Several studies specifically related to Mobile TV confirmed that multimedia quality (audio and video) was a major concern and that it influences consumers in their adoption decision (e.g., Buchinger et al., 2009; Jumisko-Pyykkö, 2008; Jumisko-Pyykkö and Hannuksela, 2008; Jumisko-Pyykkö and Utriainen, 2011; Jumisko-Pyykkö and Väänänen-Vainio-Mattila, 2006; Knoche, McCarthy and Sasse, 2006). Hence, we theorize:

H5b) The higher the perceived audio and video quality of Mobile TV service, the higher the Perceived Value of Mobile TV (or Multimedia Quality is positively related to the Perceived Value of Mobile TV)

Ease of Use

Perceived ease of use, defined as the degree to which a person believes that using a particular technology/system is free from effort (Davis, 1989) has been extensively used in the IS literature as an adoption determinant for an endless number of innovations and its determinant influence in the adoption decision has consistently been supported, namely for several different mobile services (e.g., Kim, Park and Oh, 2008; Pagani, 2004; Tan and Chou, 2008; Wang, Lo and Fang, 2008; Wu and Wang, 2005). Favorable ease of use perception is important for initial acceptance (Davis *et al.*, 1989), which is essential for adoption and continued use.

Ease of Use perceptions are important for Mobile TV because the resources are limited compared to other systems (e.g., smaller screen size and smaller “keyboard” with fewer dedicated touches for each function than a fixed TV command may turn the usability of Mobile TV into a more difficult task).

In our study, Ease of Use is defined as the users’ perceptions about the effort required for using the Mobile TV service. Specifically, this includes the easiness of connecting to the

service, switching channels, changing the volume level, accessing and navigating within the Mobile TV menus. Results from the focus groups interviews suggested that consumers may be interested in Mobile TV only if it is intuitive to use, easy to use.

Besides the indisputable relevance of Ease of Use within the technology adoption literature, Ease of Use has also been proved to be an antecedent of consumer perceived value (e.g., Kim *et al.*, 2007; Kim and Niehm, 2009; Ko, Kim and Lee, 2009) and a dimension of Service Quality (e.g., Barnes and Vidgen, 2003; Bressolles, 2006; Nasr, Eshghi and Ganguli, 2012; Santos, 2003; Shamdasani *et al.*, 2008; Tan and Chou, 2008; Yang, Jun and Peterson, 2004). Therefore, we hypothesize:

H5c) The higher the Perceived Ease of Use of the Mobile TV service, the higher its Perceived Value (or Perceived Ease of Use is positively related to Perceived Value of Mobile TV)

Speed

The results of our exploratory qualitative research suggested that the speed of access/connection to the Mobile TV service and the speed of channel switching are relevant to the global assessment of Mobile TV service quality and, ultimately, perceived value. If consumers try to connect to the service or switch channel and the system takes too long to respond, they will just quit (unless they are really eager to watch a specific anticipated content like a live sports event; but if the rule is that it takes too long to connect to the Mobile TV service or to switch channels, they may definitely lose interest in the service).

Speed (sometimes also called efficiency or responsiveness) has been considered in the literature as a dimension of perceived service quality (e.g., Dabholkar, 1996; Kim and Kim, 2010; Parasuraman *et al.*, 2005; Shamdasani *et al.*, 2008; Vlachos, Giaglis, Lee and Vrechopoulos, 2011; Yoo and Donthu, 2001). Several Mobile TV studies have also supported the influence of speed on consumers' evaluation and acceptance of the service (e.g., Buchinger *et al.*, 2009; Cui *et al.*, 2007; Pagani, 2004). Hence, we hypothesize:

H5d) The higher the Speed/efficiency of the Mobile TV service, the higher the Perceived Value of Mobile TV (or Mobile TV service Speed is positively related to Perceived Value).

Content

Content has been defined as a construct which has dimensions of exactness, relevance and sufficiency (Jung, Perez-Mira and Patton, 2009). In recent years, the construct has been widely studied in the context of the Internet and web-sites and has been proved to influence consumers' perceptions of web service quality (e.g., Aladwani and Palvia, 2002; Carlson and O'Cass, 2010; Chen and Macredie, 2005; Dai et al., 2011; De Wulf *et al.*, 2006; Palmer, 2002; Udo et al., 2010; Vlachos and Vrechopoulos, 2008). Content has also been regarded in the context of mobile services (e.g., Kuo et al., 2009; Methlie and Pedersen, 2005; Shuurman *et al.*, 2008; Tan and Chou, 2008; Udo *et al.*, 2010; Vlachos *et al.*, 2003; Vlachos and Vrechopoulos, 2008) and it has revealed to be the most influential factor for consumers when evaluating service quality of mobile entertainment services (e.g., Tan and Chou, 2008; Vlachos and Vrechopoulos, 2005).

Our exploratory qualitative research also suggested Content to be an important factor for Mobile TV adoption. For example, certain types of content (such as news) seem to be highly suitable for the mobile medium due to its conciseness and modest attention requirements. Live events (especially sports) to watch in a mobile phone as a backup for "unfortunate" circumstances where no other visual medium is available, were also elicited within the top choices. Women revealed interest in the possibility of watching specific soaps or comedies that they regularly follow. Results from several Mobile TV studies and pilots also put forward the availability of suited content as a key factor for consumer adoption of Mobile TV (e.g., Buchinger et al., 2009; Carlsson and Walden, 2007; Choi et al., 2008; Knoche and Sasse, 2006; Schatz et al., 2007; Shuurman *et al.*, 2008). This is not surprising, given that Mobile TV is basically an entertainment service; hence, content is expected to have a strong influence on consumers' perception of the interest and value of Mobile TV.

Within the Internet domain, content has generally been defined as a construct that includes the amount and variety of information, its appropriateness and presentation mode (use of text, graphics and multimedia). In our study and based on previous Mobile TV studies and results from our exploratory research, we define (suitable) content as a consumer's assessment that the programs are applicable for the mobile medium (appropriateness), up-to-date (timeliness), sufficient (quantity and variety) and that they match consumer's interests (relevance). We examine content as a new potential antecedent of perceived value and a dimension of perceived service quality. Therefore, we hypothesize

H5e) The higher the availability and suitability of the Mobile TV Content, the higher the Perceived Value of Mobile TV (or Content is positively related to the Perceived Value of Mobile TV).

The summary of the research hypotheses is presented in Table 6.

Table 6: Summary of the Research Hypotheses

H1: The higher the Perceived Value of Mobile TV, the higher its Adoption Intention (or Perceived Value is positively related to the Adoption Intention of Mobile TV).
H2: The higher the Perceived Benefits of Mobile TV, the higher its Perceived Value (or Perceived Benefits are positively related to the Perceived Value of Mobile TV).
H2a): Greater perceived Information Awareness is associated with greater Perceived Value of Mobile TV (or Information Awareness is positively related to Perceived Value).
H2b): Greater perceived Entertainment is associated with greater Perceived Value of Mobile TV (or Perceived Entertainment is positively related to Perceived Value).
H2c): The higher the consumers' perceptions of Mobile TV as a way to (better) Pass their Time in slack periods, the greater the perceived value of Mobile TV (or Pass Time is positively related to Perceived Value).
H2d): The higher the perception of Mobile TV as a Status and image enhancement symbol, the greater the Perceived Value of Mobile TV (or Personal Status enhancement is positively related to Perceived Value).
H2e): The higher the consumer perception of Mobile TV as being Convenient, the greater the Perceived Value of Mobile TV (or Convenience is positively related to Perceived Value).
H2f): The higher the consumer perception of Mobile TV as a means of providing Privacy moments, the greater the Perceived Value of Mobile TV (or Privacy is positively related to Perceived Value).
H3: The higher the Perceived Monetary Costs of Mobile TV, the lower its Perceived Value (or Perceived Monetary Costs are negatively related to the Perceived Value of Mobile TV).
H4: The higher the Perceived Non-Monetary Costs of Mobile TV (meaning the performance risk of high battery consumption), the lower its Perceived Value (or Non-Monetary Costs (Battery Consumption) are negatively related with Perceived Value).
H5: The higher the Perceived Quality of Service of Mobile TV, the higher its Perceived Value (or Perceived Quality of Service is positively related to Perceived Value).
H5a): The higher the Reliability of the Mobile TV service, the higher its Perceived Value (or Reliability is positively related to Perceived Value).
H5b): The higher the Perceived Multimedia Quality of the Mobile TV service, the higher its Perceived Value (or Multimedia Quality is positively related to the Perceived Value of Mobile TV).
H5c): The higher the perceived Ease of Use of the Mobile TV service, the higher its Perceived Value (or Perceived Ease of Use is positively related to Perceived Value).
H5d): The higher the Speed of the Mobile TV service, the higher its Perceived Value (or the Mobile TV service Speed is positively related to Perceived Value).
H5e) The higher the suitability of the Mobile TV Content, the higher the perceived value of the service (or, Content is positively related to the Perceived Value of Mobile TV).

4.3 Potential Contributions of Our Model

Our research attempts to fill gaps identified in the literature review section by 1) proposing a more comprehensive and specific model of Mobile TV adoption (than the most widely used models like the TAM and its innumerable derivatives and extensions; 2) proposing an integrated model of adoption that put together theories and constructs from three different main fields of research: Information Systems (namely Ease of Use, Adoption Intention), Marketing (namely consumer Perceived Value, Perceived Costs, Perceived Benefits and Quality of Service) and Communications (namely Perceived Uses and Gratifications).

Our proposed theoretical model endorses the point of view of previous researchers that technological innovations' adoption and also consumer perceived value are, indeed, context and product specific. Therefore, consistent with procedures recommended for marketing theory development, we conducted an exploratory qualitative research that helped us to progress towards the theoretical model development, namely by identifying and synthesizing relevant variables explored in the literature but also by generating new ideas for constructs and hypotheses. Actually, our conceptual model considers and integrates a whole set of variables that are new or almost unexplored in the academic literature like Privacy/Secret Use, Battery Consumption, Multimedia Quality, Speed and Content suitability. Moreover, the way in which these and other widely explored variables (like Ease of Use) are integrated, as well as the combination of Uses and Gratifications with Perceived Value through the means of Benefits are definitely innovative.

While specifically identified and combined to explain consumers' interest and potential adoption of Mobile TV services, these constructs can certainly be applied and further empirically tested within the context of adoption of other (technological) innovations.

For managers in the telecommunications and media industries, the proposed model and final conclusions of our research will hopefully address some unanswered questions and provide them orientation and support in the design of mobile services that fulfill consumers' needs and requirements and lead to increased consumer value perceptions and related adoption.

The proposed conceptual model will be empirically tested by means of a survey. Methodological aspects are outlined in the next chapter.

5. METHOD

This chapter describes the methodology and procedures used in our empirical study namely the research design, the measures selection and survey instrument development, the pre-test, the sampling process, the final survey administration and data analysis.

5.1 Research Design

Our research project involved two phases of data collection and analysis:

- First, a qualitative exploratory study consisting on individual interviews with key industry informants and group interviews with consumers (potential and current Mobile TV adopters);
- Second, a cross-sectional quantitative study through means of a survey.

For simplification reasons and in order to avoid redundancy, the methodological details are described more comprehensively in each of the respective qualitative and quantitative study sections, together with the presentation of the results.

Furthermore, this section refers exclusively to methodological options of the quantitative study while all the information related to the qualitative study was addressed in the respective chapter (Chapter 3), before the conceptual model chapter, respecting the sequential phases of our project: the qualitative research consisted on an exploratory field study conducted after the literature review with the main objective to complement the latter and give us further insights for the development of the conceptual model; therefore, it makes sense to present it before the conceptual model chapter.

As previously stated, we conducted a quantitative study in order to test the robustness and validity of our proposed conceptual model and respective hypothesized relationships. The data were collected through the means of a survey at a single point in time (cross-sectional design). Our research was conducted in Portugal⁵, with mobile phone users registered with the website of a renowned and reliable market research company (Netsonda). Before the final

⁵ One of the highest developed countries in Europe regarding mobile services' adoption, with a penetration rate of 159% at the end of 2012 (126% if considering only those SIM cards that have effective utilization). It was the 2nd highest mobile services' penetration country in Europe, right after Finland (source: ANACOM).

study, we pre-tested the survey instrument with a small convenience sample; the instrument was further refined and subject to slight modifications. Our final survey questionnaire was administered through the Internet to a large sample of Mobile TV potential adopters, current adopters and “ex-adopters”.

The survey questionnaire was structured into three different parts: the first part consisted on a group of questions directed to collect respondents’ demographic data and assess some use habits of mobile telephony service; the second part consisted on all the questions intended to assess the conceptual model constructs; the third part consisted on some complementary demographic questions as well as two qualitative questions regarding the reasons for not adopting Mobile TV (addressed for respondents who did not intend to adopt).

The scales used to measure the model constructs were essentially drawn from our thoroughful literature review and consisted on multiple-item Likert scales.

In addition to the main effects expected and based on the literature review, the exploratory qualitative study and our market knowledge, we collected data on certain demographic variables that might have moderating effects on the outcome measures. However, the primary purpose of our model and subsequent quantitative research was to integrate existing IS/IT adoption, media Uses & Gratifications and consumer value theories to propose a more specific and comprehensive model of mobile services adoption, investigating specifically the antecedents of Mobile TV perceived value. Demographics were collected to investigate any potential moderating effects. Notwithstanding, this was done for the purpose of any supplementary data analysis and interpretation that might be useful and for possible future research. Any potential moderating effects resulting from those variables are beyond the scope of this dissertation and will be explored in future research. The final qualitative question regarding respondents’ reasons for not adopting Mobile TV was added to the survey questionnaire (and analyzed by using content analysis) with essentially practical purposes of providing us (and industry managers) a better understanding of the factors that influence consumers’ adoption decision of Mobile TV, namely to identify possible determinants that have not been considered in our model.

To conclude, the data (related to the model test) were analyzed by using SEM- Structural Equation Modeling, a sophisticated statistical technique that enables the assessment of the

relationships between the model's constructs together with its predictive power. We believe it is the most appropriated technique to test the validity of a new model.

5.2 Measures Development and the Survey Instrument

5.2.1 The Measures

With one exception, all theoretical constructs were operationalized using multi-item measures drawn from standardized scales well established in the literature, having acceptable reliabilities (Cronbach alphas > 0.70 as recommended by Hair, Anderson, Tatham, & Black, 1998), and adapted to the Mobile TV use context. For each measurement item we adapted the wording to suit the studied service but always keeping it as similar as possible to the original scales.

All constructs (except “actual use”) were measured by indicators with a seven-point Likert-type response format ranging from ‘strongly disagree’ to ‘strongly agree’. A seven-point response format was used for all indicators in an effort to maximize respondent specificity, as opposed to employing a five-point “only” response format (Fornell, 1992; Kumar, 2000). Actual use (only applied to current Mobile TV users- 0.06% of the sample or 29 respondents) was measured by three items using check-box interval scales. Table 7 lists the constructs’ operational definitions together with the items used to measure them and their reliabilities (Cronbach’s alphas) in previous studies. The final version of the survey questionnaire can be found in the Appendices.

Table 7: Measures for operationalization of the model constructs

PERCEIVED BENEFITS	Construct	Cronbach alphas (previous studies)	Items/Measures Description	Measures References (adapted from)
	Information Awareness: The gratification that satisfies one's need or motivation to use Mobile TV for the sake of keeping informed about news and events of his interest	0.88 (Lee <i>et al.</i> , 2010) 0.88 (Lin, 2002)	IA1: Mobile TV provides me access to up-to-date information and news (=) IA2: With Mobile TV I can easily get the information I need (=) IA3: Mobile TV allows me to keep up to date on the latest news and events (=)	Lee, Goh, Chua and Ang, 2010; Leung and Wei, 1998; Lin, 2002
	Entertainment: The gratification that satisfies one's need or motivation to use Mobile TV for keeping entertained/having fun	0.78 (Ko <i>et al.</i> , 2005) 0.81 (Lee <i>et al.</i> , 2010) 0.95 (Nysveen <i>et al.</i> , 2005)	E1: I find Mobile TV service to be entertaining (=) E2: Mobile TV is fun (=) E3: Watching Mobile TV is a pleasant activity (=)	Leung, 2001; Lin, 2002; Lee, 2010; Nysveen <i>et al.</i> , 2005 Choi <i>et al.</i> , 2009; Lin, 2002; Leung and Wei, 1998; Ko <i>et al.</i> , 2005; Nysveen <i>et al.</i> , 2005 Choi <i>et al.</i> , 2009; Nysveen <i>et al.</i> , 2005
	Pass Time: The gratification that satisfies one's need or motivation to use Mobile TV to "relieve boredom" and help to "better pass his time" in "boring" or "uninteresting situations" such as when waiting or when commuting in public transportation	0.9 (Wei, 2008) 0.89 (Lee <i>et al.</i> , 2010) 0.8 (Choi <i>et al.</i> , 2009)	PT1: Mobile TV is a way to relieve boredom by occupying time (=) PT2: In waiting situations, Mobile TV can be an interesting occupation (added) PT3: Mobile TV is a good way to help pass the time (=)	Leung and Wei, 1998; Leung and Wei, 2000; Lee <i>et al.</i> , 2010; Choi <i>et al.</i> , 2009 Developed by the researcher to have a scale with three items Wei, 2008; Lee <i>et al.</i> , 2010; Choi Kim & McMillan, 2009; Ko <i>et al.</i> , 2005

Table 7: Measures for operationalization of the model constructs (continuation)

PERCEIVED BENEFITS	Construct	Cronbach alphas (previous studies)	Items/Measures Description	Measures References (adapted from)
	Image/Status Enhancement: The gratification that satisfies one's need or motivation to use Mobile TV to enhance his personal image/status amongst others	0.77 (Lee <i>et al.</i> , 2010) 0.85 (Choi <i>et al.</i> , 2009) 0.81 (Nysveen <i>et al.</i> , 2005) 0.8 (Leung and Wei, 2000)	IM1: Watching Mobile TV helps me feel important (=) IM2: Watching Mobile TV makes me feel stylish (=) IM3: Having Mobile TV is a status symbol (=)	Lee <i>et al.</i> , 2010; Leung and Wei, 1998 Leung and Wei, 1998 and 2000; Choi <i>et al.</i> , 2009 Leung and Wei, 2000; Choi <i>et al.</i> , 2009; Lee <i>et al.</i> , 2010
	Convenience: The gratification/benefit that derives from using Mobile TV to save time and efforts	0.85 (Choi <i>et al.</i> , 2009) 0.65 (Ko <i>et al.</i> , 2005) 0.87 (Nysveen <i>et al.</i> , 2005)	CONV1: With Mobile TV I can have immediate access to information and entertainment programmes, anywhere at any time (similar) CONV2: Mobile TV is a convenient way to watch TV anywhere at any time [adapted from "MoTV is a convenient way to access information and entertainment programmes" (or "watch TV")] CONV3: Using Mobile TV makes me save time/efforts (adapted after Pre-Test to "Watching TV on my mobile would help me making better use of my time")	Choi <i>et al.</i> , 2009; Lee <i>et al.</i> , 2010; Leung and Wei, 2000; Wei, 2008 Ko <i>et al.</i> , 2005; Lee <i>et al.</i> , 2010 Ko <i>et al.</i> , 2005; Nysveen <i>et al.</i> , 2005
	Privacy: The gratification/benefit that derives from using Mobile TV to take advantage of privacy moments or for secret uses	Not found in the literature (new construct: Privacy as a benefit)	PR1: Mobile TV can afford me some privacy moments PR2: Mobile TV allows to me to watch some desired programs in a secret way PR3: With Mobile TV I can watch what I want independently from others' preferences PR4: Mobile TV allows me to watch the contents that I want, quietly, in my private space	Developed by the researcher based on exploratory qualitative study (feedback from key informants), some academic literature and industry studies

Table 7: Measures for operationalization of the model constructs (continuation)

	Construct	Cronbach alphas (previous studies)	Items/Measures Description	Measures References (adapted from)
PERCEIVED COSTS	Perceived Monetary Costs (Price): The monetary sacrifice of adopting and using Mobile TV service. It corresponds to the price of the service itself (the fee paid to the mobile operator).	0.78 (Voss <i>et al.</i> , 1998) 0.89 (Kim <i>et al.</i> , 2007)	FEE1: The fee that I have to pay for the use of Mobile TV is too high (=) FEE2: The fee that I have to pay for the use of Mobile TV is reasonable (=) FEE3: I am staisfied with the fee that I have to pay for the use of Mobile TV (=)	All items from Voss <i>et al.</i> , 1998 (used by Kim <i>et al.</i> , 2007)
	Non-Monetary Costs (Battery consumption): The subjective expectation that using Mobile TV consumes too much battery power and increases the risk of running out of battery too quickly	0.82 (Sweeney <i>et al.</i> , 1999)	BC1: Mobile TV is risky in terms of high battery consumption (=) BC2: There is a chance that watching Mobile TV will exhaust all my battery power (=) BC3: My mobile phone is weak in battery power to fully take advantage of Mobile TV (=)	Sweeney <i>et al.</i> , 1999 Sweeney <i>et al.</i> , 1999 Tan and Chou, 2008
PERC QUAL of SERV	Reliability: The the ability to perform and deliver the promised service accurately and consistently from a technical point of view	0.83 (Parasuraman <i>et al.</i> , 2005)	REL1: The Mobile TV service is always available when I want/ try to connect (=) REL2: The Mobile TV service launches and runs right away (=) REL3: The Mobile TV service does not crash (=) REL4: The TV transmission does not freeze after I connect to the Mobile TV service (=)	All items from Parasuraman <i>et al.</i> , 2005

Table 7: Measures for operationalization of the model constructs (continuation)

PERCEIVED QUALITY of SERVICE	Construct	Cronbach alphas (previous studies)	Items/Measures Description	Measures References (adapted from)
	Multimedia Quality: The level of audio and video quality perceived by the consumer when using the service	0.83 (Kuo <i>et al.</i> , 2009)	MMQ1: The Mobile TV service is displayed in a harmonious way (=) MMQ2: I can clearly see the pictures and hear the sound of the TV programmes that I watch in my mobile phone (=) MMQ3: The Mobile TV sound and image quality are good enough (added)	Kuo, 2003; Kuo <i>et al.</i> , 2009 Adapted from Kuo <i>et al.</i> , 2009 Developed by the researcher to have a scale with three items
	Ease of Use: The user's perceptions about the effort required for using the Mobile TV service. This includes the easiness of connecting to the service, switching channels, changing the volume level, accessing and navigating within the Mobile TV menus	0.94 (Parasuraman <i>et al.</i> , 2005) 0.91 (Shamdasani <i>et al.</i> , 2008)	EoU1: The Mobile TV interface makes it easy to find the channels that I'm looking for EoU2: The Mobile TV interface makes it easy to switch channels (=) EoU3: The information about the channels and programs is well organized (=) EoU4: Using Mobile TV is complicated (reversed to "is not complicated" for the non-users group) EoU5: Using Mobile TV requires a lot of effort (reversed to "does not require..." for the non-users group)	Parasuraman <i>et al.</i> , 2005 Parasuraman <i>et al.</i> , 2005 Parasuraman <i>et al.</i> , 2005 Shamdasani <i>et al.</i> , 2008 adapted from Dabholkar (1996) Shamdasani <i>et al.</i> , 2008 adapted from Dabholkar (1996)
	Speed: The efficiency (in terms of time) with which the service responds to the user's instructions. It regards specifically the speed of access/connection to the Mobile TV service and the speed of channel switching	0.75 (Shamdasani <i>et al.</i> , 2008) 0.85 (Kuo <i>et al.</i> , 2009)	SPEED1: It does not take too much time to connect to the Mobile TV service SPEED2: It does not take too much time to load the channels that I switch to SPEED3: The Mobile TV service can instantly react to my instructions	All items from Kuo <i>et al.</i> , 2009

Table 7: Measures for operationalization of the model constructs (continuation)

	Construct	Cronbach alphas (previous studies)	Items/Measures Description	Measures References (adapted from)
PERC QUAL of SERV	Content: The user's assessment that the programs are appropriated for the mobile medium, up-to-date, sufficient (quantity and variety) and that they match consumer's interests.	0.91 (Udo, Bagchi and Kirs, 2010) 0.85 (Jung <i>et al.</i> , 2009) 0.86 (Kuo <i>et al.</i> , 2009)	CONT1: The Mobile TV service has an ideal amount of channels to chose from CONT2: The programs available through the Mobile TV service are appealing CONT3: The contents of Mobile TV are interesting from my point of view	All items adapted from Udo <i>et al.</i> , 2010
PERCEIVED VALUE	Perceived Value: The consumer's overall assessment of the utility of the Mobile TV service, which is determined by his/her perception of what is received and what is given.	0.88 (Cronin <i>et al.</i> , 2000) 0.87 (Kim <i>et al.</i> , 2007) 0.88 (Shamdasani <i>et al.</i> , 2008)	PV1: I value Mobile TV greatly PV2: The benefits that I receive from Mobile TV exceed the cost incurred PV3: What I gain from Mobile TV is more than what I have to give up PV4: Overall, the value of Mobile TV to me is high PV5: Compared to what I have to sacrifice, the overall ability of Mobile TV to satisfy my wants and needs is quite high	First three items: Shamdasani <i>et al.</i> (2008) adapted from Brady <i>et al.</i> (2005) and Sweeney <i>et al.</i> (1999) Cronin <i>et al.</i> , 2000 Cronin <i>et al.</i> , 2000
BEHAV. INT°	Behavioral (adoption) Intention: The degree to which a person is willing to adopt/use Mobile TV	0.83 (Kim <i>et al.</i> , 2007) 0.94 (Morris, Venkatesh and Ackerman, 2005) 0.9 Davis, Bagozzi and Warshaw, 1989	BI1: I intend to use Mobile TV in the next « n » months BI2: I predict that I would use Mobile TV in the next « n » months BI3: I expect to use Mobile TV in the next « n » months	All measures from Davis, Bagozzi and Warshaw, 1989
ACTUAL USE	Actual Behavior (use): The consumer's use of the Mobile TV service over time (and not only on a single occasion)	0.85 (Sledgianowski and Kulviwat, 2009)	AU1: How long have you been using Mobile TV service? AU2: How frequently do you watch Mobile TV? AU3: How much time do you spend (per session/per day) watching Mobile TV?	Davis, Bagozzi and Warshaw, 1989; Sledgianowski and Kulviwat, 2009. Self-reported check-box interval scale.

5.2.1.1 Perceived Benefits (Gratifications)

With the exception of Privacy, the remaining five components of perceived benefits- Information Awareness, Entertainment, Pass Time, Image/Status and Convenience- were all measured using reliable scales adapted from Uses and Gratifications studies.

We should highlight that, although having been criticized in the past of being “a-theoretical” and not a rigorous social science theory, the U&G paradigm has progressed and evolved into a generally accepted and solid theory. Recent research using the U&G has been published in top level journals like Decision Science, the Journal of the Academy of Marketing Science, the Journal of Advertising, Telematics and Informatics, the Journal of the American Society for Information Science and Technology, among others.

Researchers like Thomas Stafford, Herbjorn Nysveen and Carolyn Lin have made important contributions in that sense by putting an emphasis on theory development namely by applying sophisticated statistical techniques. The U&G profile development is typically accomplished through a two stage research design: first, an exploratory list of terms that characterize the typical uses and gratifications sought is developed (this process allows for the sampling of the domain of a theoretical construct (e.g., Churchill, 1979)); the second stage uses factor analysis to group descriptive terms into profiles representative of specific audience gratifications and intended uses for a medium. Recently, the second stage procedure has been supplemented by assessing construct validity and reliability for component measures of U&G profiles and by fitting confirmatory measurement models using SEM.

Regarding Privacy, after extensive search and having found no equivalent in the literature (neither within the U&G nor within other theories and fields of research) in the sense that we defined it- as a benefit, a multi-item scale to measure this construct was developed by the researcher based essentially on insights from the exploratory qualitative study together with those from previous industry studies and trials (some academic literature was also considered but it was, for the most, based on qualitative studies having no measures for Privacy- please refer to Chapter 4 for further details). As can be seen in the next chapter, the reliability of the proposed measure revealed to be significantly high within the context of our study.

5.2.1.2 *Perceived Costs*

Perceived Monetary Costs (Price), defined as the monetary sacrifice of using Mobile TV (the fee paid to the mobile operator) was measured by a three item scale adapted from Voss *et al.* (1998) and further used by Kim *et al.* (2007) in the context of Mobile Internet adoption.

Perceived Non-Monetary Costs (Battery Consumption), defined as the subjective expectation that using Mobile TV consumes too much battery power (increasing the risk of running out of battery too quickly) is operationalized in our study as a perceived risk using three items: two items were borrowed and adapted from Sweeney *et al.* (1999), that studied the role of perceived risk in the quality-value relationship; the third item was adapted from a study in the context of mobile information and entertainment services by Tan and Chou (2008).

5.2.1.3 *Perceived Quality of Service*

As conceptualized in our model, Perceived Quality of Service is a latent variable represented by five components: Reliability, Multimedia Quality, Ease of Use, Speed and Content. Because service quality dimensions vary across different industries, we drew on the insights from our exploratory qualitative research together with the conclusions of previous studies to propose the above-mentioned set of service quality components that are relevant in the context of Mobile TV.

Reliability or the ability to perform and deliver the promised service accurately and consistently from a technical point of view, is measured by four items from Parasuraman *et al.*'s (2005) E-S-QUAL corresponding to "system availability". The four items were reproduced exactly as in the original scale only changing the service name (from "web site" to "Mobile TV").

Multimedia Quality is defined as the level of audio and video quality perceived by the consumer when using the service. It is measured by two appropriate indicators borrowed and adapted from Kuo *et al.* (2009) and Kuo (2003) and a third indicator specifically developed for this study in order to have a more robust measure with three items.

Ease of Use, defined as the user's perceptions about the effort required for using the Mobile TV service, accounts for the easiness of connecting to the service, switching channels, changing the volume level, accessing and navigating within the Mobile TV menus. To measure Ease of Use in the specific context of Mobile TV, items with high reliability were selectively taken from previous research in the Internet domain, namely three items from Parasuraman *et al.*'s (2005) E-S-QUAL and two items from Shamdasani *et al.* (2008).

Speed, within the context of the Mobile TV service, regards specifically to the rapidity of access/connection to the Mobile TV service and the quickness of channel switching. It is the time efficiency with which the service responds to the user's instructions. Although Parasuraman *et al.* (2005) also consider some "speed" items under the "efficiency" umbrella, we rather selected three items from Kuo *et al.*'s (2009) study on mobile value-added services as they were more appropriate to the Mobile TV context.

Finally, the last component of Quality of Service is Content which is defined as the user's assessment that the programs are appropriated for the mobile medium, up-to-date, sufficient in terms of quantity and variety, and that they match consumer's interests. Content has been assessed in the context of the Internet and web sites' quality and also mobile value-added services. The measure for this construct consists of three items adapted from Udo, Bagchi and Kirs (2010) web site content scale.

5.2.1.4 *Perceived Value*

The perceived service value construct is defined as the consumer's overall assessment of the utility of the Mobile TV service, which is determined by his/her perception of what is received and what is given. It is measured by five indicators: three of them were borrowed from Shamdasani *et al.* (2008) and previously adapted from Brady *et al.* (2005) and Sweeney *et al.* (1999); the other two items were selected from Cronin *et al.* (2000).

5.2.1.5 *Behavioral Intention (Adoption Intention)*

Behavioral Intention or the degree to which a person is willing to use Mobile TV is measured by the widely used three-item's measure from Davis, Bagozzi and Warshaw (1989).

5.2.1.6 *Actual Use*

Actual Use could only be assessed with current users of the Mobile TV service. Only 29 respondents in a total sample of 500 (corresponding to 0,06%, higher than the market penetration rate of 0,04% at the time the data were collected) answered to the three questions of Davis, Bagozzi and Warshaw's (1989) scale. We used self-reported check-box interval scales as in Sledgianowski and Kulviwat (2009). Actual usage was measured using 3 questions regarding the oldness and frequency with which the respondent currently uses Mobile TV. The first question regarding how long the respondent has been using Mobile TV is a check-box with four optional categories (for over one year; between six months and one year; between three and six months and, for less than three months). The second and third questions regard the frequency of using the service (seven optional categories ranging from "less than once per month" to "more than once per day") and, the average duration of a session (five optional categories from "less than 5 minutes" to "over 20 minutes").

These are the kind of self-reported measures typically used to operationalize system usage, particularly in cases where objective usage metrics are not available. Objective usage logs were not possible in the present context (only mobile operators have that data). When researchers want to evaluate innovations' potential acceptability very early in their development life cycle and cannot obtain objective measures of user experience with the product/service, self-reported measures can be used as a relative (vs objective) measure of actual behavior. Yet, both the TRA and the TAM postulated that Behavioral Intention is the major determinant of Usage Behavior, that behavior should be predictable from measures of intention and that any other factors that influence behavior do so indirectly by influencing intention. Nevertheless, given that intentions are subject to change between the time of intention measurement and behavioral performance, researchers should expect the intention-behavior correlation to diminish with increased elapsed time (Fishbein and Ajzen, 1975). Moreover, at the time intentions are assessed, if the respondents have very limited experience with the system, their intentions should not be expected to be extremely well-formed and stable.

To conclude, a list of the measurement items for each variable along with the standardized estimates and reliability statistics (Cronbach's alpha) of our study is provided in the data analysis chapter. In the context of our study and sample, the Cronbach's alphas of each

construct ranged from 0.73 to 0.95, exceeding the recommended minimum level of 0.70 (Hair, Anderson, Tatham, & Black, 1998).

5.2.2 The Survey Instrument

As mentioned previously, the survey instrument was created by combining existing measures and adapting them to the Mobile TV context (the survey questionnaire was refined following to the application and results of the pre-test; the instrument that we discuss hereafter is the final version of the survey questionnaire).

The sixteen constructs from our research model were measured through the survey administration by using the scales shown in Table 7. Forty three items were used to measure the three latent constructs: Perceived Benefits, Perceived Costs and Perceived Quality of Service. The questionnaire was structured into three main sections that we detail next.

5.2.2.1 Section I: Filter Questions and Mobile Services Consumption Habits

After a short presentation of the study, question 1 asked respondents if they were willing to answer honestly and sincerely to the questionnaire. The second question consisted on an audio and video test to make sure the respondents were able to properly visualize a video that was further displayed to some respondents. Questions 3 to 5 consisted on filter questions related to the targets that we had defined regarding sampling and quotas, including mobile phone possession, age group and gender (please refer to section 5.4 of this chapter for further details).

Additionally, section I included eight questions (6-13) related to mobile services consumption habits and Mobile TV awareness. The former (mobile services consumption habits) aimed to provide us with additional information that could be useful in future research to assess eventual relationships between certain usage patterns and the likelihood of adopting the Mobile TV service (for example, possession of premium handsets, higher average monthly bills, utilization of more advanced mobile services...). The latter (Mobile TV awareness) aimed to assess respondents' level of awareness and experience with the Mobile TV service in order to direct them to the right group of questions (questions' wording was different depending on the respondent being a current user or having already tried Mobile TV or not).

After these questions and before moving on to the next section, a short Mobile TV video demo was displayed for respondents that had never tried Mobile TV before (those that answered negatively to question 12 or to question 10- see the survey instrument in the Appendices). The video lasted 58 seconds. It was not specifically designed for our study. It was a TV commercial showing different people using Mobile TV in different situations and contexts, watching different types of programs in a premium handset. The aim was to provide a short overview of the Mobile TV service for those that had never had any previous experience with the service, so that they could more easily answer the survey questions.

5.2.2.2 Section II: Measurement of the Model Constructs

This section included questions 14-23 (for non-users) or 26-35 (for current or ex-users) formulated to measure the conceptual model constructs based on the selected scales (as discussed in the previous section of this chapter).

Questions addressed to respondents that had never tried the service were formulated in this way: “Please consider the following statements regarding Mobile TV and, based on your current knowledge and perceptions, indicate the extent to which you agree or disagree with each of them according to the following scale” (1=Totally disagree; 2=Disagree; 3=Somehow disagree; 4=Don’t agree nor disagree; 5=Somehow agree; 6=Agree; 7=Totally agree).

Questions addressed to Mobile TV current or ex-users were formulated like: “Please consider the following statements regarding Mobile TV and, based on your experience with the service, indicate the extent to which you agree or disagree with each of them according to the following scale” (the scale was the same).

Besides this slight difference in the “introduction” to the questions, the questions themselves differed on the term of the verb. For example, regarding the benefit of Information Awareness:

- IA1 for “non-users”: Mobile TV would provide me access to up-to-date news and information (1=Totally disagree / 7=Totally agree)
- IA1 for “users”: Mobile TV provides me access to up-to-date news and information (1=Totally disagree / 7=Totally agree)

Adding to these, there was one more difference (a more significant one) in the group of questions related to the Quality of Service components. As respondents that had no experience at all with Mobile TV were unable to assess service quality parameters, instead of being asked to evaluate their perceptions of the Mobile TV quality of service (answers would have been completely biased), they were asked to evaluate the importance of such factors to their adoption decision:

“19. Please consider the following statements and indicate how important you consider these factors if you were to use the Mobile TV service” (1=Not important at all for me / 7=Extremely important for me).

The correspondent question for users and ex-users was for them to evaluate the real quality of service they had experienced:

“30. Please consider the following statements and, based on your experience with the Mobile TV service, indicate the extent to which you agree or disagree with each of them using the following scale” (1=Totally disagree / 7=Totally agree).

Finally, the “users” group had three additional questions related to the frequency and intensity of Mobile TV utilization to measure “Actual Use” (Q38-Q40).

To close this group of questions and following to the pre-test results, we had two supplementary questions (for both the users and the non-users’ groups), one of them fully qualitative, to help us better understand the reasons why consumers do not intend to adopt Mobile TV (in case they had answered negatively to the Behavioral Intention questions). These two questions were included to address our own curiosity and industry interests but their purpose did not fit within the scope of this study and the answers were superficially analyzed; yet, they still provided us extremely interesting information and findings that we present and discuss in chapters 6 and 7.

At last, we should highlight that, based on the focus groups’ interviews conclusion that most participants were not aware of the Mobile TV service fees and, in order for respondents to be able to answer to the perceived price questions, we informed respondents about the current service fees: before the price questions we had a table showing Mobile TV monthly fees.

Also, for the non-users group and because they would have had a biased perception of battery consumption (having no previous experience at all with the service), we informed respondents about the relative extent to which Mobile TV consumes battery power (i.e., before the battery

consumption questions we informed respondents that Mobile TV consumes more battery power than voice or SMS services but no more than accessing the web or email or playing games using the mobile phone (or whichever service that keeps the handset screen “turned on”).

5.2.2.3 Section III: Demographics

This last section of the questionnaire contained some additional demographic questions (41-45; common to both groups) for the main purpose of sample characterization (although possible moderating effects may be uncovered from a deeper analysis of these variables, this is not within the scope of the current study).

The final version of the survey questionnaire as discussed above is presented in the Appendices.

5.3 The Pre-Test

Prior to conducting a large scale survey, it is important to test the concepts, wording, physical design and procedure of the survey to ensure that the research instrument as a whole functions well. This is done by conducting a pre-test and is particularly relevant in research based on self-completion questionnaires, since no interviewer will be present to clarify any misunderstood question. The pre-test test can also be useful in determining the consistency of the scale items and the reliability and validity of the constructs’ measures.

A first version of the survey questionnaire (very similar to the final version) was developed and used for the pilot test to detect any problems with the wording, sequence of questions, clarity of the instructions and design of the survey instrument. The questionnaire was pre-tested by email invitation with an attached word file version of the instrument with very clear instructions. The data were collected in the first two weeks of January 2012. A convenience sample through snowball approach was used. We collected 43 full answered questionnaires (there was no missing data), which is considered enough for the purposes of a pilot test.

Besides the answers collected from respondents, we also gathered the opinions of three Marketing professors and researchers, as well as of two industry professionals on the survey

instrument. Specifically, they were asked to review the questionnaire and comment on any issue they thought would need further improvement such as the clarity of the questions, if they were measuring what they were supposed to, if they were relevant for the industry and research purposes, if the scales seemed appropriate, length of the questionnaire etc.

Outcomes of the pre-test

Besides the qualitative aspects such as understandability of the questions, wording, sequence, etc., we made a very basic statistical analysis on the sample characterization and also tested the measurement scales using Principal Components Analysis.

From the 43 collected questionnaires, 65% were answered by women and 35% by men. 41,5% were in the 26-35 age group and another 41,5% in the 36-45 age group. 67,5% of the pilot test respondents had University degrees. The average mobile phone monthly bill was “up to 16€” for 47,5% of the respondents and “between 16€ to 30€” for 32,5%. 85% paid their own mobile phone bill. 93% had already heard about Mobile TV; 12% had already tried and 5% (one respondent) subscribed currently.

The sub-scales for the different dimensions of the latent variables Perceived Benefits, Perceived Costs and Perceived Quality of Service presented high Cronbach alphas (all above 0,8) except one: Convenience (one of the dimensions of Perceived Benefits), which presented an alpha of 0,5. By eliminating the third item of the scale (CONV3), the alpha increased for 0,83. However, instead of eliminating the item straightforward, we tried to understand the reason for the low alpha and decided to keep CONV3 in the final version of the questionnaire (in order to preserve the scale with three items) but changed the wording that might be causing the “problem” (see Table 7 in this chapter). The measures for Perceived Value and Behavioral Intention also presented high internal consistency. Results of the PCA’s suggested different factor organization, some of which did not make sense from a theoretical point of view. Therefore (and also because the sample was too small to take any radical decisions based on such analysis), we decided to pursue with the original proposed organization of the factors.

Globally, the differences between the first version and the final version of the questionnaire were minor. We detail them next.

We identified a wording problem in the first item of the Perceived Value Scale suspected to lead to misinterpretation and biased answers. The first item (faithfully reproduced from the original scale) was “I value the Mobile TV service very much”. We realized the “very much” expression was a problem because it led respondents to answer too negatively and not very consistently with the other answers to Perceived Value i.e, we realized those respondents might value the Mobile TV service to a certain extent but not “very much”; hence, the fact of having “very much” was leading to an “excessively” negative reaction to that item when compared to the answers to other items of the same scale. Therefore, we decided to change “very much” to a slightly “softer” wording in the final instrument. In Portuguese this corresponded to changing from “Eu dou muito valor...” to “Eu dou bastante valor...”.

Regarding the already mentioned issue related to the third item of the Convenience scale, we changed wording from “Watching TV on my mobile phone makes me save time and efforts” to “Watching TV on my mobile phone helps me to make better use of my time”, which was more appropriated in the Mobile TV context.

The video demo was added to the final survey instrument but was not included in the pre-tested version. The behavioral intentions (to use Mobile TV in the next 4 months) were extremely negative with an average of 1.55 (in a 1-7 scale) for each of the three BI questions. Therefore, and because 88% of the respondents had never had any experience with the service, we thought adding the video demo might help giving them an idea of the service possibilities without “forcing” any kind of opinion but just increasing awareness.

The extremely negative pattern of adoption intentions also led us to increase the “intention period” to 6 months in the final questionnaire (vs “in the next 4 months” previously). We thought the economic crisis effect and strong “pessimism” climate might induce in such negative answers within a very short term period (in which people have no hope of improvement) while, extending the “decision period” to 6 months could potentially contribute to more reliable answers.

Additionally and as previously said, we added two questions to the final version of the questionnaire (Q24-25 and Q36-37, the latter being fully qualitative) in order to better understand the reasons why respondents are not willing to adopt Mobile TV (according to their answers, they clearly recognized the benefits, it did not seem that the costs were evaluated very negatively but at the end, the adoption intention was very negative; from an industry/practical point of view, it was important to understand the reasons for that). The objectives of these two questions did not fit within the academic scope of our research nor conceptual model testing but rather, they aimed to increase our understanding (and share it with industry practitioners) of such negative behavioral intentions (if to be confirmed in the final results).

Finally, we made some changes to the Perceived Price “section”. We did not change the questions themselves (measures) but the table with the price information that we provided previous to the price questions. In the pre-test, we showed a table that was considered as “confusing” and with “too much information” by academic colleagues and was likely inducing in very “neutral” responses. The table showed the prices for the three alternative operators and for different service options (monthly, weekly and daily subscriptions). Hence, when asked if they found the Mobile TV service price “high” or “reasonable”, many respondents answered “don’t agree nor disagree”. This could be related to the fact that, depending on their particular interests, respondents might find (for example) the monthly fee high but not the daily or weekly fee; as such, they would answer neutrally about the price. In the impracticability of repeating the same questions regarding each of the different price schemes (for time and length reasons) we decided to present only the monthly fees in the final questionnaire (as this is the more interesting option from the industry point of view) and only an average price for the three operators (no distinction by operator as the prices were, finally, very close to each other).

We had asked respondents to give us feedback on the time they had taken to answer to the questionnaire. The answers ranged from 8 to 16 minutes (with the “mode” on 11-12 minutes), which was considered acceptable for a web-survey questionnaire, even after adding the 1 minute video-demo.

The final questionnaire, as discussed in the previous section, was the result of all these steps and slight modifications that helped us improve the initial version. It can be found in the Appendices.

5.4 Sampling and Data Collection Procedure of the Final Survey

After having improved the survey instrument following to the pre-test analysis, the final questionnaire was administered through the Internet to a large sample of mobile phone users.

The universe of our survey was that of the potential adopters of Mobile TV. We defined the target population, based on the insights provided by industry informants in the exploratory study, as comprising any individual, regardless of gender, aged between 18 and 55 years old that held a mobile telephone for personal use.

Respondents were randomly selected from a pool of participants included in the database of a renowned web survey company. Based on our market knowledge and experience, potential adopters of Mobile TV services are regular users of the Internet and we considered this solution was likely to provide us with a good response rate in a short period of time. Moreover, it had the important advantage of providing a more diversified and higher quality sample than if we had used a convenience student or snowball sample (the most common practices in academic research, especially at this level). Although not being a probability sample (this required that any element of the population had the same known chance of being selected, which was not possible), respondents were randomly selected among the 102.000 elements of Netsonda's database. Netsonda is a leading and reliable market research company in Portugal.

Five hundred completed questionnaires were desired. Since the data were to be analyzed using structural equation modeling (SEM), a minimum sample size of 200 is recommended, with increases occurring if misspecification is suspected, the model is overly large or complex or the data exhibit non-normal characteristics (Hair *et al.*, 2010). There are different opinions regarding sample sizes and proposed guidelines vary with analysis procedures and the model characteristics (model complexity leads to the need of larger samples). Numerous studies (e.g., Anderson and Gerbing, 1988) have been in agreement that 100-150 subjects is the minimum satisfactory SEM sample size. Boomsma (1982, 1983) recommended 400. Other

authors suggest rules of thumb of 10 subjects per variable. Bentler and Chou (1987) suggested that a ratio as low as 5 subjects per variable would be enough for normal and elliptical distributions (under condition that the latent variables have multiple indicators) and that a ratio of at least 10 subjects would be sufficient for other distributions. Therefore, a sample size of 500 for our 51 measured variables' model seemed a reasonable target, taking into consideration our time and monetary restrictions.

We also pre-defined some quotas in terms of age in order to assure variability and representativeness of the sample (in terms of what is the industry target for the Mobile TV service). Based on results of the exploratory study together with conclusions from several industry studies, we had set our target population to fit within the 18-55 years' old range. These were split into four different age groups also based on industry information: 18-25; 26-35; 36-45 and 46-55. Then, we didn't impose strict fixed quotas but "minimum and maximum limits" quotas according to our interest in ensuring at least a minimum "weight" in certain groups which are the industry target for Mobile TV services. Therefore, our "quotas" were:

- 75 respondents <18-25 years' old < 200 respondents
- 100 respondents <26-35 years' old < 250 respondents
- 100 respondents <36-45 years' old < 200 respondents
- 50 respondents <46-55 years' old < 125 respondents

As gender was not a relevant criteria in the opinion of key industry informants, we didn't set gender quotes but imposed the condition that we preferred to have more male respondents than female i.e, over 50% of men (because of the technological character of the service and because we were in a very early stage of the market- men are traditionally more technology savvy and aware) under condition that there would not be less than 35% of women.

Finally, we also defined that we wanted at least 100 respondents that had experience with the Mobile TV service (either current users or previous users that had effectively tried the service for at least one week in the past) in order to allow for possible group differences' analyses (unfortunately, we could not be more exigent regarding this proportion as the market penetration rate of Mobile TV services was only 0,5% of unique mobile phone users at the time we conducted the survey).

Taking into consideration these restrictions, Netsonda sent 2180 email invitations to individuals aged 18-55, regardless of gender, having Portuguese nationality and residence. As previously mentioned, the individuals that received the invitation were randomly selected amongst the ones that met these conditions. The 2180 figure was defined by Netsonda based on their experience regarding the response rates. The data collection took place over a two week period between the 29th of February and the 6th of March 2012 (it was extended relative to the initial expectation of only one week because of the difficult target to collect 100 “users” responses).

The selected members of the panel received an email inviting them to participate in the study and containing the online survey link. Subjects were instructed to respond to the survey as candidly and honestly as possible as there were no right or wrong answers. Respondents were compensated for their effort with 1€ to add to their Netsonda account (when they reach a certain amount, Netsonda gives them a voucher that can be used in certain renowned shops like FNAC).

In order to fulfill the quotas, as Netsonda starts having responses, they monitor the results in real time and, if subjects are missing to complete a certain group, they send a reminder to the subjects of that group that have been invited but still didn’t answer. If this is not enough, they may invite additional subjects that fit into the target quotas (Netsonda told us this was not necessary in our study).

There were 55 screen outs (respondents that started answering but didn’t go up to the end) and the final response rate was 22,9%.

Netsonda delivered us an SPSS file with the 500 inserted answers in the form of raw data that was further treated and analyzed by the researcher.

5.5 Data Analysis Strategy/Methodology

Data were first analyzed using descriptive statistics using SPSS 18. Next, the reliability and validity of the measures in this particular context and with this particular sample were assessed (also using SPSS 18). The selected measures were tested regarding validity and reliability properties. While validity is the extent to which a variable actually measures what it

is supposed to measure, reliability is the extent to which a variable or set of variables is consistent in what it is intended to measure (Churchill, 1979; Hair *et al.*, 2010).

The reliability of the constructs was assessed using Cronbach's alpha (Nunnally, 1978). Internal consistencies using Cronbach alphas of 0.8 or above are considered adequate; yet, an alpha of 0.7 is still considered acceptable (Nunnally and Bernstein, 1994; Fornell and Larcker, 1981).

The validity of the scale items was tested using Principal Components Analysis (PCA). Given that there were a low number of items per factor, a CFA is not recommended due to problems of model identification (Hair *et al.*, 2010). Construct validity was also evaluated by examining the factor loadings within the constructs as well as the correlation between the constructs. This is what is usually called convergent and discriminant validity (Anderson and Gerbing, 1988).

Convergent validity assesses the extent to which different indicators for the measure refer to the same construct (Hair *et al.*, 2010; Nunnally and Bernstein, 1994). Convergent validity is evaluated by the average variance extracted (AVE). An AVE of 0.5 or higher shows adequate convergent validity (Fornell and Larcker, 1981).

Discriminant validity assesses if a measure is adequately distinguishable from related constructs; it measures the degree to which a concept differs from other similar concepts and is indicated by the items not correlating highly with other measures from which they should, theoretically, differ (Anderson and Gerbing, 1988). The criteria to assess discriminant validity is that the items should load more strongly on their own construct than on other constructs in the model (i.e., loadings should be higher than cross-loadings); moreover, the average variance shared between each construct and its measures should be greater than the variance shared between the construct and other constructs (i.e., the square root of AVE should be larger than the correlations between constructs or the off-diagonal elements) (Fornell, 1982).

The relative importance and significance of the factor loading of each item was assessed by the guidelines in Hair *et al.* (2010) that loadings greater than 0.30 are considered significant; loadings greater than 0.40 are considered to be more important; and loadings of 0.50 or greater are considered to be very significant.

Structural equation modeling (SEM) was used for data analysis to test the validity of our proposed model. By enabling the assessment of the relationships between the constructs together with the predictive power of the research model, it is the most appropriated technique to test the validity of a new model.

SEM is a comprehensive approach to testing hypotheses about relations among observed and latent variables (Hoyle, 1995) and can be used for both predictive applications and theory testing. Using SEM, a researcher can test a theoretical model with measures of latent constructs and their direct and indirect effects on other variables and factors. Within SEM there are two models:

- 1) A measurement model, where measured observations (variables) are linked to a construct;
- 2) A structural model, that describes causal relationships between those constructs.

In building structural equation models, the measurement models must be specified first.

As suggested by Anderson & Gerbing (1988), a two-stage approach was adopted consisting on the analysis of the two models separately: first, estimating the measurement model and obtaining the standardized regression coefficients; second, estimating and testing the structural model.

The measurement model was assessed using item loadings, internal consistency, convergent and discriminant validity, as previously described. The validity of the measurement model was evaluated by fit indices and goodness-of-fit measures between the data and the proposed model.

AMOS 16 (Arbuckle, 2007) was employed to perform the structural model analyses. It was chosen because of its user-friendliness.

The structural model and hypotheses were tested by examining the path coefficients (which are standardized beta weights). The items' weights and loadings indicate the strength of measures, while the estimated path coefficients indicate the strength and the signs of the theoretical relationships. The structural parameters and t-statistics were the basis for testing our five main research hypotheses (the extant were tested using Pearson correlation analyses).

In addition to the individual path tests, the explained variance in the dependent constructs was assessed as an indication of the overall predictive strength of the model.

Finally, we assessed the overall adequacy of the proposed theoretical model using a number of overall fit measures. Fit indices provide a relative sense of the fit of the model studied. Each index has various strengths and weaknesses and, therefore, most researchers report multiple indices for contemplation. The most common fit measures include the chi-square with degrees of freedom and a p-value, the root mean square error of approximation (RMSEA), the standardized root mean square residual (SRMR), the non-normed fit index (NNFI), the comparative fit index (CFI) and the goodness of fit index (GFI). One note about assessing fit indices is that several fit indices are relative: they should be primarily used to compare models. Although there are rules of thumb for acceptance of model fit (e.g., that CFI should be at least .90), Bollen (1989) observes that these cut-offs are arbitrary. A more salient criterion may be simply to compare the fit of a model to the fit of other prior models of the same phenomenon.

5.5.1 Description of Fit Indices Used in Our Analysis

5.5.1.1 Chi-Square

Although often referred to as a test statistic, in SEM chi-square is more of an assessment of fit, measuring the distance between the sample covariance matrix and the fitted covariance matrix (Joreskog, 1993) — a small chi-square represents a good fit and a large chi-square a bad fit. The corresponding p-value acts in opposite fashion to what is traditionally desired. A p-value greater than the alpha (normally 0.05) represents a non significant p-value but a significant fit. The ratio of chi-square to degrees of freedom, given a large sample size approaching infinity, corresponds to a z-score of 1.96. A model with a proper fit should be less than 1.96, although many researchers use 2.0 or 2.5 with some going as high as 5 (Bollen 1989).

The drawback with chi-square as a fit measure is its relation to sample size. The chi-square value can be made small by reducing the sample size. As the sample size increases, each model in a nested sequence will successively be rejected by the asymptotic chi square test at any fixed level of significance (McDonald and Marsh, 1990). Since the model merely approximates a population, a large sample will cause any model to be rejected in that the chi-

square measures the distance between the previously mentioned matrices. In the case of a large sample size, it is suggested to look to other fit indices.

5.5.1.2 Root Mean Square Error of Approximation (RMSEA)

The RMSEA (Steiger, 1990) is a measure of discrepancy per degree of freedom. It tells us how well the model (with unknown but optimally chosen parameter estimates) would fit the population's covariance matrix (Byrne, 1998). It is sensible to the number of estimated parameters in the model i.e., the RMSEA favors parsimony in that it will choose the model with the lesser number of parameters. A value less than 0.05 is indicative of a very good fit and if higher than 0.1, it is unacceptable.

5.5.1.3 Comparative Fit Index (CFI)

The CFI is the preferred fit index when analyzing large sample sizes (Hoyle 1995). It assesses the percent of lack of fit which is accounted for by going from the null model to the researcher's SEM model. This is done by comparing the sample covariance matrix with the null model (which assumes the latent variables in the model are uncorrelated- the "independence model"). Values for this statistic range between 0-1 with values closer to 1 indicating very good fit. By convention, CFI should be equal to or greater than 0.9, indicating that 90% of the covariation in the data can be reproduced by the given model. CFI penalizes for low sample sizes; with sample sizes less than 250, it tends to over-reject the tested model (Hoyle 1995).

5.5.1.4 Parsimony Comparative Fit Index (PCFI)

The PCFI is a relative fit index based on the CFI by adjusting it for loss of degrees of freedom. It is obtained by correcting the CFI with a penalization factor associated to the model complexity. This adjustment aims to penalize models that are less parsimonious, so that simpler theoretical processes are favored over more complex ones: the higher the complexity of the model, the lower the PCFI. This index seriously penalizes for model complexity which results in parsimony fit index values that are considerably lower than other goodness of fit indices. Generally, a PCFI under 0.6 indicates a bad model fit (Mulaik et al.,

1989); a PCFI in the] 0.6; 0.8] range indicates an acceptable model fit and a PCFI above 0.8 indicates a good model fit (Blunch, 2008).

5.5.1.5 Goodness-of-Fit Index (GFI)

The Goodness-of-Fit Index calculates the proportion of variance that is accounted for by the estimated population covariance (Tabachnick and Fidell, 2007). By looking at the variances and covariances accounted for by the model it shows how closely the model comes to replicating the observed covariance matrix (Diamantopoulos and Siguaw, 2000). That is, GFI deals with error in reproducing the variance-covariance matrix. This statistic ranges from 0 to 1 with larger samples increasing its value. By convention, GFI should be equal to or greater than 0.9 to accept the model. Given the detrimental effect of sample size on this fit index (a large sample size pushes GFI up), it should not be relied upon as a standalone measure.

5.5.1.6 Parsimony Goodness-of-Fit Index (PGFI)

The PGFI is a relative fit index based on the GFI by adjusting it for loss of degrees of freedom. It is obtained by correcting the GFI with a penalization factor associated to the model complexity. This adjustment aims to penalize models that are less parsimonious, so that simpler theoretical processes are favored over more complex ones: the higher the complexity of the model, the lower the PGFI. This index seriously penalizes for model complexity which results in parsimony fit index values that are considerably lower than other goodness of fit indices. Generally, a PGFI under 0.6 indicates a bad model fit (Mulaik et al., 1989); a PGFI in the] 0.6; 0.8] range indicates an acceptable model fit and a PGFI above 0.8 indicates a good model fit (Blunch, 2008).

5.5.1.7 Akaike Information Criterion (AIC)

The AIC is a second form of parsimony fit index also known as an ‘information criteria’ index. This statistic does not provide a test of a model in the sense of testing a null hypothesis (it does not tell anything about how well a model fits the data in an absolute sense) but rather, it is used to compare models estimated with the same data and indicates which of the models is the most parsimonious. Smaller values suggest a better fitting. Hence, the model that

produces the lowest value is the best one. We highlight that the AIC needs a sample size of at least 200 to make its use reliable (Diamantopoulos and Siguaw, 2000).

To conclude, together with the model fit, the core of the structural model analysis should be an examination of the coefficients of the hypothesized relationships. We assessed the significance of individual structural paths (representing the impact of one construct on another) through an examination of the t-values associated with the structural coefficients.

We should highlight that, although examination and discussion of the coefficients are often secondary to the fit, they should not be (Schreiber *et al.*, 2006) and some researchers are more concerned with the model fit indicators than with the path coefficients related with the hypothesized model and relationships.

After examination of the parameter estimates, fit indexes and residuals, researchers can conduct model modifications to the original hypothesized model to have a better fitting. SEM software programs allow for the calculation of modification indices because hypothesized models do not provide a perfect reproduction of the observed covariance matrix. However, any modification completed should make theoretical sense, and should not be done only for the sake of improving model fit at any price. As caricaturized by Schreiber *et al.* (2006) and Ullman (2001), making model modifications suggested by SEM modification indices sometimes becomes like “eating salted peanuts: one is never enough” and abuses occur only because researchers want to improve the model fit statistics.

Throughout all the data analysis process, we have been particularly cautious in making modifications only if they made sense from a theoretical point of view (for example, with the PCA results, we did not accept the suggested factors re-organization because some of them did not make theoretical sense).

6. QUANTITATIVE STUDY

This chapter aims to present the main results from the statistical treatment and analysis of the survey data. First, we tried to characterize the sample using descriptive statistics to enhance our understanding of each construct and its items. Second, we used multivariate statistical techniques (SEM) to test the proposed theoretical model, namely the proposed measures and the hypothesized relationships amongst constructs. The findings are discussed in the Conclusions chapter.

The sample that was used in the current study is composed of 500 subjects. However, it is decomposed into two sub-groups namely: 400 non-users of Mobile TV (do not use Mobile TV currently and have never used it previously) and 100 subjects that are (currently) or have been Mobile TV users for at least one week. Within the users' group, 29% of the respondents are current Mobile TV users (they currently pay a subscription for the service) while 71% have already tried it but are not current subscribers.

We should highlight that we got 29 current users within our total 500 sample, corresponding to 0.58% of the sample which was even higher than the real penetration (0.35%) of Mobile TV services in Portugal at the end of the first quarter of 2012 (when the data were collected). Due to the early stage of the market, it is extremely difficult to find actual users of Mobile TV.

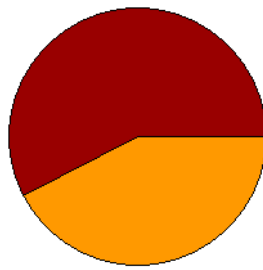
We proceed to a separate analysis of each of the sub-samples of the present study.



6.1 Social and Demographic Sample Characterization

6.1.1 Gender

Starting by characterizing the samples regarding **gender**, in the non-users sample, we verify that it is composed at 57.8% by males and 42.3% by females (chart below). This compares to 48% males and 52% females in the Portuguese resident population.

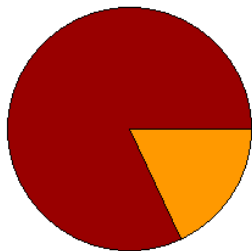
Figure 13: Non-users' sample distribution by gender





	N	%
 Males	231	57.8%
 Females	169	42.3%
Total	400	100%

Regarding the users' sample, we observe that it is composed at 82% by males and 18% by females, a significant difference vs. the non-users' group where the gender disparity was not so pronounced (there are no available data regarding gender split for Mobile TV users within the total Portuguese population). This led us to further test if gender would have a moderating effect in our structural model (cf multi-group analysis section of this chapter).

Figure 14: Users' sample distribution by gender

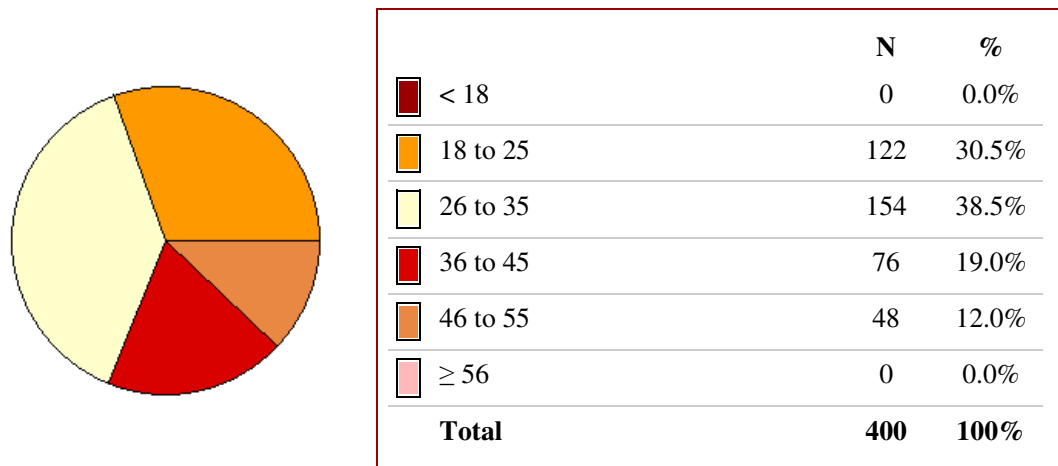


	N	%
 Males	82	82.0%
 Females	18	18.0%
Total	100	100%

6.1.2 Age

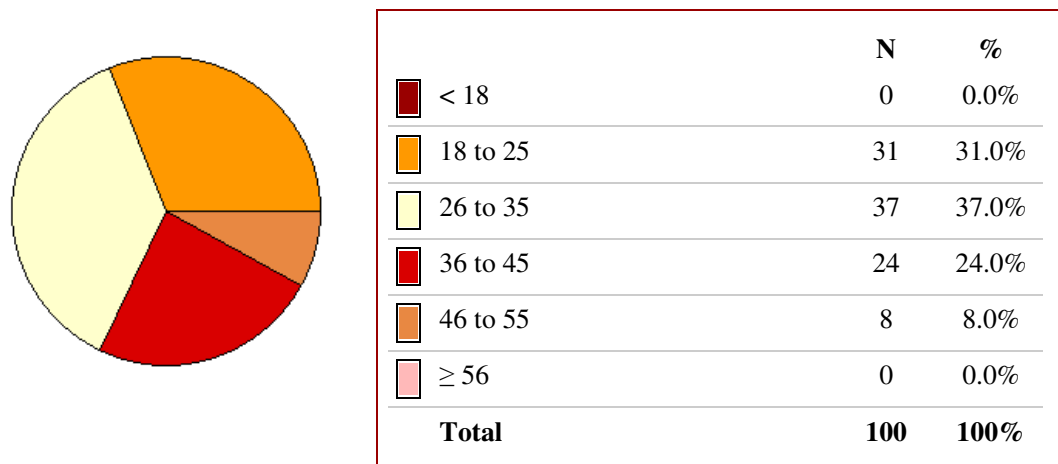
As far as **age** is concerned, we observe that 38.5% of the subjects in the non-users' sample are between 26 and 35 years old, followed by 30.5% that are between 18 and 25 years old (that is, about 2/3 of the sample fit into an age range of 18-35). We also observe that 19% are between 36 and 45 years old and, finally, 12% are aged 46 to 55 being the less represented group (this was voluntary as this age group is not considered a major target for this type of services by mobile operators; please see the methodology chapter for further details). The equivalent figures in the Portuguese population are: 15.2% of 18-25; 26.8% of 26-35; 30.0% of 36-45 and 28% of 46-55 years old (considering the total of these age groups as 100%).

Figure 15: Non-users' sample distribution by age



Regarding the users' group, we observe that 37% of the subjects are between 26 and 35 years old, followed by 31% that are between 18 and 25 years old (that is, about 68% of the sample fit into an age range of 18-35). We also observe that 24% are between 36 and 45 years old and, finally, 8% are aged 46 to 55. Comparing to the non-users sample, there are no significant differences.

Figure 16: Users' sample distribution by age

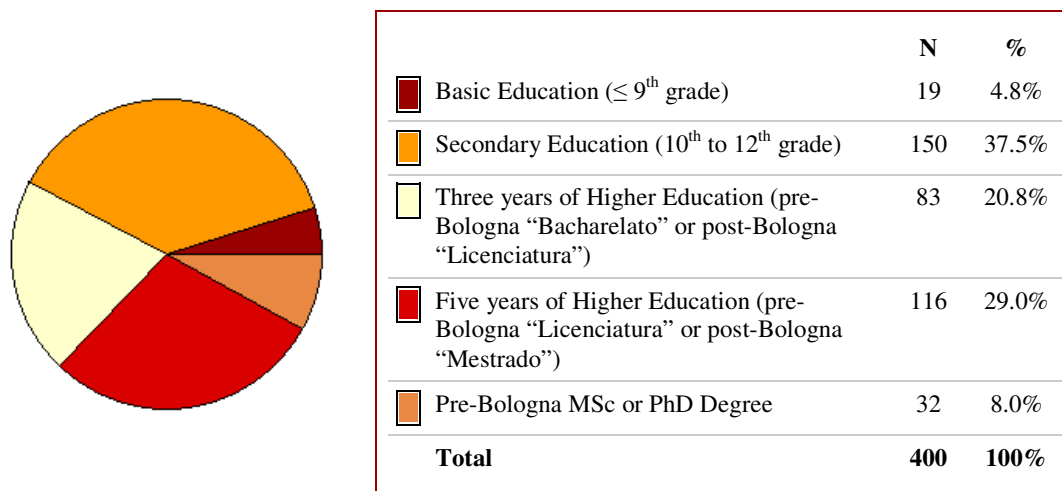


6.1.3 Education Level

As to the **education level**, 37.1% of the non-users' sample have a high school degree between "10° and 12° ano", followed by those with a 5 years' university degree (29%) and those with a Bachelor's degree (20.8%). At the boundaries, we find 8% of non-users with a MSc or PhD degrees and 4.8% with the minimal education level only ("ensino básico").

This compares with 58% of the Portuguese resident population between 15 and 64 years' old with the basic education level (up to 9^o ano), 22% with a high school degree, 17% with a university degree and 3% with no school level. Our sample is considerably higher educated although the figures are not directly comparable as our sample goes only up to 55 years' old (vs. 64 years' old for the Portuguese population figures).

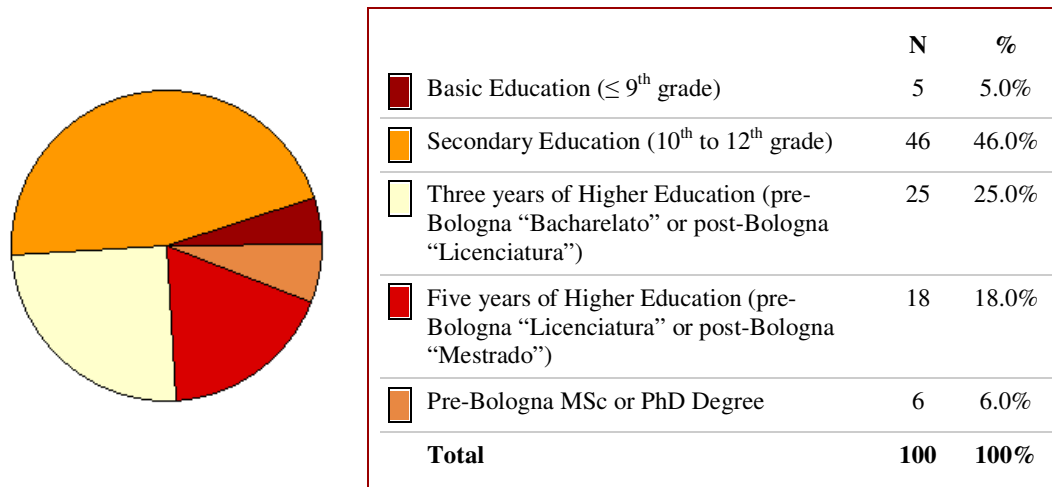
Figure 17: Non-users' sample distribution by education level



Regarding the users' group, 46% of the sample have a high school degree (between "10^o and 12^o ano"), followed by those with a Bachelors' degree (25%) and those with 5 years' university degree (18%). Finally, we find 6% of with a MSc or PhD degrees and 5% with the minimal education level only ("ensino básico").

Interestingly and unexpectedly (taking into account Rogers' (2003) characterization of innovators and early adopters), we observe that the education level in the users' sample is globally lower than in the non-users' sample: in the non-user's sample there were 58% of the respondents with university degrees vs. 49% only in the users' group; furthermore, there were 42.5% of non-users' respondents with studies up to high school degree while in the users' group this percentage increases to 51%. Due to these differences, we decided to further test if education level would have a moderating effect in our structural model (cf multi-group analysis section of this chapter).

Figure 18: Users' sample distribution by education level



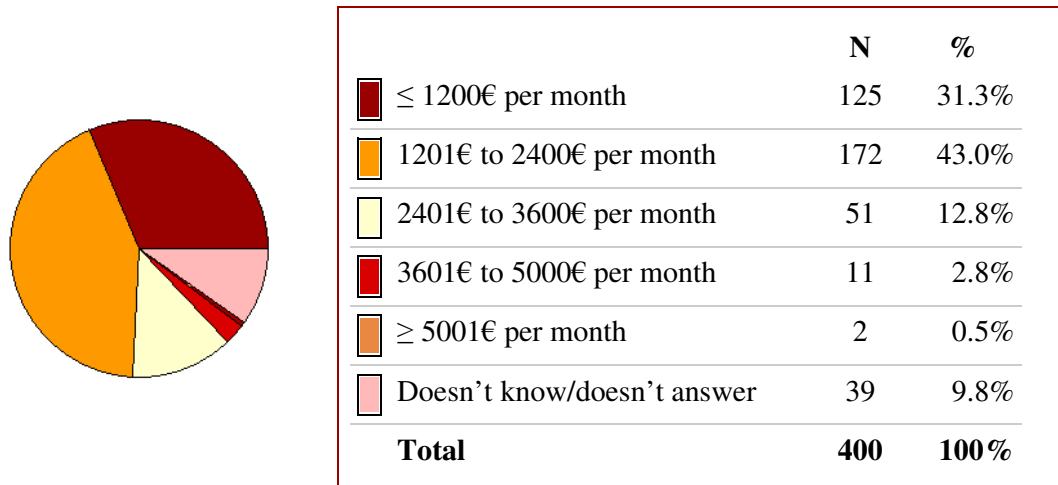
6.1.4 Income Level

Concerning the **income level**, we observe that 43% of the non-users' sample individuals have net monthly income between 1201 and 2400 Euros, followed by 31.3% with a net income up to 1200 Euros/month. Next, 12.8% of the sample has a monthly income between 2401 and 3600 Euros; 2.8% between 3601 and 5000 euros and finally, 0.5% has a net income above 5000 Euros/month. There were 9.8% of the subjects that didn't know or chose not to answer this question.

We could not find data for the total Portuguese population that fit exactly the same echelons that we selected (the data concerned gross income instead of net income). Yet, we established a close parallelism and the figures are⁶: 75.7% of the Portuguese population up to 1200 Euros/month (vs. 34.6% in our non-users and 33.7% in our users' samples); 18.3% of the Portuguese population between 1201-2400 Euros/month (vs. 47.6% in our non-users and 46% in our users' samples); 5.5% of the Portuguese population between 2401-5000 Euros/month (vs. 17.2% in our non-users and 15.7% in our users' samples); 0.5% of the Portuguese population above 5001 Euros/month (vs. 5.5% in our non-users and 4.5% in our users' samples). We conclude the respondents in our samples have much higher income levels than the Portuguese population.

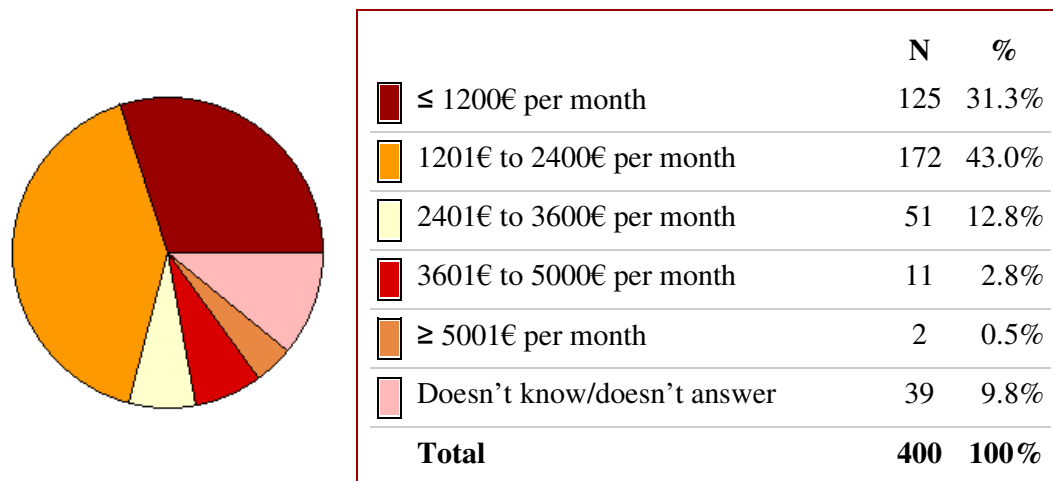
⁶ Please note we didn't take into account our "doesn't know/doesn't answer" answers, in order to establish the parallel with the figures of the total Portuguese population.

Figure 19: Non-users' sample distribution by income level



Regarding the users' sample, we observe that 41% of the inquired individuals have net monthly income between 1201 and 2400 euros, followed by 30% with a net income up to 1200 euros/month. Next, 7% of the sample has a monthly income between 2401 and 3600 euros and likewise for the 3601-5000 euros range. Finally, 4% of the respondents have a net income above 5000 euros/month. There were 11% of the subjects that didn't know or chose not to answer this question. There is a slight difference vs. the non-users' sample in that this group has a higher percentage of individuals with revenues above 2400€ per month (18% vs 16%) and also a higher percentage of individuals that prefer not to answer (maybe because they have high revenues- generally, respondents that have higher revenues are more reluctant to answer this kind of question than those with lower revenue levels). Yet, the differences are minor.

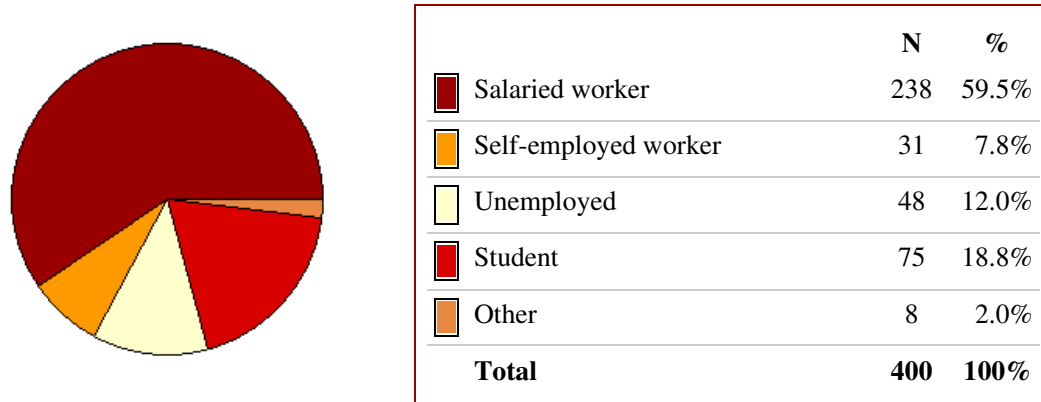
Figure 20: Users' sample distribution by income level



6.1.5 Current Employment Situation

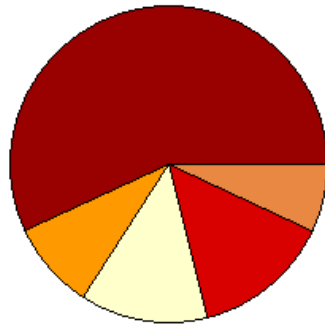
As regards to the **employment situation**, 58.9% of the non-users of Mobile TV have a job and are working for a third party, followed by 18.3% of students. We identified 12.3% of unemployed and 8.3% of independent workers. 2.3% referred another professional situation. It is not possible to compare these figures with those of the Portuguese population (for example, in our sample there are only considered students above 18 years'old but we don't know if they are university or high school students; the figures for the Portuguese population class students by their education level, regardless of age).






Figure 21: Non-users' sample distribution by employment situation



Concerning the users' group, 57% of the users of Mobile TV have a job and are working for a third party, followed by 14% of students. We identified 13% of unemployed and 9% of independent workers. 7% referred another professional situation. Here the major differences vs. the non-users' sample is that there are 4% less students and 5% more respondents that answered "other". This is not very relevant for the purposes of our study or even for industry specific purposes.

Figure 22: Users' sample distribution by employment situation



	N	%
 Salaried worker	57	57.0%
 Self-employed worker	9	9.0%
 Unemployed	13	13.0%
 Student	14	14.0%
 Other	7	7.0%
Total	100	100%

6.1.6 Region

When asked about **where they live**, 48.6% of the non-users stated living in a large city area followed by 32.9% in a small town and 18.3% in a rural area.

This compares to 43% of the users living in a large city area followed by 37% that live in a small town and 18% that live in a rural area. The results are quite similar to the non-users' group with 80% of the respondents living in urban areas.

6.1.7 Marital Status

With reference to the **marital status**, we observe 47.7% of the non-users are married or live with a partner, 46.3% are single and 6% are divorced.

Within the users' group, we observe 49% are married or live with a partner, 48% are single and 3% are divorced.

Table 8 illustrates the above mentioned aspects.

Table 8: Sub-samples' characterization

		Non users	%	Users	%
Gender	Male	231	57.8	82	82.0
	Female	169	42.3	18	18.0
Age group	18 to 25 years old	122	30.5	31	31.0
	26 to 35 years old	154	38.5	37	37.0
	36 to 45 years old	76	19.0	24	24.0
	46 to 55 years old	48	12.0	8	8.0
Education level	Basic Education (\leq 9th grade)	19	4.8	5	5.0
	Secondary Education (10th to 12th grade)	150	37.5	46	46.0
	Three years of Higher Education	83	20.8	25	25.0
	Five years of Higher Education	116	29	18	18.0
	Pre-Bologna MSc or PhD Degree	32	8	6	6.0
Income level	\leq 1200€ per month	125	31.3	30	30.0
	1201€ to 2400€ per month	172	43.0	41	41.0
	2401€ to 3600€ per month	51	12.8	7	7.0
	3601€ to 5000€ per month	11	2.8	7	7.0
	\geq 5001€ per month	2	0.5	4	4.0
	Doesn't know/doesn't answer	39	9.8	11	11.0
Current employment situation	Salaried worker	238	59.5	57	57.0
	Self-employed worker	31	7.8	9	9.0
	Unemployed	48	12.0	13	13.0
	Student	75	18.8	14	14.0
	Other	8	2.0	7	7.0
Region	I live in a large city area	197	49.3	43	43.0
	I live in a small town	129	32.3	37	37.0
	I live in a rural area	72	18.0	18	18.0
	Other	2	0.5	2	2.0
Marital status	Married or living with a partner	186	46.5	49	49.0
	Single	191	47.8	48	48.0
	Divorced	23	5.8	3	3.0

6.2 Mobile Phone Characteristics and Services' Utilization

6.2.1 Mobile Phone Type and Service Expenditures

Regarding the **type of mobile phone owned** by non-Mobile TV users, we observe 41.5% of the individuals own a Smartphone, followed by 38.8% that own a 3G handset (but not a Smartphone). 25% possess a 2G telephone and 3.3% declared not knowing which type of mobile telephone they own.

Concerning the respondents that are current users or have already tried Mobile TV, we observe 64% of the individuals own a Smartphone (vs. 41.5% only in the non-users' group), followed by 43% (vs. 38.8%) that own a 3G handset (but not a Smartphone). 14% (vs. 25% of the non users) possess a 2G telephone and 1% declared not knowing which type of mobile telephone they own. We notice a remarkable difference between the users and the non-users' groups regarding the type of mobile phone owned: the users' group has a much higher percentage of respondents with premium or more advanced mobile phones (namely Smartphones).

Respondents were also asked about their **monthly spending in mobile telephony services**. We observe that 64.3% of the non-users spend less than 16€ per month followed by 25.5% that spend between 16€ and 30€ per month. 8.3% of the sample have a monthly phone bill between 30€ and 60€ and 1.5% of the non-Mobile TV users spend 60€ to 100€ per month. Finally, 0.5% referred spending over 100€ per month with mobile telecommunications services.

As far as users are concerned, we observe that only 38% of the respondents spend less than 16€ per month (vs. 64.3% in the non-users' group). 45% of the respondents spend between 16€ and 30€ per month (vs. 25.5% only in the non-users' group). 10% of the sample have a monthly phone bill between 30€ and 60€ (vs. 8.3% of the non-users) and 6% of the Mobile TV users spend 60€ to 100€ per month (vs. 1.5% of the non-users). Finally, 1% referred spending over 100€ per month with mobile telecommunications services (vs. 0.5%). Like with the type of mobile phone owned, we remark a significant difference between the users and the non-users' groups regarding the monthly spending in mobile telephony services: the "users" have a greater expense than the non-users; the percentage of respondents spending over 16€ per month in mobile services is 62% in the users' group while it was only 35.7% in the non-users' group.

Another question aimed to assess **who pays the mobile phone bill**. We observe that 84.5% of the non-users pay their own mobile telecommunications expenditures followed by 11.3% whose expenditures are paid by the parents. For 9.5% of the sample, it is the employer that pays the mobile phone bill.

Regarding the users' group, we observe that 90% of the individuals pay their own mobile telecommunications expenditures followed by 9% whose expenditures are paid by the employer. For 8% of the sample, the parents pay the mobile phone bill. There are no significant differences vs. the non-users group in this matter.

Table 9: Mobile phone type and service expenditures

		Non users	%	Users	%
Type of mobile phone	Smartphone	166	41.5	64	64.0
	3G handset (but not a Smartphone)	155	38.8	43	43.0
	2G telephone	100	25.0	14	14.0
	Doesn't know	13	3.2	1	1.0
Monthly spending in mobile telephony services	≤ 16€	257	64.3	38	38.0
	16€ to 30€	102	25.5	45	45.0
	31€ to 60€	33	8.3	10	10.0
	61€ to 100€	6	1.5	6	6.0
	> 100€	2	0.5	1	1.0
Who pays the mobile phone bill	My self	338	84.5	90	90.0
	My employer	38	9.5	9	9.0
	My parents	45	11.3	8	8.0
	Other	5	1.2	1	1.0
Have you ever tried/used Mobile TV for at least a week?	Yes	0	0.0	100	100
	No	400	100	0	0.0
Do you subscribe a Mobile TV service (monthly, weekly or daily) for at least once a month?	Yes	-	-	29	29.0
	No	-	-	71	71.0

6.2.2 Type and Frequency of Mobile Services Used

We tried to get an insight on which type of mobile services are used by the respondents and how often (we thought it might be interesting to check in further studies if there was any eventual relationship between more intensive users of advanced mobile services and Mobile TV adoption intention). As such, respondents were asked about which mobile services they use (from a list of services) and how often they use them. The results are shown below.

Table 10: Type and frequency of advanced mobile services used: non-users' sample

	Never used in the last two months	Once a month or less	Two to three times a month	Once or twice a week	Three to five times a week	Once or twice a day	More than twice a day
Mobile commerce (purchase of goods, ticket reservations, banking services, download of free or paid apps...)	265 66.3%	52 13.0%	24 6.0%	20 5.0%	21 5.3%	8 2.0%	10 2.5%
Localization based services (GPS, local news, traffic information, information on restaurants, sites, hotels...)	200 50.0%	74 18.5%	46 11.5%	32 8.0%	23 5.8%	19 4.8%	6 1.5%
Video-calls	325 81.3%	42 10.5%	14 3.5%	9 2.3%	7 1.8%	2 0.5%	1 0.3%
Playing games on the mobile phone	90 22.5%	83 20.8%	58 14.5%	52 13.0%	57 14.3%	31 7.8%	29 7.3%
Connecting to the Internet through the mobile phone	114 28.5%	55 13.8%	35 8.8%	39 9.8%	43 10.8%	40 10.0%	74 18.5%
Social networking on the mobile phone (Facebook, Twitter...)	186 46.5%	38 9.5%	25 6.3%	28 7.0%	35 8.8%	30 7.5%	58 14.5%
Watching videos on the mobile phone (including "You Tube", films, TV series and other types of video previously downloaded and/or recorded on the mobile phone. Live TV not included.)	207 51.8%	53 13.3%	32 8.0%	38 9.5%	26 6.5%	27 6.8%	17 4.3%
Watching "regular" live TV (on the mobile phone)	369 92.3%	19 4.8%	5 1.3%	4 1.0%	2 0.5%	1 0.3%	0 0.0%

We can see that, within the non-users' group, the less used services are watching TV, making video-calls, mobile commerce, watching videos and location-based services. Playing games (including games that come with the mobile phone software and do not constitute a service provided by the mobile operator), accessing the Internet and social networking are the most used services/functionalities.

What is interesting is to compare this table and results with those of the Mobile TV users group.

Table 11: Type and frequency of advanced mobile services used: users' sample



There is a considerable difference in the type and frequency of advanced mobile services used. A much higher percentage of the Mobile TV users (whether current or previous users) use all of the above mentioned services and, with higher frequency than the non-users.

For example, regarding e-commerce, 66.3% of the non-users answered they have never used this service in the last two months vs. 34% only in the users' group. Furthermore, 51% of the users' group respondents use e-commerce services via their mobile phone more than once per month vs. 21% only of the non-users.

Regarding localization based services, 50% of the non-users have never used this kind of services in the last two months vs. 17% only in the users' group. Also, while 53% of the Mobile TV "users" access localization based services every week, only 20% of the non-users do so.

As regards accessing the Web using their mobile phones, 28.5% of the non-users have never done it in the last two months vs. 7% only in the users' group; additionally, 76% of the Mobile TV users access the Internet through their mobiles every week against 49% only in the non-users' group.

Concerning accessing social networks through the mobile phone, 46.5% of the non-users have never used this kind of service in the last two months vs. 18% only within the users' group; moreover, while 68% of the Mobile TV "users" use this functionality on a weekly basis, only 38% of the non-users do so.

As to watching videos on their mobile phones (other than Mobile TV), 52% of the non-users have never done it in the last two months vs. 22% only in the users' group; besides, 58% of the users' group respondents do this every week against 27% only of the non-users.

Hence, we can infer that the respondents in the Mobile TV users' group are more mobile technology savvy and more intensive users of advanced mobile services in general, when compared to the non-users' group.

6.3 Descriptive Analysis of the Model Variables

We conducted a descriptive analysis of the model variables in order to enhance our understanding of each construct and its items. This may help uncover potential problems with the constructs while also identifying interesting issues for the industry. For each construct, we present a graph with the weight of each Likert scale value to each measured item. The items are shown in the vertical axis and the accumulated percentage of respondents in the horizontal axis. For greater easiness and visibility of the results presentation, we present the data from a perspective of the most salient answers, i.e., we try to show the higher agreement or disagreement levels (%) for each measured item.

We highlight that this section is essentially descriptive and that the respective main findings and implications are discussed in the conclusions chapter.

6.3.1 Perceived Benefits

6.3.1.1 Information Awareness

We observe that the scale **Information Awareness**, composed by 3 items (IA1, IA2 and IA3), shows average values of M= 5.74 and a standard deviation of DP=1.26 for IA1, M=5.08, DP= 1.46 for IA2 and M=5.65, DP=1.23 for IA3 in the non-users' group.

For the users' sample, the scale **Information Awareness** shows average values of M= 5.26 and a standard deviation of DP=1.48 for IA1, M=4.76, DP= 1.65 for IA2 and M=5.11, DP=1.58 for IA3. The medians, modes and variances can also be seen in Table 12.

Table 12: Mean, median, mode, standard deviation and variance of the items of the Information Awareness scale

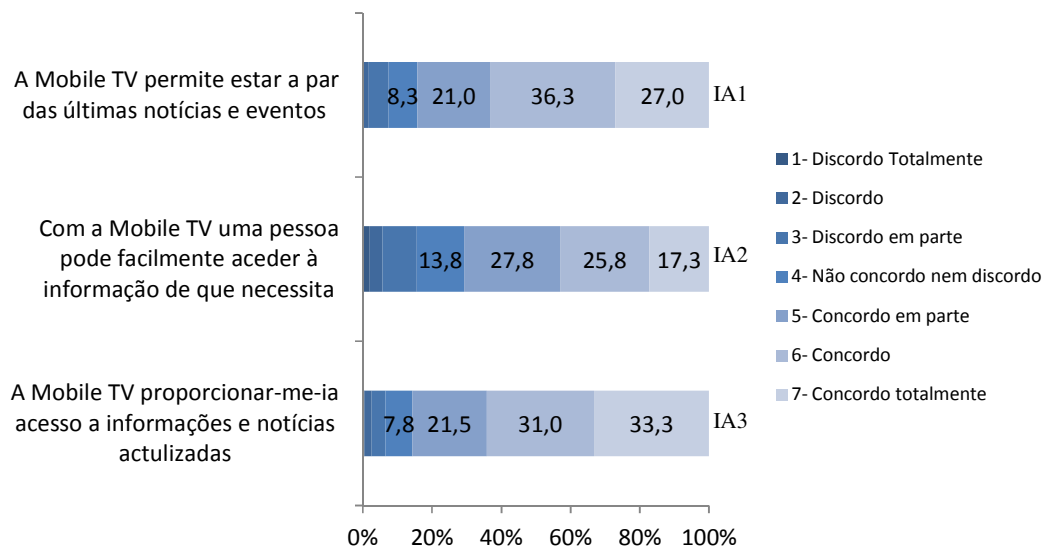
	IA1		IA2		IA3	
N	400	100	400	100	400	100
Mean	5.74	5.26	5.08	4.76	5.65	5.11
Standard deviation	1.26	1.48	1.46	1.65	1.23	1.58
Median	6	5	5	5	6	5
Mode	7	5	5	5	6	6
Variance	1.6	2.19	2.13	2.73	1.51	2.48

Note: IA=Information Awareness; 400= non users' sample; 100= users' sample

These figures reflect a clear trend of agreement for all the items of Information Awareness, in both the non-users and the users' groups although less pronounced in the latter. This means that, based on their current knowledge and awareness levels of the service (but not real use experience) non-users perceive that the Mobile TV service would provide them the benefit/gratification of Information Awareness. As for the users, the figures indicate that, based on their real experience with the service, users perceive Mobile TV as providing them the benefit/gratification of Information Awareness.

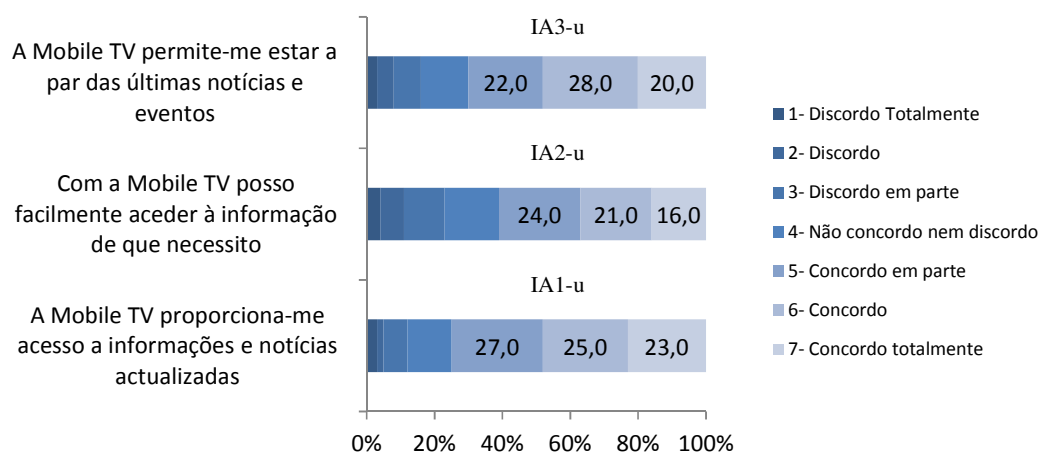
This is better illustrated and explained by looking at the charts below.

Figure 23: Information Awareness measures: Non-users' sample



Regarding the respondents perceptions of *Information Awareness*, we observe that approximately 86% of the non-users agree (partially or totally) that MobileTV would provide them access to updated news. The results also show that 71% agree that MobileTV provides easy access to the information one needs, while 84.3% agree that MobileTV allows to be aware of the latest news and events. As to the reliability of this scale within the non-users' group, we obtained a Cronbach alpha of $\alpha=0.87$.

Figure 24: Information Awareness measures: Users' sample



Regarding users' perceptions of *Information Awareness*, we observe that approximately 75% of the users (vs. 86% of the non-users) agree, partially or totally, that MobileTV provides

them access to updated news. The results also show 61% agree that MobileTV provides easy access to the information one needs (vs. 71% in the non-users' group), while 70% agree that MobileTV allows to be aware of the latest news and events (vs. 84.3% of the non-users). As to the reliability of this scale within the users' group, we obtained a Cronbach alpha of $\alpha=0.94$.

6.3.1.2 Entertainment

The scale **Entertainment** is also composed by 3 items (Entert1, Entert2 and Entert3), that present all an above-the-average mean within the non-users' sample: M= 5.89 for Entert1, M=5.42 for Entert2 and M=5.29, for Entert3. The median is 6 for all the three items while the mode is 7 for Entert1 and 6 for both Entert2 and Entert3 (Table 13).

Regarding the users' sample, the **Entertainment** scale also presents above-the-average means for the three items: M= 5.49 for Entert1_u, M=5.09 for Entert2_u and M=5.03, for Entert3_u. The median is 6.00 for Entert1_u and 5.00 for the other two items while the mode is 6 for Entert1_u and Entert3_u and 5 for Entert2_u (Table 13).

Like with Information Awareness, there is also a clear trend of agreement for all the items of Entertainment for both the non-users and the users' groups but slightly less pronounced in the latter.

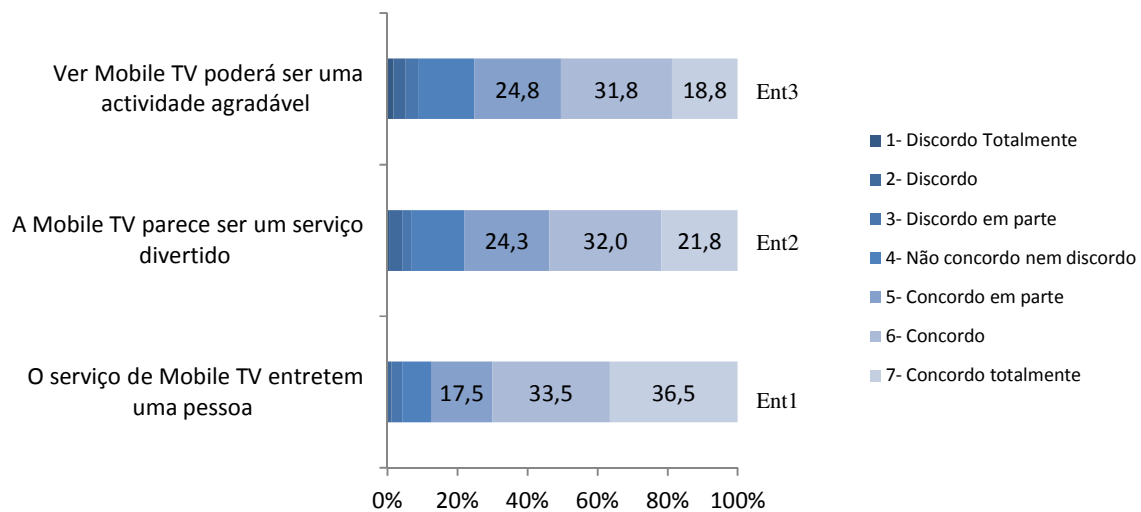
This suggests that non-users' expectations of the perceived Entertainment benefit/gratification of Mobile TV are higher than the perceptions of those that already tried the service (and are, therefore, answering based on their real experience with the service).

Table 13: Mean, median, mode, standard deviation and variance of the items of the Entertainment scale

	Entert1		Entert2		Entert3	
N	400	100	400	100	400	100
Mean	5.89	5.49	5.42	5.09	5.29	5.03
Standard deviation	1.15	1.35	1.3	1.36	1.38	1.51
Median	6	6	6	5	6	5
Mode	7	6	6	5	6	6
Variance	1.33	1.83	1.7	1.86	1.89	2.29

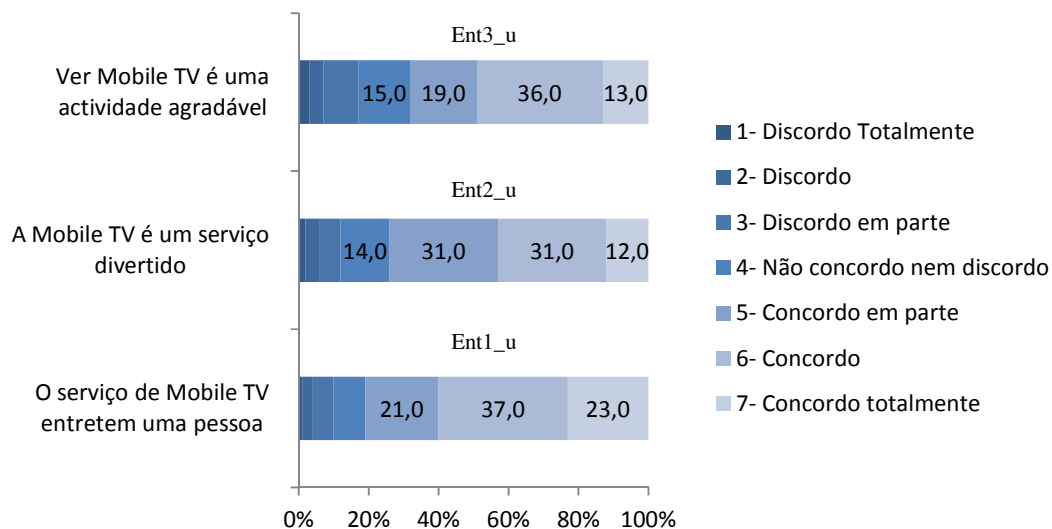
Note: Entert=Entertainment; 400= non users' sample; 100= users' sample

Figure 25: Entertainment measures- Non-users' sample



As far as the *Entertainment* construct is concerned, we observe that 70% of the non-users agree or totally agree that the Mobile TV service is entertaining (87.5% if we add those that partially agree). The agreement level lessens to 53.8% (78.1% including partial agreement) regarding the perception that the Mobile TV service is fun. Finally, 75.4% of the non-users agree that watching Mobile TV may be a pleasant activity. This scale has a Cronbach alpha of $\alpha=0.91$.

Figure 26: Entertainment measures- Users' sample



Concerning the users' sample, we observe that 81% of the users agree that the Mobile TV service is entertaining (vs the perceptions of 87.5% of the non-users). 74% agree that the

Mobile TV service is fun (vs. 78.1% of the non-users) and 68% agree that watching Mobile TV is a pleasant activity (vs. the expectations of 75.4% of the non-users). This scale has a Cronbach alpha of $\alpha=0.91$ (similar to the non-users' sample).

6.3.1.3 Pass Time

The *Pass Time* construct is measured by 3 items (PT1, PT2, PT3), which show above the average means of 5.59, 5.79 and 5.56 for PT1, PT2 and PT3 respectively, within the non-users' group.

For the users' sample, the *Pass Time* construct presents above the average means of 5.33, 5.39 and 5.40 for PT1_u, PT2_u and PT3_u respectively (not far from the non-users' group values although slightly lower).

In both samples, the mode is 6 for all three indicators as well as the median and the standard deviations are extremely close (Table 14).

The figures suggest that, based on their current knowledge and awareness of the service (but not use experience) non-users perceive that the Mobile TV service would provide them the benefit/gratification of Passing Time. As for the users, the figures indicate that, based on their real experience with the service, they perceive Mobile TV as providing them the benefit/gratification of Passing Time. There are no significant differences between non-users and users' judgments regarding the Passing Time benefit.

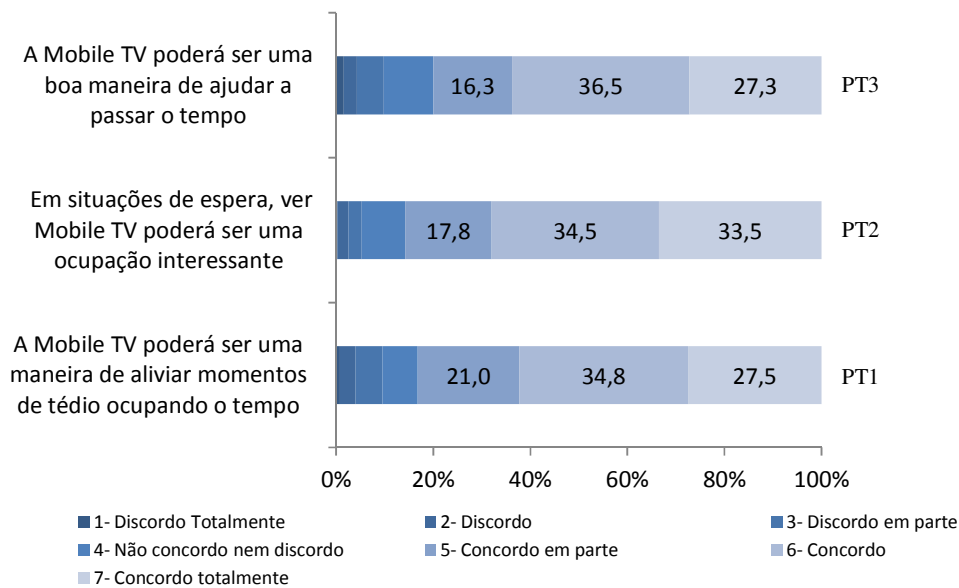
This is better illustrated and explained by looking at the charts below.

Table 14: Mean, median, mode, standard deviation and variance of the items of the Pass Time scale

	PT1		PT2		PT3	
N	400	100	400	100	400	100
Mean	5.59	5.33	5.79	5.39	5.56	5.40
Standard deviation	1.35	1.48	1.23	1.44	1.4	1.39
Median	6	6	6	6	6	6
Mode	6	6	6	6	6	6
Variance	1.81	2.2	1.5	2.06	1.96	1.92

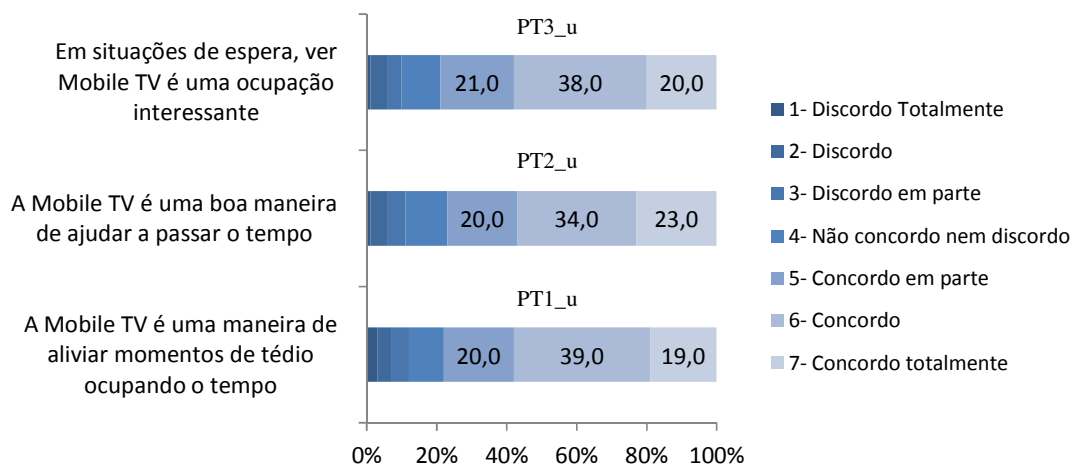
Note: PT=Pass Time; 400= non users' sample; 100= users' sample

Figure 27: Pass Time measures- Non-users' sample



Regarding the *Pass Time* measures, we observe that 83.3% of the respondents within the non-users' group agree that Mobile TV may help to relieve boredom by occupying time (PT1), 85.8% agree that Mobile TV may be an interesting occupation in waiting situations and 80.1% agree that Mobile TV may be a good way to help pass time. These measures are highly reliable with a Cronbach alpha of $\alpha=0,93$ (non-users' sample).

Figure 28: Pass Time measures- Users' sample



Regarding the users' sample, we observe that 78% of the respondents (vs. 83.3% of the non-users) agree, totally or partially, that Mobile TV helps to relieve boredom by occupying time (PT1_u); 79% agree that Mobile TV is an interesting occupation in waiting situations (vs

85.8% of the non-users) and 77% (vs. 80.1% non-users) agree that Mobile TV is a good way to help pass time. The differences between the two samples are minor. These measures are highly reliable with a Cronbach alpha of $\alpha=0,94$.

6.3.1.4 Status

The **Status** construct is measured by three items (**Sts1**, **Sts2**, **Sts3**). As far as the non-users' sample is concerned, all the items have below the average means: M=2.61 for **Sts1**, M=3.07 for **Sts2** and M=3.09 for **Sts3**. The median is 2 for **Sts1** and 3 for the other two items. The mode is 1 for all items of the scale. Contrarily to the previous constructs, the Status descriptive statistics clearly denote a trend of disagreement meaning that in general, non-users' respondents do not to perceive Mobile TV as a symbol of status and image enhancement.

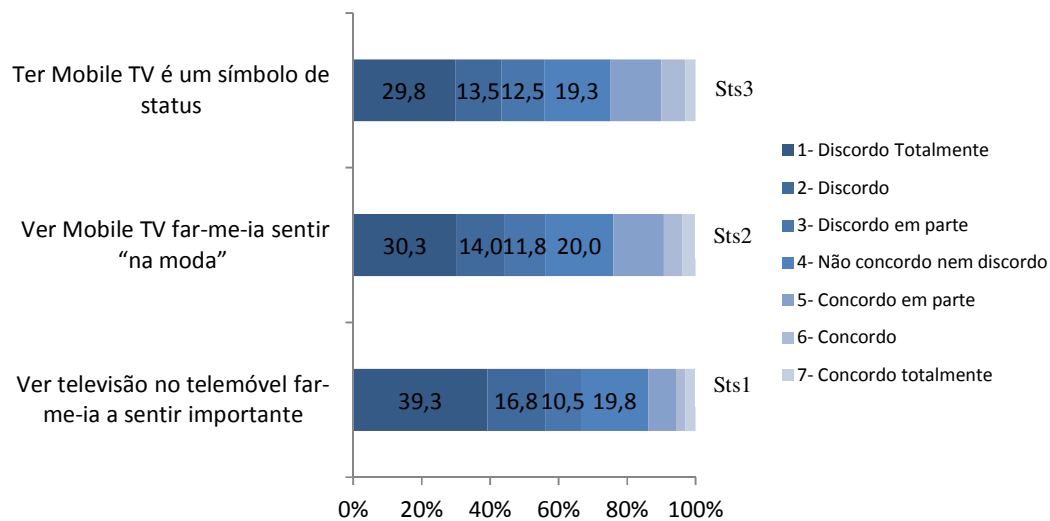
The users' sample follows a similar trend. The three items of the **Status** construct have all below the average means: M=3.00 for **Sts1**, M=3.1 for **Sts2** and M=2.91 for **Sts3** (not very different from the non-users' values). The median is 3.00 for the three items and the mode is also equal for all items of the scale with a value of 1 and similar to the non-users' group. As for the non-users' group, the Status figures clearly show a trend of disagreement meaning that in general, users' respondents do not to perceive Mobile TV as a symbol of status and image enhancement. We should highlight higher values of the standard-deviations and variances for Status (vs. the previous benefits of Information Awareness, Entertainment and Pass Time), showing a higher dispersion of the answers and less consensus among the respondents towards this benefit. This is true for both the users and the non-users.

Table 15: Mean, median, mode, standard deviation and variance of the items of the Status scale

	Sts1		Sts2		Sts3	
N	400	100	400	100	400	100
Mean	2.61	3.00	3.07	3.10	3.09	2.91
Standard deviation	1.68	1.89	1.80	1.83	1.80	1.81
Median	2	3	3	3	3	3
Mode	1	1	1	1	1	1
Variance	2.84	3.58	3.26	3.34	3.23	3.28

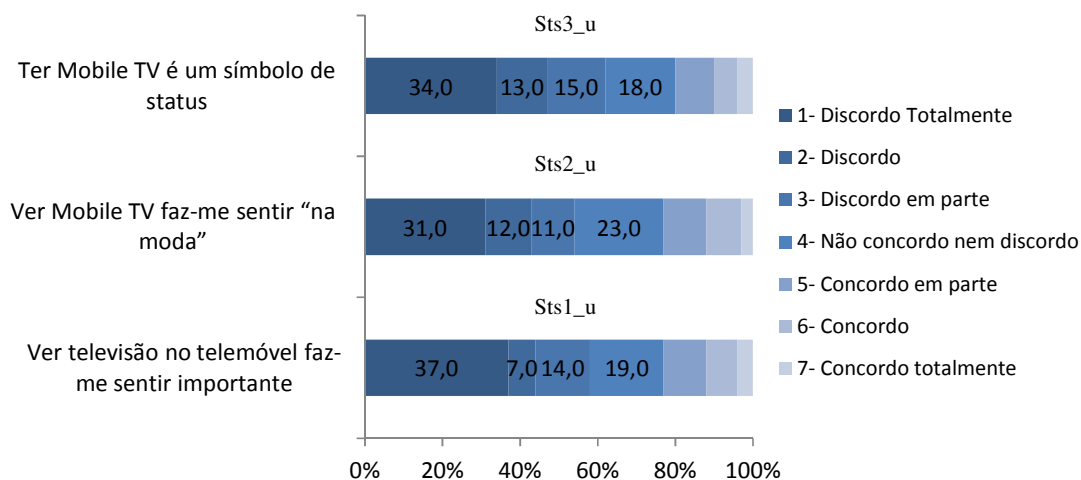
Note: Sts=Status; 400= non users' sample; 100= users' sample

Figure 29: Status/Image measures- Non-users' sample



This construct aimed to assess if respondents perceive the use of the Mobile TV service as a symbol of status and image enhancement. The results show a trend of disagreement: over 66% of the non- users' respondents disagree that watching TV on their mobile phone would make them feel important; 56.1% disagree that watching Mobile TV would make them feel fashionable and 55.8% disagree that having Mobile TV is a symbol of status. This scale has a reliability of 0.86 (Cronbach alpha).

Figure 30: Status/Image measures- Users' sample



Regarding the users' sample and as previously mentioned, the results also show a clear trend of disagreement amongst users: 58% of the respondents disagree that watching TV on their mobile phone makes them feel important (vs. 66% in the non-users' group); 53% disagree

that watching Mobile TV makes them feel fashionable (vs. 56.1% of the non-users) and 62% disagree that having Mobile TV is a symbol of status (vs. 55.8% of the non-users). This scale has a reliability of 0.95 (Cronbach alpha), considerably higher than with the non-users' sample.

6.3.1.5 Privacy

The **Privacy** scale is composed by 4 items: Pry1, Pry2, Pry3 and Pry4. The means for the non-users' sample are M=3.53 for Pry1, M=3.64 for Pry2, M=5.19 for Pry3 and M=5.19 for Pry4. The values for the medians are 4.00 for Pry1, 4.00 for Pry2, 5.00 for Pry3 and 6.00 for Pry4. The mode is 4 for Pry1 and Pry2 and 6 for Pry3 and Pry4.

As to the users' sample, the means are M=3.33 for Pry1, M=3.20 for Pry2, M=4.85 for Pry3 and M=4.89 for Pry4. They are not substantially different from the non-users' group. The values for the medians are 3.50 for Pry1_u, 3.00 for Pry2_u, 5.00 for Pry3_u and Pry4_u. The mode is 4 for Pry1_u, 1 for Pry2_u, 4 for Pry3_u and 6 for Pry4_u.

We highlight the high standard deviation and variance for Pry2 at 2.01 (SD) and 4.04 (Var) for the users' sample and 1.82 (SD) and 3.30 (Var) for the non-users, as can be seen in Table 16.

Hence, with these discrepancies between the first two items of the scale and the latest two items, it is not possible to present a global conclusion. As the figures show a moderate disagreement for Pry1 and Pry2 (the items related to "secret use"), this suggests that non-users do not perceive the Mobile TV service as a way to provide them "intimacy/secretcy" benefits. As for Pry3 and Pry4, the moderate agreement figures (the means are close to 5-partially agree) suggest that non-users somehow perceive the Mobile TV service as a way to provide them the benefit of "private/quiet" moments.

The same applies to the users' sample. The users' figures also show a moderate disagreement for the items related to "secret use", suggesting that users, on average, do not perceive the Mobile TV service as a way to provide them "intimacy/secretcy" benefits. As for Pry3 and Pry4, the figures do not even reach moderate agreement (the means are slightly below 5-partially agree) suggesting that, on average, users have a weak perception of the Mobile TV service as a way to provide them the benefit of "private/quiet" moments.

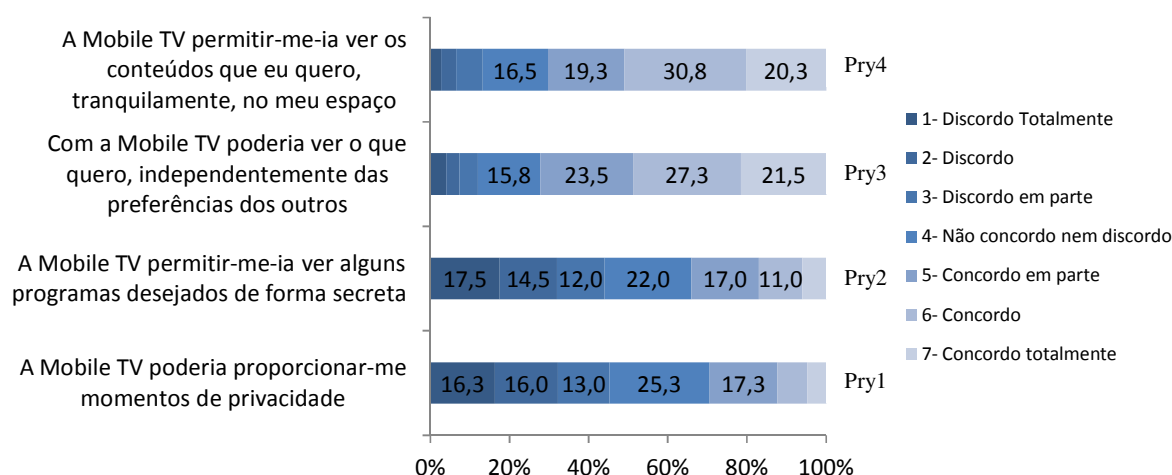
Further comments and interpretation of the privacy measures' are given below, together with the respective charts.

Table 16: Mean, median, mode, standard deviation and variance of the items of the Privacy scale

	Pry1		Pry2		Pry3		Pry4	
N	400	100	400	100	400	100	400	100
Mean	3.53	3.33	3.64	3.20	5.19	4.85	5.19	4.89
Standard deviation	1.71	1.80	1.82	2.01	1.54	1.62	1.52	1.63
Median	4	3.5	4	3	5	5	6	5
Mode	4	4	4	1	6	4	6	6
Variance	2.92	3.23	3.30	4.04	2.38	2.61	2.3	2.67

Note: Pry=Privacy; 400= non users' sample; 100= users' sample

Figure 31: Privacy measures- Non-users' sample



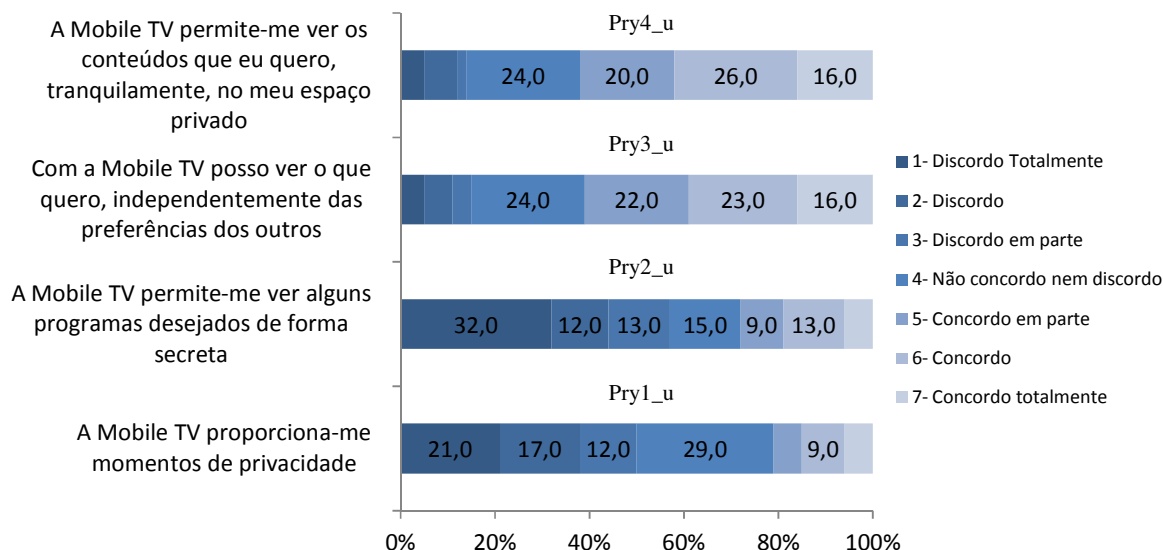
Regarding the *Privacy* scale and the non-users' sample, the results are uneven for the four items. For Pry1 (Mobile TV would provide me privacy moments) and Pry2 (Mobile TV would allow me to watch some desired contents in a secrete manner) which are more related with "secret use", the answers are evenly distributed along the scale. As previously said, the means ($M=3.53$ for Pry1 and $M=3.64$ for Pry2) are on the negative side showing a moderate disagreement trend. Although 45.3% of the respondents do not agree that Mobile TV would provide them some privacy moments (this includes total disagreement, disagreement and partial disagreement), we note that the mode is 4 ("don't agree nor disagree"), corresponding to 25.3% of the answers. The same happens with Pry2 where 44% of the respondents do not agree that Mobile TV would allow them to watch desired contents in a secrete manner; again,

the mode is 4 (“don’t agree nor disagree”) corresponding to 22% of the answers. These figures suggest that many respondents may have had some difficulty in answering these questions and assuming a clear position regarding this subject.

The answers to Pry3 and Pry4 were more concordant: 72.3% of the respondents agree that Mobile TV would allow them to watch what they want, regardless of the preferences of others and 70.4% agree that Mobile TV would allow them to watch what they want, quietly, in their own space. These two items relate more to seclusion and isolation from others to watch something peacefully and quietly instead of secrecy.

Regarding this scale reliability, the Cronbach alpha was 0.82 for the non-users’ sample.

Figure 32: Privacy measures- Users’ sample



Regarding the *Privacy* scale and the users’ sample, the results are also uneven for the four items of the scale. As with the non-users’ group, for Pry1_u (Mobile TV provides me privacy moments) and Pry2_u (Mobile TV allows me to watch some desired contents in a secrete manner) which are more related with “secret use”, the answers are regularly distributed along the scale although with a predominance on the disagreement side. 50% of the respondents do not agree that Mobile TV provides them some privacy moments (vs 45.3% in the non-users’ group). As with the non-users’ group, the mode is 4, the neutral point of the scale (“don’t agree nor disagree”). Regarding Pry2, the users’ group answered more negatively than the non-users: 57% of the respondents do not agree that Mobile TV allows them to watch desired contents in a secrete manner vs. 44% of the non-users. While the mode was 4 (don’t agree nor

disagree) for the non-users, it is 1 (totally disagree) for the users' group, showing a more pronounced negative pattern. Only 28% of the respondents agree that Mobile TV allows them to watch desired contents in a secrete manner (vs. 34% in the non-users' group).

As in the non-users' group, the answers to Pry3 and Pry4 are more "consensual" (than Pry1 and Pry2) and on the agreement side: 61% of the respondents agree that Mobile TV allows them to watch what they want, regardless of the preferences of others (vs. 72.3% of the non-users) and 62% agree that Mobile TV allows them to watch what they want, quietly, in their own space (vs. 70.4% of the non-users). The agreement pattern is less pronounced than in the non-users' group.

Regarding this scale reliability, the Cronbach alpha was 0.85 for the users' sample.

6.3.1.6 Convenience

Convenience was measured by 3 items (Conv1, Conv2, Conv3). For the non-users' sample, the means are 5.50 (Conv1), 5.63 (Conv2) and 3.66 (Conv3). The values for the medians are 6.00, 5.00 and 4.00 respectively while the mode is 6 for Conv1 and Conv2, and 4 for Conv3. There is clearly dissimilarity between respondents' perceptions of Mobile TV benefits of immediacy and ubiquity/mobility (Conv1 and Conv2) and the perception of Mobile TV as a way to make better use of their time (Conv3). The former show a trend of respondents answers mainly on the agreement side while the latter instigate moderate disagreement.

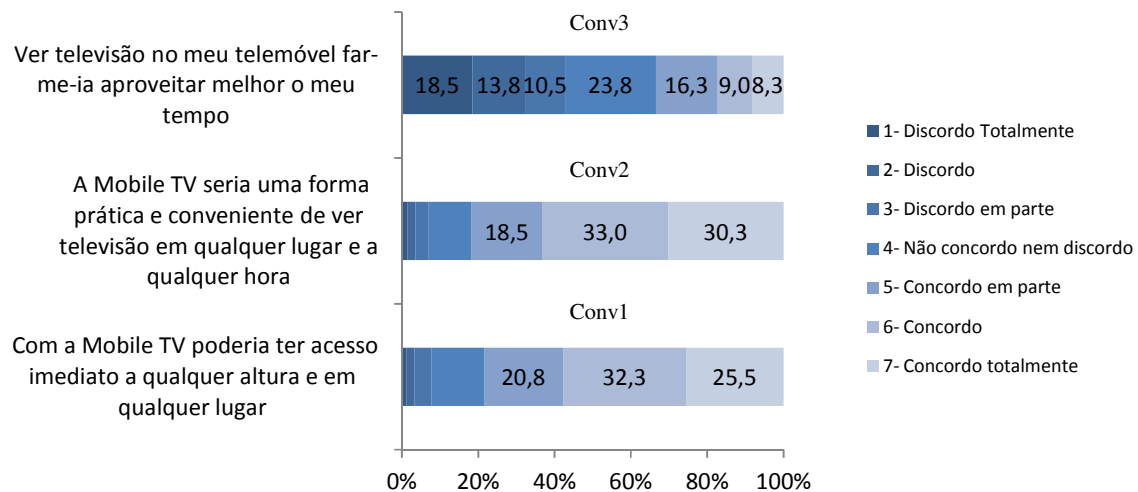
Concerning the users' sample, the means are 5.25 (Conv1), 5.41 (Conv2) and 4.12 (Conv3). The major difference vs. the non-users' sample regards the third item (Conv3) whose mean is slightly higher (it was on the disagreement side at 3.66 for the non-users). The values for the medians are 5.50, 6.00 and 4.00 respectively while the mode is 5 for Conv1 and Conv3, and 6 for Conv2. As with the non-users' group, there is a distinction (although less pronounced) between the perceptions of Mobile TV gratifications of immediacy and ubiquity/mobility (Conv1 and Conv2), which are clearly recognized by both groups, and the perception of Mobile TV as a way to make better use of one's time (Conv3). The latter does not instigate agreement meaning that consumers do not have a perception that Mobile TV would be/is a service through which they can make better use of their time.

Table 17: Mean, median, mode, standard deviation and variance of the items of the Convenience scale

	Conv1		Conv2		Conv3	
N	400	100	400	100	400	100
Mean	5.50	5.25	5.63	5.41	3.66	4.12
Standard deviation	1.34	1.58	1.35	1.53	1.86	1.94
Median	6	5.5	6	6	4	4
Mode	6	5	6	6	4	5
Variance	1.8	2.49	1.82	2.35	3.48	3.76

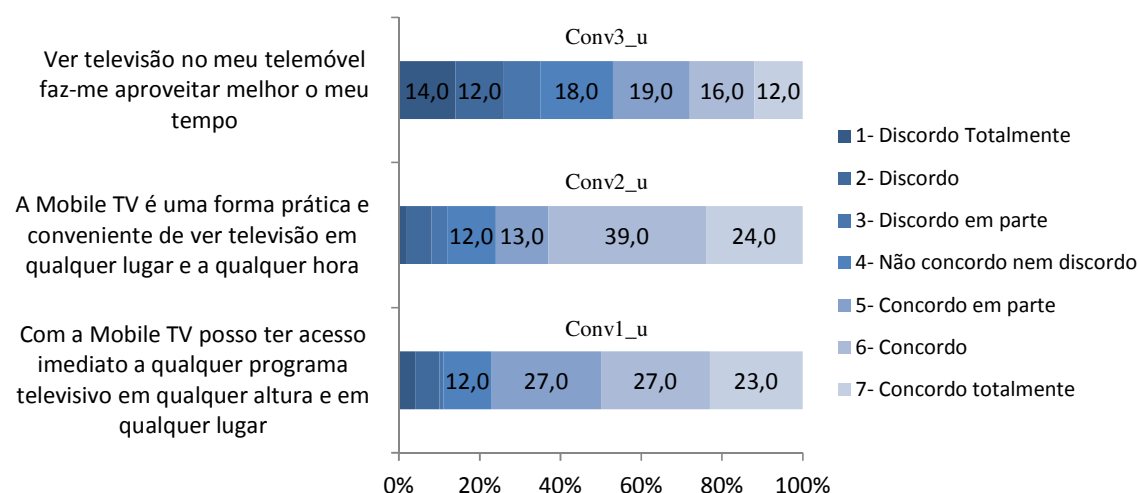
Note: Conv= Convenience; 400= non users' sample; 100= users' sample

Figure 33: Convenience measures- Non-users' sample



We observe that 78.6% of the non-users' group perceive Mobile TV as enabling immediate access to television at any time and in any place. Additionally, 81.8% of the respondents agree that Mobile TV would be a convenient way of watching TV at any time and in any place. As for Conv3, there is a high variability of the answers (as confirmed by the variance at 3.48). The majority of the non-users' respondents (42.8%) disagrees that watching Mobile TV would allow them to make better use of their time, while 33.6% of the respondents agree with the statement and 23.8% are neutral. The Cronbach alpha for this scale is $\alpha=0.66$ (non-users' sample).

Figure 34: Convenience measures- Users' sample



Concerning the users' sample, we observe 77% of the users' group respondents perceive Mobile TV as enabling immediate access to television at any time and in any place. Additionally, 76% of the respondents agree that Mobile TV is a convenient way of watching TV at any time and in any place. As for Conv3, there is a high variability of the answers (similarly to the non-users' sample). However, contrarily to the non-users' group, the majority of the respondents (47%) agrees that watching Mobile TV allows them to make better use of their time, while 35% of the respondents disagree with the statement and 18% are neutral (in the non-users' group, the majority of the respondents disagreed). The Cronbach alpha for this scale is $\alpha=0.84$ (considerably better than the 0.66 value for the non-users' group).

6.3.2 Perceived Costs

6.3.2.1 Monetary Costs

The construct **Monetary Costs** was measured by the items *Fee1*, *Fee2* and *Fee3*. The *Fee1* statement was expressed in an opposite sense to the other two items. For the purposes of scale reliability assessment and multivariate data analysis, we had to set the three scale items in the same sense/direction. As such, the items *Fee2* and *Fee3* were reversed while *Fee1* was kept unchanged. The values of the descriptive measures presented here are for *Fee2* and *Fee3* reversed. We should also highlight that the price perceptions considered regard the full monthly pack, mainly because this is the objective of any mobile operator (please, refer to the methodology section for further details).

Hence, for the non-users' sample, we observe means of 4.67, 4.08 and 4.84 for Fee1, Fee2_inv and Fee3_inv respectively. The values for the medians are 5 (*Fee1*), 4 (*Fee2_inv*) and 5 (*Fee3_inv*). The mode is 7 for Fee1, 3 for Fee2_inv and 7 for Fee3_inv (Table 18).

Regarding the users' sample, we observe means of 4.81, 4.46 and 4.92 for Fee1, Fee2_inv and Fee3_inv respectively (vs. 4.67, 3.92 and 3.17 for the non-users' group, a considerable difference in items 2 and 3). The values for the medians are 5 for all the scale items (vs. 5.00, 4.00 and 3.00 respectively in the non-users' group). The mode was 7 for Fee1, 6 for Fee2_inv and 7 for Fee3_inv (similar to the non-users' group except for the Fee2 value).

An interpretation of the Monetary Costs' measures' is given below, together with the respective charts.

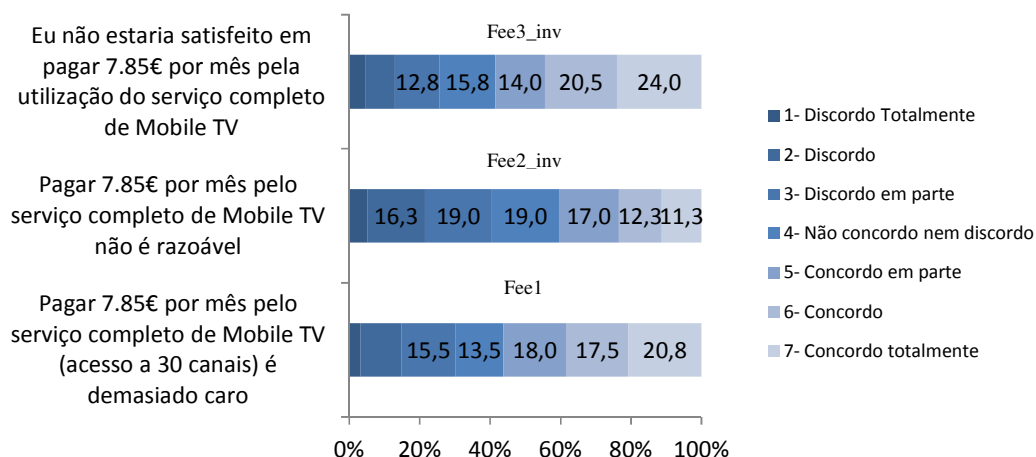
Table 18: Mean, median, mode, standard deviation and variance of the items of the Monetary Costs' scale

	Fee1		Fee2_inv		Fee3_inv	
N	400	100	400	100	400	100
Mean	4.67	4.81	4.08	4.46	4.84	4.92
Standard deviation	1.79	1.95	1.73	1.85	1.82	1.80
Median	5	5	4	5	5	5
Mode	7	7	3	6	7	7
Variance	3.21	3.81	2.99	3.42	3.32	3.25

Note: 400= non users' sample; 100= users' sample

The charts below present the values and statements for Fee2 and Fee3 reversed (the questions were asked to respondents in the affirmative/positive way but we present them here reversed).

Figure 35: Monetary Costs measures- Non-users' sample

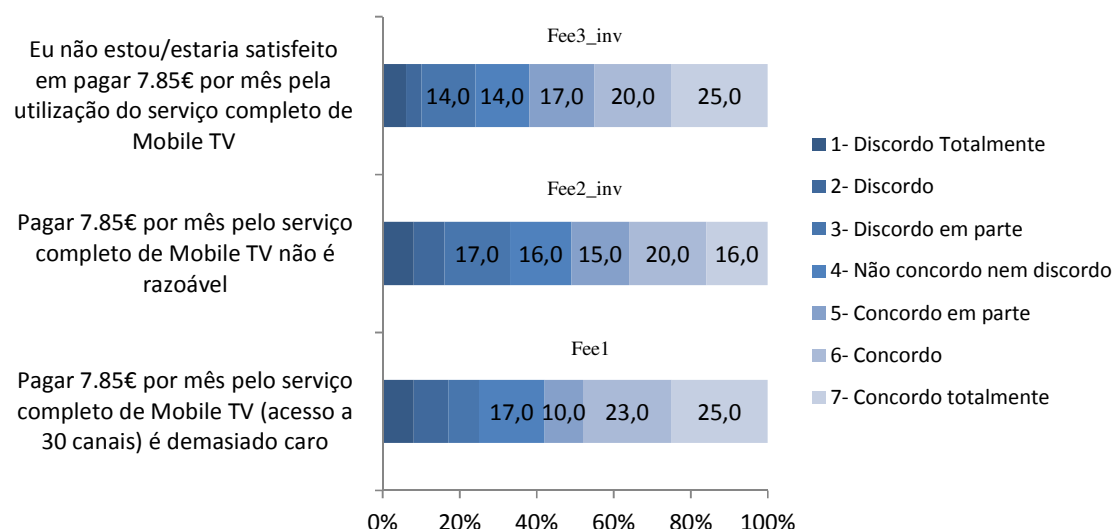


For the non-users' sample, as far as the perceptions of *Monetary Costs* (Fee) are concerned, we observe that, for all items, the results are not very pronounced to one side or another but rather, they are scattered. 56.3% of Mobile TV non-users agree that paying 7.85€ per month for the service is too expensive. For 40.5% of the respondents, it is not reasonable to pay 7.85€ per month for the full Mobile TV pack (19% are neutral) and 58.5% of the respondents would not be happy to pay 7.85€ monthly for the Mobile TV service.

These results suggest that the majority of the non-users' respondents find the Mobile TV service expensive and would not be willing to pay for it (at least, as it regards the full monthly package).

This scale is reliable at a 0.8 Cronbach alpha level.

Figure 36: Monetary Costs measures- Users' sample



As with the non-users' group and concerning the perceptions of *Monetary Costs* (Fee) by the users, we observe that, for all the items, the results are not very pronounced to one side or to another but rather, they are scattered. 58% of the Mobile TV users agree that paying 7.85€ per month for the service is too expensive (vs. 56.3% of the non-users). For 51% of the respondents, it is not reasonable to pay 7.85€ per month for the full Mobile TV pack (vs. 40.5% of the non-users) and 62% of the respondents are not/would not be happy to pay 7.85€ monthly for the Mobile TV service (vs. 58.5% of the non-users). The results differ substantially from the non-users' group: for both groups, the majority of respondents find the mobile TV service price expensive/not reasonable/are not willing to pay for it. However and

surprisingly, this is more pronounced in the users' group (in which a higher percentage of respondents are "negative" towards the Mobile TV service price). This is probably due to the fact that the users' group includes 71% of respondents that have already used but are not current users of the service. And, while we don't know the reason for them not being current users, we can presume it may be related to some kind of disappointment: they tried the service in the past and did not adopt it/become current users. Hence, it is natural that those respondents find the Mobile TV service price expensive and are not willing to pay for it, contributing to the higher percentage of "negativity" towards the service price vs. the non-users. The latter have never tried the service and many of them may have higher expectations regarding the service benefits and quality (which is confirmed by the results of our study) therefore, resulting in a lower percentage of negativity towards the service price vs. the users' group.

The price/perceived fee scale is reliable at a 0.73 Cronbach alpha level (vs. 0.8 for the non-users' sample).

6.3.2.2 *Battery Consumption*

The ***Battery Consumption*** scale is composed of 3 items (***BatCons1***, ***BatCons2***, ***BatCons3***). For the non-users' group, it presents above the average means of 4.78, 5.17 and 4.44 for BatCons1, BatCons2 and BatCons3 respectively. The medians are 5.00 for all items and the mode is 6 for items 1 and 2 and 4 for BatCons3.

Regarding the users' group, the ***Battery Consumption*** scale presents above the average means of 5.49 (vs. 4.78 non-users), 5.45 (vs. 5.17 non-users) and 4.14 (vs 4.44 non-users) for BatCons1, BatCons2 and BatCons3 respectively. The medians are 6.00 for BatCons1 and BatCons2 and 4.00 for BatCons3. The mode is 7 for BatCons1, 6 for BatCons2 and 4 for BatCons3 (Table 19).

The figures suggest that, on average, both non-users and users perceive the Mobile TV service as being "greedy" towards battery power consumption.

The respondents of the users' group are more severe in their (negative) judgment of the battery consumption risk, except for the item related to their mobile phone in particular (which is normal, as they own, on average, more advanced/premium mobile phones than the non-users cf. section 6.2.2).

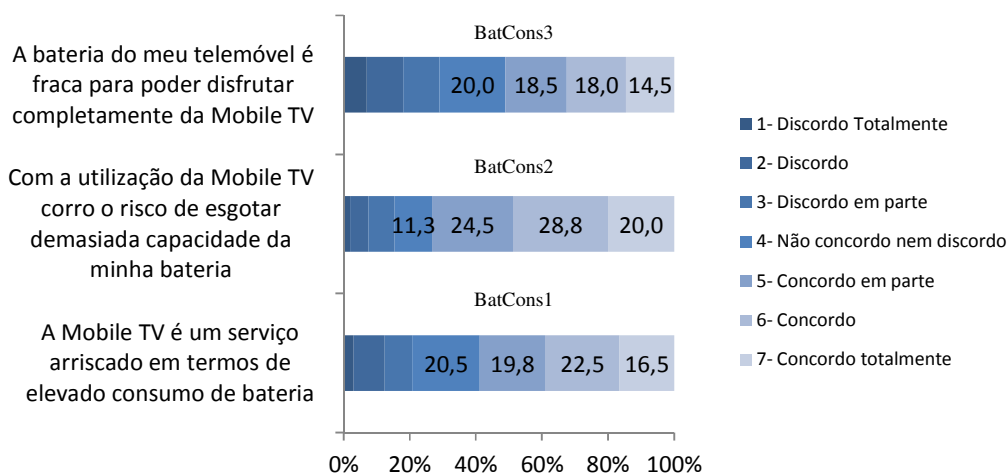
Table 19: Mean, median, mode, standard deviation and variance of the items of the Non-Monetary Costs' scale

	BC1		BC2		BC3	
N	400	100	400	100	400	100
Mean	4.78	5.49	5.17	5.45	4.44	4.14
Standard deviation	1.65	1.35	1.52	1.33	1.79	1.72
Median	5	6	5	6	5	4
Mode	6	7	6	6	4	4
Variance	2.71	1.81	2.31	1.77	3.2	2.95

Note: BC= Battery consumption; 400= non users' sample; 100= users' sample

As illustrated by the chart below, the results regarding non-users perceptions of battery consumption are the following: 58.8% of the non-users agree that Mobile TV is risky in terms of high battery consumption, increasing to 73.3% that agree that using Mobile TV amplifies the risk of running out of battery. Finally, 50.5% of the non-users believe that their mobile phone battery is weak in power to fully enjoy Mobile TV. The Cronbach alpha of this scale was $\alpha = 0.80$ for the non-users' sample.

Figure 37: Battery Consumption measures- Non-users' sample



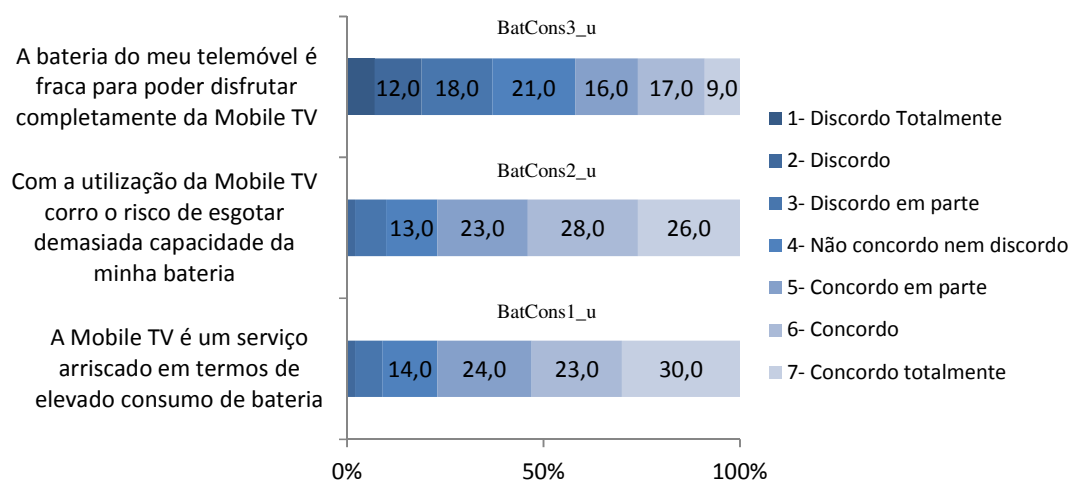
Regarding users' perceptions of battery consumption (chart below), the results are the following: 77% (vs. 58.8% of the non-users) agree that Mobile TV is risky in terms of high battery consumption; likewise, 77% (vs. 73.3% of the non-users) agree that using Mobile TV amplifies the risk of running out of battery. Finally, 42% (vs. 50.5% of the non-users) perceive that their mobile phone battery is weak in power to fully enjoy Mobile TV.

The figures suggest that both users and non-users perceive the utilization of Mobile TV as being risky in terms of (high) battery power consumption. As previously said, the respondents

of the users' group are more negative than the non-users in their evaluation of the battery consumption risk. The only exception concerns the scale item related to their own mobile phone battery capacity: this is probably due to the fact that, globally, they possess more advanced mobile phones than those of the non-users, with improved characteristics in terms of battery power.

The Cronbach alpha of this scale for the users sample is $\alpha = 0.76$.

Figure 38: Battery Consumption measures- Users' sample



6.3.3 Perceived Quality of Service

The construct Perceived Quality of Service is composed by six components: Reliability, Multimedia Quality, Ease of Use, Speed and Content. We report hereafter the descriptive statistics and major patterns of response identified for each of the scales' items.

We highlight that, because non users had never tried the service before, the question backing all Quality of Service components was: "please indicate how important these factors are to you, if you were to use the Mobile TV service- from 1-Not important at all to 7- Extremely important".

For the users group, we asked them to assess their real experience with the service: "Please consider the following statements and, based on your Mobile TV user experience, indicate how much you agree or disagree with each of them" (from 1- Totally disagree to 7- Totally agree). Please refer to the methodology chapter for further details.

6.3.3.1 Reliability

Reliability is measured by 4 items: **Rel1**, **Rel2**, **Rel3** and **Rel4**. For the non-users' sample, we observe significant above the average values for the means: 5.99 for Rel1, 5.85 for Rel2, 6.06 for Rel3 and 6.11 for Rel4. The values for the medians were 6.00 for Rel1, Rel2 and Rel3 and 7 for Rel4. The mode was 7 for all items. The variance and standard deviation are low (as can be seen in Table 20).

These figures suggest that the Reliability factor is extremely important for consumers' use of Mobile TV (specific comments on each item of the Reliability construct are outlined below, together with the charts presenting the percent distribution of the answers to each scale item).

Contrarily to the non-users' group results, we observe below the average and close to the average values for the means in the users' sample: 4.16 for Rel1 (vs. 5.99 for the non-users), 4.05 for Rel2 (vs. 5.85), 3.65 for Rel3 (vs. 6.06) and 3.63 for Rel4 (vs. 6.11 for the non-users). The values for the medians were 4.00 for Rel1 and Rel2 (vs. 6.00 in the non-users 'sample) and 3.00 for Rel3 and Rel4 (vs. 6.00). The mode was 5, 4, 3 and 3 for Rel1, Rel2, Rel3 and Rel4 respectively (vs. 7 for all the items in the non-users' sample).

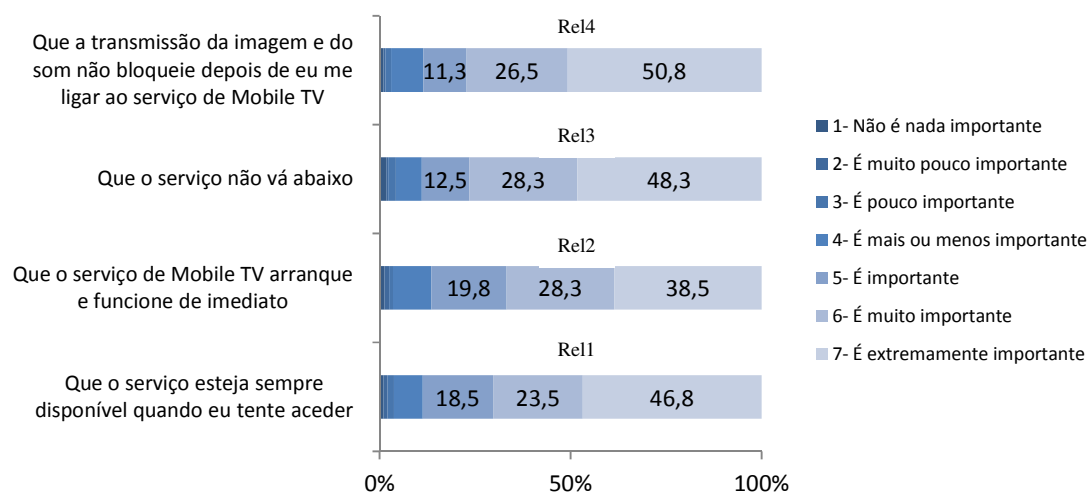
If we look more deeply to the questions/items of the scale, these results indicate that globally, the users experience with the Mobile TV service, as far as Reliability is concerned, is on the boundaries of acceptability i.e., based on their real experience, the service is not always reliable. Contrastingly, as previously mentioned, the non-users had evaluated Reliability as very important to their use decision. This discrepancy leads up to relevant conclusions and implications for the industry players that we will discuss in the next chapter.

Table 20: Mean, median, mode, standard deviation and variance of the items of the Reliability scale

	Rel1		Rel2		Rel3		Rel4	
N	400	100	400	100	400	100	400	100
Mean	5.99	4.16	5.85	4.05	6.06	3.65	6.11	3.63
Standard deviation	1.23	1.33	1.25	1.36	1.26	1.46	1.19	1.50
Median	6	4	6	4	6	3	7	3
Mode	7	5	7	4	7	3	7	3
Variance	1.52	1.77	1.57	1.85	1.58	2.15	1.42	2.26

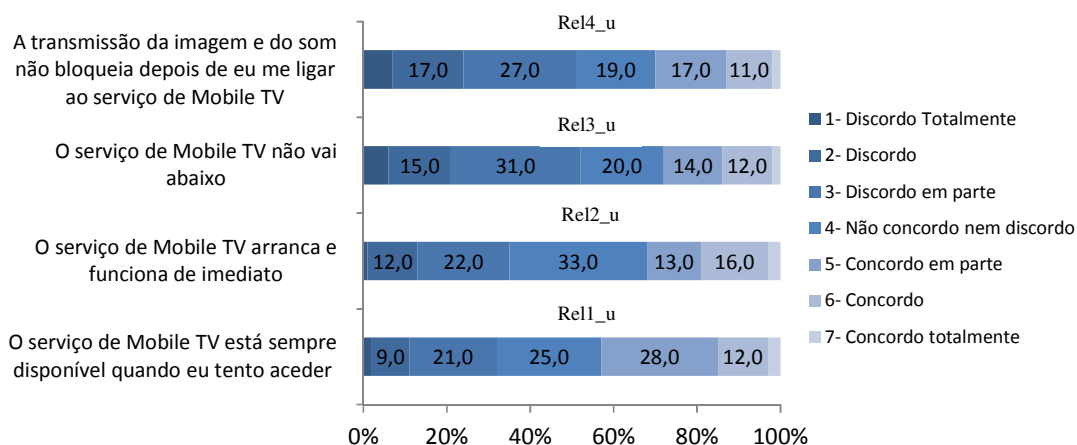
Note: Rel= Reliability; 400= non-users' sample; 100= users' sample

Figure 39: Reliability measures- Non-users' sample



Regarding the **Reliability** construct, for 88.8% of the non-users, if they were to use Mobile TV, it would be important (whether “important”, “very important” or “extremely important”) that the service is always available when they try to connect (we highlight this would be extremely important for 46,8% of the respondents). For 86.6% of the non-users’ respondents, it would be important that the service connects and works immediately (this is extremely important for 38.5% and very important for 28.3%). 89.1% of the non-users find it important that the service does not crash (for 48.3% of the respondents, this is extremely important). Finally, 88.6% of the respondents agree that it would be important that image and sound do not freeze once connected to the service (this is extremely important for 50.8% of the non-users). The Cronbach alpha for this scale is $\alpha = 0.95$ (non-users’ sample).

Figure 40: Reliability measures- Users' sample



Regarding the users' sample, only 43% of the "users" agree that the service is always available when they try to connect, of which only 3% totally agree with the statement (while, for 88.8% of the non-users, it would be important that the service is always available when they try to connect and this would be extremely important for 46,8% of the non-users' respondents).

Concerning Rel2, only 32% of the "users" agree that the Mobile TV service launches and runs immediately and there is 35% of disagreement (contrastingly, in the non-users' group, for 86.6% of the respondents it is important that the service launches and works immediately (this is extremely important for 38.5% and very important for 28.3%).

As to Rel3, only 28% of the users' group respondents agree that the service does not crash while 52% disagrees (meaning they have experienced service crashes). However, 89.1% of the non-users consider important that the service does not crash (for 48.3% of the respondents, this is extremely important).

Finally, 30% of the users' group agrees that the TV transmission does not freeze after they connect to the Mobile TV service (51% disagrees). By contrast, 88.6% of the non-users agree that it is important that the image and sound do not freeze once connected to the service (this is extremely important for 50.8% of the non-users).

These strong disparities are interesting and very suggestive of important findings and implications that we will discuss in the next chapter.

The Cronbach alpha for this scale was $\alpha = 0.89$ for the users' sample.

6.3.3.2 *Multimedia Quality*

The construct **Multimedia Quality** was measured by items **MMQ1**, **MMQ2** and **MMQ3**. For the non-users' sample, all the items present high above the average means: 5.82, 6.07 and 6.03 respectively. The medians' values are 6.00 and the mode is 7 for the three items. There are very low variances of 1.45 (**MMQ1**), 1.29 (**MMQ2**) and 1.31 (**MMQ3**) (Table 21).

These figures suggest that Multimedia Quality is extremely important for consumers' decision to use Mobile TV (specific comments on each item of the Multimedia Quality construct are outlined below, together with the charts presenting the percent distribution of the answers to each scale item).

As with Reliability, the values of the means, medians and mode for the users' sample are well below those of the non-users' group. The means are 3.96 for MMQ1 (vs. 5.82), 4.51 for

MMQ2 (vs. 6.07) and 4.46 for MMQ3 (vs. 6.03). The medians are 4.00 for MMQ1 (vs. 6.00 in the non-users' group) and 5.00 for the other two items (vs. 6.00 in the non-users' group). The mode is 4 for the first two items (vs. 7 in the non-users' group) and 5 for MMQ3 (vs. 7). As with Reliability, these figures indicate that on average and as far as Multimedia Quality is concerned, the users' experience with the Mobile TV service is only considered "acceptable" (considering that a neutral evaluation- "4, don't agree nor disagree" corresponds to the quality of service being "acceptable"). Contrastingly and as previously mentioned, for the non-users, Multimedia Quality is extremely important for their decision to use Mobile TV.

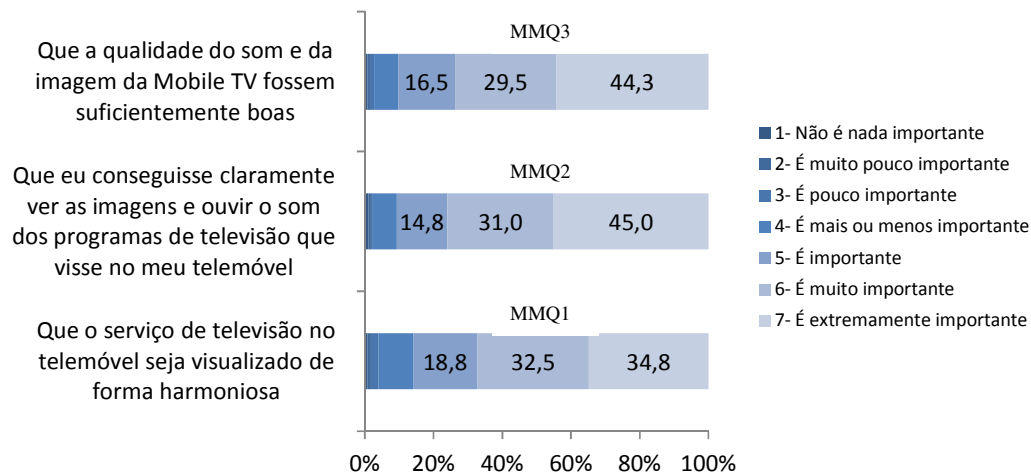
These figures, together with those from the charts below, suggest that requirements about quality of service parameters are high for those that have never tried the service while the majority of those that have already tried the service report a medium or poor quality of service experience. These contrasting results are especially interesting for the industry professionals and its implications will be discussed in the next chapter.

Table 21: Mean, median, mode, standard deviation and variance of the items of the Multimedia Quality scale

	MMQ1		MMQ2		MMQ3	
N	400	100	400	100	400	100
Mean	5.82	3.96	6.07	4.51	6.03	4.46
Standard deviation	1.21	1.38	1.14	1.40	1.14	1.49
Median	6	4	6	5	6	5
Mode	7	4	7	4	7	5
Variance	1.45	1.9	1.29	1.95	1.31	2.21

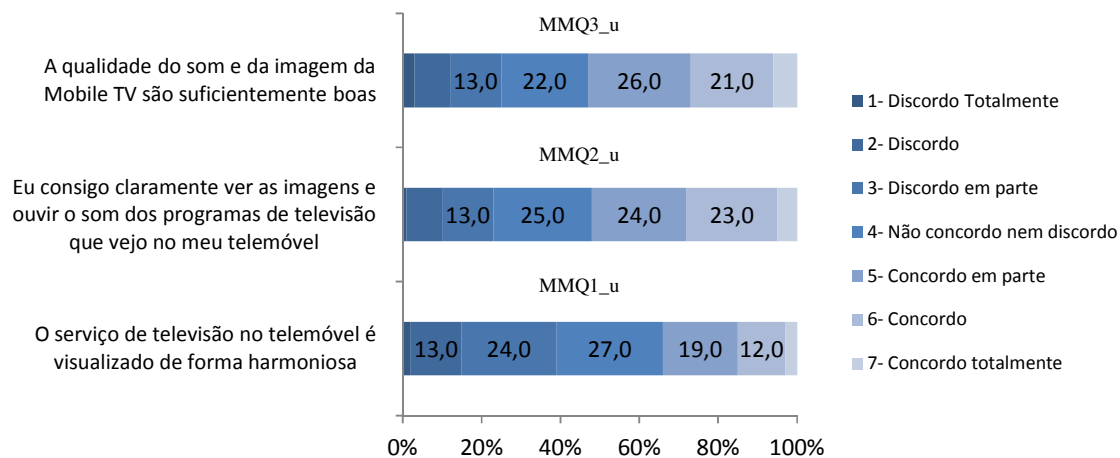
Note: MMQ= Multimedia Quality; 400= non-users' sample; 100= users' sample

Figure 41: Multimedia Quality measures- Non-users' sample



As far as **Multimedia Quality** is concerned, for 86.1% of the non-users it is important that the Mobile TV service is displayed in an harmonious way (MMQ1) while 90.8% find important to clearly see the images and hear the sound (MMQ2) (45% find it extremely important and 31% very important). 90.3% of the respondents agree that it is important that the image and sound quality of the Mobile TV service is good enough (MMQ3). This scale is reliable at a 0.93 Cronbach alpha value (non-users' sample).

Figure 42: Multimedia Quality measures- Users' sample



Regarding the users' group, only 34% of the "users" agree that the service is displayed in a harmonious way (MMQ1) while 39% disagree and 27% are "neutral". Contrastingly, for 86.1% of the non-users, it would be important that the service is displayed in a harmonious way. Regarding MMQ2, only 52% of the "users" agree that when using the Mobile TV

service they can clearly see the images and hear the sound (while in the non-users' group, for 90.8% of the respondents it is important to clearly see the images and hear the sound (45% find it extremely important and 31% very important). Finally, only 53% of the "users" agree that the Mobile TV sound and quality are good enough while for 90.3% of the respondents, this is an important factor for them to consider using the service.

For this scale and the users' sample, we obtained a reliability coefficient of 0.87 (Cronbach alpha).

6.3.3.3 Ease of Use

The construct *Ease of Use* was measured by 5 items (*EoU1*, *EoU2*, *EoU3*, *EoU4* and *EoU5*). For the non-users' sample, all items present above the average means: 5.87 (*EoU1*), 5.83 (*EoU2*), 5.66 (*EoU3*), 5.73 (*EoU4*) and 5.62 (*EoU5*). The medians are 6.00 for the five items. The mode is 7 for *EoU1*, *EoU2* and *EoU3* and 6 for *EoU4* and *EoU5*.

These figures suggest that Ease of Use is important for consumers' decision to use Mobile TV (although not so important as the previous quality of service components whose means and other descriptive statistics were higher).

For the users' group, once again the values of the means, medians and mode are below the non-users' group's values. The means are 4.73 for *EoU1* (vs. 5.87 for the non-users), 4.53 for *EoU2* (vs. 5.83), 4.69 for *EoU3* (vs. 5.66), 4.84 for *EoU4* (vs. 5.73) and 3.0 for *EoU5* (vs. 5.62). The medians are 5 for *EoU1*, *EoU3* and *EoU4*, 4 for *EoU2* and 3 for *EoU5* (in the non-users group, the medians were 6.00 for all the items). Finally, the mode is 4 for all the items except for *EoU4* (for which it is 6 as in the non-users' group).

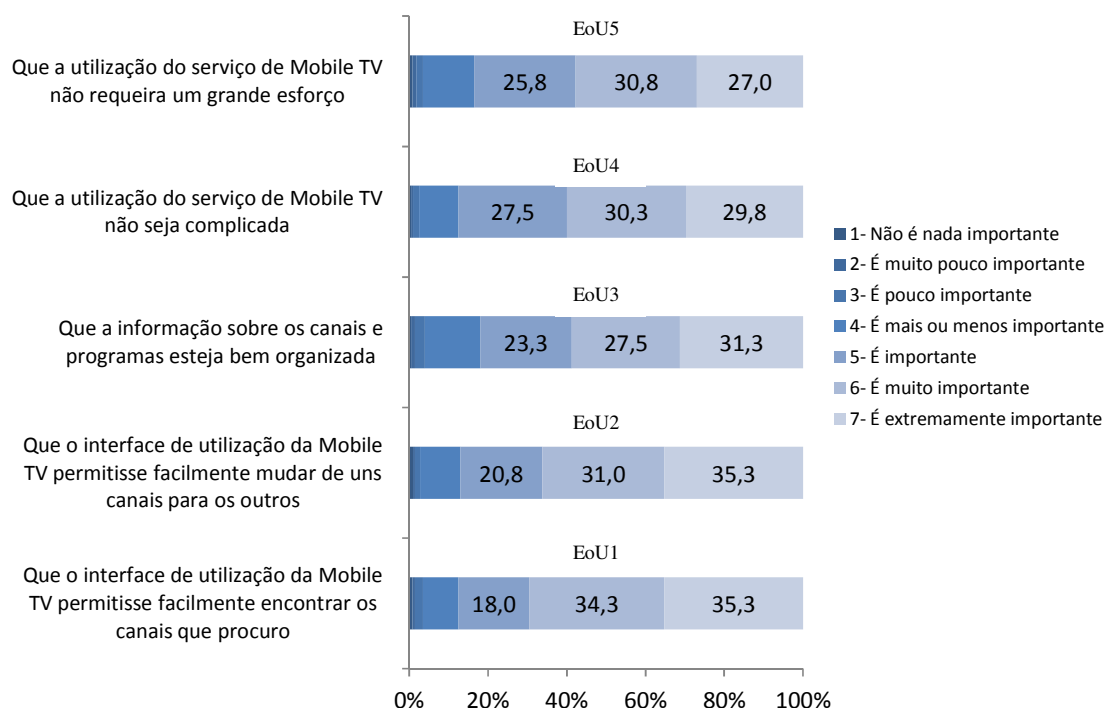
Table 22: Mean, median, mode, standard deviation and variance of the items of the Ease of Use scale

	EoU1		EoU2		EoU3		EoU4		EoU5	
N	400	100	400	100	400	100	400	100	400	100
Média	5.87	4.73	5.83	4.53	5.66	4.69	5.73	4.84	5.62	3.00
Desvio - Padrão	1.17	1.29	1.18	1.31	1.23	1.16	1.12	1.33	1.19	1.41
Mediana	6	5	6	4	6	5	6	5	6	3
Moda	7	4	7	4	7	4	6	6	6	4
Variância	1.37	1.65	1.39	1.71	1.5	1.35	1.24	1.77	1.41	1.96

Note: EoU= Ease of Use; 400= non-users' sample; 100= users' sample

These figures, together with those from the charts below, suggest that non-users' requirements about Mobile TV ease of use parameters are high (it is important for them that the service is easy to use) while those that have tried the service report, on average, that the easiness of use of the Mobile TV service is not straightforward, with the means for all items only slightly above "4- don't agree nor disagree" and a mean of "3- partially disagree" for the question regarding the effort required to use Mobile TV. Implications of these findings are discussed in the next chapter.

Figure 43: Ease of Use measures- Non-users' sample

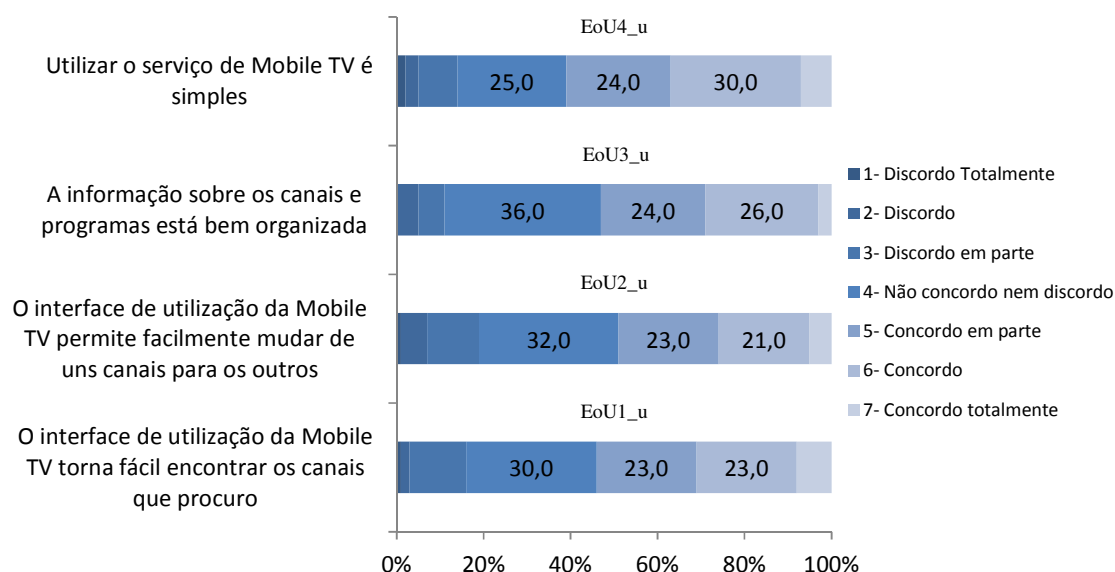


As regards the *Ease of Use* measures, 87.6% of the non-users' respondents find important that the Mobile TV user interface allows to easily find the channels. 87.1% agree that it is important that the user interface allows to easily switch channels. For 82.1% of the respondents, it is important that the information about the available channels and programs is well organized. 87.6% of the respondents agree it is important that using Mobile TV is not complicated and finally, 83.6% find it important for Mobile TV not to require a strong utilization effort.

We conclude that all Ease of Use factors are very important for potential consumers to use the Mobile TV service although they were rated a bit lower than the previous Quality of Service factors (Reliability and Multimedia Quality).

We obtained a Cronbach alpha of 0.93 for this scale within the non-users' sample.

Figure 44: Ease of Use measures- Users' sample



Regarding the users' sample, "only" 53% of the respondents agree that the Mobile TV user interface allows finding the channels easily (this was considered important by 87.6% of the non-users). Only 49% of the users' group respondents agree that the user interface allows switching channels easily (this was considered important by 87.1% of the non-users). For 53% of the users, the information about the available channels and programs is well organized (this was considered important by 82.1% of the non-users). 61% of the users agree that using Mobile TV is easy (this was considered important by 87.6% of the non-users).

We obtained a Cronbach alpha of 0.76 for this scale (users' sample).

6.3.3.4 Speed

The **Speed** construct was measured by **Sp1**, **Sp2** and **Sp3**. For the non-users' sample, the three items present above the average means of 5.96 (**Sp1**), 5.99 (**Sp2**) and 5.78 (**Sp3**). The medians are 6.00 and the mode is 7 for the three items. The variance presents low values of 1.23, 1.15 and 1.42 for **Sp1**, **Sp2** and **Sp3** respectively (Table 23).

Regarding the users' sample, the three items present "on the average" means of 4.06 (**Sp1**), 4.1 (**Sp2**) and 4.04 (**Sp3**). The medians are 4.00 (vs. 6.00) for the three items and the mode is 4 (vs.7) for the three items too.

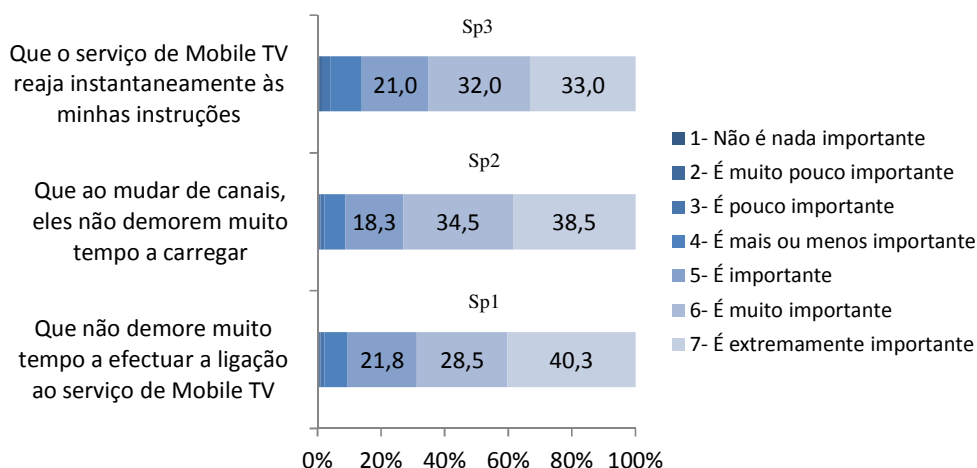
We recall that, for the users group, we assessed opinions based on real user experience while for non-users, we asked how important that factor would be if they were to use Mobile TV. As for the previous factors, the figures suggest that Speed is an important criterion for potential adopters' use of the service while the perceptions of those that have already tried it is, on average, that the service is not very efficient regarding connection time, switching channels and quickly reacting to the users' instructions. The figures in the charts below confirm these findings.

Table 23: Mean, median, mode, standard deviation and variance of the items of the Speed scale

	Sp1		Sp2		Sp3	
N	400	100	400	100	400	100
Média	596	406	599	410	578	404
Desvio - Padrão	1.11	1.33	1.07	1.22	1.19	1.29
Mediana	6	4	6	4	6	4
Moda	7	4	7	4	7	4
Variância	1.23	1.77	1.15	1.49	1.42	1.66

Note: Sp= Speed; 400= non-users' sample; 100= users' sample

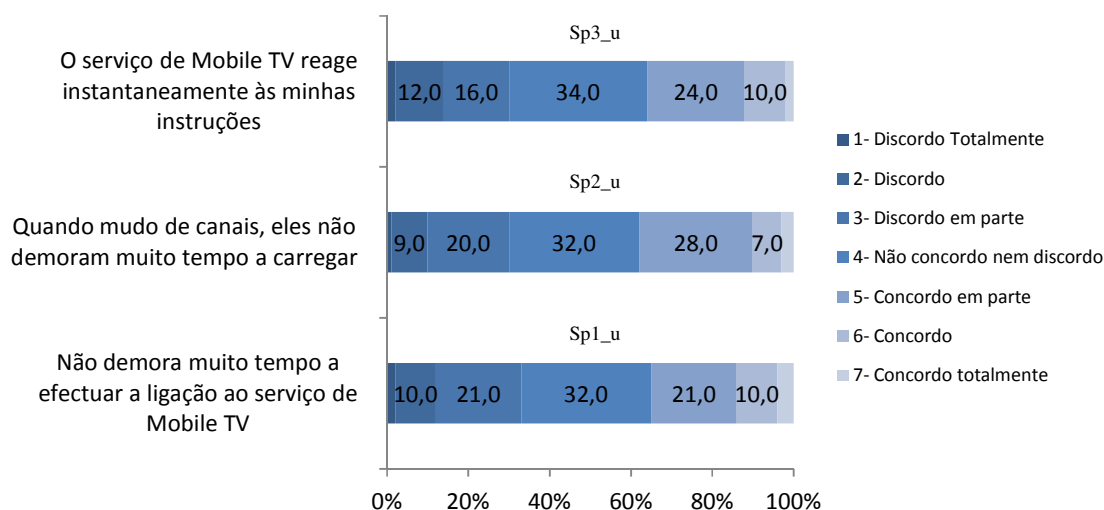
Figure 45: Speed measures- Non-users' sample



As respect to the answers to the *Speed* measures, 90.6% of the non-users agree it is important that it doesn't take much time to connect to the Mobile TV service (40.3% consider this is extremely important). 91.5% of the respondents consider important that, when switching channels, they don't take much time to load (38.5% consider this to be extremely important and 34.5% consider it very important). Finally, for 86% of the respondents it is important that

the Mobile TV service reacts immediately to the user's instructions. The reliability of this scale for the non-users' sample is 0.95 (Cronbach alpha).

Figure 46: Speed measures- Users' sample



Concerning the users' sample, only 35% of the users' respondents agree that it doesn't take much time to connect to the Mobile TV service (90.6% of the non-users consider this factor important and 40.3% consider it extremely important). Only 38% of the users' group respondents agree that, when switching channels, they don't take much time to load (while 91.5% of the non-users consider this factor important, of which 38.5% consider it extremely important and 34.5% consider it very important). Finally, only 36% of the users agree that the Mobile TV service reacts immediately to the user's instructions (contrastingly, for 86% of the non-users' respondents this is an important factor if they were to use Mobile TV).

Once again, these figures suggest that the requirements about quality of service parameters and specifically, service speed, are high for those that have never tried the service while the majority of those that have tried the service report a medium or poor quality experienced.

The reliability of this scale is 0.85 (Cronbach alpha) for the users' sample.

6.3.3.5 Content

The **Content** scale was composed by 3 items (**Cont1**, **Cont2** and **Cont3**), presenting above the average means of M=5.58 (**Cont1**), M=5.84 (**Cont2**) and M=6.06 (**Cont3**) for the non-users' sample. The medians are 6.00 for the three items while the mode is 6 for **Cont1** and **Cont2** and 7 for **Cont3** (non-users' sample).

Regarding the users' group, the means were $M=4.15$ for **Cont1** (vs. 5.58 in the non-users' sample), $M=4.55$ for **Cont2** (vs. 5.84 in the non-users' sample) and $M=4.68$ for **Cont3** (vs. 6.06 for the non-users). The medians were 4.00 for Cont1 and Cont2 (vs. non-users' 6.00) and 5.00 for Cont3 (vs. 6.00). The mode was 4 for the three items (while it was 6 for **Cont1 and Cont2** and 7 for **Cont3** in the non-users' group).

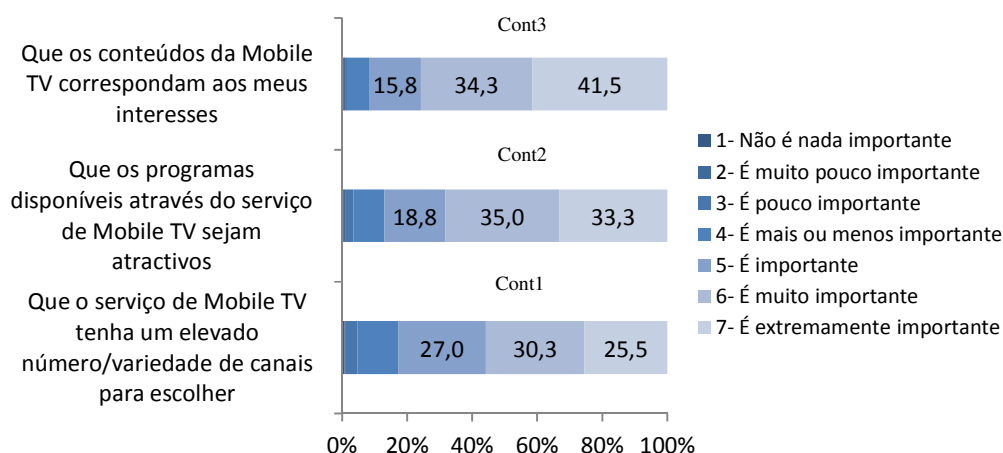
As with other Quality of Service's components, these figures (together with those shown in the charts below), suggest that requirements about Content availability and suitability of the Mobile TV service are high for those that have never tried the service while the majority of those that have tried the service report a medium or poor quality of service experience in terms of Content.

Table 24: Mean, median, mode, standard deviation and variance of the items of the Content scale

	Cont1		Cont2		Cont3	
	N					
	400	100	400	100	400	100
Média	558	415	584	455	606	468
Desvio - Padrão	1.19	1.38	1.14	1.19	1.05	1.19
Mediana	6	4	6	4	6	5
Moda	6	4	6	4	7	4
Variância	1.41	1.91	1.32	1.42	1.1	1.41

Note: Cont= Content; 400= non-users' sample; 100= users' sample

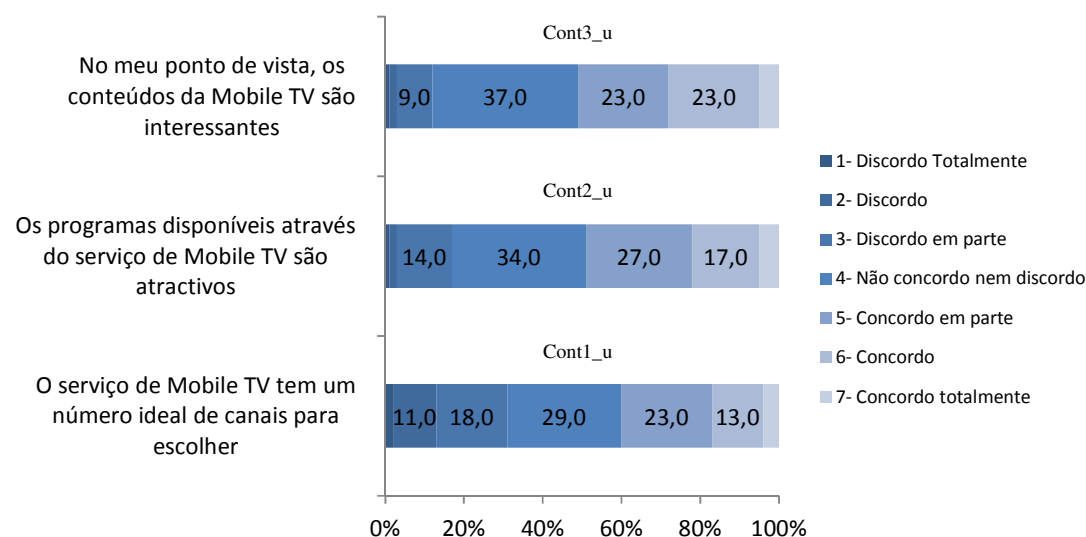
Figure 47: Content measures- Non-users' sample



Concerning the **Content** construct, we observe that 82.8% of the non-users' respondents find important that the Mobile TV service provides a significant variety of channels to choose from. We also observe that 87.1% of the non-users find important that the contents available

through Mobile TV are appealing. Finally, for 91.6% of the non-users' respondents it is important that the contents provided through Mobile TV suit their interests (for 41.5%, this is extremely important). The Cronbach alpha for this scale is 0.88 (non-users' sample).

Figure 48: Content measures- Users' sample



Regarding the users' sample, we observe that only 40% of the users' respondents agree that the Mobile TV service provides a significant variety of channels to choose from while 31% disagree (by contrast, in the non-users' group, 82.8% of the respondents found this factor to be important). We also observe that only 49% of the users agrees that the contents available through Mobile TV are appealing (87.1% of the non-users' respondents found this factor important). Finally, only 51% of the users' group agrees that the contents provided through Mobile TV suits their interests (while for 91.6% of the non-users, this is an important factor). There is a high number of neutral answers ("4", which was the mode for all items). Moreover, we highlight once again the discrepancy between reported quality of service experienced by users and the importance of those factors to Mobile TV use decisions according to respondents that never tried the service.

The Cronbach alpha for this scale is 0.84 (users' sample).

6.3.4 Perceived Value

Perceived Value was initially measured by 5 items but one of them (**PV4**) was dropped to increase the scale reliability from 0.83 to 0.844 for the non-users' sample and from 0.825 to 0.86 for the users' sample. Hence, the final measure was composed by **PV1**, **PV2**, **PV3** and

PV5. The descriptive statistics are very similar for both groups. For the non-users' sample, we observe slightly below the average means for all items: 3.5 for PV1, 3.41 for PV2, 3.28 for PV3 and 3.76 for PV4. The values for the medians were 4 for PV1, PV2 and PV5 and 3 for PV3. The mode was 4 for all items. The variance and standard deviation are low. For the users' group, we also observe slightly below the average means for all items: 3.37 for PV1, 3.28 for PV2, 3.26 for PV3 and 3.85 for PV4. The values for the medians were 4 for PV1 and PV5 and, 3 for PV2 and PV3. Like with the non-users' group, the mode was 4 for all items and the variances and standard deviations are low.

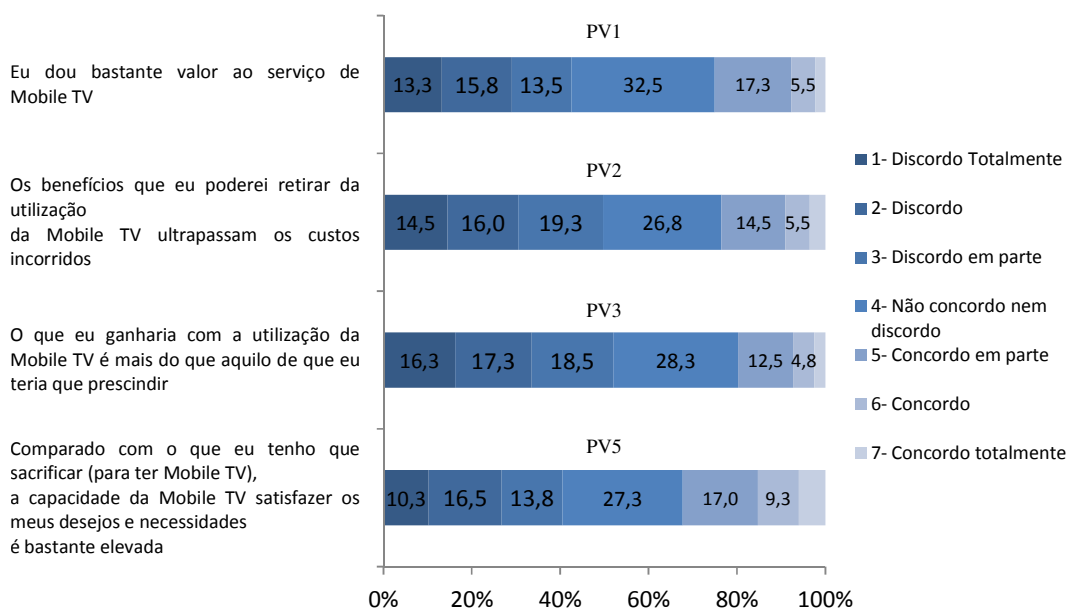
These figures suggest that both users and non-users' perceptions of the value of Mobile TV are relatively low. This is better illustrated next page by interpreting the charts that present the answers for each item of the scale.

Table 25: Mean, median, mode, standard deviation and variance of the items of the Perceived Value scale

	PV1		PV2		PV3		PV5	
N	400	100	400	100	400	100	400	100
Mean	3.5	3.37	3.41	3.28	3.28	3.26	3.76	3.85
Standard deviation	1.52	1.64	1.57	1.69	1.54	1.54	1.66	1.64
Median	4	4	4	3	3	3	4	4
Mode	4	4	4	4	4	4	4	4

Note: PV= Perceived Value; 400= non-users' sample; 100= users' sample

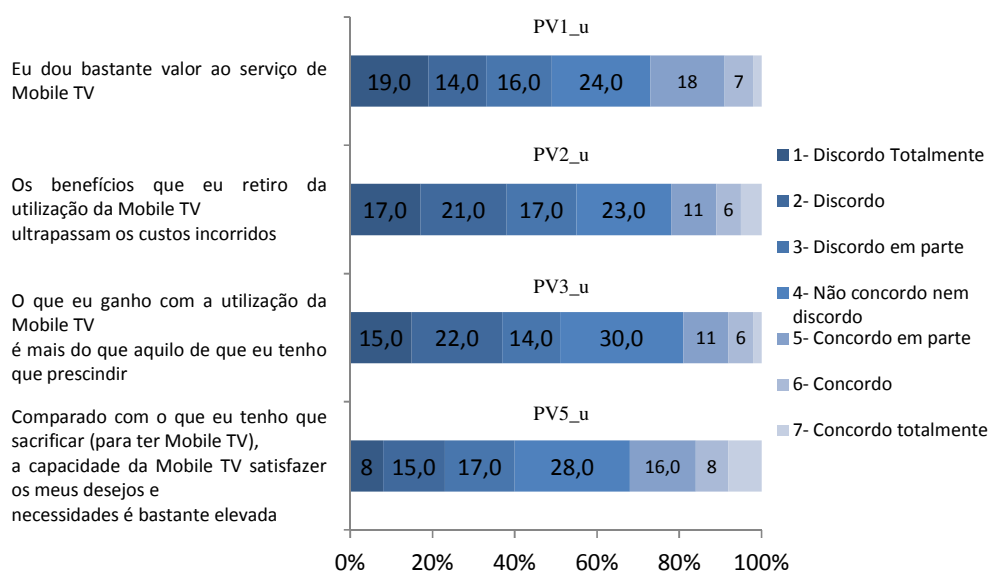
Figure 49: Perceived Value measures- Non-users' sample



Regarding the *Perceived Value* construct, only 24.9% of the non-users consider the service quite valuable while 32.5% are neutral and 42.6% disagree that the Mobile TV service is quite valuable. As in this item there was the adjective “quite”, this does not mean that respondents do not find the service valuable at all but that a majority does not find it quite valuable (and we had soften the adjective vs. the original scale in which it was “greatly” instead of “quite”). The analysis of the answers to the other items of the scale complements the interpretation. Only 23.4% of the non-users’ respondents agree that the benefits they would receive from Mobile TV exceed the costs incurred while 49.8% believe that the benefits would not compensate for the costs (although there are 3 different levels of agreement/disagreement). As for the third question, 52.1% of the non-users disagree that what they would gain from using the Mobile TV service would be more than what they have to give up (hence, they believe the pros do not compensate for the cons). Finally, 40.6% of the non-users disagree that the overall ability of Mobile TV to satisfy their wants and needs would be quite high compared to what they would have to sacrifice while 32.1% agree with the statement. We highlight the extremely high percentage of neutral answers for all items of the scale (varying between 27% and 33%) suggesting that respondents may have had some difficulty in answering these questions and assessing the value of Mobile TV for them (or the balance between benefits and costs).

As previously said, the Cronbach alpha for this scale is $\alpha = 0.84$ for the non-users’ sample.

Figure 50: Perceived Value measures- Users' sample



As regards the users' group, 49% of the respondents disagree that the Mobile TV service is quite valuable. They are still more severe in their judgement than the non-users of which 42.6% disagreed with this statement. Yet, as there are less neutral responses, 27% of the users consider the service quite valuable (vs. 24.9% in the non-users' group). Regarding the balance between benefits and costs, 55% of the users disagree that the benefits they receive from Mobile TV exceed the costs incurred (vs. 49.8% of the non-users) and only 22% agree the received benefits overcome the incurred costs (vs. 23.4% in the non-users' group). As for the third item of the scale, 51% of the users' respondents disagree that they gain more from using Mobile TV than what they have to give up (vs. 52.1% of the non-users). Like with the non-users, a majority of respondents believe that "the pros do not compensate for the cons" and only 19% think the other way while 30% are neutral. Finally, only 32% of the users agree that the overall ability of Mobile TV to satisfy their wants and needs is quite high compared to what they would have to sacrifice (similar to the non-users) while 40% disagree with this statement (also similar to the non-users). Within the users' respondents, there was also a high percentage of neutral answers to all questions (between 23% and 30%).

The Cronbach alpha for this scale with four of the five initial items was $\alpha = 0.86$ for the users' sample.

6.3.5 Adoption Intention

Adoption Intention was measured by 3 items (*AI1*, *AI2* and *AI3*). For the non-users' sample, we observe significant below the average values for the means: 2.86 for AI1, 2.94 for AI2 and 3.23 for AI3. There was not a great variability of the answers, as suggested by the standard deviations and variances. For the users' group, we also observe below the average means for the three items although not so pronounced: 3.75 for AI1, 3.86 for AI2 and 3.93 for AI3. The values for the medians were 4 for all items of the scale while the mode was 3 for AI1 and AI2 and 5 for AI3. There is higher variability of the answers (vs. the non-users') most likely because in this group we have 29 current users (29% of the sample) that probably intend to keep using the service; hence, it is normal that there is higher disparity in the answers. Table 25 shows the descriptive statistics for the Adoption Intention measures.

These figures evidence a strong negativity towards Mobile TV Adoption Intention in the next 6 months. We will discuss these findings in detail in the next chapter.

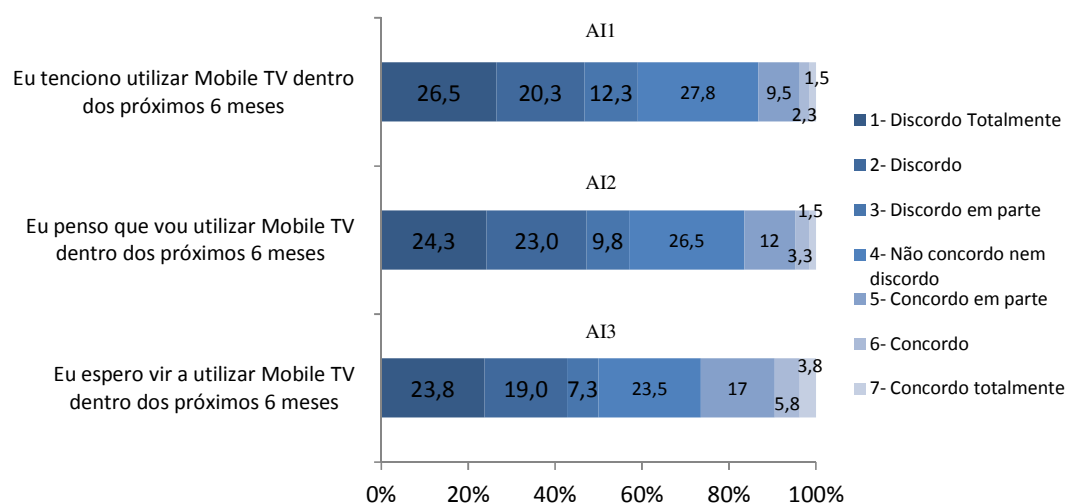
Table 26: Mean, median, mode, standard deviation and variance of the items of the Adoption Intention scale

	AI1		AI2		AI3	
N	400	100	400	100	400	100
Mean	2.86	3.75	2.94	3.86	3.23	3.93
Standard deviation	1.53	1.9	1.57	1.95	1.77	2.0
Median	3	4	3	4	3.5	4
Mode	4	3	4	3	3	5

Note: AI= Adoption Intention; 400= non-users' sample; 100= users' sample

Below, we analyze respondents' answers to each of the Adoption Intention questions/ measures, which may give us a better understanding of their beliefs.

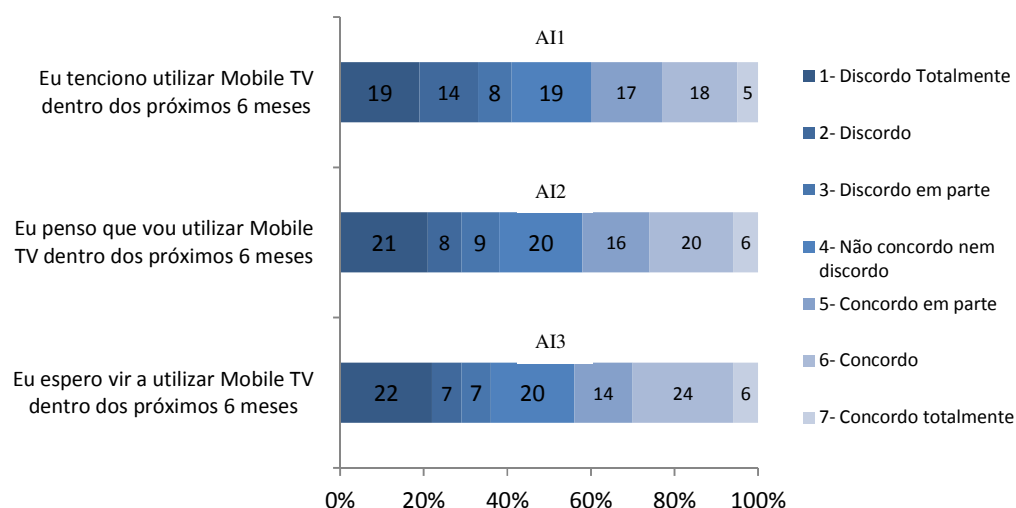
Figure 51: Adoption Intention measures- Non-users' sample



As we can see from the chart above, only 13.3% of the non-users' respondents intend to use Mobile TV within the next 6 months (and for 9.5%, this is only a weak intention) while 58.9% do not intend to use Mobile TV within the next 6 months and 27.8% are neutral. Regarding the second item of the scale, 16.8% of the non-users think they will use Mobile TV within the next 6 months and 56.7% disagree with this statement. Finally, 26.6% of the non-users' respondents hope to use Mobile TV within the next 6 months and 50.1% do not agree with this statement. The significant difference between the patterns of answers to the last question vs. the first ones suggests that some respondents might be interested in using the service but would be dependent on something to take the decision to use: there are 13.3% more respondents that hope to use Mobile TV within the next months than those that intend to do it; the term "hope" may suggest they would be dependent on some external conditions to improve in order for them to use the service (like better economic situation or getting a new mobile phone, for example).

The Cronbach alpha for this scale was $\alpha = 0.94$ for the non-users' sample.

Figure 52: Adoption Intention measures- Users' sample



Regarding the users' sample, by looking at the charts, we can see considerable differences vs. the non-users' group. 40% of the users' respondents intend to use Mobile TV in the next 6 months (vs. 13.3% only of the non-users). "Only" 41% of the users do not intend to use Mobile TV in the next 6 months (vs. 58.9% of the non-users). For AI2, 42% of the users think they will use Mobile TV within the next months (against 16.8% only of the non-users). Finally, 44% of the users hope to use Mobile TV in the next 6 months (vs. 26.6% of the non-users). For the users' group we did not find the discrepancy between the last question and the other ones that existed in the non-users' sample. This is because there was a much higher percentage of respondents stating they intended and thought they would use Mobile TV within the following months. The Cronbach alpha for this scale was $\alpha = 0.95$ for the users' sample. These findings and respective implications will be discussed in the next chapter.

6.4 Multivariate Data Analysis

The proposed theoretical model and respective hypotheses were tested by using AMOS.16 and the Structural Equation Modeling technique (SEM). We used a two-step data analysis strategy: first, we validated the measurement model; second, we tested the structural model and the hypothesized paths by examining the path coefficients. In both moments we used the same model evaluation criteria. The estimation technique was maximum likelihood as this is recommended for use with small to moderate sample sizes and under assumptions of multivariate normality. The analysis was conducted for the two independent samples: the non-users' sample (N=400) and the users' sample (N=100).

In spite of the short dimension of the users' sample and, taking into account this limitation in the results interpretation, we still decided to test the model by using SEM for the users' group and to compare the results with those of the non-users' sample. Naturally, the results should be interpreted with caution and always bearing in mind that this was a 100 respondents sample only, which is not enough for a reliable model assessment using SEM (taking into consideration the number of variables of the model in question).

We recall that, as mentioned in the methodology chapter, we only gathered data of 100 "users" due to the early stage of the Mobile TV market in which it is extremely difficult to find users' respondents. We highlight that we got 29 current users within our total 500 sample, corresponding to 0.58% of the sample which was even higher than the real penetration (0.35%) of Mobile TV services in Portugal at the end of the first quarter of 2012 (when the data were collected).

The assumption of multivariate normality was assessed by using the asymmetry coefficient of skewness ($Su < 3$) and the peakedness coefficient of kurtosis ($Ku < 7$) (Kline, 1998).

The presence of multivariate outliers was indicated by their Mahalanobis distances (the larger the distance, the larger the contribution that an observation is making to multivariate kurtosis, hence, to the departure from multivariate normality). The models were assessed with and without outliers: for the non-users' sample, we chose the solution with outliers since there were no significant changes in the models' fits, while deleting them led to the disadvantage of loss of information and model power which was not desirable (Gao, Mokhtarian and Johnston, 2008; Maroco, 2010). In the users' sample, there were no outliers.

To assess model fit, we used common goodness-of-fit indicators: GFI (goodness of fit index), CFI (comparative fit index), PGFI (parsimony goodness of fit index) and PCFI (parsimony comparative fit index), having considered that these indicated an acceptable fit for values above 0.80 and 0.60 respectively (Maroco, 2010). We also used the RMSEA (root mean square error of approximation) with a significance level of 0.1 (corresponding to a 90% confidence interval), considering that a value below 0.10 indicates an acceptable fit (Maroco, 2010).

The significance of the structural coefficients was assessed with a z-test produced by AMOS (critical ratio, p-value). To refine the model, we followed the modification indexes calculated by AMOS, as far as they made sense and were consistent with the proposed theoretical

relationships. We considered $MI > 11$ as an indicator of local fit problems (Maroco, 2010).

Whenever the introduction of new parameters suggested by SEM modification indexes produced a statistically significant reduction of the Qui-Square result ($\Delta\chi$, $p \leq 0,05$), which indicates an improvement in the global model fit, these were considered in the model. Additionally, when comparing models, we also considered the AIC index for which lower values suggest a better model fit.

6.4.1 Descriptive Measures and Correlations among the Model Variables

6.4.1.1 Non-Users' Sample

The correlation coefficients of the model variables are presented in Table 27. They vary between $r = -.27$ and $r = .56$, indicating there is no multicollinearity (Maroco, 2010).

We also proceeded to a correlations' analysis among the main constructs of the model, namely: Perceived Benefits, Monetary Costs, Non-monetary Costs (Battery Consumption), Perceived Quality of Service, Perceived Value and Adoption Intention. The results are described hereunder followed by the correlations' table.

As far as Perceived Benefits is concerned, it relates positively (and with statistical significance) with the extant variables except Monetary Costs. This means that, the higher the perception of Benefits by non-users, the higher is the perception of Value [$r = .56$, $p = .001$], the higher is the behavioral Intention to Adopt Mobile TV [$r = .47$, $p = .001$], the higher is the perception of Quality of Service [$r = .45$, $p = .001$] and the higher is the perception of Non-monetary Costs (battery consumption) [$r = .12$, $p = .034$]. The results also indicate that, the higher the perception of Benefits, the lower are the perceived Monetary Costs [$r = -.27$, $p = .001$].

As far as Monetary Costs are concerned, we observe that the higher their perception the lower is the Intention to Adopt Mobile TV [$r = -.26$, $p = .001$] and the lower is the Value perception of Mobile TV [$r = -.35$, $p = .001$]. Furthermore, we observe that, the higher the perception of Monetary Costs, the higher is the perception of Non-monetary Costs [$r = .24$, $p = .001$].

Regarding Perceived Quality of Service, we observe positive and statistically significant relationships with all the other variables except Monetary Costs. Hence, the higher the

perception of Quality of Service, the higher are the perceptions of Value [$r=.17$, $p=.001$], Non-monetary Costs (battery consumption) [$r=.12$, $p=.024$] and Adoption Intention [$r=.10$, $p=.043$]. We highlight there are no statistically significant relationships between Perceived Quality of Service and Perceived Monetary Costs [$r=.01$, $p=.91$] meaning the perception of Quality is not related with the perception of Monetary Costs.

As to the perception of Non-monetary Costs (battery consumption), it relates negatively with the perception of Value [$r=-.10$, $p=.049$]; thus, the higher the perception of Non-monetary Costs, the lower is the perception of Value (and conversely). We also observe there is no relationship between Non-monetary Costs and Adoption Intention [$r=.02$, $p=.74$].

Finally, we observe a positive and statistically significant relationship between Adoption Intention and Perceived Value [$r=.55$, $p=.001$], meaning that the higher the perception of Value, the higher is non-users' Intention to Adopt Mobile TV.

To conclude, we highlight that Perceived Benefits is the variable that has the strongest relationships with the other variables, especially with Perceived Value, with Perceived Quality of Service and with Adoption Intention. We also highlight that the higher the perception of Monetary Costs, the lower is the perception of Value and the Intention to Adopt Mobile TV. Another very relevant and strong relationship is that between Perceived Value and Mobile TV Adoption Intention. Finally, in spite of the existence of statistically significant relationships between Perceived Quality of Service and Non-monetary Costs, between Perceived Quality of Service and Perceived Value and between Perceived Quality of Service and Adoption Intention, the values are quite low suggesting they are less meaningful for non-users than the Perceived Benefits dimension. Table 27 presents the correlations coefficients and respective significance levels.

Table 27: Correlations between the model variables (non-users' sample)

			Correlation coefficient	p
Perceived Benefits	<-->	Behavioral Intention	0.47	0.000
	<-->	Perceived Value	0.56	0.000
	<-->	Monetary Costs	-0.27	0.000
	<-->	Non-Monetary Costs	0.12	0.034
	<-->	Perceived Quality of Service	0.44	0.000
Monetary Costs (Price)	<-->	Non-Monetary Costs	0.24	0.000
	<-->	Perceived Value	-0.35	0.000
	<-->	Behavioral Intention	-0.26	0.000
Perceived Quality of Service	<-->	Non-Monetary Costs	0.12	0.024
	<-->	Perceived Value	0.17	0.001
	<-->	Behavioral Intention	0.10	0.043
	<-->	Monetary Costs	0.01	0.906
Non-Monetary Costs (Battery consumption)	<-->	Perceived Value	-0.10	0.049
	<-->	Behavioral Intention	0.02	0.739
Behavioral Intention	<-->	Perceived Value	0.55	0.000

We assessed normality of all the model variables by verifying the values of peakedness (kurtosis) and asymmetry (skewness) (Table 28). They all range within the adequate parameters to ensure multivariate normality assumptions according to Kline (1998) ($Su < 3$ and $Ku < 7$).

Table 28: Values of skewness and kurtosis of the model variables (non-users' sample)

Variables	Skewness	Kurtosis
Perceived benefits		
Information Awareness	-.893	.699
Entertainment	-.888	.575
Pass Time	-1.113	1.055
Status/Image	.396	-.660
Privacy	-.346	-.251
Convenience	-.376	-.152
Perceived monetary costs		
Fee3	-.445	-.918
Fee2	.110	-.972
Fee1	-.264	-1.089
Perc. non-monetary costs		
Battery Consumption 3	-.288	-.896
Battery Consumption 2	-.803	.002
Battery Consumption 1	-.451	-.651
Perceived Quality of Service		
Reliability	-1.596	3.172
Multimedia Quality	-1.513	3.362
Ease of Use	-.963	1.819
Speed	-1.162	1.916
Content	-1.164	2.486
Perceived Value	-.048	-.383
Behavioral Intention	.349	-.756

6.4.1.2 Users' Sample

The correlation coefficients of the model variables are presented in Table 29. They vary between $r = -.46$ and $r = .60$, indicating there is no multicollinearity (Maroco, 2010).

As with the non-users' sample, we proceeded to a correlations' analysis among the main constructs of the model, namely Perceived Benefits, Monetary Costs, Non-monetary Costs (Battery Consumption) and Perceived Quality of Service.

Regarding Perceived Benefits, this dimension relates positively (and with statistical significance) with the extant variables except Monetary Costs. This means that, the higher the perception of Benefits by users, the higher is the perception of Quality of Service [$r=.5$, $p=.001$], the higher is the perception of Non-monetary Costs (battery consumption) [$r=.11$, $p=.055$], the higher is the perception of Value [$r=.538$, $p=.001$] and the higher is the Intention to Adopt Mobile TV [$r=.604$, $p=.001$]. Conversely, the results indicate that, the higher the perception of Benefits, the lower are the perceived Monetary Costs [$r=-.46$, $p=.001$].

Concerning Monetary Costs, we observe that the higher they are perceived, the higher is the perception of Non-monetary Costs [$r=.24$, $p=.001$]. Monetary Costs relate negatively with Perceived Value [$r=-.45$, $p=.001$] and Adoption Intention [$r=.5$, $p=.001$], meaning that, the higher the users' perception of Monetary Costs, the lower the Perceived Value of Mobile TV and the lower their Intention to Adopt it.

As to the perception of Quality of Service, we observe positive and statistically significant relationships with Non-monetary Costs, Perceived Value and Adoption Intention. This means that, the higher the Perceived Quality of Service, the higher are the perceptions of Battery Consumption [$r=.14$, $p=.011$], of Perceived Value [$r=.51$, $p=.001$] and the higher is the Intention to Adopt Mobile TV [$r=.42$, $p=.001$]. Regarding the relationship between Perceived Quality of Service and Monetary Costs, it is negative [$r=-.35$, $p=.001$] which means that higher perceptions of Quality of Service correspond to lower perceptions of Monetary Costs.

To conclude, we highlight the most relevant and strongest relationships:

Perceived Benefits is the variable that has the strongest relationships with Perceived Value ($r=.538$) and Adoption Intention ($r=.604$) suggesting that it is the variable that has the highest influence on consumers' perception of the Value of the Mobile TV service and on their Adoption Intention. Perceived Benefits also have a strong positive relationship with Perceived Quality, suggesting that the more consumers have positive perceptions of the Quality of Service of Mobile TV, the stronger will be their perceptions of its Benefits. Finally, it also has a strong negative relationship with Monetary Costs suggesting that, the more consumers perceive the Mobile TV Benefits as being high, the lower are their perceptions of Monetary Costs (meaning that they tend to find the price of the service less relevant as long as the benefits are high).

Within the users' group, Perceived Quality of Service has much stronger relationships than within the non-users' group suggesting this variable is particularly relevant when the consumer has already tried the service. Namely, it has a strong positive relationship with Perceived Value, suggesting that the more consumers will perceive the Quality of Service of Mobile TV as being high, the more valuable they will find the service. It also has a considerable positive relationship with Adoption Intention which suggests that, the more consumers (that have tried the service) find its Quality of Service as being high, the higher will be their intention to adopt the service.

We should also highlight the strong negative relationships between Monetary Costs and Perceived Value and between Monetary Costs and Adoption Intention. This suggests that the more consumers perceive the service as being costly, the less valuable they will find it and the lower will be their intention to adopt it.

Finally, we should highlight that Perceived Benefits has the strongest (positive) relationship with Adoption Intention (even stronger than that of Perceived Value). Battery consumption is the variable that has the weaker relationships suggesting it is less meaningful for consumers than the other ones. Table 29 presents the correlations coefficients and respective significance levels.

Table 29: Correlations between the model variables (users' sample)

			Correlation coefficient	p
Perceived Benefits	<-->	Perceived Quality	.499	0.000
	<-->	Monetary costs	-.457	0.000
	<-->	Non- Monetary costs	.110	0.055
	<-->	Perceived Value	.538	0.000
	<-->	Adoption Intention	.604	0.000
Perc. Quality of Service	<-->	Monetary costs	-.346	0.001
	<-->	Non- Monetary costs	.135	0.011
	<-->	Perceived Value	.511	0.000
	<-->	Adoption Intention	.416	0.000
Perc. Monetary Costs	<-->	Perceived Value	-.446	0.000
	<-->	Non- Monetary costs	.239	0.000
	<-->	Adoption Intention	-.500	0.000
Perceived Value	<-->	Adoption Intention	.543	0.000

As with the non-users' sample, we assessed normality of all the model variables (for the users' sample) by verifying the values of peakedness (kurtosis) and asymmetry (skewness) (Table 30). They all range within the adequate parameters to ensure multivariate normality assumptions according to Kline (1998) ($Su < 3$ and $Ku < 7$).

Table 30: Values of skewness and kurtosis of the model variables (users' sample)

Variables	Skewness	Kurtosis
Perceived benefits		
Information Awareness	-.752	.117
Entertainment	-1.024	.879
Pass Time	-1.026	.638
Status/Image	.390	-.930
Privacy	-.144	-.559
Convenience	-.733	-.133
Perceived monetary costs		
Fee3	-.557	-.673
Fee2	.268	-.999
Fee1	-.542	-.921
Perc. non-monetary costs		
Battery Consumption 3	-.288	-.896
Battery Consumption 2	-.803	.002
Battery Consumption 1	-.451	-.651
Perceived Quality of Service		
Reliability	.227	-.418
Multimedia Quality	-.158	-.390
Ease of Use	.034	-.050
Speed	.167	.320
Content	.193	-.446
Perceived Value	.257	-.430
Behavioral Intention	-.238	-1.164

6.4.2 Measurement Model

6.4.2.1 Non-Users' Sample

Before proceeding with the analysis of the relationships amongst the model variables, we assessed the quality of the latent variables. To assess the validity of the measures, the scales were subjected to a confirmatory factor analysis, using maximum likelihood estimation procedures in AMOS. Absolute and relative fit tests were used to assess the measurement model: χ^2 ; CFI, GFI, PGFI, PCFI and RMSEA (Maroco, 2010).

For the non-users' sample, the measurement model revealed an acceptable quality ($\chi^2/df=4.46$; CFI=.91; GFI=.86; RMSEA=.10) but the modification indices suggested the inclusion of the correlations between the unexplained variance of three pairs of dimensions of the Perceived Benefits construct (Entertainment/Pass Time; Status/Privacy; Privacy/Convenience) and also the correlation between two dimensions of the Perceived Quality construct (Reliability/Multimedia Quality). Given the consistency of the proposed suggestions with the theory and the relevance of those modifications to improve the model fit (modification indices above 50), these changes were taken into consideration and improved the model significantly ($\Delta\chi^2 = 152$, $p \leq 0.01$).

Table 31: Correlation coefficients in the measurement model (non-users' sample)

			Estimate	Standardized Estimate	Standard Error	Critical Ratio	P
PBenefits	<-->	Mon. Costs	-0.279	-0.279	0.056	-4.951	0.000
Mon. Costs	<-->	Bat. Cons.	0.249	0.249	0.055	4.529	0.000
P Quality	<-->	Bat. Cons.	0.136	0.136	0.053	2.545	0.011
P Quality	<-->	Mon. Costs	0.012	0.012	0.057	0.207	0.836
PBenefits	<-->	Bat. Cons.	0,111	0,111	0,057	1,94	0,052
PBenefits	<-->	P Quality	0,454	0,454	0,046	9,822	0,000
e(MultimediaQual)	<-->	e(Reliability)	0,224	0,638	0,025	8,832	0,000
e(Privacy)	<-->	e(Status)	0,402	0,315	0,072	5,614	0,000
e(Privacy)	<-->	e(Convenience)	0,188	0,272	0,05	3,792	0,000
e(PassTime)	<-->	e(Entertainment)	0,299	0,511	0,053	5,652	0,000

In the final solution, all the fit indices suggest a good model fit to the variance-covariance matrix ($\chi^2/DF < 2$; CFI and GFI $> .90$; PCFI and PGFI $> .60$; RMSEA < 0.10) (Maroco, 2010).

Table 32: Goodness of fit indices for the measurement model (non-users' sample)

	χ^2	χ^2/DF	p	CFI	PCFI	GFI	PGFI	RMSEA	AIC
Initial	504.40 (113), N=400	4.464	.000	.91	.76	.86	.64	.10	584.40
Final	197.26 (109) N= 400	1.810	.000	.98	.79	.95	.67	.06	285.27

In addition to the assessment and refinement of the measurement model, we tested construct reliability and validity as suggested by Diamantopoulos and Siguaw (2000).

Construct reliability was tested using: (1) the Cronbach alphas, which assesses reliability through the internal consistency of each constructs' items; (2) composite reliability (ρ), which represents the internal consistency of all indicators on the latent variable (Bagozzi, 1980) and (3) the average variance extracted (AVE), that measures the extent to which the group of the items variances is explained by the latent variable (Fornell and Larcker, 1981).

All constructs presented good internal consistency values (Cronbach α) as shown in Table 33.

Table 33: Cronbach alphas of the model variables (non-users' sample)

Variables	Cronbach α
Perceived benefits	
Information Awareness	0.87
Entertainment	0.91
Pass Time	0.93
Status/Image	0.86
Privacy	0.82
Convenience	0.66
Perceived monetary costs (Price)	0.82
Non monetary costs (Battery Cons.)	0.80
Perceived Quality of Service	
Reliability	0.95
Multimedia Quality	0.93
Ease of Use	0.93
Speed	0.95
Content	0.88
Perceived Value	0.83
Behavioral Intention	0.94

As these values are all above the desirable level of 0.70-0.80 (with the exception of 0.66 for “convenience” which can still be considered acceptable⁷), we conclude that the scales are reliable and the measures present content validity (Churchill, 1979).

Regarding composite reliability, all the scales present values well above the desirable levels of $\rho > 0.70$ (Bagozzi, 1980), suggesting good composite reliability. As for AVE, except for monetary costs, the average variance extracted of all other constructs is greater than the desired level of 0.50, meaning that at least 50% of the variance is explained by the latent variable. Monetary Costs has an AVE of only 46%; however, given the theoretical relevance of this construct and the results regarding its composite reliability (ρ) and internal consistency (Cronbach alpha), we decided to keep the scale in the model.

Composite Reliability and Average Variance Extracted scores are presented in Table 34.

Table 34: Composite reliability and average variance extracted (non-users’ sample)

	Composite Reliability	Average Variance Extracted
Perceived Benefits	0.979	0.501
Perceived Quality of Service	0.993	0.775
Monetary Costs	0.939	0.463
Battery Consumption	0.880	0.631

To assess convergent validity, we analyzed factor loadings, standard errors, t-values and significance values of the variables included in the final measurement model. These are indicated in Table 35. All the scales show significant paths with the respective dimensions and high factor loadings (≥ 0.5), presenting desirable levels of composite reliability (Marôco, 2010). Moreover, we checked the t-values and level of significance for these loadings and confirmed they were all significant at $p < 0.001$. Table 35 summarizes these results.

⁷The Cronbach alpha for this scale improved to 0.79 if we dropped one item of the scale. However, we decided not to do it because the scale would have only two items and also because the Cronbach alpha for the scale as it is (with the three items) is significantly higher for the users’ sample. We are confident the scale is good but the issue is that the questions are difficult to answer by someone that has never tried the service. We believe the low Cronbach alpha of this scale for the non-users’ sample is related to this issue.

Table 35: Factor loadings, standard errors, t-values and significance values of the model latent variables (non-users' sample)

		Estimate	Standardized Estimate	Standard Error	Critical Ratio (t)	p
Perc Benefits	Privacy	0.901	0.688	0.064	14.131	0.000
	Status	0.776	0.499	0.079	9.796	0.000
	Entertainment	0.925	0.789	0.054	17.116	0.000
	Info Awareness	0.799	0.681	0.056	14.299	0.000
	Pass Time	0.938	0.756	0.058	16.066	0.000
	Convenience	0.938	0.79	0.055	17.198	0.000
Perc Qual of Service	Content	0.895	0.885	0.04	22.333	0.000
	Speed	0.954	0.894	0.042	22.709	0.000
	MultimediaQual	0.944	0.871	0.043	21.746	0.000
	Reliability	0.933	0.816	0.048	19.583	0.000
	Ease of Use	0.97	0.932	0.04	24.394	0.000
Perc Mon. Costs	Mon. Costs 1	1.124	0.627	0.088	12.768	0.000
	Mon. Costs 2	1.427	0.827	0.082	17.424	0.000
	Mon. Costs 3	1.484	0.816	0.086	17.168	0.000
Battery Cons.	BConsumption1	1.463	0.89	0.074	19.68	0.000
	BConsumption2	1.387	0.913	0.068	20.336	0.000
	BConsumption3	0.927	0.518	0.087	10.612	0.000

6.4.2.2 Non-Users' Sample

As with the non-users' sample, before proceeding with the analysis of the relationships amongst the model variables, we assessed the quality of the latent variables. To assess the validity of the measures, the scales were subjected to a confirmatory factor analysis, using maximum likelihood estimation procedures in AMOS. Absolute and relative fit tests were used to assess the measurement model: χ^2 ; CFI, GFI, PGFI, PCFI and RMSEA (Maroco, 2010).

The initial solution of the measurement model revealed to be unacceptable because there were negative co-variances. **These results were due to the items of the dimension Non-monetary Costs (Battery Consumption). Therefore, this variable was removed from the model.** Having dropped this construct, the model ran but revealed a poor model fit to the data ($\chi^2/df=2.457$; CFI=.79; GFI=.79; RMSEA=.14). The software did not suggest the inclusion of new parameters through its modification indices; as such, we assumed this model as the best

possible model to the sample in question. We cannot neglect the fact that we are trying to assess how a model including over forty measured variables fits a 100 respondents' sample which is not recommended when using SEM⁸.

It is normal, though, that the model fit is poor but this doesn't mean it could not be possibly better with a higher sample. Furthermore, we highlight that a good-fitting model is not necessarily a valid model and conversely (Kenny and McCoach, 2003). Hence, we decided to pursue with SEM analysis also for the users' sample. We aimed to assess and test the hypothesized model relationships using the same technique as for non-users and we believe, even if the model fit is poor, the results provide us a rough indication of how the constructs behave and relate with one another (although not overlooking the fact that, a higher sample size could have impacts in the results).

Table 36: Goodness of fit indices for the measurement model (users' sample)

Model	χ^2	χ^2/DF	p	CFI	PCFI	GFI	PGFI	RMSEA
Initial	Unacceptable solution							
Final	181.795 (74)	2.457	0.000	0.79	0.69	0.79	0.56	0.14
	N= 100							

Table 37: Correlation coefficients in the measurement model (users' sample)

			Estimate	Standardized Estimate	Standard Error	p
PBenefits	<-->	P Quality	.502	.089	5.644	0.000
PBenefits	<-->	Mon. Costs	-.447	.095	-4.688	0.000
P Quality	<-->	Mon. Costs	-.350	.106	-3.298	0.000

In addition to the assessment of the measurement model and, as for the non-users' sample, we also tested construct reliability and validity as suggested by Diamantopoulos and Siguaw (2000).

⁸ While Kline (2010) suggested that a very complicated path model needs a sample size of 15-20 times the number of variables in the model, our ratio does not even reach the much lower level suggested by Bentler and Chou (1987) of 5 participants per construct. Yet, we highlight that a good-fitting model is not necessarily a valid model and conversely, models with nonsensical results and models with poor discriminant validity or Heywood cases can be "good-fitting" models. Finally, a model whose all parameters are statistically significant can have a poor fitting (Kenny, D.A. and McCoach, D.B., 2003).

Construct reliability was tested using: (1) the Cronbach alphas, which assesses reliability through the internal consistency of each constructs' items; (2) composite reliability (ρ), which represents the internal consistency of all indicators on the latent variable (Bagozzi, 1980) and (3) the average variance extracted (AVE), that measures the extent to which the group of the items variances is explained by the latent variable (Fornell and Larcker, 1981).

All constructs presented good internal consistency values (Cronbach α) as shown in Table 38.

Table 38: Cronbach alphas of the model variables (users' sample)

Variables	Cronbach α
Perceived benefits	
Information Awareness	0.94
Entertainment	0.91
Pass Time	0.94
Status/Image	0.95
Privacy	0.85
Convenience	0.84 (vs. 0.66 for non-users)
Perceived monetary costs (Price)	0.73
Non monetary costs (Battery Cons.)	0.76
Perceived Quality of Service	
Reliability	0.89
Multimedia Quality	0.87
Ease of Use	0.76
Speed	0.85
Content	0.84
Perceived Value	0.84
Behavioral Intention	0.94

As these values are all above the desirable level of 0.70-0.80, we conclude that the scales are reliable and the measures present content validity (Churchill, 1979).

Regarding composite reliability, all the scales present values well above the desirable levels of $\rho > 0.70$ (Bagozzi, 1980), suggesting good composite reliability. As for AVE, except for monetary costs, the average variance extracted of all other constructs is greater than the

desired level of 0.50, meaning that at least 50% of the variance is explained by the latent variable. Monetary Costs has an AVE of 47%; however, given the theoretical relevance of this construct and the results regarding its composite reliability (ρ) and internal consistency (Cronbach alpha), we decided to keep the scale in the model.

Composite Reliability and Average Variance Extracted scores are presented in Table 39.

Table 39: Composite Reliability and Average Variance Extracted (users' sample)

	Composite Reliability	Average Variance Extracted
Perc Benefits	0.985	0.606
Perc Quality of Serv	0.942	0.590
Perc Monetary Costs	0.968	0.472

To assess convergent validity, we analyzed factor loadings, standard errors, t-values and significance values of the variables included in the measurement model. These are indicated in Table 40. All the scales show significant paths with the respective dimensions and high factor loadings (≥ 0.5), presenting desirable levels of composite reliability (Marôco, 2010). Moreover, we checked the t-values and level of significance for these loadings and confirmed they were all significant at $p < 0.001$. Table 40 summarizes these results.

Table 40: Factor loadings, standard errors, t-values and significance values of the model latent variables (users' sample)

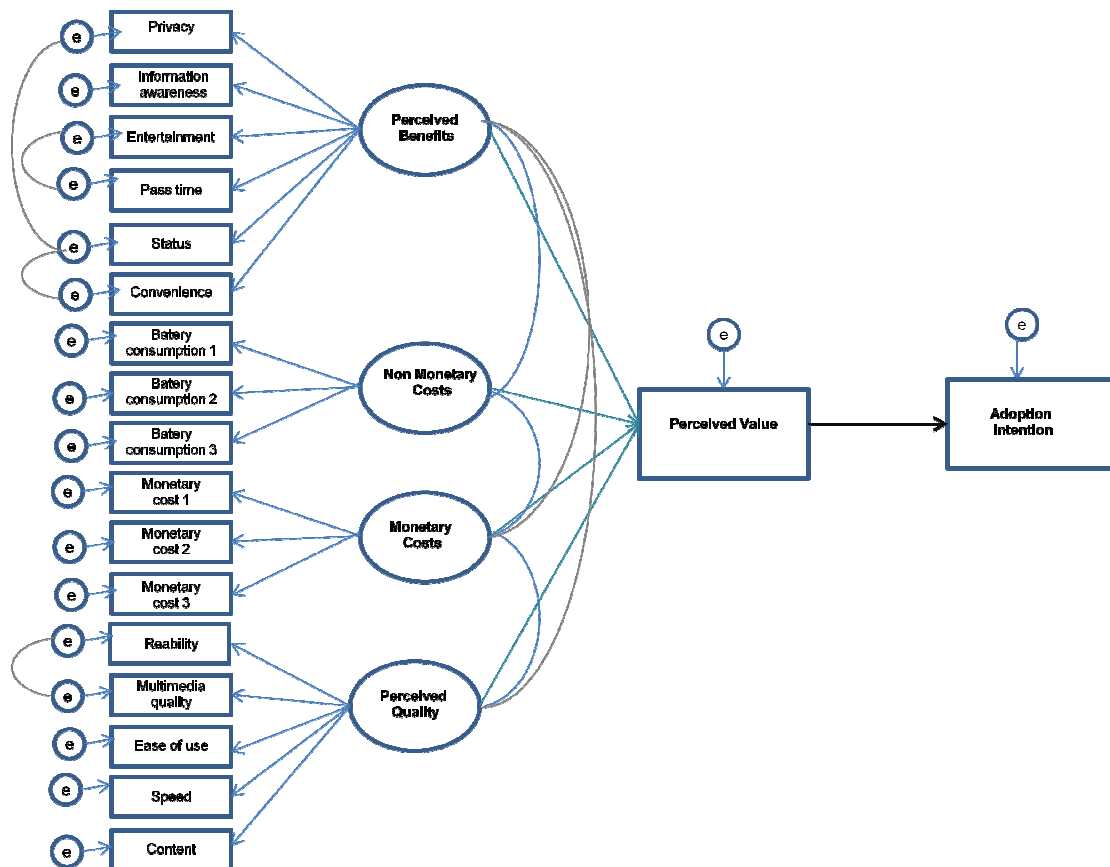
		Estimate	Standardized Estimate	Standard Error	Critical Ratio (t)	p
Perc Benefits	Privacy	1.172	0.799	0.126	9.341	0.00
	Status	1.045	0.600	0.164	6.355	0.00
	Entertainment	1.11	0.861	0.106	10.481	0.00
	Info Awareness	1.052	0.715	0.132	7.977	0.00
	Pass Time	1.136	0.840	0.113	10.085	0.00
	Convenience	1.208	0.824	0.123	9.786	0.00
Perc Quality of Service	Content	0.688	0.631	0.105	6.529	0.00
	Speed	0.809	0.726	0.103	7.83	0.00
	MultimediaQual	0.991	0.789	0.113	8.769	0.00
	Reliability	0.982	0.808	0.108	9.071	0.00
	Ease of Use	0.462	0.512	0.091	5.08	0.00
Perc Mon. Costs	Mon. Costs 1	1.033	0.532	0.200	5.157	0.00
	Mon. Costs 2	1.199	0.651	0.189	6.353	0.00
	Mon. Costs 3	1.654	0.923	0.185	8.948	0.00

6.4.3 Structural Model

6.4.3.1 Non-Users' Sample

The test of the model main hypotheses was done by analyzing the structural model, as presented in Figure 29. The model included *paths* between Perceived Benefits, Monetary Costs, Non-monetary Costs, Perceived Quality of Service and Perceived Value and, between Perceived Value and Adoption Intention. Additionally, we assumed the correlations between Perceived Benefits and Perceived Quality of Service (for parsimony reasons, the results of the correlations between the errors of some of the model scales will not be included in this section).

Figure 53: Structural model to test the antecedents of Mobile TV adoption (non users' sample)



The results of the structural model test showed a good fit to the data ($\chi^2/df=2.018$; CFI=.97; PCFI=.78; GFI=.92; PGFI=.78; RMSEA=.06). The ratio Qui-square/degrees of freedom ($\chi^2/df=2.0$) indicates a good model fit (Marôco, 2010). The GFI index, another absolute index, exceeds 0.90, indicating a good model fit (ibidem, 2010). The CFI at 0.97 (>0.95) indicates a very good model fit. The parsimony indices PCFI and PGFI (both higher than 0.60) evidence a good model fit (the PCFI at 0.78 almost reaches the criterion for a very good model fit- ≥ 0.8). The RMSEA (with confidence interval at 90%) is lower than 0.10, suggesting a good model fit⁹. The modification indices did not present relevant suggestions to improve the model.

By calculating the Mahalanobis distance, we identified 56 multivariate outliers. The global quality of the model fit excluding these cases did not present relevant differences ($\Delta\chi$, $p \leq 0.05$). Therefore, we include the outliers in the studied sample.

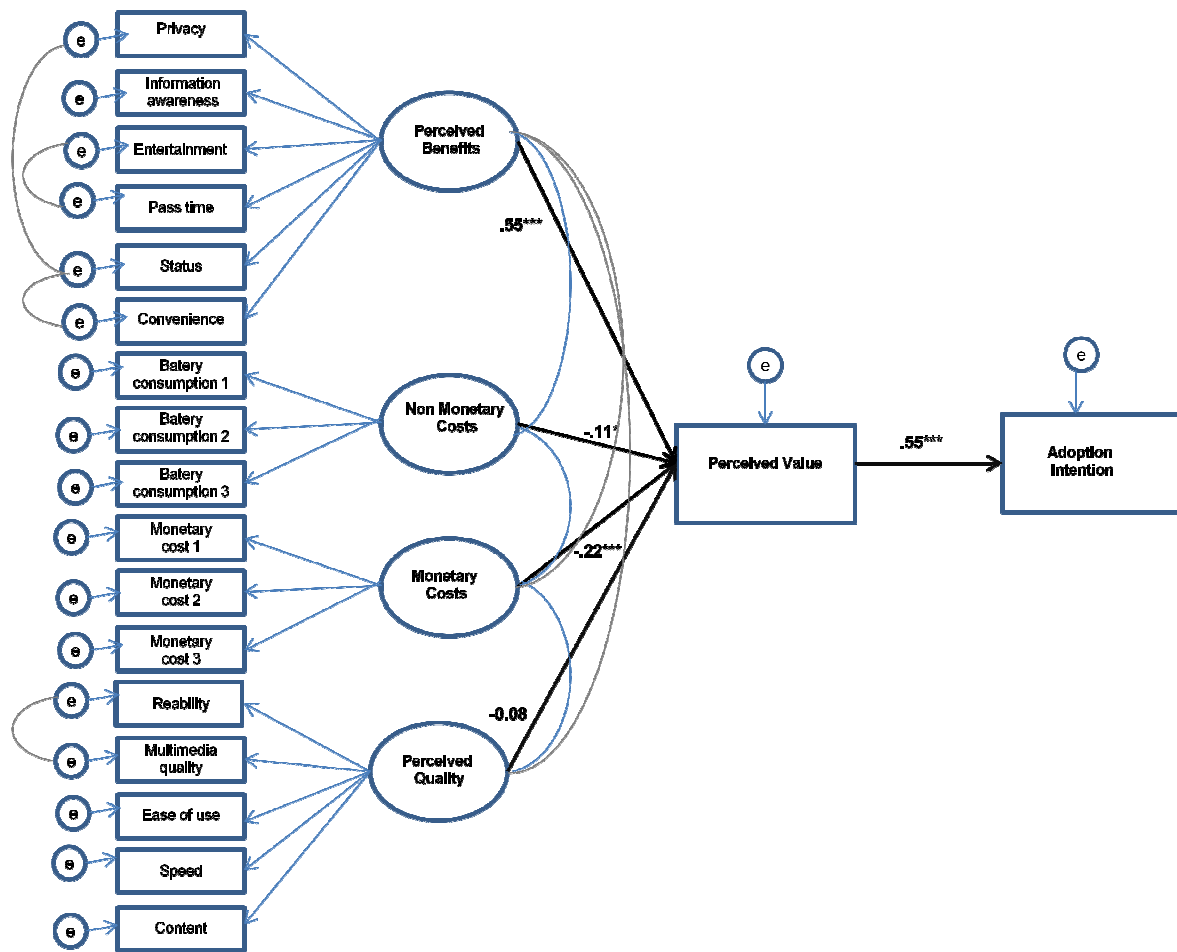
Table 41: Goodness of fit indices for the structural model (non-users' sample)

	χ^2	χ^2/DF	p	CFI	PCFI	GFI	PGFI	RMSEA
Structural Model	308.25 (147), N=400	2.018	.000	.97	.78	.92	.68	.06

The estimated parameters are presented in Figure 30 and in Tables 22 and 23.

⁹ All model fit assessment criteria based on Marôco, 2010

Figure 54: Final structural model to test the antecedents of Mobile TV adoption intention (non-users' sample)



Notes: The estimated parameters are presented in their standardized form. * $p < .05$, ** $p < .01$; *** $p < .001$. For simplification reasons, the correlation coefficients are not presented in the graphic representation.

Table 42: Factor loadings, standard errors, t-values and significance values of the model variables (non-users' sample)

			Estimate	Standardized Estimate	R ²	Standard Error	Critical Ratio	p
PValue	<---	PBenefits	0.715	0.551	0.304	0.076	9.386	0.000
PValue	<---	P Quality	-0.099	-0.076	0.006	0.065	-1.531	0.126
PValue	<---	Mon. Costs	-0.278	-0.215	0.146	0.067	-4.159	0.000
PValue	<---	Bat.Cons.	-0.136	-0.105	0.011	0.060	2.259	0.024
Ad. Int.	<---	PValue	0.649	0.550	0.303	0.049	13.152	0.000

As hypothesized and for the non-users' sample, we identified a positive relationship between Perceived Benefits and Perceived Value (H2); a negative relationship between Monetary

Costs and Perceived Value (H3), a negative relationship between Non-Monetary Costs and Perceived Value (H4) and a positive relationship between Perceived Value and Adoption Intention (H1). We did not identify a statistically significant positive relationship between Perceived Quality of Service and Perceived Value (H5).

For the non-users' sample, the Perceived Value of Mobile TV seems to depend mainly from its Perceived Benefits ($\beta=.55$, $p<.000$; $R^2 = .30$) and from Monetary Costs ($\beta= -.022$, $p<.000$; $R^2 = .15$). Non-monetary costs ($\beta= -.011$, $p<.000$; $R^2 = .01$), despite being statistically relevant ($p<0.05$), have a quite low coefficient ($R^2 = 0.01$), explaining less than 1% of the variability of the Perceived Value data. Perceived Quality of Service did not reveal to be a predictive factor of Mobile TV Perceived Value for the non-users' sample as this path is not significant ($p>0.05$).

The direct relationship between Mobile TV Perceived Value and its Adoption Intention is positive and significant ($\beta=.55$, $p<.000$), explaining about 30% of the latter results' variability. As hypothesized and for the non-users sample, the higher the Perceived Value of the Mobile TV service, the higher the behavioral intention to adopt it/use it.

Regarding the model correlations (Table 43), they are all significant with the exception of the relationship between Monetary Costs and Perceived Quality of Service. Perceived Benefits is positively related with Perceived Quality ($r=0.446$, $p<0,000$) and negatively correlated with Monetary Costs ($r=-.291$, $p<0.000$). The correlation coefficient between Perceived Benefits and Non-monetary Costs, despite being significant, is too low to be considered as relevant ($r=.110$, $p<0.000$). The same can be said about the correlation coefficient between Perceived Quality and Non-monetary Costs ($r=-.135$, $p<0.05$).

Table 43: Correlation coefficients in the structural model (non-users' sample)

			Estimate	Standard Error	Critical Ratio	p
PBenefits	<-->	P Quality	.446	.047	9.593	0.000
P Quality	<-->	Bat Cons.	.135	.053	2.534	.011
Mon. Costs	<-->	Bat Cons.	.239	.055	4.361	0.000
PBenefits	<-->	Mon. Costs	-.291	.056	-5.217	0.000
P Quality	<-->	Mon. Costs	.005	.056	.082	.935
PBenefits	<-->	Bat Cons.	.110	.057	1.922	.055

Table 44 synthesizes the results of the hypotheses tested through the structural model for the non-users' sample.

Table 44: Summary of the structural model hypotheses' tests for the non-users sample

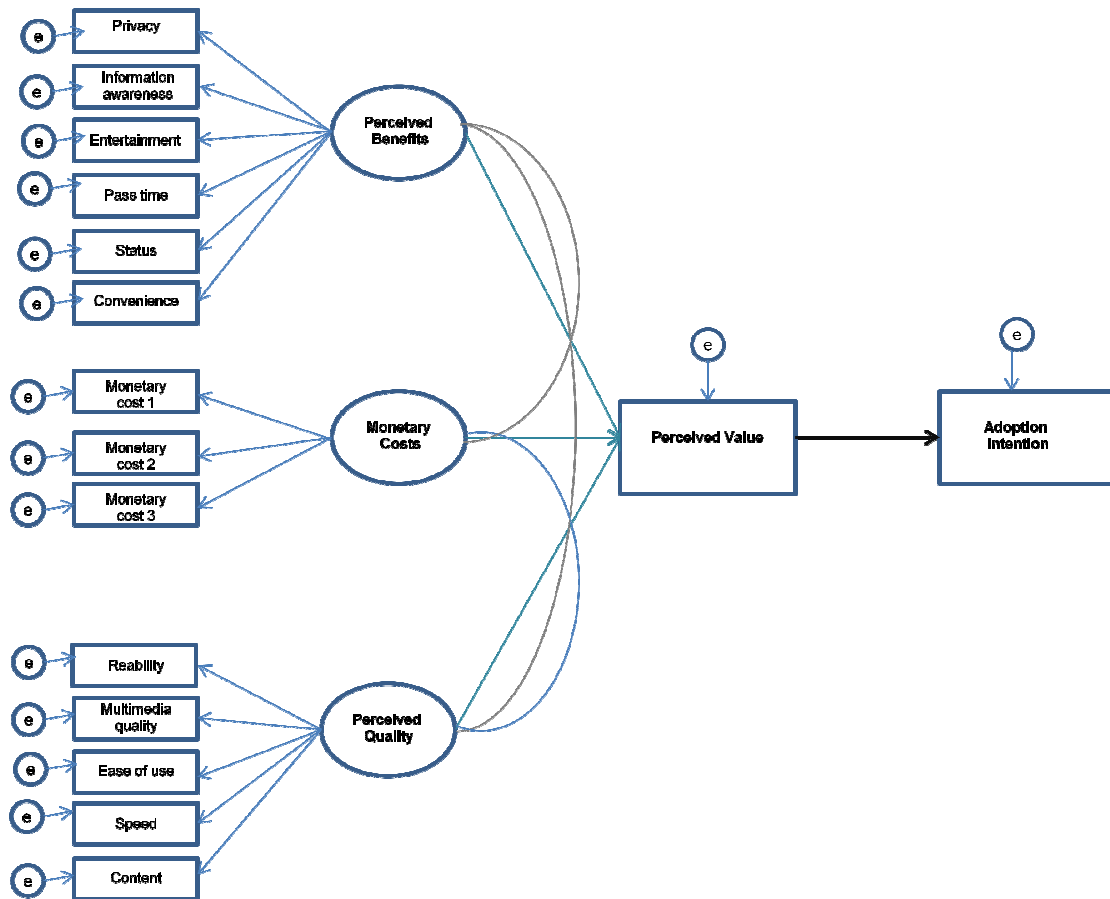
Hypotheses	Description	+/-	Conclusion
H2	The higher the Perceived Benefits of the Mobile TV service, the higher its Perceived Value.	+	✓
H3	The higher the Perceived Monetary Costs of Mobile TV, the lower its Perceived Value.	-	✓
H4	The higher the Perceived Non-Monetary Costs of Mobile TV, the lower its Perceived Value.	-	✓
H5	The higher the Perceived Quality of Service of Mobile TV, the higher its Perceived Value.	+	X
H1	The higher the Perceived Value of Mobile TV, the higher its Adoption Intention.	+	✓

We conclude that, four out of the five main hypotheses initially formulated and tested through structural equation modeling were supported while one (H5) was rejected. These results will be discussed in the next chapter.

6.4.3.2 Users' Sample

As for the non-users' sample, the test of the model main hypotheses was done by analyzing the structural model, as presented in Figure 55. The model included *paths* between Perceived Benefits, Monetary Costs, Perceived Quality of Service and Perceived Value and, between Perceived Value and Adoption Intention. Additionally, we assumed the correlations between Perceived Benefits and Perceived Quality of Service (for parsimony reasons, the results of the correlations between the errors of some of the model scales will not be included in this section).

Figure 55: Final structural model to test the antecedents of Mobile TV adoption intention (users' sample)



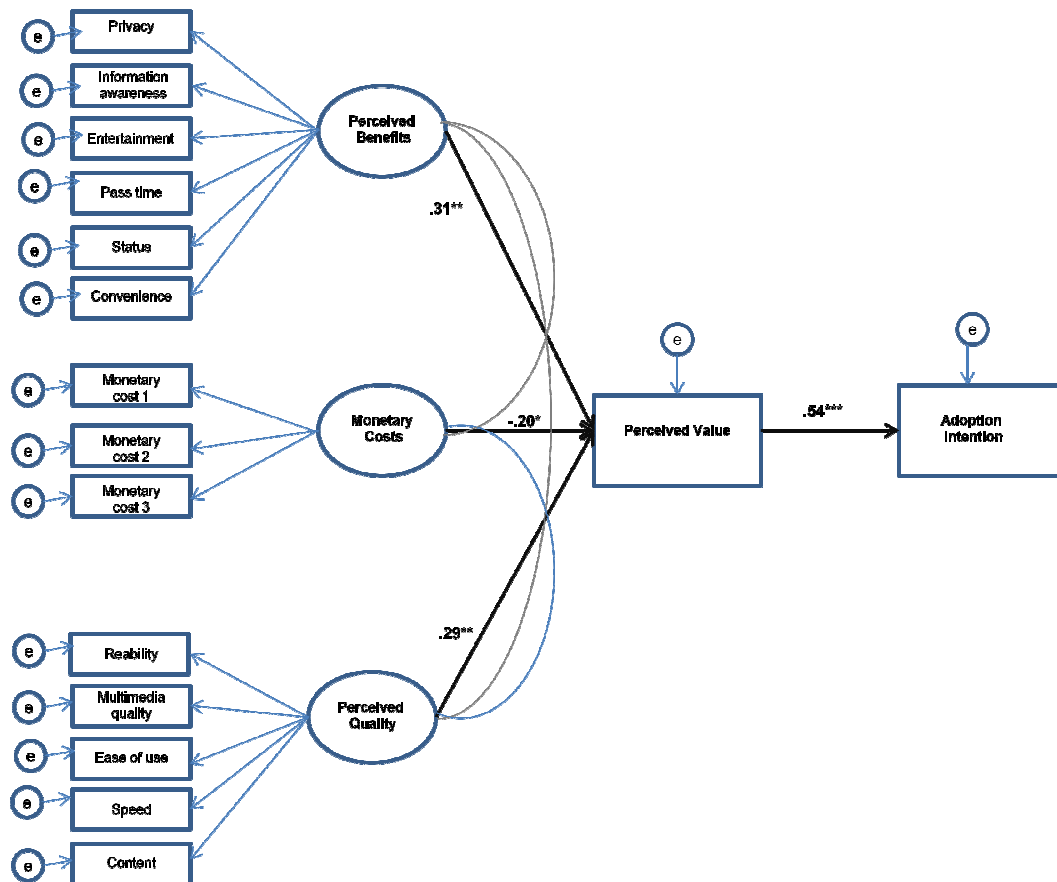
The results of the structural model test showed a poor fit to the data ($\chi^2/df=2.73$; CFI=.8; PCFI=.66; GFI=.74; PGFI=.54; RMSEA=.15). SEM modification indices did not suggest the addition of new parameters to significantly improve the model fit. In spite of the poor model fit to the data, we proceeded with the analysis of the model estimates although being aware of its limitations: as previously highlighted, we are conscious that the ratio sample size/model variables is low to use SEM but a good-fitting model is not necessarily a valid model and conversely (Kenny and McCoach, 2003). Hence, we decided to pursue with SEM analysis also for the users' sample and we believe that, even if the model fit is poor, the results provide us a rough indication of how the constructs behave and relate with one another (although not overlooking the fact that, a higher sample size could have impacts in the results).

Table 45: Goodness of fit indices for the structural model (users' sample)

	$\chi^2/$	χ^2/DF	p	CFI	PCFI	GFI	PGFI	RMSEA
Final Structural Model	270.29 (99)	2.730	.000	.80	.66	.74	.54	.15
N= 100								

The estimated parameters are presented in Figure 56 and in Tables 46 and 47.

Figure 56: Final structural model to test the antecedents of Mobile TV adoption intention (Users' sample)



Notes: The estimated parameters are presented in their standardized form. * $p < .05$, ** $p < .01$; *** $p < .001$. For simplification reasons, the correlation coefficients are not presented in the graphic representation.

Table 46: Factor loadings, standard errors, t-values and significance values of the model variables (users' sample)

			Estimate	Standardized Estimate	R²	Standard Error	Critical Racio	P
PValue	<---	PBenefits	0.419	0.309	0.195	0.149	2.818	0.005
PValue	<---	PQuality	0.390	0.287	0.182	0.144	2.708	0.007
PValue	<---	Mon. Costs	-0.275	-0.202	0.141	0.136	-2.017	0.044
Adop. intent	<---	PValue	0.745	0.543	0.295	0.116	6.435	0.000

All the estimated coefficients show statistical relevance and corroborate the hypothesized model relationships. As suggested by Kenny and Mc Coach (2003), a model can have a poor fitting but all its parameters being statistically significant (as happens with our model). Hence, we should not neglect the limitations of this analysis but at the same time, we should not disregard its results: except for non-monetary costs (battery consumption), that was dropped from the model in the previous section, all the hypotheses are supported, according to the analyzed data.

As hypothesized and for the users' sample, we identified a positive relationship between Perceived Benefits and Perceived Value (H2); a negative relationship between Monetary Costs and Perceived Value (H3), a positive relationship between Perceived Quality of Service and Perceived Value (H5) and a positive relationship between Perceived Value and Adoption Intention (H1).

For the users, the Perceived Value of Mobile TV seems to depend mainly from its Perceived Benefits ($\beta=.31$, $p<.000$; $R^2= 0.195$) and from its Perceived Quality of Service ($\beta=0.29$, $p<.000$; $R^2= 0.18$). Monetary Costs ($\beta= -0.20$, $p<.000$; $R^2= 0.14$) is also predictor of Perceived Value, although the coefficient is lower. We highlight the difference vs. the non-users' sample regarding Perceived Quality of Service: while the relationship was not statistically significant in the non-users' sample (Quality of Service was not a predictor of Perceived Value), in the users' sample Perceived Quality of Service confirms to be an important predictor of Mobile TV Perceived Value.

The direct relationship between Mobile TV Perceived Value and its Adoption Intention is positive and significant ($\beta=.54$, $p<.000$), explaining about 30% of the latter results' variability. As hypothesized and for the users sample, the higher the Perceived Value of the Mobile TV service, the higher the behavioral intention to adopt it/use it.

Regarding the model correlations (users' sample), as shown in Table 47, they are all significant. Perceived Benefits is positively related with Perceived Quality ($r=0.503$, $p<0.000$) and negatively correlated with Monetary Costs ($r=-.447$, $p<0.000$). Perceived Quality of Service is also negatively correlated with Monetary Costs ($r=-.341$, $p<0.000$).

Table 47: Correlation coefficients in the structural model (users' sample)

			Estimate	Standardized Estimate	Standard Error	p
PBenefits	<-->	P Quality	.503	.089	5.661	0.000
PBenefits	<-->	Mon. Costs	-.447	.095	-4.712	0.000
P Quality	<-->	Mon. Costs	-.341	.106	-3.221	0.000

Table 48 synthesizes the results of the hypotheses tested through the structural model for the users' sample.

Table 48: Summary of the structural model hypotheses tests for the users' sample

Hypotheses	Description	+/-	Conclusion
H2	The higher the Perceived Benefits of the Mobile TV service, the higher its Perceived Value.	+	✓
H4	The higher the perceptions of Mobile TV Non-Monetary Costs, the lower its Perceived Value.	-	Not Tested
H3	The higher the Perceived Monetary Costs of Mobile TV, the lower its Perceived Value.	-	✓
H5	The higher the Perceived Quality of Service of Mobile TV, the higher its Perceived Value.	+	✓
H1	The higher the Perceived Value of Mobile TV, the higher its Adoption Intention.	+	✓

We conclude that, four out of the five main hypotheses initially formulated and tested through structural equation modeling were supported while one (H4) could not be tested through structural equation modeling because, as explained in the Measurement Model section, including the variable Non-Monetary Costs (Battery Consumption) in the model led to unacceptable negative co-variances and the model did not run; this variable was, therefore, drawn from the model at that stage and H4 was tested by using Pearson correlation analysis (see next section). These results will be discussed in the next chapter.

6.4.4 Additional Hypotheses Testing through Correlation Study

6.4.4.1 Non-Users' Sample

In the present study, we aimed to assess if the different components that constitute the multi-dimensional variables **Perceived Benefits** (Information Awareness, Entertainment, Pass Time, Status, Privacy and Convenience), and **Perceived Quality of Service** (Reliability, Multimedia Quality, Ease of Use, Speed, Content), were related with **Perceived Value**, as conceptually hypothesized:

Table 49: Additional research hypotheses tested through correlations' study

H2a): Greater perceived Information Awareness is associated with greater Perceived Value of Mobile TV (or Information Awareness is positively related to Perceived Value).
H2b): Greater perceived Entertainment is associated with greater Perceived Value of Mobile TV (or Perceived Entertainment is positively related to Perceived Value).
H2c): The higher the consumers' perceptions of Mobile TV as a way to (better) Pass their Time in slack periods, the greater the perceived value of Mobile TV (or Pass Time is positively related to Perceived Value).
H2d): The higher the perception of Mobile TV as a Status and image enhancement symbol, the greater the Perceived Value of Mobile TV (or Personal Status enhancement is positively related to Perceived Value).
H2e): The higher the consumer perception of Mobile TV as being Convenient, the greater the Perceived Value of Mobile TV (or Convenience is positively related to Perceived Value).
H2f): The higher the consumer perception of Mobile TV as a means of providing Privacy moments, the greater the Perceived Value of Mobile TV (or Privacy is positively related to Perceived Value).
H5: The higher the Perceived Quality of Service of Mobile TV, the higher its Perceived Value (or Perceived Quality of Service is positively related to Perceived Value).
H5a): The higher the Reliability of the Mobile TV service, the higher its Perceived Value (or Reliability is positively related to Perceived Value).
H5b): The higher the Perceived Multimedia Quality of the Mobile TV service, the higher its Perceived Value (or Multimedia Quality is positively related to the Perceived Value of Mobile TV).
H5c): The higher the perceived Ease of Use of the Mobile TV service, the higher its Perceived Value (or Perceived Ease of Use is positively related to Perceived Value).
H5d): The higher the Speed of the Mobile TV service, the higher its Perceived Value (or the Mobile TV service Speed is positively related to Perceived Value).

To test these hypotheses we assessed the relationships between the variables and Perceived Value by conducting correlation tests, namely Pearson's correlation test.

The results show there are statistically significant relationships between the different variables and Perceived Value. Specifically, for the different components of Perceived Benefits, we observe positive and significant relationships between Information Awareness and Perceived Value ($r=.353$, $p=.001$), Entertainment and Perceived Value ($r=.401$, $p=.001$), Pass Time and Perceived Value ($r=.399$, $p=.001$), Status and Perceived Value ($r=.466$, $p=.001$), Privacy and Perceived Value ($r=.430$, $p=.001$), Convenience and Perceived Value ($r=.503$, $p=.001$). These results suggest that, the higher the perceptions of the different Mobile TV benefits/gratifications, the higher the Perceived Value of Mobile TV (Table 50).

Table 50: Correlations between Perceived Value and the different dimensions of Perceived Benefits (non-users' sample)

		Information Awareness	Entertainment	Pass Time	Status	Privacy	Convenience
Perceived Value	r	.353	.401	.399	.466	.430	.503
	p.	.000	.000	.000	.000	.000	.000
	N	400	400	400	400	400	400

Regarding the different dimensions of Perceived Quality of Service, we also observe positive relationships with Perceived Value for all of them although the correlation coefficients are less expressive, namely: Reliability and Perceived Value ($r=.107$, $p=.033$), Multimedia Quality and Perceived Value ($r=.133$, $p=.008$), Ease of Use and Perceived Value ($r=.197$, $p=.001$), Speed and Perceived Value ($r=.137$, $p=.006$), Content and Perceived Value ($r=.172$, $p=.001$) (Table 51).

Table 51: Correlations between Perceived Value and the different dimensions of Perceived Quality of Service (non-users' sample)

		Reliability	Multimedia Quality	Ease of Use	Speed	Content
Perceived Value	r	.107	.133	.197	.137	.172
	p.	.033	.008	.000	.006	.001
	N	400	400	400	400	400

Table 52 summarizes the results of the hypotheses tested through the correlation study.

Table 52: Results of the hypotheses tested through the correlation study (non-users' sample)

Hypotheses	Description	Conclusion
H2a)	Information Awareness is positively related to Perceived Value	✓
H2b)	Perceived Entertainment is positively related to Perceived Value	✓
H2c)	Pass Time is positively related to Perceived Value	✓
H2d)	Personal Status enhancement is positively related to Perceived Value	✓
H2e)	Convenience is positively related to Perceived Value	✓
H2f)	Perceived Privacy is positively related to Perceived Value	✓
H5a)	Reliability is positively related to Perceived Value	✓
H5b)	Multimedia Quality is positively related to the Perceived Value of Mobile TV	✓
H5c)	Perceived Ease of Use is positively related to Perceived Value	✓
H5d)	Speed is positively related to Perceived Value.	✓
H5e)	Content is positively related to Perceived Value of Mobile TV.	✓

We conclude that the eleven hypotheses tested through Pearson correlation study were supported for the non-users' sample. These results will be discussed in the next chapter.

6.4.4.2 Users' sample

As with the non-users' sample, we aimed to assess if the components that constitute the multi-dimensional variables of **Perceived Benefits** (Information Awareness, Entertainment, Pass Time, Status, Privacy and Convenience) and **Perceived Quality of Service** (Reliability, Multimedia Quality, Ease of Use, Speed, Content), were related with **Perceived Value**, as conceptually hypothesized (see Table 49). We also assessed the relationship between **Non-Monetary Costs** (battery consumption) and Perceived Value, as the former was excluded from the structural model test (for reasons already mentioned).

As with the non-users' sample, to test these hypotheses we assessed the relationships between the variables and Perceived Value by conducting correlation tests, namely Pearson's correlation test.

The results show there are statistically significant relationships between the different variables and Perceived Value. Specifically, for the different components of Perceived Benefits, we observe positive and significant relationships between Information Awareness and Perceived Value ($r=.419$, $p=.001$), Entertainment and Perceived Value ($r=.374$, $p=.001$), Pass Time and Perceived Value ($r=.282$, $p=.001$), Status and Perceived Value ($r=.573$, $p=.001$), Privacy and Perceived Value ($r=.542$, $p=.001$), Convenience and Perceived Value ($r=.511$, $p=.001$). These results indicate that, the higher the perceptions of the different Mobile TV benefits/gratifications, the higher the Perceived Value of Mobile TV, (cf Table 53).

Table 53: Correlations between Perceived Value and the different dimensions of Perceived Benefits (users' sample)

		Information Awareness	Entertainment	Pass Time	Status	Privacy	Convenience
Perceived Value	r	.419	.374	.282	.573	.542	.511
	p.	.000	.000	.000	.000	.000	.000
	N	100	100	100	100	100	100

Regarding the different dimensions of Perceived Quality of Service, except for Ease of Use we also observe positive relationships with Perceived Value and the correlation coefficients are much more expressive than in the non-users' study, namely: Reliability and Perceived Value ($r=.429$, $p=.001$), Multimedia Quality and Perceived Value ($r=.414$, $p=.001$), Speed and Perceived Value ($r=.301$, $p=.002$), Content and Perceived Value ($r=.518$, $p=.001$). These results indicate that, with the exception of Ease of Use, the higher the perceptions of the extant Quality of Service dimensions, the higher the Perceived Value of Mobile TV. Concerning Ease of Use, we did not find a statistically significant relationship between this variable and Perceived Value in the users' group ($r=.016$, $p=.872$). This may be due to the fact that, the users being more experienced and having already tried the service, the Ease of Use criterion becomes less relevant for their service value assessment. It has been suggested in previous studies (e.g., Huang et al., 2012; Moores, 2012; Venkatesh et al., 2003) that Ease of Use is less relevant with time, as consumers experiment a technology and get used to it.

As above mentioned, we also tested the relationship between Non-monetary costs (Battery Consumption) and Perceived Value (which could not be assessed in the structural model) and we did not find a statistically significant relationship, i.e., Perceived Value is not related with the perception of Battery Consumption for the users' sample ($r= -.012$, $p=.908$) (cf. Table 54).

Table 54: Correlations between Perceived Value and the different dimensions of Perceived Quality of Service and Non-monetary costs (users' sample)

		Battery Consumption	Reliability	Multimedia Quality	Ease of Use	Speed	Content
Perceived Value	r	-.012	.429	.414	.016	.301	.518
	p	.908	.000	.000	.872	.002	.000
	N	100	100	100	100	100	100

Table 55 summarizes the results of the hypotheses tested through the correlation study.

Table 55: Results of the hypotheses tested through the correlation study (users' sample)

Hypotheses	Description	Conclusion
H2a)	Information Awareness is positively related to Perceived Value	✓
H2b)	Perceived Entertainment is positively related to Perceived Value	✓
H2c)	Pass Time is positively related to Perceived Value	✓
H2d)	Personal Status enhancement is positively related to Perceived Value	✓
H2e)	Convenience is positively related to Perceived Value	✓
H2f)	Perceived Privacy is positively related to Perceived Value	✓
H5a)	Reliability is positively related to Perceived Value	✓
H5b)	Multimedia Quality is positively related to the Perceived Value of Mobile TV	✓
H5c)	Perceived Ease of Use is positively related to Perceived Value	X
H5d)	Speed is positively related to Perceived Value.	✓
H5e)	Content is positively related to Perceived Value of Mobile TV.	✓
H4)	Battery Consumption is negatively related to Perceived Value	X

We conclude that, for the users' sample, ten out of the twelve hypotheses conceptually formulated and tested through Pearson correlation study were supported while two (H4 and H5c) were not supported because the relationships were not significant ($p > 0.5$). Namely, the hypothesis that Battery Consumption would be negatively related to Perceived Value (that could not be tested in the structural model for the users' sample) was not supported. These results will be discussed in the next chapter.

6.4.5 Multi-Group Analyses

Finally and adding to the main purposes of our quantitative study, we used multi-group analysis to assess if there was any moderation effect of some of the demographic variables on the intention to adopt Mobile TV.

SEM allows to analyze simultaneously the data of different sub-samples and to test the differences between the groups by forcing some of the model parameters to remain unchanged. We followed the steps suggested by Jap and Anderson (2003) for this kind of analysis consisting on three sequential steps: 1) assessing the models' fits and respective estimates without fixing any kind of restriction (with free structural coefficients); 2) assessing the models' fits and respective estimates with constrained structural coefficients; 3) hypotheses testing regarding the invariance of the structural coefficients.

In a first stance, we tested the measurement model invariance (assessed in both groups by comparing the non-constrained model with a constrained model where the factor loadings and the variances/co-variances of both groups were fixed). Then, we conducted a test to the structural invariance of the model by comparing the model with free structural coefficients vs. the model with constrained structural coefficients (and equal in both groups) (Maroco, 2010). Statistically significant differences between the structural coefficients of the groups defined by the variables in question indicate a moderating effect of those variables in the model relationships. In case the model with constrained structural coefficients shows a worse model fit, we conclude that there are relevant differences between the groups and therefore, a moderating effect of the studied variable.

Taking into account simultaneously the practical and theoretical relevance of the variables, we decided to study the possible moderating effect of the variables "Smartphone possession" (yes/no), "age group" (≤ 35 years' old vs. > 35 years' old), "gender" and "education level" (up to high school degree vs. university degree). We highlight that, when describing and characterizing the samples, we had identified significant differences between the users and the non-users' regarding the variables "Smartphone possession" (much higher percentage within the users' group), "gender" (much higher percentage of males in the users' group) and "education level" (globally lower education level within the users' group). Furthermore, gender has been identified in the literature as a moderator of technology adoption (e.g., Yang

and Lee, 2010; Im, Kim and Han, 2008; Nysveen, Pedersen and Thorbjörnsen, 2005). As far as “age” is concerned, although we did not find significant differences between the users and the non-users’ groups in the samples’ characterization, industry experts in our qualitative study had suggested that age might influence Mobile TV adoption. Besides, age has also been identified in the literature as influencing technology adoption (e.g. Venkatesh *et al.*, 2003; Yang and Jolly, 2008; Yousafzai and Yani-de-Sorieno, 2012).

The results were the following:

6.4.5.1 Smartphone Possession

For the comparison between the individuals that possessed a Smartphone and those that didn’t, the model with similar structural coefficients for both groups doesn’t present a worse model fit when compared with the unconstrained model. Therefore, we assume there are no relevant differences between the two groups (assuming that the models are invariant relative to the factor loadings): $\chi^2_{\text{diff.}}(22) = 77.33$, $p=0.745$.

Table 56: Standardized estimates of the structural relationships by Smartphone possession group

Structural Relationships			With smarthphone			No smarthphone		
			Estimate*	Standard Error	Critical Ratio	Estimate*	Standard Error	Critical Ratio
PValue	<---	PBenefits	0,570	0,107	6,584	0,558	0,090	7,925
PValue	<---	P Quality	-0,228	0,098	-2,876	0,038	0,082	0,590
PValue	<---	Mon. Costs	-0,338	0,089	-4,691	-0,200	0,076	-3,354
PValue	<---	Bat.Cons.	0,164	0,083	2,442	0,064	0,073	1,119
Ad. Int.	<---	PValue	0,494	0,078	7,303	0,574	0,066	10,708

Note: *in a totally standardized to a common metric solution.

6.4.5.2 Age

The conclusions of the multi-group analysis based on the age group (≤ 35 years’ old vs. > 35 years’ old) are exactly the same: the model with similar structural coefficients for both groups doesn’t present a worse model fit when compared with the unconstrained model. Therefore, we assume there are no relevant differences between the two age groups (assuming that the models are invariant relative to the factor loadings): $\chi^2_{\text{diff.}}(22) = 24.88$, $p=0.303$.

Table 57: Standardized estimates of the structural relationships by age group

Structural Relationships			18-35 years' old			> 35 years' old		
			Estimate*	Standard Error	Critical Ratio	Estimate*	Standard Error	Critical Ratio
PValue	<---	PBenefits	0,557	0,086	8,343	0,580	0,112	5,920
PValue	<---	P Quality	-0,111	0,079	-1,828	-0,034	0,101	-0,386
PValue	<---	Mon. Costs	-0,228	0,073	-4,033	-0,286	0,089	-3,649
PValue	<---	Bat.Cons.	0,167	0,070	3,078	-0,030	0,084	-0,416
Ad. Int.	<---	PValue	0,553	0,059	11,013	0,488	0,101	6,210

Note: *in a totally standardized to a common metric solution.

6.4.5.3 Gender

For the comparison between males and females, as with the previous variables, the model with similar structural coefficients for both groups doesn't present a worse model fit when compared with the unconstrained model. Therefore, we assume there are no relevant differences between the two gender groups (assuming that the models are invariant relative to the factor loadings): $\chi^2_{\text{diff.}}(22) = 26.33$, $p=0.237$.

Table 58: Standardized estimates of the structural relationships by gender

Structural Relationships			Males			Females		
			Estimate*	Standard Error	Critical Ratio	Estimate*	Standard Error	Critical Ratio
PValue	<---	PBenefits	.587	.105	7.428	.503	.108	5.809
PValue	<---	P Quality	-.147	.088	-2.228	.004	.093	.049
PValue	<---	Mon. Costs	-.225	.095	-3.153	-.225	.092	-3.063
PValue	<---	Bat.Cons.	.142	.084	2.270	.058	.085	.846
Ad. Int.	<---	PValue	.553	.064	10.059	.546	.078	8.452

Note: *in a totally standardized to a common metric solution.

6.4.5.4 Education Level

For the comparison based on the education level, we dichotomized the sample into “up to high school degree” and “university degree”. As with the previous variables, the model with similar structural coefficients for both groups doesn't present a worse model fit when compared with the unconstrained model. Hence, we assume there are no relevant differences between the two education levels' groups (assuming that the models are invariant relative to the factor loadings): $\chi^2_{\text{diff.}}(22) = 25.61$, $p=0.269$.

Table 59: Standardized estimates of the structural relationships by education level

Structural Relationships			Up to High-school degree			University degree		
			Estimate*	Standard Error	Critical Ratio	Estimate*	Standard Error	Critical Ratio
PValue	<---	PBenefits	.434	.126	4.546	.629	.098	8.234
PValue	<---	P Quality	-.007	.110	-.086	-.129	.081	-2.036
PValue	<---	Mon. Costs	-.229	.108	-2.785	-.200	.085	-3.016
PValue	<---	Bat.Cons.	.163	.098	2.187	.057	.075	.966
Ad. Int.	<---	PValue	.492	.080	7.319	.593	.062	11.173

Note: *in a totally standardized to a common metric solution.

From these four multi-group analyses, we conclude none of the variables (Smartphone possession, age group, gender and education level) exert any significant moderation effect on the structural model relationships. However, we should highlight that the multi-group analyses were conducted only for the (400) non-users' sample. The (100) users' group sample does not allow this type of analysis because of its insufficient dimension. Moreover, we could not conduct the analyses for the total sample of 500 (400 non-users + 100 users) because they did not respond to the same questions; hence, the two groups could not be analyzed together as one sole sample; it would not be methodologically correct from a scientific point of view.

6.5 Analysis of the Answers to Questions 24/36 and 25/37 of the Survey Questionnaire about Reasons for Non Adoption of Mobile TV

Besides the survey questions that aimed to measure the model constructs and allow for model testing and, to the sample characterization questions, based on the results of our pre-test, we have added two questions at the end of the survey questionnaire (Q24-25 and Q36-37) in order to better understand the reasons why respondents do not intend to adopt Mobile TV. The objective of these two questions did not fit within the academic scope of our research nor conceptual model testing but rather, they aimed to increase our understanding of the highly negative patterns towards Mobile TV adoption intention (if the pre-test results were to be replicated) as, for the industry, it is important to understand the motives for such negative behavioral intentions. Hence, for both the users and the non-users' groups, respondents that had answered negatively (points 1-3 of the scale) to all the Adoption Intention questions (Q23 and Q35) were asked to answer two additional questions: the first one (Q24 for non-users or Q36 for users) was a qualitative nominal scale type question that asked respondents to select among the suggested factors, the main reason (only one) why they did not intend to use

Mobile TV in the next six months. The second one (Q25 for non-users or Q37 for users) was a fully qualitative question (free text answer) in which respondents were asked to indicate the factors that could make them change their mind towards Mobile TV adoption.

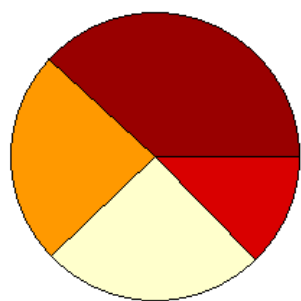
We proceeded to a summary content analysis of the answers to the last question by classifying pieces of text into main categories of reasons that would possibly make consumers change their mind towards adoption of Mobile TV. Our main findings are described hereafter.

Q24 and Q36: Main reason for not using Mobile TV in the next 6 months

This question had four possible suggested answers: (1) Price- “It is too expensive”; (2) TV viewing habits- “I usually don’t watch TV/I don’t like watching TV”; (3) Possession of compatible mobile phone- “I don’t have a mobile phone that supports Mobile TV” and (4) Other reasons- “Another reason. Please specify”. Our choice of these proposed answers was based on findings from our focus groups and market sensibility. For time reasons and because it is somehow redundant with the next question (Q25/Q37), we did not analyze the qualitative answers to the fourth alternative (“please specify”).

Within the non-users’ group (Figure 57), 38.1% of the 236 respondents that answered negatively to the Adoption Intention questions selected as main reason for non adopting the service being too expensive, followed by 25% that chose the fact of not having a Mobile TV compatible handset and 24.2% that chose as main reason not having the habit/not liking watching TV.

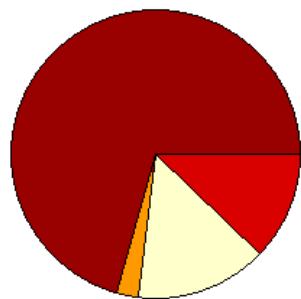
Figure 57: Main reason for not intending to use Mobile TV in the next six months- Non-users’ group







	Cases	%
It's too expensive	90	38.1%
I don't have a mobile phone that supports Mobile TV	57	24.2%
I usually don't watch TV/I don't like watching TV	59	25.0%
Another reason	30	12.7%
Total	236	100%

Within the users' group (Figure 58), 71% of the 41 respondents that answered negatively to the Adoption Intention questions selected the price answer ("it's too expensive") as the main reason for non adopting, followed by 14.6% that chose as main reason not having the habit/not liking watching TV.

Figure 58: Main reason for not intending to use Mobile TV in the next six months- Users' group



	Cases	%
 It's too expensive	29	70.7%
 I don't have a mobile phone that supports Mobile TV	1	2.4%
 I usually don't watch TV/I don't like watching TV	6	14.6%
 Another reason	5	12.2%
Total	41	100%

Q25 and Q37: "What could make you change your mind and become interested in using Mobile TV?"

This question was a purely qualitative question in which the respondents answered by spontaneously eliciting one or several reasons that could possibly make them change their minds towards Mobile TV adoption. Having proceeded to a content analysis of the answers, we identified five main categories: (1) price related issues; (2) willingness to pay (which accounts for all the answers suggesting the service to be absolutely free of charge); (3) quality of service related issues; (4) compatible mobile handset related issues (including not only technical compatibility with the service but also characteristics of the mobile phone associated with a better Mobile TV experience) and (5) a residual category "other reasons".

The list of answers and respective content categorization is shown in the Appendices together with the countings/frequencies for each main category and sub-category. We present and discuss hereafter the respective main findings.

From the content analysis to the answers of the non-users' respondents, we identified:

- Price related issues (lower price, being included in a price bundle with other services, etc.): 90 cases

- Willingness to pay (the service should be free): 52 cases
- Quality related issues (service reliability, sound and image quality, easiness of use, content (number, choice and suitability of channels), service speed): 29 cases
- Possession of a compatible/premium handset (including pricing issues of compatible mobile handsets): 47 cases
- Other: 60 cases, of which:
 - Existence of a free trial period: 17 cases
 - Compatibility (with TV viewing habits, with personal values, with lifestyle): 15 cases
 - Battery consumption: 6 cases

From the content analysis to the answers of the users' respondents, we identified:

- Price related issues (lower price, being included in a price bundle with other services, etc.): 29 cases
- Willingness to pay (the service should be free): 3 cases
- Quality related issues (service reliability, sound and image quality, easiness of use, content (number, choice and suitability of channels), service speed): 14 cases
- Possession of a compatible/premium handset (including pricing issues of compatible mobile handsets): 3 cases
- Other: 6 cases, of which:
 - Compatibility (with TV viewing habits, with personal values, with lifestyle): 3 cases
 - Battery consumption: 1 case

Consistent with the answers to the previous question (main reason for not using Mobile TV), both the non-users and the users' respondents have mostly stated that changes in the Price of the service (lower price; possibility of paying for fewer channels and/or only for the channels they want; Mobile TV being included in a bundle of services) could make them change their mind towards adoption of Mobile TV. This factor was the most cited by respondents of both groups. The second factor for non-users was Willingness to Pay followed closely by Possession of a Compatible Mobile Phone. In the users' group, the second factor was Quality of Service. We still highlight 29/234 cases for Quality of Service issues cited by the non-users' respondents, 17 cases suggesting a free trial period and 15 cases related to Compatibility issues (including affinity with TV viewing in general, compatibility with personal values and compatibility with lifestyle/day-to-day habits).

These findings suggest that the Price factor may have more relevancy and a stronger influence on Mobile TV adoption intentions than what was suggested by the results of our model test (the Price variable's structural coefficients were not very high and, on average, respondents have not evaluated the price variable very negatively). Besides the Price issue, Willingness to Pay aroused as an important explanation why consumers do not intend to use Mobile TV: several respondents would only be interested in using the service if it was totally free of charge, meaning they are not willing to pay for Mobile TV even at a very low price.

The possession of a compatible mobile phone also aroused as an important factor within the non-users' group suggesting it may be a Facilitating Condition for the adoption of Mobile TV (it does not mean that consumers who own compatible mobile phones will adopt Mobile TV but the fact of not having one may be a barrier or, conversely, possession of a compatible handset may facilitate adoption).

Within the users' group, we highlight the prevalence of answers citing Quality of Service related issues, which seems to substantiate our suspicions that a significant part of respondents that tried the service in the past and did not become current users have been unsatisfied and/or disappointed, namely by the poor Quality of Service they experienced.

We should still highlight there was a considerable number of answers stating that the availability of a free trial period could make consumers change their mind regarding their adoption intention. There were also several answers suggesting operators to offer compatible mobile phones for free, others claiming consumers should be able to choose their personalized pack of channels and others suggesting Mobile TV to be a part of a bundle of services.

Besides the richness and usefulness of this information to the industry by helping shedding light on additional factors that influence consumers' intentions towards Mobile TV adoption, these findings suggest that Willingness to Pay, Facilitating Conditions and Compatibility should be considered as additional constructs to account for in future Mobile TV (and/or other mobile services) adoption studies.

6.6 Summary and Conclusions of the Chapter

Throughout this chapter we presented the results of our quantitative study that consisted on a survey conducted to 500 potential consumers of Mobile TV, of which 400 respondents that had never tried the service previously (“non-users’ group”) and 100 respondents that were current users by the time we conducted the survey or had already been users previously (“users’ group”).

First, we proceeded to the sample/sub-samples characterization followed by a descriptive analysis of the model variables, using descriptive and univariate statistical indicators. Next, we used multivariate data analysis, namely the structural equation modeling technique to validate the measures (by assessing their reliability and validity), to assess the quality of the measurement and structural models and to test the hypothesized model relationships. We also used correlation studies, namely Pearson correlation, to test some of the hypotheses that could not be tested using SEM due to the way the model and its variables were specified. We ended up with a multi-group analysis whose purpose was to assess the possible moderating effects of specific variables in consumers’ intention to adopt Mobile TV. Finally, through the means of content analysis, we analyzed the answers to a qualitative question regarding factors that could make respondents change their mind towards the adoption of Mobile TV.

The discussion and implications of the major findings of our quantitative study will be depicted in the next chapter. We will also evidence our research’s theoretical and managerial contributions, point out its limitations and leave some suggestions for future research.

7 DISCUSSION AND CONCLUSIONS

In this chapter we provide a systematized discussion of our quantitative study main findings and their implications, as well as presenting our research's theoretical and practical contributions, limitations and suggestions for future research.

The main objective of our research was to obtain a better understanding of the factors that drive consumer's adoption of Mobile TV. We aimed to overcome some limitations of existing models (as identified in the "Literature review" section) by proposing a new conceptual framework that integrated the perspectives of (1) technology and innovations' adoption, (2) television uses and gratifications, (3) consumer value and (4) quality of service.

Specifically, we investigated the adoption of Mobile TV based on consumers' Perceived Value of the service as derived from its Perceived Benefits (corresponding to gratifications from the U&G theory), its Perceived Costs and its Perceived Quality of Service. Perceived Benefits were composed by the gratifications of Information Awareness, Entertainment, Pass Time, Status/Image, Privacy and Convenience. Perceived Costs included Price as Monetary Cost and Battery Consumption as Non-monetary Cost. Perceived Quality of Service was composed by Reliability, Multimedia Quality, Ease of Use, Speed and Content. The outcome measure was Adoption Intention, which was hypothesized to be predicted by consumers Perceived Value.

Our methodological approach was based on an exploratory qualitative study, consisting on individual interviews with key industry informants and focus groups with potential Mobile TV adopters, and on a "large scale" quantitative study lying in a survey conducted to a sample of 500 Mobile TV potential adopters: 400 respondents that had never tried the service (non-users' group) and 100 respondents that were current Mobile TV users by the time we conducted the study or had already tried it for at least one week (users' group).

Regarding the exploratory qualitative study, it was conducted prior to the model formulation. Its main purpose was to contribute to the theoretical model development by helping us to select and synthesize a wide array of variables previously identified in the literature and to identify new ones that could be relevant to include in our model, taking into account their

practical adequacy to our research problem. We aimed to define a conceptual model and theoretical background that would be pertinent to the mobile telecommunications industry from a management and consumer points of view. The results and conclusions of the qualitative study were already presented in the respective chapter and will not be subject of further discussion here.

As to the quantitative study, we will discuss in the next section its main findings and respective implications with particular emphasis on the results of the hypotheses tests.

7.1 Main Findings and Its Implications

As described in the previous chapter, we analyzed the data gathered through our quantitative study in three sequential steps: first, we proceeded to the sample characterization (both in terms of demographics and of mobile phones and services utilization); second, we carried out a descriptive analysis of the model variables, using descriptive and univariate statistical indicators. Finally, we used multivariate data analysis to validate the selected measures, to assess the quality of the measurement and structural models, to test the model's hypothesized relationships and to assess the moderating effects of specific variables in consumers' intention to adopt Mobile TV. Each of those stages yielded interesting findings that we will highlight here with particular emphasis and more elaborated discussion as regards the results of the tests of hypotheses.

We present our main findings in the same sequence that we carried out the data analysis.

7.1.1 Main findings from the sample characterization

In terms of demographics, we outline the major difference that has been found between the two sub-samples in that the users' sample had a much higher percentage of men (82% vs. 57.8% in the non-users' sample), suggesting that gender could potentially be a moderating variable in the adoption of Mobile TV. Previous research has confirmed the moderating role of gender in the adoption of technologies (for example, Yang and Lee (2010) in a study about the adoption of mobile data services; Im, Kim and Han (2008) about web-based applications; Nysveen, Pedersen and Thorbjørnsen (2005) about mobile chat services). Hence, we decided to further test through multi-group analysis in SEM if gender had a moderating effect in Mobile TV adoption intention.

We also found out that, contrarily to what would be expectable according to Rogers (2003)'s characterization of adopters (which suggests that innovators and early adopters have higher education levels than the early majority, the late majority and laggards), the respondents in our users' group were globally less educated than those in the non-users': only 49% of the users' respondents had a university degree vs. 58% of the non-users. Based on this finding we also decided to further test through multi-group analysis in SEM, if education level had a moderating effect in Mobile TV adoption intention.

Regarding the age group, the income level, the current employment situation, the region in which they live and the marital status, no major differences have been identified between the users and the non-users' groups.

Finally, we compared the demographic characteristics of our sample/s with those of the total Portuguese population and concluded that our sample (both users and non-users' groups) was globally younger, with a higher education level and with a higher income level than the average Portuguese population. This is probably due to the fact that our respondents come from Netsonda's national database which, by the nature of their studies (online surveys) is constituted by individuals that are literate, have easy access to computers and to the Internet and are younger than the average population.

Regarding the samples' characterization as to mobile phones' possession and mobile services' utilization, we highlight three major findings: 1) the users' group has a considerable higher percentage of premium mobile phones namely Smartphones, which have improved characteristics for Mobile TV utilization than medium and low-range mobile phones: 64% of the users' respondents own a Smartphones vs. 41.5% in the non-users' group; 2) the "users" spend substantially more money on mobile telecommunications' services: they have on average a higher monthly bill with 55% of the users' respondents spending between 16€-60€ per month vs. 34% only of the non-users (of which 64% spend less than 16€ per month) and 3) they use much more advanced mobile services through their mobile phones (like e-commerce, location based services, accessing the Internet, etc.) and with higher frequency than the non-users. The respondents of the users' group seem to be more mobile technology savvy and more intensive users of advanced mobile services in general than the respondents in the non-users' group. Hence, we also decided to further test through multi-group analysis in SEM a possible moderating effect of Smartphone possession in Mobile TV adoption

intention.

7.1.2 Main findings from the descriptive analysis of the model variables

Next to the sample characterization, we analyzed, based on descriptive statistics, the results obtained for both the users and the non-users regarding all the model variables and their respective measurement items. The aim was to help us uncover potential problems with the constructs while also identifying interesting issues for the industry that do not show up when using multivariate data analysis. We recall that the non-users answered to the questions based on their current knowledge/awareness of the service (although they had never tried it) while the users answered to the questions based on their real utilization experience with the service.

7.1.2.1 Perceived Benefits

We found out that, with two exceptions, the components of Perceived Benefits were evaluated positively by non-users, with means higher than 5 (partially agree) and sometimes very close to 6 (agree), and also by users (although a bit lower than the non-users). This was true for the benefits of Information Awareness (Mobile TV allows to be aware of updated news and events), Entertainment (watching Mobile TV is an entertaining and pleasant activity), Pass Time (it is an interesting activity to relieve boredom in waiting situations) and Convenience (Mobile TV is an easy and convenient way to access television anytime and anywhere), meaning that respondents in both groups perceive these gratifications as benefits provided by the Mobile TV service.

The two exceptions were Status/Image and Privacy. Globally, both users and non-users partially disagreed that using Mobile TV enhances their personal image and status (the means for all three items and for both groups were very close to 3- partially disagree). For the majority of respondents, Status/Image is not recognized as a benefit of Mobile TV. Regarding Privacy, this construct was measured by four items of which two were related to “secrecy” (allows watching desired contents in a private/secrete manner) and the other two were related to isolation from others to watch something peacefully and quietly. Regarding the “secrecy” facet, on average, both groups partially disagreed that the Mobile TV service would provide them this benefit. This does not mean that Mobile TV does not allow watching desired contents in a secrete/ private manner but probably, that respondents do not prize this benefit. It is interesting to confront this finding with the unanimous revelation of key industry experts in our qualitative study about the fact that the most watched Mobile TV contents are the adult channels (and during daytime). We suspect that, either the respondents in our sample have not

been honest in answering these questions or, our sample did not capture respondents that recognize this benefit (more likely). This may be due to lack of awareness/ knowledge of the service from the respondents (we recall that the 400 non-users had never tried the service, of which 50 had never heard of it before).

As to the “isolation/peace/quietness” facet of Privacy, we can say both groups partially agreed that Mobile TV provides this benefit (the means for the users’ respondents were 4.85 and 4.89- not really in the “partially agree” level but very close to it).

Having identified this duality in the Privacy construct, in spite of the high reliability and validity of the scale, we suggest that this scale is further tested in future studies within other contexts and/or with a different sample in order to appraise if it should remain as it is (with the current four measurement items) or if it should be split into two different constructs with slightly different meanings (in which case, additional measurement items should be added to each of them).

7.1.2.2 Perceived Monetary Costs

Regarding the service price, we found out that, globally, both users and non-users find the Mobile TV service expensive and are not willing to pay for it (at the monthly cost of 7.85€ for the full pack of channels). The degree of “negativity” towards the price variable is not very pronounced: the means of the three items are in the high “4’s” for both groups (5 corresponding to partial agreement and 4 being neutral). We should highlight that, surprisingly, negativity towards the monthly fee was stronger in the users’ group. This is probably due to the fact that the users’ group includes 71% of respondents that have already used but are not current users of the service: they tried the service in the past and did not adopt it/become current users. We presume they may have been unsatisfied. The content analysis to the last question of the survey (concerning what could make respondents change their mind regarding their “non-adoption intention”) clearly suggests that, within the users’ group, a significant part of those that did not become current users would have been unsatisfied or disappointed with quality of service issues and point out the poor quality of service/price relationship. Hence, it is natural that those respondents are more negative towards the service price vs. the non-users (which have never tried the service and may, on average, have higher expectations regarding the service benefits and quality thus, being less negative in their assessment of the service price). Practical implications of these results and

suggestions to counter the price “barrier” are discussed in the next section of this chapter (multivariate data analysis).

7.1.2.3 Perceived Non-Monetary Costs

As for battery consumption (non-monetary cost), both groups had negative perceptions about this factor, meaning they perceive the Mobile TV service as being risky/costly in terms of high power consumption. The respondents of the users’ group were more severe in their (negative) judgment of the battery consumption risk, except when asked if their mobile phone battery was weak in power to fully enjoy Mobile TV: as they own, on average, more advanced/premium mobile phones than the non-users (as highlighted in the previous section), it is normal that they respond less negatively to this question than non-users. However, battery consumption did not seem to be an important factor for consumers’ value assessment of Mobile TV and respective adoption decision, as discussed further on in the hypotheses tests’ section. The only recommendation we can advance for the industry is to work towards technical improvements that would either decrease the power consumption rate of Mobile TV or increase the power of the mobile phones’ batteries (or both at the same time).

7.1.2.4 Perceived Quality of Service

We remind that, because non-users had never tried Mobile TV and could not make any judgment about its Quality of Service, they assessed how important each Quality of Service component would be for them if they were to use the service, while users evaluated, for each component, the real Quality of Service they had experienced.

We concluded that, in order for the non-users’ respondents to use the Mobile TV service, it would be very important that it shows very high quality regarding all the components of Quality of Service without exception (means of around “6” for all the items of all the factors). Hence, it would be very important for them that the service is highly reliable, that it shows high multimedia quality, that it is easy to use, that it is efficient in terms of speed and that it has an ideal assortment of suitable contents available. Conversely, users’ assessments of the same factors in terms of their real experience with the service were low or neutral (items’ means close to “4” and in any case, much lower than non-users’ assessments for all the factors). This means that the Quality of Service that users experienced with the service was poor or only “acceptable”. The confrontation between a potential consumer’s requirements in terms of high Quality of Service (previously to trying the service) and a poor or barely

“acceptable” Quality of Service experience once he/she tries the service, has very important implications for the industry that we discuss in the next section of this chapter together with the findings of the hypotheses tests.

7.1.2.5 Perceived Value

The results of the descriptive analysis of the Perceived Value construct showed that consumers’ perceptions of the value of Mobile TV are relatively low, both for the non-users and for the users’ respondents. Moreover, although the differences were minor, we found out that the “users” had, on average, lower value perceptions of the Mobile TV service and were slightly more severe in their judgements than the non-users. As with the Price variable, a possible explanation for this stems from the fact that the users’ group includes 71% of respondents that have already used but are not current users of the service, as they may have been unsatisfied with it; hence, those respondents may be more critical when assessing the value of Mobile TV for them (vs. the non-users, which have never tried the service).

These findings have relevant implications for the industry: if consumers do not perceive the Mobile TV service as being valuable for them, they will not adopt it (our hypothesized positive relationship between Perceived Value and Adoption Intention was supported, as further discussed). Hence, practitioners should try to increase consumers’ value perceptions of Mobile TV by acting on the factors that influence consumers’ value perceptions and that we identified in our study. They should adopt marketing strategies that will contribute to strengthen consumers’ perceptions of the Benefits and Quality of Service of Mobile TV (which positively affect Perceived Value) and to mitigate consumers’ negative perceptions of the Costs (especially Monetary Costs). Specific suggestions regarding these Value antecedents are presented in the next section (multivariate data analysis).

7.1.2.6 Adoption Intention

The results of the descriptive analysis of the Adoption Intention construct evidenced a strong negativity towards Mobile TV Adoption Intention within the following 6 months. This was valid for both groups of respondents although with a higher degree of negativity in the non-users’ group. It is difficult to evaluate if such negativity is a question of time (for example, respondents may not have Mobile TV compatible mobile phones and do not intend to have one within the next 6 months or, they don’t have a stable professional and economic situation and don’t expect this to improve within the next 6 months) or if it may be something more

“definitive” and independent from the time period. If we take into account the answers to the Perceived Value questions that we just discussed, it is more likely that a significant majority of respondents does not intend to adopt Mobile TV at all, as they don’t seem to consider the service as being valuable enough. Hence, in order to stimulate adoption, practitioners need to increase consumers’ value perceptions which depend on the aforementioned antecedents. Yet, consumers’ adoption intention of Mobile TV does not depend solely on their value assessment of the service. There are other factors that we have not considered in our model but that may play an important role in consumers’ adoption decisions. The content analysis to Q25/Q37 of our survey questionnaire strongly contributed to unveil some of those factors that are discussed in section 7.1.4 of this chapter.

7.1.3 Main Findings from the Multivariate Data Analysis

7.1.3.1 Measurement Model and Measures Validation

Regarding our proposed conceptual model, before proceeding with the analysis of the relationships amongst the model variables, we assessed the quality of the latent variables (measurement model) by subjecting the scales to a confirmatory factor analysis, using maximum likelihood estimation procedures in AMOS. Absolute and relative fit tests were used to assess the measurement model. In the final solution and for the non-users’ sample, all the fit indices suggested a good model fit to the data ($\chi^2/DF < 2$ at 1.8; CFI and GFI $> .90$ at 0.98 and 0.95 respectively; PCFI and PGFI $> .60$ at 0.79 and 0.67 respectively; RMSEA < 0.10 at 0.06) (Marôco, 2010). For the users’ sample, the measurement model revealed a poor fit to the data ($\chi^2/df = 2.457$; CFI = .79; GFI = .79; PCFI = .69; PGFI = .56 and RMSEA = .14). As the software did not suggest the inclusion of new parameters through its modification indices, we assumed this model as the best possible model to the sample in question¹⁰.

In addition to the assessment of the measurement model, we validated the measures of the different constructs by assessing construct reliability and validity (we checked the Cronbach alphas, the composite reliability (ρ) and the average variance extracted (AVE)). We concluded that the proposed scales were all reliable and valid (for both sub-samples).

¹⁰ We recall these fit indices’ results were likely due to the fact that the users’ sample was too small, with a very low ratio number of variables/observations of 1 to 2.5 (the minimum recommended by renowned researchers is of 1 to 5). Notwithstanding, we decided to pursue with the analysis and believe the results still deserve consideration as a good model fit does not necessarily mean a valid model and conversely (Kenny and McCoach, 2003).

7.1.3.2 Tests of Hypotheses through Structural Equation Modeling and Pearson Correlation Studies

Once the scales validated, we tested the proposed structural relationships in order to validate our model. We had five main hypotheses that we tested through SEM analysis, and eleven “second level” hypotheses that we tested through Pearson correlation study for technical/methodological reasons explained in the respective chapter. The discussion of the hypotheses tests’ results is organized into five groups of variables: the four hypothesized antecedents of Perceived Value- 1) Perceived Benefits; 2) Perceived Monetary Costs; 3) Perceived Non-monetary Costs and 4) Perceived Quality of Service- and 5) Perceived Value, following the logical direction of the model constructs from independent and antecedent variables to dependent variables. For each of them we present the findings for both the non-users and the users’ groups.

Perceived Benefits

The Perceived Benefits construct was included in our model as an independent variable hypothesized to be a predictor of consumers’ Perceived Value of Mobile TV so that, the higher the Perceived Benefits of Mobile TV, the higher its Perceived Value (H2). Perceived Benefits as an antecedent of consumer Perceived Value has been extensively tested in several consumer value-based studies and the relationship has proven to be positive (e.g., Jarvenpaa and Loebbecke, 2009; Kim et al., 2007; Kim and Han, 2009; Kleijnen et al., 2007; Kuo et al., 2009; Lee et al., 2007; Nysveen et al., 2005; Pura, 2005; Turel et al., 2007). As previously stated and consistent with the rationale presented in the model chapter, our study differs from previous ones in that we conceptualized the Perceived Benefits construct as composed by six gratifications of Mobile TV use that we draw from the Uses and Gratifications literature and from the conclusions of our exploratory qualitative study. Our hypotheses H2a), H2b), H2c), H2d), H2f) and H2g) reflect the relationships between the six gratifications that constitute the Perceived Benefits construct and Perceived Value. No previous empirical study has ever made a parallelism between gratifications from the Uses and Gratifications theory and Perceived Benefits nor have gratifications been tested as antecedents of Perceived Value. The results of the hypotheses tests showed that all the relationships were positive and statistically significant for the two samples.

As hypothesized and for the non-users' sample, Perceived Benefits was found to be the most significant predictor of Mobile TV Perceived Value (H2) ($\beta=.55$, $p<.000$; $R^2 = .30$). For the users' sample, the Perceived Value of Mobile TV also seems to depend mainly from its Perceived Benefits ($\beta=.31$, $p<.000$; $R^2 = 0.195$) although the coefficient and variance explained are lower (it is followed by close by Perceived Quality of Service, as we will see later on). These findings are consistent with previous studies (e.g., Jarvenpaa and Loebbecke, 2009; Kim et al., 2007; Kim and Han, 2009; Kleijnen et al., 2007; Kuo et al., 2009; Lee et al., 2007; Nysveen et al., 2005; Pura, 2005; Turel et al., 2007). Furthermore, for both groups Perceived Benefits had the strongest impact on Perceived Value, over and above the impact of Perceived Costs and that of Perceived Quality of Service (in line with Constantiou and Mahnke, 2010's results but contrarily to those of Kim et al.'s 2007 study that found out Costs had a stronger impact on Perceived Value than Benefits).

Information Awareness

In our study, the gratification of Information Awareness was included in the model as one of the six gratifications that constitute the Perceived Benefits construct. It was hypothesized to have a positive relationship with Perceived Value (H2a). The hypotheses tests through Pearson correlation analysis supported the theorized relationship for both the users ($r=.419$, $p=.001$) and the non users' group ($r=.353$, $p=.001$) meaning that, the higher consumers' perceptions of the Mobile TV service as providing them easy access to updated news and events, the higher their perception of the Mobile TV service value.

In the literature, Information Awareness has been identified as a gratification of traditional TV use (e.g., Bantz, 1982; Conway and Rubin, 1991; Levy and Windahl, 1984), as a gratification of the Internet (Ko et al., 2005; Lin, 2002; Stafford et al., 2004) and of mobile data services use (Knutsen and Lyytinen, 2006). In 2005, Ko et al. found a positive relationship between Information Awareness and the duration of time on a Web site (which predicted Attitude towards the website which, in turn, led to Purchase Intention). In their 2010's study, Lee et al. found a positive and statistically significant correlation between Information Awareness (named Information Discovery in their study) and the intention to use mobile sharing and gaming applications. Likewise, in her 2002's study, Lin concluded that "Information Learning" was a significant predictor of online media use. However, the

relationship between Information Awareness and Perceived Value had never been tested before.

Our results suggest that Information Awareness plays a role in consumers' perceptions of Mobile TV service value. From the users' perspective, the more they perceive Mobile TV as a means of being aware of the latest news and events, the more they appraise Mobile TV as being a valuable service. Hence, we highlight the need for mobile operators and content providers to ensure that the news and informational content they provide through the Mobile TV service is relevant, updated, accurate and easy to access.

Entertainment

Like Information Awareness, Entertainment was included in our model as one of the six gratifications that constitute the Perceived Benefits construct. It was hypothesized to have a positive relationship with Perceived Value (H2b). The hypothesis test through Pearson correlation study supported the theorized relationship for both the users ($r=.374$, $p=.001$) and the non users' group ($r=.401$, $p=.001$) meaning that, the higher consumers' perceptions of the Mobile TV service as being an entertaining, funny and pleasant service, the higher their perception of the Mobile TV service value.

In the literature, enjoyment, fun and entertainment were found to be gratifications of the Internet (Ko et al., 2005; Lin, 2002; Stafford et al., 2004), mobile services (Höflich and Rössler, 2001; Knutsen and Lyytinen, 2006; Lee et al., 2010; Nysveen et al., 2005) and traditional TV (Conway and Rubin, 1991). As with Information Awareness, the relationship between the Entertainment gratification and Perceived Value had never been tested before. However, there were some close theorized relationships in the literature: Choi et al. (2009) hypothesized Entertainment to be positively related with attitude towards using Mobile TV, which was supported for the males' group (it was not supported for women); In Lin (2002)'s study, the Entertainment gratification failed to emerge as a predictor of online media services' use (the respective hypothesis was not supported). Lee et al. (2010) found a positive and statistically significant relationship between Entertainment and the intention to use mobile sharing and gaming applications. In Ko et al. (2005), the hypothesized positive relationship between Entertainment and the duration of time on a Web site was not supported. In the

Marketing literature, Ko et al. (2009) tested the relationship between enjoyment and perceived value of mobile shopping and found it was positive and statistically significant.

Our results suggest that Entertainment may influence consumers' perceptions of Mobile TV service value. The more users perceive the Mobile TV service as being entertaining, fun and pleasant, the higher their service value assessment. Hence, we highlight the need for mobile operators and content providers to ensure that the Mobile TV service gratifies consumers' entertainment needs by providing the corresponding relevant contents (which may be different for different groups of users, as suggested by the results of our qualitative study: men are usually more interested in sports and news, women in series and documentaries, youngsters in music, children in cartoons, etc.).

Pass Time

The Pass Time gratification was another component of our Perceived Benefits construct. It was hypothesized to have a positive relationship with Perceived Value (H2c). The hypotheses tests through Pearson correlation analysis supported the theorized relationship for both the users ($r=.282$, $p=.001$) and the non users' group ($r=.399$, $p=.001$) meaning that, the higher consumers' perceptions of the Mobile TV service as a way to relieve boredom by occupying time in waiting situations, the higher their perception of the Mobile TV service value.

The relationship between Pass Time and Perceived Value had never been tested in previous studies. However, in his 2008's study, Wei identified a positive relationship between the Pass Time gratification and the use of the mobile phone to play interactive games. Conversely, in Lee et al. (2010)'s study, the hypothesis that Pass Time would be positively related with attitude towards using Mobile TV was not supported.

Our results suggest that the more consumers perceive Mobile TV as helping to relieve boredom by occupying time, the higher their perceptions of Mobile TV as a valuable service. Regarding implications for service and content providers, we put forward the interest in offering a service that is compatible with the Pass Time need. When consumers want to use the Mobile TV service to pass time as the primary "function", they will ideally watch contents that are short in terms of duration and that do not require much concentration. Among the available channels and programs, service providers should have content and/or service options

adapted to this “snack style” consumption needs (deferred visualization or short versions of certain programs may be interesting service features).

Status

The fourth component of our Perceived Benefits construct was the Status gratification. It was hypothesized to have a positive relationship with Perceived Value (H2d). The hypotheses tests through Pearson correlation analysis supported the theorized relationship for both the users ($r=.573$, $p=.001$) and the non users' group ($r=.466$, $p=.001$) meaning that, the higher consumers perceive the use of Mobile TV as a symbol of status and image enhancement, the higher their perception of the value of the service.

The direct relationship between Status/Self-Image Enhancement and Perceived Value had never been tested before. Notwithstanding, our findings are close to those of Choi et al. (2009) that found out the Status gratification had a positive relationship with the intention to use Mobile TV for the men's group. Conversely, the hypothesis that Personal Status would be positively related with the intention to use mobile interactive games was not supported in Lee et al. (2010). In the Marketing literature, social value, defined as “*the social approval or enhanced social self-concept generated by service use*” (Sweeney and Soutar, 2001: 211), has been proved to influence the use of mobile entertainment services (Pihlström and Brush, 2008).

Privacy

The gratification of Privacy was the fifth component of our Perceived Benefits construct. It was hypothesized to have a positive relationship with Perceived Value (H2e). The hypotheses tests through Pearson correlation analysis supported the theorized relationship for both the users ($r=.542$, $p=.001$) and the non users' group ($r=.430$, $p=.001$) meaning that, the higher consumers perceive the use of Mobile TV as a way of providing them privacy moments, the higher their perception of the service value.

To the best of our knowledge, the concept of Privacy as a benefit (as we conceptualized it) does not exist in the academic literature (nor even with a different name but close meaning like “secrecy”, “secret use” or “intimacy”). Our conceptualization derived mostly from findings from our exploratory qualitative study and from previous Mobile TV working

papers, conference proceedings, industry analysts' reports and experimental studies which evidenced that one of Mobile TV's most watched type of content are adult channels and also, that users enjoy watching Mobile TV in the evening at home, isolated from other members of the family (some pilot studies in Europe have even shown that the evening period was also a prime time for Mobile TV, just like with traditional TV). Privacy does exist in the literature (and has been extensively studied, namely in technology adoption literature) with another meaning: as a risk, as a threat (e.g. the risk of usurpation of personal data when using Internet banking services or email or electronic commerce). Hence, the findings of our study cannot be compared with those of previous studies but rather, we suggest this construct and respective hypothesized relationship to be further tested in future research in order to validate our findings and measures.

The results of the hypothesis test suggested that, the more consumers perceive Mobile TV as a means of providing them privacy moments, the higher are their perceptions of the service value. However, evidence from the descriptive analysis of this variable suggested that, on average, respondents did not really prize this benefit. Hence, service providers should take advantage of their communication campaigns, namely TV advertisements, to "educate" consumers and enhance their perceptions of this Mobile TV benefit. They can illustrate this benefit by showing concrete use situations: for example, a family at home whose father and son are watching a football match on the main TV and the mother is watching her favorite series on her mobile, quietly, in her room; a "secret use" situation in which a businessman is amusing himself in a boring meeting or conference by secretly watching TV on his mobile. By showing concrete use situations, consumers can better realize the benefits of Mobile TV, which can contribute to more positive perceptions.

Convenience

Finally, Convenience was the sixth gratification included in our model as a component of the Perceived Benefits construct. It was hypothesized to have a positive relationship with Perceived Value (H2f). The hypothesis test through Pearson correlation study supported the theorized relationship for both the users ($r=.511$, $p=.001$) and the non users' group ($r=.503$, $p=.001$) meaning that, the higher consumers' perceptions of the Mobile TV service as being a convenient service, the higher their perception of the Mobile TV service value.

In the literature, Convenience has been a recurrent theme in Uses and Gratifications research (e.g., Ko et al., 2005; Papacharissi and Rubin, 2000; Stafford and Gillenson, 2004) but it has also been studied in the Marketing field (e.g., Kleijnen et al., 2007; Pihlstrom and Brush, 2008; Tojib and Tsarenko, 2012) and in the IS/IT field (e.g., Jung-Yu and Chih-Yen, 2011). Contrarily to the extant five gratifications, Convenience has been previously tested as an antecedent of Perceived Value (although it was not conceptualized as a “gratification” from the Uses and Gratifications theory). Our findings are in line with those of Kleijnen et al. (2007) and with those of Tojib and Tsarenko (2012) who found out that Convenience was an antecedent of the Perceived Value of mobile services. They are also consistent with the findings of Choi et al. (2009) who found out that the Convenience/Permanent Access gratification was positively related with the attitude towards using Mobile TV, and with those of Ko et al. (2005) who confirmed the hypothesized positive relationship between the Convenience gratification and the duration of time on a Web site.

Our results suggest that, the more consumers perceive Mobile TV as being convenient, namely by enabling immediate access to television at any time and in any place, the higher are their perceptions of Mobile TV as being a valuable service. Hence, mobile operators should ensure that their network coverage is as wide and as reliable as possible so that Mobile TV users can access the service whenever they want regardless of where they are, namely when using public transportation like trains and the subway.

Conclusion on Perceived Benefits

Our study identified Perceived Benefits as the major driver of Mobile TV Perceived Value (and, subsequently, Adoption Intention). Hence, industry practitioners must be aware of the benefits that may lead to consumers’ increased value perceptions of the Mobile TV service and ensure that they offer a service which, from a technical and Quality of Service point of view, is able to effectively gratify their needs and motivations. Secondly, they should advertise the service to increase awareness and “educate” the consumer. They should opt for communication strategies that clearly show those benefits through explicit use situations.

The conclusions that derive from our model test suggest that consumers are more influenced by benefits than by costs. Perceived Benefits is the variable that contributes the most for the Perceived Value of Mobile TV. Hence, it is about them that should be delineated the communication strategy: service providers should opt by promoting the benefits rather than

arguing against the costs. Specific implications and suggestions related to each benefit/gratification were presented above together with the respective findings and discussion.

Perceived Monetary Costs (Price)

The Perceived Monetary Costs construct was included in our model as an independent variable hypothesized to be a predictor of consumers' Perceived Value of Mobile TV so that, the higher the perceived monetary costs of Mobile TV, the lower its perceived value (H3). The monetary cost corresponds to the actual price of the service and was measured based on consumer's perceptions of the monetary amount paid for using the Mobile TV service. As stated in the methodology section, although some mobile operators had different price schemes at the moment we conducted the study (for example, daily, weekly and monthly; total pack of channels or shorter packs with fewer channels; option of premium content paid as an extra), for practical reasons regarding respondents' better understanding of the questions and also increased simplicity in terms of data analysis, the monetary costs questions only considered one price scheme: the option of a monthly subscription for the full pack of channels. We chose this option because it is the most interesting one from mobile operators point of view and also the one that better corresponds to the concept of adoption (it implies "continued adoption" rather than using the service punctually only a couple of days or weeks per year).

As theorized, our H3 was supported for both the non-users and the users' groups. Perceived Monetary Costs (price) was found to be a predictor of Mobile TV Perceived Value for the non-users ($\beta = -0.22$, $p < .000$; $R^2 = 0.15$) and also for the users' respondents ($\beta = -0.20$, $p < .000$; $R^2 = 0.14$). These findings are consistent with previous studies in Marketing which have found that Perceived Price or Monetary Cost directly and negatively influences Perceived Value (e.g., Cronin et al., 2000; Dodds, 1999; Kim et al., 2007; Kwon and Schumann, 2001; Thaler, 1985; Turel et al., 2007; Zeithaml, 1988). However, contrarily to Kim et al.'s 2007 study results, in our study Perceived Benefits have a stronger impact on Perceived Value than Perceived Costs.

Furthermore, based on the descriptive analysis of the model variables, our study showed that a majority of respondents have negative perceptions of the price of Mobile TV finding it

expensive and not being willing to pay for it (at the monthly cost of 7.85€). Although the degree of “negativity” towards Mobile TV monthly fee was not very pronounced in the answers to the questions related with the price variable, it became much more apparent in the answers to the last questions of the survey concerning (1) the major reason why respondents would not use the service in the next six months and (2) what could make them change their mind regarding their non-adoption intention (qualitative). The price issue clearly came out with (1) 43% of the 277 respondents claiming that the reason for “non-adoption” was price and (2) 142 out of 277 respondents stating that, if the price was lower or if the service was free, that could make them change their mind and become interested in using Mobile TV. Furthermore, results from our exploratory qualitative research suggested that consumers tend to make judgments on the Mobile TV price by comparing the cost of a monthly subscription with their mobile phone monthly bill. Thus, even if they may not find the price of the service at €7.85/month for the full pack very expensive *per se*, they may not be willing to pay for it taking into account that, for the majority of respondents, it represents 50% or more of their average mobile phone bill (of around €16). This denotes the distinction between consumers’ judgment of price and their willingness to pay, which are clearly different things. This was also evidenced by the answers to our qualitative question of what could make respondents change their mind towards adoption of Mobile TV (Q25/Q37): there were 44/277 answers “claiming” the service to be free meaning those respondents are not willing to pay for the service at all regardless of the price level. In further studies it would be interesting to consider both constructs (price and willingness to pay).

Practical implications and suggestions: The conclusions of our study suggested that price is a strong barrier to the adoption of Mobile TV services. To counter the price barrier as a drawback to Mobile TV adoption, we propose several possibilities. One possibility is for mobile operators to include the Mobile TV service (and price) in a bundle of several services in which case it is impossible for the consumer to make a judgment on the price of the Mobile TV service *per se*, as it becomes a part of a couple of services for which the client pays a global undifferentiated amount. We recall that in the Focus Groups we conducted, one participant clearly stated that he would not be willing to pay any fee for the Mobile TV service itself but he would accept to have it in a bundle of services for which he would pay an undistinguished amount (even if he recognized he was not getting the service for free but he was certainly paying for it in a “hidden” way). Within the answers to the final qualitative question, there were also several respondents suggesting the inclusion of Mobile TV in a

service bundle. In line with our suggestion, Naylor and Frank (2001) examined the effects of price bundling on perceived value and demonstrated that providing an all-inclusive price package, even if actual monetary expenditure is higher, significantly increases perceptions of value for first time consumers.

Another possibility that showed interest and acceptance by some of our focus groups' participants is for mobile operators to provide the service for "free" and in exchange, users would accept to receive mobile advertising; hence, the service would be sponsored by advertisers. Providing access to a service and contents that consumers really want in exchange for them to receive a limited number of advertisements would allow the advertising companies to be able to send advertisements with consumers consent and, eventually, even with consumers' interest, as they might be related with the TV content chosen by the user.

Another suggestion would be for service providers to offer different packages of specific channels that suit individual preferences and that should, therefore, be lower priced than a full package with all the channels. Results from our focus groups indicated that several participants would not be interested in having access to (and paying for) 30 channels to choose from because they only watch certain specific channels; they prefer to have less choice as long as they can watch the channels and contents that really interest them. Hence, service providers should offer standard packages with a restricted number of channels that would be grouped by types of content and/or personalized packages in which the customers would chose the channels one by one according to their preferences. Having the possibility to choose and to pay only for contents that really interest them would likely increase consumers' willingness to pay for the Mobile TV service.

A fourth proposition, which showed to be of interest for some of our focus groups' participants, would be for mobile operators to offer premium mobile phones "for free" or at very low prices against the customer compromise to subscribe the service for, at least, a certain period of time (this has been for long a common industry practice with other mobile services). The analysis of the responses to the final qualitative question of the survey also showed the possession of a premium mobile phone could play a role in consumers' adoption decision.

As a final proposition, we suggest that mobile operators offer free Mobile TV trial periods in order to enable consumers to assess the service value and shape their willingness to pay.

Perceived Non-Monetary Costs (Battery Consumption)

The Perceived Non-Monetary Costs construct is an independent variable in our model hypothesized to be a predictor of consumers' Perceived Value (H4). The non-monetary cost that we accounted for was the one of a perceived performance risk of using the service: the risk of high battery consumption. As highlighted in the conceptual model chapter, in the literature, the construct of non-monetary costs include other non-monetary expenses or sacrifices that the consumer incurs to purchase and/or consume the product or service, like effort and risk perceptions. Specifically, in the technology acceptance domain the non-monetary component usually consists on technical factors related to the technology ease of use and the effort required to learn how to use it (Kim et al., 2007). In our model we also included the "ease of use" construct but it was accounted for as a dimension of Perceived Quality of Service as we found it was more appropriate than as a Perceived Cost (previous studies have also done so).

Our H4 hypothesized that, the higher the Perceived Performance Risk (meaning the risk of high battery consumption) the lower the Perceived Value of Mobile TV. It was supported only for the non-users' group ($\beta = -0.11$, $p < .000$; $R^2 = .01$). However, despite being statistically relevant ($p < 0.05$), Non-monetary Costs has a quite low coefficient and explains less than 1% of the variability of the Perceived Value data. Our finding of a negative relationship between Perceived Risk and Perceived Value (for the non-users' sample) is consistent with previous results in the literature (e.g., Lee and Allaway, 2002; Shamdasani et al., 2008; Snoj et al., 2004; Sweeney et al., 1999). Moreover, battery consumption has specifically been identified as a perceived performance risk of a new mobile phone in a study conducted by Sääkjärvi and Lampinen (2005).

The results of our study suggest that battery consumption has a negative impact on consumers' value assessment of Mobile TV only for the non-users' respondents and the impact is minor. Yet, the industry should attempt to attenuate this drawback by improving mobile phone characteristics in terms of higher duration of their batteries and also by improving the transmission technologies so that Mobile TV becomes less greedy in terms of power consumption.

Perceived Quality of Service

In our model, Perceived Quality of Service is as an independent multidimensional variable hypothesized to be a predictor of consumers' Perceived Value of Mobile TV. Our hypothesis H5 aimed to measure the impact of the Perceived Quality of Service of Mobile TV on its Perceived Value. Previous research in the Marketing field has highlighted the significant role of Service Quality to the elaboration of consumer Value assessments (e.g., Baker et al., 2002; Brady and Robertson, 1999; Dodds et al., 1991; Chang and Wildt, 1994; Sweeney et al., 1997). Our Perceived Quality of Service construct was composed by five components that suit specifically the Mobile TV context and were drawn from the literature and from the results of our exploratory study: Reliability, Multimedia Quality, Ease of Use, Speed and Content. Our hypotheses H5a), H5b), H5c), H5d) and H5f) reflect the relationships between the five components of the Perceived Quality of Service construct and Perceived Value.

Regarding the main hypothesis (H5), the results of the SEM analysis supported that Perceived Quality of Service is a significant predictor of Mobile TV Perceived Value for the users' group ($\beta=0.29$, $p<.000$, $R^2=0.18$) meaning that, the higher consumers' perceptions of Mobile TV Quality of Service, the higher their perceptions of the service Value. Furthermore, for the users, the Perceived Value of Mobile TV seems to depend mainly from its Perceived Benefits ($\beta=.31$, $p<.000$; $R^2= 0.195$) followed closely by its Perceived Quality of Service and, to a lesser extent by Monetary Costs ($\beta= -0.20$, $p<.000$; $R^2 = 0.14$). For the non-users', the hypothesis (H5) was not supported: Perceived Quality of Service did not reveal to be a predictive factor of Mobile TV Perceived Value for the non-users' sample as this path was not significant with $p>0.05$.

Our findings for the users' group are consistent with previous studies in different contexts and with different services that found out Perceived Quality of Service was an antecedent of Perceived Value (e.g., Bauer et al., 2006 for online shopping; Bernardo et al., 2012 for online travel agencies; He and Li, 2011; Kuo et al., 2009; Lai et al., 2009 and Lim et al., 2006 for mobile telecommunications' services; Hellier et al., 2003 for car insurance and personal superannuation services; Marimon et al., 2010 for online supermarkets; Shamdasani et al., 2008 for Internet banking, Sweeney et al., 1999 in the retail setting; Tam, 2004 for the restaurant industry). The hypothesized interdependences between the five dimensions of

Perceived Quality of Service and Perceived Value were tested through Pearson correlation studies and the findings are discussed next.

Reliability

Reliability was included in our model as one of the five components that constitute the Perceived Quality of Service construct. It was hypothesized to have a positive relationship with Perceived Value (H5a). The hypotheses tests through Pearson correlation analysis supported the theorized relationship for both the users ($r=.429$, $p=.001$) and the non users' group ($r=.107$, $p=.033$) although the correlation coefficient is not very expressive for the latter meaning that, the higher consumers' perceptions of the Mobile TV service as providing them a reliable service (one that is always available when they try to connect, that connects and works immediately, that does not crash and whose image and sound do not freeze), the higher their perception of the Mobile TV service value.

To our knowledge, the relationship between Reliability and Perceived Value had never been tested before. What has been found by several researchers is that Reliability is important in determining Service Quality (e.g., Bressolles, 2006; Chae et al., 2002; Kuo et al., 2009; Parasuraman et al., 1988; Parasuraman et al., 2005; Wolfinbarger and Gilly, 2003; Zeithaml and Bitner, 2000).

From the users' perspective, our results suggest that the more they perceive Mobile TV as being reliable, the more they value the service. Consumers may be especially concerned about network availability and coverage everywhere, continuous signal and transmission, no interruptions or cuts. As suggested by our qualitative study, Mobile TV is commonly understood as an "any time, any place" service; it should be available anywhere at any time with good quality. If being on the move or outside of home leads to uneven levels of reception experienced and service discontinuities, this is problematic. Excessive delay in connecting to the service or in switching channels and loss during transmission affects the image resolution, skipping frames and freezing pictures. All these factors have a major effect on consumers' perceptions of the quality of the service and on their perceptions of value (especially once they have tried the service). Moreover, evidence from the answers to the last question of the survey (concerning what would make respondents change their mind as regards their non-adoption intention) suggested that a significant part of consumers that have already tried the

service has been disappointed with some Quality of Service issues, namely service Reliability (they stated they might adopt the service if these issues were resolved/improved). Service providers should pay the upmost attention to these factors and ensure that the service is highly reliable in order to retain the customers that try the service and encourage continued adoption.

Multimedia Quality

Multimedia Quality was the second dimension of our Perceived Quality of Service construct. It was hypothesized to have a positive relationship with Perceived Value (H5b). The hypotheses tests through Pearson correlation analysis supported the theorized relationship for both the users ($r=.414$, $p=.001$) and the non users' group ($r=.133$, $p=.008$) (although the correlation coefficient is not very expressive for the latter) meaning that, the higher consumers' perceptions of the Mobile TV service as offering multimedia quality (i.e., the service is displayed in an harmonious way, the user can clearly see the images and hear the sound; the image and sound quality are good enough), the higher their perception of the Mobile TV service value.

To our knowledge, the relationship between Multimedia Quality and Perceived Value had never been tested before. However, Multimedia Quality has been assessed and validated as being an important determinant of Service Quality (e.g., Kuo et al., 2009). Other studies (namely experimental ones) did not statistically test relationships but have still confirmed that multimedia quality (audio and/or video) was a major concern in the context of advanced mobile services and that it influences consumers in their Quality of Service perceptions and adoption decision (e.g., Buchinger et al., 2009; De Moor et al., 2010; De Pessimier et al., 2012; Jan et al., 2012; Jumisko-Pyykkö, 2008; Jumisko-Pyykkö and Utriainen, 2011; Jumisko-Pyykkö and Väänänen-Vainio-Mattila, 2006; Knoche, McCarthy and Sasse, 2006).

Our results suggest that, the more consumers perceive Mobile TV as offering good multimedia quality, the more they perceive the service as being valuable. As suggested by the conclusions of our qualitative study, consumers expect an image quality which is not significantly inferior to the standard established by traditional TV (even if the screen is much smaller). Regarding audio quality, it is equally important but consumers are much less "anxious" about it (because a mobile phone screen size raises much more suspicions about image quality than its capacity to deliver good sound quality). Therefore, as for all other

quality of service dimensions, service providers must ensure that the Mobile TV service meets consumers' requirements in terms of multimedia quality before launching a commercial offer that risks disappointing consumers and killing the service from the beginning. This is far from being an issue related only to the mobile device characteristics.

Ease of Use

Contrarily to a more common practice in previous Perceived Value studies which include Ease of Use as a Perceived Costs component, in our model Ease of Use was considered as a dimension of the Perceived Quality of Service construct. It was hypothesized to have a positive relationship with Perceived Value (H5c). The test of this hypothesis through Pearson correlation analysis supported the theorized relationship only for the non-users' group ($r=.197$, $p=.001$) meaning that, the higher non-users' perceptions of the Mobile TV service as being easy to use (i.e., the user interface allows to easily find and switch channels and using the service does not require a strong effort), the higher their perception of the Mobile TV service value. For the users' respondents, the hypothesis was not supported ($r=.016$, $p=.872$) meaning that increased easiness of use perceptions do not correspond to higher value perceptions of the Mobile TV service. As stated in the quantitative study chapter, this may be due to the fact that, the users being more experienced and having already tried the service, the Ease of Use criterion becomes less relevant for their service value assessment. In fact, it has been suggested in previous studies (e.g., Huang et al., 2012; Moores, 2012; Venkatesh et al., 2003) that Ease of Use is less relevant with time, as consumers experiment a technology and get used to it.

The relationship between Perceived Ease of Use and Perceived Value has been previously tested although sometimes it is considered in the reverse sense: "time effort" or "learning effort" ("Non-Easiness of Use") are conceptualized as Perceived Costs and thus, the hypothesized relationship with Perceived Value is negative. Hence, our findings for the non-users' group are consistent with previous studies that found out Perceived Ease of Use is positively related with Perceived Value (e.g.; Iniesta-Bonillo et al., 2012; Ko et al., 2009) but also with those of Kleijnen et al. (2007) who found out that Cognitive Effort negatively influences Perceived Value and also with those of Kim and Niehm (2009) who, like us, conceptualized Ease of Use as a dimension of Quality of Service and found out it had a positive relationship with Perceived Value. Globally, our findings are also in line with the

proposition of Davis et al. (1989) that a favorable ease of use perception is important for initial acceptance.

According to our results, for consumers that have never tried the service, the more they perceive Mobile TV as being easy to use, the more they perceive the service as being valuable. Results from our focus groups' interviews suggested that the Ease of Use of Mobile TV specifically meant being easy to connect to the service, to switch channels, to change the volume level, to access and navigate within the Mobile TV menus, being notified of an incoming call and having the possibility to take it (when watching Mobile TV), that the service is intuitive to use in general. This has implications for the mobile network operators, who provide the service, but also for mobile phone manufacturers and for mobile applications suppliers (who provide the software for the Mobile TV interface). Together, they should join efforts to ensure they meet customers' needs regarding the ease of use of the Mobile TV service.

Speed

Like the previous dimensions of our Perceived Quality of Service construct, Speed was hypothesized to have a positive relationship with Perceived Value (H5d). The theorized relationship was tested through Pearson correlation analysis and was supported for both the users ($r=.301$, $p=.002$) and the non users' group ($r=.137$, $p=.006$) (although the correlation coefficient is not very expressive for the latter) meaning that, the higher consumers' perceptions of the Mobile TV speed/efficiency (i.e., the service reacts immediately to the user's instructions namely, it doesn't take much time to connect and, when switching channels, they don't take much time to load), the higher their perceptions of the Mobile TV service value.

Our findings are in line with those of Collier and Sherrell (2010) who found out that Speed is a significant antecedent of Perceived Value. Likewise, our results are in line with those of Kuo et al. (2009), who have also conceptualized Speed as a component of Perceived Quality of advanced mobile services which, in turn, confirmed to be a predictor of Perceived Value. Finally, similarly to our findings, in their 2009's study, Shamdasani et al. confirmed that Speed was an antecedent of Perceived Quality of Service which, in turn, was an antecedent of Perceived Value.

Content

The last dimension of our Perceived Quality of Service construct was Content, which was hypothesized to have a positive relationship with Perceived Value (H5e). The theorized relationship was tested through Pearson correlation analysis and was supported for both the users ($r=.518$, $p=.001$) and the non users' group ($r=.172$, $p=.001$) (although the correlation coefficient is not very expressive for the latter) meaning that, the higher consumers' perceptions of the Mobile TV as offering a significant variety of appealing channels that suit their interests, the higher their perceptions of the Mobile TV service value.

To our knowledge, the direct relationship between Content and Perceived Value had never been tested before. However, our findings are consistent with those of Aladwani and Palvia, (2002), Carlson and O'Cass, 2010, Dai, Haried and Salam, 2011, Sohn and Tadisina (2008), Udo et al. (2010), Vlachos and Vrechopoulos (2008), who found out that Content had a strong positive influence on consumers' Internet and web-site Quality perceptions. Likewise, Content has been considered in the context of mobile services and it has revealed to be the most influential factor for consumers when evaluating service quality of mobile entertainment services (e.g., Tan and Chou, 2008; Vlachos and Vrechopoulos, 2005). Finally, results from several Mobile TV studies and pilots have also put forward the availability of suited content as a key factor for consumer adoption of Mobile TV (e.g., Buchinger, 2009; Carlsson and Walden, 2007; Choi et al., 2008; Knoche and Sasse, 2006; Schatz et al., 2007; Shuurman et al., 2008).

Conclusions of our exploratory qualitative study also suggested that consumers consider Mobile TV content as an important factor for Mobile TV adoption namely as regards its appropriateness to the mobile medium, its timeliness (consumers are interested in up-to-date contents), its sufficiency (quantity and variety) and its relevance (the degree to which it matches consumer's interests). The focus groups conclusions suggested that consumers prefer to have a choice of fewer channels that really suit their interests than paying for a large pack of channels of which only a few may interest them. In terms of practical implications, our findings suggest that Mobile TV service and content providers must ensure that they supply a service that meets consumers' needs in terms of content by proposing a choice of channels and programs adapted to each type of consumer and use circumstances (for example, we figured out there were differences in terms of preferences depending on the user being a man

or a woman, being younger or older, being in a “snack-type” consuming situation or really wanting to watch a specific and longer program). There are different types of consumers and use situations that require different types of TV contents. Practitioners must make sure they address consumers’ requirements in terms of Mobile TV content provision.

To Conclude on Perceived Quality of Service

In our study, Reliability, Multimedia Quality, Ease of Use, Speed and Content were not conceptualized as antecedents of Perceived Quality of Service but rather as its components, which had methodological implications: we did not test an antecedent-consequent relationship between the above mentioned variables and Quality of Service but rather, Quality of Service was measured/was the outcome of the combination of those five components, which the results of the measurement models (namely the factor loadings of the model latent variables) validated. However, we still decided to test the relationship between each of the Quality of Service components and Perceived Value through Pearson correlation studies, as discussed above, which may be considered an additional theoretical contribution of our research.

Based on the results of our study, we conclude that Perceived Quality of Service is a strong predictor of consumers’ Perceived Value only after experimentation of the service, meaning that it may not be an important factor for initial adoption or trial but it is, undoubtedly, a very important factor for continued adoption. As consumers place their requirements in terms of Quality of Service at very high standards (as evidenced from the descriptive analysis of the model variables), it is extremely important that they are not disappointed once they try the service: not only would this lead consumers to resign in the short term but probably for good, as the impact of the first impressions is very strong and may dampen any further trial of the service even in more advanced stages of the market and with improved technical characteristics and performance (both of the handsets and of the service itself).

Specific implications and suggestions related to each Quality of Service parameter were presented above together with the respective findings and discussion.

Perceived Value

Our conceptual model is a consumer value-centric model in which Perceived Value is a dependent variable hypothesized to be a predictor of consumers’ Adoption Intention of Mobile TV. Value-based models have raised increasing interest in mobile services literature

and perceived value has proved to play a determinant role in adoption intention, regardless of different service categories and different cultural backgrounds. Our hypothesis H1 aimed to measure the impact of consumers' Mobile TV Perceived Value on their Adoption Intention. The results of the SEM analysis supported that Perceived Value is a significant predictor of Mobile TV Adoption Intention for both the users ($\beta=.54$, $p<.000$, $R^2 = 0.3$) and the non-users' group ($\beta=.55$, $p<.000$, $R^2 = 0.3$) meaning that, the higher consumers' perceptions of Mobile TV Perceived Value, the higher their Intention to Adopt the service.

Our findings are consistent with previous studies in different contexts and with different services that found out Perceived Value (although with different antecedent or component benefits and costs in each study) was a strong predictor of consumers' adoption or use intentions (e.g., Kim et al., 2007 with mobile Internet; Kim and Han, 2009 with mobile data services; Kleijnen et al. (2004) with mobile gaming ; Kleijnen et al., 2007 with mobile brokerage services; Kuo et al., 2009 with mobile value-added services; Lee et al., 2007 with mobile data services regardless of different service categories; Nysveen et al., 2005 with mobile services; Pura, 2005 with mobile location-based services; Turel et al., 2007 with SMS). As in previous studies, our findings indicate that consumers' perceptions of Mobile TV as being a valuable service is a prerequisite to adopt/use the service. This is not to say that other factors do not play a role but the underlying conclusion is that consumers must find the service valuable in order for them to adopt it.

Based on the conclusions of our study, the industry should attempt to maximize consumers' Mobile TV value perceptions by ensuring that the service they offer gratifies the identified needs/provides the identified perceived benefits with the highest possible quality (concerning the previously described QoS parameters) and at the lowest possible costs (both monetary and non-monetary, as aforementioned). Additional suggestions and practical contributions of our study will be discussed in the respective section of this chapter.

7.1.3.3 Multi-Group Analyses to Test Moderating Effects

The last step of our multivariate data analysis consisted on multi-group analyses that aimed to identify possible moderating effects of four selected variables: Smartphone possession, age, gender and education level (the reasons for the choice of these variables were dully explained in the quantitative study chapter). For these analyses, each of the above mentioned variables

was dichotomized in order to assess differences between each two groups (as specified in the previous chapter). Of the four variables tested, none of them revealed to have a moderating effect on the intention to adopt Mobile TV (the structural relationships were not significantly different when comparing the different groups). Our findings differ from those of Choi et al. (2009) and Constantiou and Mahnke (2010) who found out that gender moderated the intention to adopt Mobile TV. They also differ from the findings of Kim and Han (2009), Ha et al. (2007), Jayasingh and Eze (2012), Nysveen et al. (2005), Riquelme and Rios (2010) who concluded that gender and/or age had moderating effects on the intention to adopt other types of mobile services. However, our findings are in line with those of Hernandez et al. (2011) who found out that socioeconomic variables (age, gender and income) do not condition the behavior of online shoppers. As explained in the respective section of the quantitative study chapter, for technical reasons and scientific rigour, our multi-group analyses were conducted only for the non-users' sample (it was not possible to conduct them for the users' sample alone neither was it possible to add the two samples because some of the questions they answered were different).

7.1.3.4 Summary of Main Findings regarding the Conceptual Model Test

The findings of our research support the majority of the hypotheses presented in the conceptual model chapter. Namely, the results of our study show that, in the context of Mobile TV services, consumer Perceived Value significantly influences consumers' Adoption Intention. Further, results revealed that the antecedents of perceived value have distinct effects on consumers' value perceptions depending on whether the consumers have already tried the service or not: Perceived Quality of Service was not significant for the non-users' respondents while Non-monetary Costs (Battery Consumption) was not significant for the users' respondents. Furthermore, our findings demonstrated beyond any doubt that Mobile TV Perceived Benefits as we conceptualized them- composed by six gratifications derived from the Uses and Gratifications literature and from our exploratory qualitative research- positively influence consumers' Perceived Value (regardless of previous trial/use of the service). Likewise, the assumption that Perceived Monetary Costs (service fee) negatively affects consumers' Perceived Value was supported, while Battery Consumption (Non-Monetary Cost) also had a negative impact on Perceived Value in the non-users' sample. Regarding the hypothesized positive relationship between Mobile TV Quality of Service (composed by five components derived from the Service Quality and mobile services specific

literature, as well as from our exploratory qualitative study) and consumers' Perceived Value, it was supported only in the context of consumers that had already tried the service.

7.1.4 Main findings from the content analysis of the answers to the question “What could make you change your mind and become interested in using Mobile TV?”

As previously stated, at the end of our survey questionnaire we had two questions whose purpose was exclusively to provide us a better understanding of the reasons why respondents did not intend to adopt Mobile TV (of which, Q25/Q37 was purely qualitative). Throughout this section, we have already referred to some of the outputs of these questions' analysis because they complement and help us better interpret the quantitative results. Hence, we highlight the following main findings: the fact of the service being too expensive was the main reason pointed out by 43% of the respondents (users and non-users altogether) for not intending to use the service in the next six months. This was followed by “not having the habit/not liking watching TV” (22.7% of the answers). Price related and willingness to pay issues like the service being lower priced or free of any charge, were spontaneously elicited by 51.2% of the respondents when asked about the factors that could make them change their mind regarding their intention to adopt Mobile TV. Other important factors that we identified as possibly changing respondents' intentions towards Mobile TV adoption were: possession of a compatible mobile phone (in the non-users' group) and Quality of Service issues (mainly in the users' group). Finally, having a free trial period and compatibility issues (including affinity with TV viewing in general, compatibility with personal values and compatibility with lifestyle/habits) also emerged as possibly playing a role.

Several implications derive from our findings. The first one is that the Price factor seems to have more relevancy and a stronger impact on Mobile TV adoption intentions than what was suggested by the results of our model test (where the Monetary Costs' structural coefficients were not very high). In addition Willingness to Pay, Facilitating Conditions (the possession of a compatible/premium mobile phone) and Compatibility (with lifestyle and personal values) emerged as other important factors that play a role in consumers' intentions to use Mobile TV. Finally, the relevancy of Quality of Service to retain customers and lead to continuous adoption seems to confirm. These qualitative findings and information are extremely rich and useful for practitioners as they help shedding light on additional factors that influence consumers' intentions to adopt Mobile TV and that have not been accounted for in our model.

For researchers, these findings suggest that Willingness to Pay, Facilitating Conditions and Compatibility should be considered as additional constructs in future mobile services' adoption studies.

7.2 Theoretical Contributions

Our study explored the determinants of adoption of an innovative technological service: mobile TV. It makes several key contributions to the field of information technology and innovations acceptance in general by presenting an alternative approach to the technology acceptance and innovations' diffusion models, traditionally used in information technology literature.

First, we successfully put together theories and constructs from three different main fields of research: Information Systems (namely Ease of Use and Adoption Intention), Marketing (namely Consumer Value, Perceived Costs, Perceived Benefits and Quality of Service) and Communications (namely Uses and Gratifications) contributing to bridge a theoretical gap: by leveraging on a variety of theories available, we addressed suggestions made by several renowned researchers that claimed a need for integration of different theories and unifying models (e.g., Bagozzi, 2007; Dwivedi et al., 2008), as well as a need to move towards alternative theoretical perspectives (Dwivedi et al., 2008).

Our attempt to introduce theoretical Marketing perspectives (like Consumer Value and Quality of Service) in the IS/IT adoption field is not the first one. For example, Kim et al. (2007), Kim and Han (2009), Ko et al. (2009), Turel et al. (2007) have all used consumer value approaches to explain the adoption of technological services. However, to our knowledge, our study is the first attempt to combine theoretical insights from three different fields of research (and not only theories or constructs from the same field) to investigate the individual adoption decision of a technological innovation, and we have successfully demonstrated its effectiveness.

Our research model included Uses and Gratifications elements that constituted the higher-order Perceived Benefits construct which, together with Monetary Costs, Non-monetary Costs and Quality of Service (including Ease of Use from the IS field as a parameter) led to consumers' value assessment and subsequent adoption intention. No previous empirical studies had combined the Uses and Gratifications theory with a consumer value-based

approach: we tested six gratifications as components of Perceived Benefits. Moreover, no previous studies had empirically tested Quality of Service as a combination of Reliability, Multimedia Quality, Ease of Use, Speed and Content. Finally, Battery Consumption as a non-monetary cost (a perceived risk) had never been tested as an antecedent of Perceived Value. Our study empirically measured these variables and assessed their impact on the perceived value outcome and subsequent adoption intention in the context of Mobile TV services. Our research was, therefore, oriented towards a model building approach in which the potential relationships between the variables and outcome criteria were investigated and, for the majority, supported.

By proposing an alternative approach to the technology acceptance and diffusion of innovations' theories, conceiving the individual as a consumer rather than a technology adopter, our study highlighted the importance of value driven criteria and provided a Marketing/economic explanation for the adoption decision instead of one based on the technical characteristics of the innovation. This is especially relevant when we are treating with innovative products or services that, in spite of bringing technological advancements, are "consumer goods" providing or not value to the user.

Actually, among other things, our proposed research model was inspired by a common finding confirmed in our exploratory qualitative study: mobile phone users have significant experience and knowledge in technology use; moreover, many recent innovations have similar technological characteristics. Hence, their adoption decisions are not highly influenced by the technology characteristics or related concerns (like ease of use) but rather, they are influenced by value criteria; consumers tend to compare the value of an innovation with existing solutions they already have (or can chose from), before deciding to adopt it.

Furthermore, our theoretical model endorsed the point of view of previous researchers (e.g., Bolton and Drew, 1991; Boksberger and Melsen, 2011; Dekimpe et al., 2000; Kleijnen et al., 2007; Parasuraman et al., 2005; Shamdasani et al., 2008) that both technological innovations' adoption and consumer perceived value are context and product specific. Therefore, we proposed and successfully assessed a more specific, more comprehensive and less parsimonious model (vs. previous ones, namely the TAM and its derivatives) that enables a deeper understanding of the particular technology and research problem in question filling

gaps pointed out by several researchers (e.g., Dekimpe et al., 2000; Kleijnen et al., 2007; Loebbecke et al., 2008; Parasuraman et al., 2005; Shamdasani et al., 2008).

Another relevant contribution has to do with the methodological post-positivist approach that we pursued: by using both qualitative and quantitative methods, we bridged a theoretical gap pointed out by Dwivedi et al. (2008) that observed the positivist approach and utilization of quantitative techniques have strongly dominated ICTs' adoption literature and called for different paradigms and research methods. On the other hand, qualitative only techniques have dominated research using the Uses and Gratifications theory.

Consistent with procedures recommended for marketing theory development, we conducted an exploratory qualitative research based on key informants' individual interviews and focus groups with consumers, whose results contributed to the theoretical model development, namely by generating new ideas for constructs and hypotheses. In fact, our conceptual model included several variables that were new or almost unexplored in the academic literature like Privacy (as a benefit), Battery Consumption, Multimedia Quality, Speed and Content suitability. These variables were defined and conceptualized based on adequate theoretical and empirical support and they were measured using existing or a combination of existing scales (when available) and some new measures were created supported by the exploratory qualitative study. All the scales were subject to well-known reliability and validity tests in the quantitative phase of our research and they all proved to be valid and reliable with very high Cronbach α values. This is a major theoretical contribution and researchers can further use and re-assess these scales in future studies, applied to other services, contexts and models.

Moreover, we also included a final qualitative question in the survey questionnaire aiming to improve our understanding of the reasons why respondents did not intend to adopt Mobile TV and of the factors that could make them change their minds towards adoption. The findings of our exploratory qualitative study and those that derived from the content analysis of this survey question provided us extremely rich qualitative information that was particularly useful in providing insights for interpretation of the quantitative data analysis' results.

As far as the quantitative approach is concerned, we conducted a large scale quantitative study by means of a survey and using a non-convenience sample (which is more the exception than the rule in academic research at this level) to test our model and the hypothesized

relationships, which were assessed using the Structural Equation Modeling technique for data analysis. The way we integrated the above mentioned “new” variables with other widely explored variables (like Ease of Use, Price, Adoption Intention), as well as the combination of Uses and Gratifications with Perceived Value through the means of Perceived Benefits proved successful (the main hypotheses were supported, the fit indices were good both for the measurement and structural model in the non-users’ group) and is definitely innovative. The results of our research should be generalizable to other services and contexts within the limits of this study, defined later on.

Finally, our research advances the Uses and Gratifications theory literature by applying it in the context of mobile television services and combining it with other theories like consumer value and technology adoption. Not only did we identify specific Mobile TV gratifications by using qualitative techniques (together with the literature review), a common practice in uses and gratifications studies, but we also empirically tested the proposed gratifications by using quantitative techniques and measurement scales, whose results showed high validity and reliability values. This is an important contribution as there are not many scales available within the uses and gratifications field.

To conclude, in order to further validate our findings and model we exhort future researchers to adopt our methodological approach and test our proposed model in different contexts and with different services, when aiming to assess which are the most important variables that contribute to the success likelihood of other new products and services.

7.3 Contributions for Management

When launching new (mobile) products or services, marketers and managers in general would like to be able to predict whether they will be well accepted and adopted by consumers, to identify the reasons why they may not be well accepted (by users), and to take corrective actions to increase their acceptability in order to improve business results and the related impact from large investments in time and money.

Our research contributes to the assessment and predictability of the acceptance of new mobile services by helping to identify and assess the key variables associated with consumers’ adoption behavior. More specifically, we have contributed to provide a deeper understanding

of the factors that influence consumers' intention to adopt Mobile TV. The results of our study emphasized the importance of consumer value to the adoption decision. They also highlighted the importance of different value antecedents considered by individuals previously to their adoption decision.

Our study suggests that a new mobile service must be valuable for consumers in order to generate adoption, i.e., the adoption intention is value driven rather than technology determined and the decision to adopt the service may be deferred if consumers are not able to derive value from the service use. Furthermore, our study put forward that in order to be considered valuable by consumers, the new service must bring considerable benefits that exceed its associated costs. Finally, besides the importance of the trade-off between perceived benefits and perceived costs to potential users' assessment of a new service, quality of service is also an important factor that consumers take into account and that contribute to their perceptions of value, once they try the service; the conclusions of our study evidenced that Quality of Service is very important for customer retention and continued adoption.

Our study has also contributed to identify specific factors affecting the Mobile TV service value perceptions and subsequent adoption intentions that marketers need to take into consideration and highlight or mitigate when promoting the service in order to facilitate adoption. These were Mobile TV gratifications (information awareness, entertainment, killing time, status, privacy and convenience), service price, battery consumption and quality of service (including reliability, multimedia quality, service speed, ease of use and suited content). By unveiling the relevant gratifications, costs and quality of service dimensions that influence consumers' assessment of Mobile TV value and subsequent adoption intention, our study may help mobile operators and content providers conceiving a Mobile TV service that individuals more promptly adopt, while also contributing to help them delineate effective marketing strategies. Namely, our findings underlined the preponderant influence of perceived benefits in the value assessment and subsequent adoption intention. The conclusions of our study have also evidenced that price is a strong barrier to the adoption of Mobile TV services and that Service Quality is determinant for continuous adoption.

Hence, if mobile operators are able to deliver a Mobile TV service that provides the identified benefits with high levels of quality (for the identified QoS parameters), they will likely supersede consumers' (negative) perceptions of the associated costs, leading to a positive

value perception and subsequent adoption of the service. Conversely, if companies fail to do it, the outcome will likely be the rejection of Mobile TV. Hence, mobile operators must ensure that the Mobile TV service provides the benefits identified in our study and they should define their communication strategies focusing on promoting the most relevant ones. At the same time, they should pay increased attention to pricing of the service which was found to be an important hurdle to adoption. We have suggested that advertisement-sponsored, bundled services value-added pricing models, offering smaller packages of channels at lower price (vs. access to all channels) and offering a free trial period may add value to consumers and prove successful by facilitating the adoption decision at an early stage of the Mobile TV market. Such pricing strategies could accelerate a mass diffusion of the service. As regards to Quality of Service, which we found to be determinant for continuous adoption and to achieve higher levels of customer retention, it is important that Mobile TV players (including mobile operators, content providers, network equipment and mobile handset and applications' suppliers) work together to meet consumers' requirements in terms of Quality of Service rather than offering a service that is not "field-ready".

As above illustrated, we have also made an important contribution to management by having highlighted, for each model variable and relationships, the practical implications that derive from the respective main findings and having made relevant suggestions for Mobile TV players in order to increase the success and adoption likelihood of the service. More detailed practical implications and suggestions can be found in the "results discussion and implications" section of this chapter.

It has always been our aim to conceive a model that would significantly contribute to advance scientific knowledge while at the same time, having practical relevancy and applicability. Therefore, not only did we draw on the literature review to develop our conceptual model (as is the more common practice) but we have also conducted a qualitative exploratory study, which included personal interviews with key industry experts, to help us identify and select the most relevant variables to account for in our model. It was largely due to the exploratory study and to information gathered from industry experimental studies that we included in our model a couple of variables extremely relevant for the industry but very difficult to find or even inexistent in the academic literature as is the case with the benefit of Privacy, the non-monetary cost of Battery Consumption and the Quality of Service parameters of Content and Multimedia Quality. Notwithstanding, we managed to successfully identify some existent

scales and to create new ones to measure these variables and, the findings that derived from their appraisal and test of the corresponding relationships were very relevant and have significant practical implications that we discussed in the respective section of this chapter.

Furthermore, contrarily to the majority of academic studies, not only did we assess and test the proposed theoretical model and hypotheses, but we have also thoroughly analyzed all the model variables based on descriptive statistics and frequency of answers, with the main objective of contributing to the management practice by uncovering relevant findings for the industry. Within the most relevant findings are those that derive from the comparison between the users and the non-users' respondents, namely our finding that users' perceptions of the Mobile TV Benefits and Quality of Service (which were evaluated based on their real experience with the service) are lower than those of the non-users suggesting "expectations disconfirmation" issues which have important implications for practice, as they lead to consumers' disappointment and resignation of the service. This is all the more important as "non-adoption" may be irreversible because the impact of the first impressions is very strong: damaging subscribers' first perceptions may have as a consequence that they will never come back to the service (even though further improvements may have occurred). Hence, we suggested it is of the utmost importance that mobile operators and other concerned industry players ensure that the Mobile TV service meets consumers' requirements in terms of Quality of Service before launching a commercial offer that risks disappointing consumers and killing the service from the beginning.

To conclude, the findings from this exploratory research allowed us and to practitioners to gain insights into consumers' adoption determinants of the Mobile TV service. While the key main variables (Benefits, Monetary and Non-monetary Costs, Quality of Service and consumer Value) are generalizable to other (mobile) services, its components should be identified and assessed for each specific service. Before launching new services, practitioners should involve potential consumers in the product/service development process by following our exploratory qualitative methodological approach and conducting focus groups and/or in-depth individual interviews with potential adopters in order to identify specific needs and motivations to use a new product or service. Although it may not always be easy to make realistic user acceptance tests in an early stage of development of a new mobile service, techniques like those we used in our focus groups (including live demos with prototypes and computer based mockups) can help create a realistic image of the new service, even if a brief

exposure may not be sufficient to allow potential users to form stable perceptions. This is especially true if the gratifications, costs and quality of service issues are context/situation-dependent, as happens with many mobile services. In this case, we suggest practitioners to conduct experimental pilot-studies whenever possible, in which potential users would have the opportunity to test and assess new mobile services in real or close to real conditions and then, conduct qualitative studies based on those experiences in order to identify the specific needs and motivations to use a new product or service. This is extremely important as the ability to identify the determinants of user acceptance early in the development process will have an impact on a company's ability to abandon or improve poor systems and significantly reduce the risk of launching to market finished solutions that end up being rejected by consumers. This will contribute to developing more effective and appealing customer-oriented products/services and will ultimately lead to competitive advantages in the market place.

As a final note, we highlight that, although the results of our quantitative study suggested there were no moderating effects of gender, age, Smartphone possession or education level on Mobile TV adoption intention, findings of our exploratory qualitative study suggested that Mobile TV contents' preferences were different according to gender. Service and content providers should take this finding into consideration and make sure they offer a service that addresses the specific preferences of men and women.

7.4 Limitations and Suggestions for Future Research

In social sciences, researchers have to make choices that often lead to limitations of their studies. In spite of the significant theoretical and practical contributions of our research, as with any academic work, our study presents some limitations that constitute, at the same time, opportunities for future research. We describe them hereafter in no order of importance.

Model variables

The first limitation has to do with other important variables that were not accounted for in our model. Despite our attempt to propose a more comprehensive model than previous ones in the literature, there are many other variables within our research framework that have been left out and that deserved being investigated. Before arriving to our proposed model, we went

through different conceptualizations that included other equally important variables. However, for parsimony reasons, we had to choose concentrating in our final selected constructs in detriment of others like Personal Innovativeness, Social Influence, Compatibility, Relative Advantage, Awareness (including effects of Marketing Communications and Word-of-Mouth), Willingness to Pay, Facilitating Conditions and Use Context. The impacts of these variables on Adoption Intention should be investigated in future studies, particularly the possible moderating effects of domain-specific Personal Innovativeness, Relative Advantage, Use Context/Situational Factors and Facilitating Conditions (previous possession of a premium mobile phone) and the possible determinant effects of Willingness to Pay and Compatibility (with TV viewing habits, with personal values and with lifestyle- for example, utilization of public transportation modes). Among these variables, the findings of our research (content analysis to Q25/Q37 of the survey questionnaire) outlined the relevancy of Willingness to Pay, Compatibility and Facilitating Conditions. We suggest the impacts of these variables to be assessed in future studies related with Mobile TV and/or other mobile services' adoption.

Methodological Limitations

Our researched adopted a cross-sectional survey approach which has the drawback of offering only a snapshot of the current market situation but not an overall perspective of the market dynamics. This would only be possible by using a longitudinal study and conducting a survey repeatedly at different points in time. This is all the more relevant that our study has been conducted in an early stage of development of the Mobile TV market and in a period of economic crisis (thus, having an influence on respondents' awareness and knowledge about the service and, on increased negativity towards price evaluations, willingness to pay and intention to adopt in the next six months).

Furthermore, the embryonic stage of the Mobile TV market raised additional difficulties namely to have a reasonable number of actual users to enquire. Not only the users' sample was small by itself but it was extremely small comparing to the non-users' sample which didn't allow for some relevant statistical tests and between groups' comparisons. Non-users low awareness of the service was an additional challenge and we believe respondents could have answered differently to the questionnaire if they had increased knowledge of the service. Moreover, because non-users' awareness and knowledge of the service was extremely low,

we were forced to use different ways to formulate the “same” question depending on whether the respondent had already tried the service or not. With questions formulated differently for the two distinct groups, this also prevented us from making between-groups and multi-group comparisons with statistical accuracy and relevancy. Also due to the embryonic stage of the Mobile TV market, we believe the judgments on Quality of Service, even within the users’ group, may have been slightly biased. In fact, users’ responses to the quality of service questions were based on their experience with the service at a very early stage of the market in which some respondents had tried the service in non-optimal conditions (e.g., mobile phones available had lower sized and lower definition screens, the transmission quality was lower than currently, contents and formats were not adapted to the mobile phone screens as many are already now, etc.).

We strongly suggest our study to be replicated at another moment in time and with larger samples in order to increase the ability to make causal inferences and offer further insights by re-assessing the model variables’ relationships over time. Furthermore, in a more advanced stage of the market, with non-users’ respondents’ increased knowledge and familiarity with the Mobile TV service, the formulation of some questions should be reviewed in order to allow for straightforward comparisons between the non-users and the users’ group. Also, conducting a longitudinal study and examining behaviors at a more advanced stage of the market would allow the inclusion of the construct Actual Behavior in addition to Adoption Intention. A longitudinal Mobile TV adoption study would likely have a great impact on theory as well as on practice by providing understanding of potential changes consumers go through.

Finally, the fact of having resorted to an online sample of volunteer respondents who were financially rewarded for their time and contribution (although the amount was extremely low), guaranteed us a high response rate in a short period of time. However, it may have had as consequence slight data bias, namely regarding the quality of the answers and the representativeness of the population.

Additional Limitations and Suggestions for Future Research

Our research was carried out in Portugal, one of the countries in Europe with the higher penetration of mobile services. Hence, our findings are potentially generalizable to other

developed countries. Yet, future research should replicate our study in different countries which would allow for cross-cultural comparisons and further validation of our study's concepts and findings, while assisting multinational companies in better customizing their marketing efforts and strategies.

Future research should also test our model in different settings, with other mobile and non-mobile services by proceeding to the necessary adaptations (i.e., replicating the exploratory qualitative phase of our study and identifying the Costs, Benefits and QoS components specific to the service in question).

In our study, we tested a whole new measurement scale for the construct of Privacy (as a benefit) and we changed previous measures in order to adapt them to the Mobile TV context. Future replications of our study, whether applied to the same service or to different services and in different countries should contribute to validate our measures.

Our study put forward consumers' perceptions of Mobile TV as a way to gratify certain needs. While those Mobile TV benefits were clearly recognized by the majority of respondents, this has not prevented a strong negativity towards Mobile TV adoption intention. Further studies could investigate the extent to which Mobile TV is or not perceived by consumers' as being superior to other alternatives in gratifying their needs. It would be interesting to conduct a study that would use the conjoint analysis technique as a way to assess consumers' value perceptions of different products and/or services that they can choose from to gratify each of the identified needs: for example, when waiting in a doctor's waiting room and wanting to "kill time", if they have the choice between watching Mobile TV (paid service) or reading the available "gossips' magazines" or watching the "mid-afternoon programs for housewives" which usually pass on doctor's waiting-rooms TVs, what would consumers prefer? When on the move and wanting to be aware of updated information about a recent bomb attack, having the choice between watching the latest/live news on Mobile TV, access information sites on the web using their mobile or listening to an information radio station, what would consumers prefer? Conjoint analysis would be a very interesting technique to assess consumers' value perceptions of Mobile TV relative to other alternatives because consumers usually have a couple of different alternatives to gratify a same need. Hence, it is important not only to assess the "absolute value" of Mobile TV but also the "relative value" and understand in which circumstances Mobile TV would be the preferred

choice to gratify consumers' needs. This could help shed light on additional reasons for adopting or not adopting Mobile TV (besides the ones already identified in our study) and would concern also the constructs Relative Advantage and Context/Situational Factors that were not accounted for in our model.

Finally, we should say that this project has taken much longer than what was initially planned. When we started our research, Mobile TV was a topical subject for the industry and a subject not explored at all in the academic literature. Since the beginning of our research there have been significant changes, both in the market and in the academic field: the Mobile TV market context has hugely evolved (a common characteristic of technological markets/products), namely regarding the increased availability of very sophisticated mobile phones and tablets and quadruple play offers of telecom operators who propose bundles of fixed telephony and Internet service, premium cable or fiber fixed TV service and mobile telephony service including mobile Internet and, sometimes, a reduced price for Mobile TV. Notwithstanding, this does not invalidate or discredit the relevance of our study and findings which remain fully valid, while our model and methodological approach can still be applied to other existent and upcoming services.

7.5 Concluding Comments

Not overlooking the limitations of our study, this research has still made significant contributions to the academic field and to managerial practice.

Our main objective relied on the conceptualization and validation of a new marketing model that integrated theories and constructs from different fields of research to understand the factors that determinate consumer adoption of the Mobile TV service.

Our research contributed to advance scientific knowledge in several fields while, at the same time, showing practical applicability and relevancy.

Like any other research project, the findings of this study need to be viewed in context. In particular, due to the cross-sectional design of our study, its findings reflect the maturity of the Portuguese mobile television market at a particular time. We highlight the high degree of negativity towards Mobile TV adoption evidenced by our study, which may be related with the low level of consumer awareness typical of an embryonic stage of the market and also with overall consumption retention in a period of economic crisis. It is possible that the

negativity towards mobile TV adoption converts to more positive sentiment as the market matures and economic crisis dissipate.

Despite the current negativity towards Mobile TV adoption, the findings of our study shed light on the antecedents of Mobile TV adoption (namely consumers' Perceived Value) and provided useful insights that may influence the future development of the Mobile TV service and market by leading to increased perceptions of value that will facilitate the adoption decision.

Yet, perceived value is certainly not the only variable that influences Mobile TV adoption. A unique model cannot capture all the factors that exert an influence on consumers' adoption decisions and there will always be a trade-off between generalization ability and parsimony.

We come to the end of this project with a mixed feeling of frustration and desire to pursue with further research as our study raised as many questions as it answered. Hence, the challenge remains to further advance scientific knowledge by conducting new studies that will reassess our model and extend it with additional constructs that will reinforce the current research stream.

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