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WHAT DO USERS NEED? EXPLORING INFLUENCES ON THE ADOPTION OF MOBILE CONTENT AND THE DIFFERENCES AMONG CATEGORIES OF ADOPTERS

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WHAT DO USERS NEED?

EXPLORING INFLUENCES ON THE ADOPTION OF MOBILE CONTENT AND THE DIFFERENCES AMONG CATEGORIES OF ADOPTERS

By

Janaina Maia Gonzaga de Oliveira, MSc., Eng.

Master of Engineering and Management of Information Systems

Eng. Computing

A dissertation submitted to the Digital Media Centre

Dublin Institute of Technology

In fulfilment of the requirements

For the degree of

DOCTOR OF PHILOSOPHY, PhD

Supervisor: Dr Helen McQuillan

April, 2013

ABSTRACT

Businesses develop products and services with the goal of earning a satisfactory return on their original investment of time and capital. For their part, consumers seek out products and services that meet a recognized need. However, predicting the adoption rate of any new technology is an inexact science, and some businesses find themselves on the wrong side of the curve. The variables factoring into consumers' purchasing decisions are manifold and contingent on a wider network of influences. This research suggests that a primary variable that influences consumers' adoption of a technological innovation (in this case, mobile content) is the perception of 10 proposed Mobile Content Needs. The first goal of this research is to propose a framework for the relationships among the adoption of mobile content, users' perception of their need for mobile content, and users' innovativeness, which is a measure of the likelihood to adopt a new product. This research seeks to explore the differences among groups (categories) of adopters in the context of the perceived needs influencing their decision to adopt mobile content. In other words, it examines the prominence of particular mobile content needs for each of the five categories of adopters. This examination provides indirect evidence of how the mobile content adoption process evolves over time in relation to a specific innovation and within specific groups. This research is useful for those seeking to better understand the mobile content market in its totality, in particular the motivations driving different adopter groups. The results of this research may enable the development of more relevant, targeted content, with a surer knowledge of what a potential consumer needs at each stage of the adoption lifecycle. Similarly, this research offers a foundation for more extensive studies in the near future.

Keywords: perceived needs, mobile content, motivational variables, adoption of innovations, innovativeness, categories of adopters, consumer behaviour.

DECLARATION

I certify that this thesis which I now submit for examination for the award of Doctor of Philosophy, is entirely my own work and has not been taken from the work of others, save and to the extent that such work has been cited and acknowledged within the text of my work.

This thesis was prepared according to the regulations for postgraduate study by research of the Dublin Institute of Technology and has not been submitted in whole or in part for another award in any Institute.

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Signature _____ Date _____

DEDICATION

To the memory of my dear mother Dr. Hedwiges A. M. G. Oliveira.

I did it for you.

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1. CHAPTER ONE: INTRODUCTION

1.1. Introduction

This PhD research was originally framed within the context of the European Commission research project ICiNG (Innovative Cities for the Next Generation), which applied the use of mobile content applications and services to improve information and services relating to cities and citizens. After the end of the ICiNG project, this research evolved into a more elaborate analysis of the impact of perceptions of mobile content needs (MCN) on the adoption of mobile content, such that the insights obtained through the ICING project can be applied to further research and eventually put into practice.

1.2. The research scenario

The evolution of media technologies from telegraph to radio, newspaper, magazines, television and most recently the Internet has created a new class of media, namely mobile content. According to Ramos, Gómez-Barroso and Feijóo (2012), mobile technology will reach more than five billion subscribers worldwide by the end of 2013. Mobile content refers to media that can be accessed via a mobile device—predominantly mobile phones and tablets, though the distinction between the two may be blurring. The first deployment of mobile content dates to 1998, but the technology has evolved rapidly through and beyond the time of this research (2011) from simple text logos and messaging to videos, high-fidelity music and rich images, all enabled and empowered by smartphones and high-speed global communications networks. According to market research published by M:Metrics Inc. (2006), more than 20% of all mobile phones are expected to become Internet-enabled by 2013, and smartphones,

which are mobile phones with advanced capabilities, such as the ability to run applications, are becoming the largest new platform for digital content consumption. The report shows that while smartphone owners comprise a small percentage of the population of mobile phone users, large percentages of smartphone users are consuming mobile content.

The adoption of technology innovation has been studied in the context of a wide variety of knowledge domains. In essence, adoption research seeks to understand and improve the effectiveness of strategies to close the knowledge-practice gap (Scott, Plotnikoff, Karunamuni, Bize and Rodgers, 2008). Based on the extensive work of Rogers (1962), users have been divided into categories of adopters, reflecting their willingness to adopt particular innovations. Research on the adoption of mobile content and how the existing body of work on adoption and diffusion of innovations applies to mobile content is scant. This research seeks to begin adding data toward clarifying these grey areas.

In this research, the adoption of innovations is investigated within the mobile content context. The research seeks to shed light on two main points. First, it aims to identify the variables motivating potential consumers to download and use mobile content. Second, it seeks to understand the relative importance of these variables for users representing different categories of adopters. For example, an individual who chooses to download a new version of a mobile game immediately upon release might have a different perception of needs towards mobile content than an individual who decides to download this game only when all his/her friends have already done so. This research seeks to understand if the needs for mobile content perceived by the first subject differ significantly from the needs for mobile content perceived by the second subject. As such, this research has four objectives; first, to determine if a proposed set of ten mobile

content needs (MCN) derived from research reviewed in Chapter Three is associated with the adoption of mobile content; second, to propose a needs and innovativeness-based adoption framework that can be subjected to empirical, quantitative testing given an appropriate sample; third, to determine if and how the MCNs manifest differently for individuals occupying different categories of adopters. The third objective will allow for tentative inferences of how different needs become emphasised and de-emphasised as mobile content penetrates the market. Fourth, and finally, the research will examine results from two different countries—Ireland and Brazil—to determine the extent to which adoption of innovation in this context is universal or rooted firmly within cultures. This would both help the understanding of how motivational variables affect the adoption of mobile content and help explain why the two subjects in the example above have different approaches to adoption of mobile content innovations.

This dissertation combines studies in three areas of research: [1] traditional, empirically based theories and models of the adoption of technology; [2] uses and gratification research; and [3] traditional motivational studies. The research takes into account existing literature that links motivational variables and the adoption of mobile content. These areas are linked to propose a set of ten variables (MCN) to be investigated to discover to what extent user needs influence the adoption of mobile content.

Adoption research is widely used to explain the adoption of technology. The most popular models include the Technology Acceptance Model (TAM), proposed by Davis (1989), TRA, or the Theory of Reasoned Action (Fishbein and Ajzen, 1975), and TPB, or the Theory of Planned Behaviour (Ajzen, 1991). These models use quantifiable variables to predict the adoption of innovations. These models were further developed by

researchers across diverse disciplines, including telecommunications, proposing further variables as influencers in the adoption process (Plouffe, Vandenbosch and Hulland, 2001; Kwon and Chidambaram, 2001).

Not only have different theories been proposed to describe and quantify the adoption of technology, Bussell (2011) found adoption of technology varies from one country to the next. Thus far, there is little research that compares adoption of similar technologies in different countries. For this reason, this study chose samples from two different countries to provide relevant perspective and data, as well as laying the groundwork for future research in cross-national technology adoption. It should be noted, though, that a cross-national comparison of results is not one of the prime goals here. Similarly, Vannoy and Palvia (2010) assert that "[f]ew studies have investigated technology adoption targeting the individual at the level of society, community, or lifestyle experience" (p. 149). Each of these technology adoption models is discussed in detail in Chapter Three.

Uses and gratifications research derives from communication research and focuses on mass communications (Blumler and Katz, 1974). It stems from the idea that individuals seek gratification from technology use based upon their needs and motivations (Lin, 1996). This approach has been extended to a range of technologies, from telephones (Dimmick and Sikand, 1994) to video games (Leung and Wei, 1999). In the previously mentioned studies, needs were found to be predictors of the adoption of diverse technological innovations. Needs are therefore employed in this study as the basis for the MCN framework. However, uses and gratification research has recently investigated how gratifications are often impacted by age or level of technological proficiency. Salman and Rahim (2012) note that status as a "digital native" or "digital migrant"

significantly affects the rate and level of technology acceptance. They further posit that previous research has focused on the digital divide, but it is time for a new focus on digital inclusion, particularly as it relates to access to and use of the Internet. Therefore, although previous research forms the basis for the MCN framework, understanding adoption of technologies in current society is necessary.

Motivational research, which identifies motivational variables that help predict the adoption of innovations, also contributes to this investigation (Qualasvirta, 2005; Geser, 2004; Steverink and Lindenberg, 2006). The variables derived from studies within these three fields (motivational research, adoption of technology, and uses and gratifications research) were brought together, and the ten variables most cited and relevant to the adoption of innovations were selected within the specific area of mobile content adoption. They are: functionality, utility, reliability, compatibility, popularity, communication, ease of use, status, value and fun. Vannoy and Palvia (2010) note previous individual studies on different MCN have been conducted using TRA or TAM, but recent studies are looking at the impact the user has on the design, development and marketing of mobile content. This establishes that despite the availability of previous individual studies on different MCN in the literature, a framework to examine the collective predictive relationship of MCN has not yet been developed, nor applied to mobile content adoption. Therefore, this is the *first research problem* addressed in this research and it establishes the context for the investigation as a whole.

This research draws upon prior studies to explore the influence of MCN in the adoption of mobile content, with the goal of producing a theoretical generalisation and a favourable comparison with extant literature. This study also incorporates individual innovativeness, which is a score that measures how prone an individual is to adopt an

innovation. Innovativeness has been consistently studied in the context of the adoption of innovations (Frank, 2001; Fell, Hansen and Becker, 2003; Yu, Liu, and Yao, 2003; Hung, Ku, and Chang, 2003; Yang, 2005). It was incorporated into the model to more efficiently predict the adoption of mobile content. Innovativeness as a theoretical construct is described in detail in Chapter Three.

In addition, this research seeks to understand if the mobile content needs (MCN) described are perceived the same way by individuals who adopt the innovation at different times. For this analysis, this research makes use of Rogers' (1962) categories of adopters, which categorize individuals according to when they decide to adopt an innovation (time of adoption). Rogers' and other research linked to his approach is further discussed in Chapter Three.

Due to the highly individualized nature of perception, it can be difficult for producers of consumer products to fully understand consumers' perceptions. Knowledge of these perceptions can profoundly affect business strategy. According to Lu and Shiu (2011), the perceived value of a product can have a direct relationship on a consumer's willingness to purchase. They further posit that the industry must work hard to ensure the consumer perceives value in a product over the long run to sustain business and financial success. Specifically, "…the perceived quality…separately contributed to value perception, which was positively associated with willingness to buy" (p. 1189).

Moderating the perceived value can be difficult, however. According to Heriyati and Siek (2011), too much information about what is available regarding features on mobile phones can lead to confusion. Consumers will often rely on trusted confidantes for guidance when making the decision regarding mobile phone use and features as a way

to circumvent information overload. This word of mouth communication can influence perceived quality. However, Heriyati and Siek's study did demonstrate that perceived quality was more important than word of mouth communication in the decision to purchase a particular smartphone.

For these reasons, understanding the decision process and how mobile content needs are established is essential. Within this context, understanding the response of different consumers throughout the adoption of such content is of equal importance. Together, these investigations will shed light on consumer behaviour and motivation and will enhance understanding for mobile product designers.

1.3. Research questions

The research questions focus on two major issues: [1] how to create a model to identify the influence of mobile content needs (MCN) and individual innovativeness in the adoption of mobile content and [2] to understand how the relative importance of MCN change depending upon individuals' innovativeness, which is captured by Rogers' categories of adopters. The research questions addressed in the current investigation are as follows:

1. **What are the differences in the perception of needs for mobile content among different categories of adopters?** In essence, the aim of this research question is to identify whether and how each of the Mobile Content Needs is perceived differently by the five types of adopters at different stages of the mobile content adoption lifecycle. Vannoy and Palvia (2010) note that most research to date has been conducted using TRA or TAM; therefore, a new method of looking at patterns of adoption is prudent. The following analyses are performed to answer this question:

a. Categorise mobile content adoption lifecycle into 5 stages and group responses for each stage according to 5 categories of adopters (Rogers, 1962);
b. Does MCN differ between the categories of adopters?
c. How does MCN differ between the categories of adopters?

2. **Can a theoretical framework incorporating users' innovativeness and needs to acquire mobile content be used to predict mobile content adoption?** This research question seeks to understand if MCN and innovativeness contribute to the existing body of research in the field of innovation by predicting adoption of mobile content innovations, as well as creating a framework using these variables to help predict the adoption of mobile content. After an analysis of 806 literature articles regarding trends in mobile technology over a ten-year period, Ladd, Datta, Sarker and Yu (2010) found the need for further research in two areas: "design of mobile computing systems" and "organizational/societal impact and change precipitated by mobile computing technologies" (p. 285). Likewise, Donner's (2008) review of 200 studies showed that while mobile adoption determinants and the interrelationships between technology and users is a major research thread in the developing world, which is highly relevant for one component of the present study, the overall picture is still unclear. Nikou and Mezei (2012) identified functionality as a main driver of mobile services, while Borges, Rita and Pagani (2011) highlighted the extremely limited understanding of the forces influencing mobile TV adoption, a cutting-edge variety of mobile content. Understanding the impact of users' innovativeness and

willingness to adopt new content will contribute to answering these research needs within the confines of mobile content adoption. Significance of the study

The central theme of this investigation is to develop a better understanding of the adoption of mobile content. This study indirectly examines changes in the perception of need for mobile content by individuals from its release until the moment it is declared obsolete. In this way, this investigation contributes to knowledge about mobile content adoption that is pertinent for wider industry practice.

1.3.1. Scientific goal

The scientific goals of this research include the use of a unique multidisciplinary approach of motivational theories, adoption, and uses and gratifications research to study the adoption of innovations, in particular the adoption of mobile content. It also contributes to the understanding of the adoption of mobile content in terms of behavioural needs, indicating which variables influence each individual potential consumer to adopt mobile content and how these needs are expressed across different adopter groups. Lastly, the research will further contribute to the growing body of knowledge on the cultural aspects of technology adoption.

The understanding of behavioural adoption requirements specific to the mobile sphere is important to narrow down the adoption of mobile content from traditional, widely available technological services studies. With the evolution of mobile devices, which at the time of this research (2011) are in their 3rd generation, this study broadens the understanding of future converging content adoption when traditional web content will be increasingly consumed via smartphones and related mobile devices (tablets, pads). This research also contributes to a quantitative understanding of data within this field

of research, making use of a series of statistical analyses that provide insights on the demand for mobile content in both Brazil and Ireland.

From a scientific point of view, this research also seeks to contribute to an enhanced understanding of how to apply and extend established innovation adoption theory and diffusion theories to mobile content with practical applications in the improvement of mobile content development and marketing capabilities. An important element in achieving this is the creation of a framework that can help predict adoption of innovations using MCN and innovativeness targeted to mobile content, contributing to the existing body of knowledge in the field. Other important aspects to which this thesis contributes are in the further profiling and understanding of adopter categories, by understanding that each group has different and specific needs and preferences. This has some important implications for innovation policy makers and commercial decision makers.

1.3.2. Relevance to mobile services industry

This research contributes to a clearer understanding by mobile content suppliers and consumers of the motivations surrounding mobile content use and adoption from an individual perspective, based on concepts of consumer desire (Sarker and Wells, 2003).

Another implication of this research from an industry perspective is to contribute to an enhanced understanding of what potential users expect and need from mobile content at different stages of its adoption process. This is based on the premise that such an understanding will improve the capability and efficiency in the development and marketing of new mobile content. It might have potential to improve the ability to evolve mobile content over time, considering a series of characteristics to be listed in

this research (MCN) to meet customer expectations. In other words, this research presents a map of what needs each category of adopter (at each time in the adoption lifecycle) values as important for the adoption of mobile content. This will help content creators and marketers to produce and market more relevant content, and adapt it over time according to the adoption of a given mobile content. This may save time and investment in research on finding "what the audience needs" from mobile content.

1.4. Thesis outline

The research is presented in six chapters. This chapter provides an introduction to the general scope and content of this research. It is followed by the literature review in Chapters Two and Three, which takes a contextual approach to the fields being studied and serves as a conceptual basis for this research's general findings and statements. Chapter Two: "Mobile Content and Services" describes the mobile content services considered in this study and briefly discusses current developments of mobile networks, devices and services. Chapter Three: "Theoretical Background" explores adoption of innovation and presents the main findings in the literature in this field. Chapter Three also presents theories of motivation and needs relevant to adoption of innovations. The research methodology is developed in Chapter Four, which presents the research's methodological approach and describes the scientific methods used for data analysis and validation. This is followed by Chapter Five: "Results and Discussion", which presents the main results of this research work, as well as a critical discussion of the results, their limitations and an assessment of its contribution to the existing body of literature in the field. Finally, Chapter Six: "Conclusion and Further Research" summarises the research and provides a discussion of the validity of the research

results. In addition, the conclusion makes some final comments on related research and suggests future research possibilities.

2. CHAPTER TWO: FROM MOBILE PHONES TO MOBILE CONTENT

2.1. Introduction

This chapter establishes the context for this dissertation through an exploration of the research literature as it relates to the growth of mobile technology and the current state of mobile content. A basic understanding of the many aspects of mobile devices, networks and content is crucial to theorising on the future development and use of mobile content. This analysis demonstrates that the evolution of mobile telecommunications facilitates the development of mobile technology-related innovations (Winterbottom, 2006) and influences the variety of mobile services and content available on the market. This discussion is followed by a discussion of the infrastructural challenges for networks, devices and services for the adoption of mobile content, and an analysis of the implications of the technological developments on mobile content usage. Finally, an exploration of the cultural context for the study (Brazil and Ireland) seeks to add a sociological angle to the research as a whole. While not the emphasis of the research, the socio-cultural variable(s) is an important factor when considering any technology adoption. As a whole, this historical backdrop helps to ground the research problems within the larger discussion of technological change, adaptation and consumerism.

2.1.1. Communication and mobile technology

Complex communication skills are one of the key capabilities that differentiate the human species from most other mammals. Humans' typically high sociability invites constant communication with companions and family. Recently, the expansion of a

global technology consumer market has induced a deep shift in the human relationship paradigm—one in which face-to-face contact becomes less and less relevant to establishing and maintaining human contact.

The availability of highly evolved communication resources has enabled the success of human communication through the Internet and the mobile phone, changing the means by which people communicate. A new paradigm for establishing and maintaining meaningful relationships became more accepted and increasingly adopted worldwide. Long-distance relationships, romantic or otherwise, were thus enabled and supported by technological advances in communication, triggered by globalization (Mann and Stewart, 2005).

Increasingly, mobile technologies are permeating various aspects of businesses' and individuals' lives. Mobile phones are more than communication devices: they are used for a myriad of applications, such as checking email, paying for tickets, sending money transfers, taking pictures, watching sports events and experiencing mobile content, among others (Goggin, 2006). Ilahiane (2011) highlighted how this medium is reshaping the landscapes of both the developing and developed world. The effects of this mobile revolution are not only social; the mobile phone has redefined the world of commerce as well. Jo, Pan and Kaski (2011) assert that "[u]nderstanding the patterns of human dynamics and social interaction and the way they lead to the formation of an organized and functional society are important issues, especially for techno-social development" (p. 1).

This research centres on mobile content as an application for the mobile phone. It aims to provide insight on how people's perceived needs for mobile content (MCN) influence

the adoption of mobile content by looking within select groups. Vannoy and Palvia (2010) explain that technology not only impacts society, but society impacts technology; therefore, understanding this cyclical nature is important to fully conceptualize what is possible for the future. To develop this understanding, it is necessary to understand the networks and devices that contributed to the development of mobile content as well as the types of mobile services and platforms supporting content, as they may influence mobile content usage and adoption.

This chapter explores the evolution of mobile technology. Understanding the recent evolution of mobile networks (section 2.2), devices (section 2.3) and services (section 2.4) is crucial to understanding how society uses mobile technologies and the future development and use of mobile content. This analysis illustrates how the evolution of mobile telecommunications facilitates the development of mobile technology-related innovations (Winterbottom, 2006) and influences the variety and availability of mobile services and content. A discussion of the infrastructural challenges for networks, devices and services for the adoption of mobile content (section 2.5) follows the historical review. Next, a brief look at the two study countries (2.5.1) describes how cross-national, cross-cultural differences may impact mobile content adoption. The final section includes an analysis of the implications of the technological developments on mobile content usage (section 2.6), followed by a summary of the issues covered (section 2.7).

2.2. Wireless networks

The natural evolution of the first generation of the analogue mobile phones was through the use of digital networks. The second generation of mobile cellular phones therefore

became known as 2G, defining the digital cellular era from 1991 onward. 2G networks provided data services with severely limited network speed. Of course, demand for mobile content at the time was likewise limited. This era was characterized by the adoption of the GSM standard for cellular communications. The advantages of GSM included the guarantee of call anonymity and confidentiality through sophisticated data encryption, authentication and other security features along with larger use capacities (Agar, 2003).

GSM had been chosen as the common standard for mobile networks in Europe in the 1980s and became mandatory in the following decade (Agar, 2003). A digital, shared standard would allow international roaming across many European borders, which was not possible with any comparable analogue system. The new standard also provided economies of scale in mass production of devices throughout Europe, again not possible with analogue devices (Tanaka, 2001).

2G technologies were followed by 3G technologies in the early 2000s. The aim of 3G systems was to develop a global standard, given that the first and second-generation systems were developed under numerous proprietary, regional and national standards (ITU, 2002). However, the 3G era appeared more as a consolidation of the desire to increase the speed of 2G devices. The multimedia cellular, or the new 3G standard, allowed the use of wireless services such as Internet browsing, picture and video messaging, and handheld global positioning systems (Agar, 2003).

Technology companies experimented with several different approaches to 3G. Funk (2001) suggested that 85% of these approaches were based on Wideband CDMA (Code Division Multiple Access). UMTS in Europe and NTT DoCoMo's FOMA (Freedom of

Mobile Media Access) in Japan are two such examples. By 2001, Japan's NTT DoCoMo had launched the "i-mode", a precursor of the mobile content market. The i-mode (or information mode) was a mobile service that provided continuous Internet access to mobile phone owners in the Japanese market. The i-mode technology enabled access to the Internet (HTTP) through a mobile device, but with the difference that its charges were based on the volume of data transmitted rather than the amount of time spent connected. The technology became extremely popular in Japan and has served as a benchmark for European mobile network companies, like Vodafone and Verizon. Continuous improvement and innovations efforts, such as colour LCDs, corporate alliances, location-based services, dynamic content services and camera phones, guaranteed the continuous innovation and improvement of the i-mode (Steinbock, 2007). 3G phones operating on CDMA 2000 standard, used by the KDDI operator, became less popular in Japan due to higher costs and lower coverage (Funk, 2001). That made possible the success of the first Japanese mobile solution, the i-mode, in spite of the standardization efforts around the globe pointing to GSM.

At the same time, local area network systems such as WLAN (Wireless Local Area Network) began offering high-speed network connections sent over the air without cables. These networks were limited at first, as mobile technology had not yet caught up with the potential of wireless networks. Today, WLAN is ubiquitous in many cutting-edge cities. Users in both domestic and commercial settings often access these networks with smartphones and other Internet-capable devices (Roos, Myllymäki, Tirri, Misikangas and Sievänen, 2002; Garber, 2012; Perahia, Cordeiro, Park and Yang, 2010). From the cellular network side of the equation, the development of 4G capabilities has made Internet browsing possible and convenient, even outside of Wi-Fi umbrellas.

The rapid evolution of mobile networks not only increased the range and variety of services and features, but also decreased their relative cost (Biljon, 2007). However, despite the technological progress supported by these advances, their adoption by the final customer can be limited by the consumer's understanding of their benefits in the context of their own lives, or their perception of how much they need those services in light of the rapid evolution of such services. This rationale applies not only to networks, but also to mobile devices and services, which developed as rapidly as the wireless networks presented in this section. The next sections illustrate the rapid evolution of mobile devices (section 2.3) and services (section 2.4) and discusses how they influence the development of mobile content, ultimately leading to their adoption or non-adoption.

2.3. Devices

According to Bergman (2000), mobile devices are computer-enhanced information appliances for consumers, dedicated to a restricted set of tasks. The mobile phone (cellular or cell phone) is a mobile device with wireless telephony capabilities. As of 2009, mobile subscriptions had far outpaced landline subscriptions; in rich countries, there were more mobile subscriptions than people (The Economist, 2009). The evolution of mobile devices has made possible the existence and demand for "on the go" mobile content, which is content that can be downloaded anywhere, at any time. This subsection briefly describes the mobile devices necessary for mobile content retrieval and use.

In 1977, Illinois Bell, the AT&T operating company for Chicago, installed the first cellular phone system. By then, early mobile telephone services in the US were

extremely expensive. On the other hand, in Northern Europe, fixed and mobile phone services boosted the expansion of services through lower prices (Agar, 2003). In 1993, BellSouth/IBM built personal digital assistant (PDA) features into their version of the mobile phone, which then included phone, pager, calculator, calendar, fax and email capabilities. The evolution continued until Motorola ingeniously associated mobile phones with fashion with their RAZR product line. Much of the appeal began to focus on design as much as function. In the early 2000s, Kyocera introduced the QCP6035, with 8MB of memory, which integrated the cell phone with an attached modem, allowing the phone to access applications such as email and a basic web browser (Agar, 2003).

Danger Hiptop, later T-Mobile Sidekick, a mobile phone model produced by Danger Inc., which included a quality web browser, email access and instant messaging, was launched in 2002. That year also saw the release of the Blackberry 5810, the first of its kind to include voice functionality. However, an external headset and a microphone were necessary to make it work. In the same year, Sanyo and Sprint made the Sprint SCP-5300PCS, which included a low-quality digital camera (Agar, 2003). The Motorola RAZR v3 was introduced in 2004 and was the pioneer of the ultra-thin, stylish modern phones. Later in 2006, the thin Blackberry Pearl 8100 was the first to include a digital camera and a media player together. These rapidly evolving devices heralded the rapid growth in demand and consumption of mobile technology in general and mobile content specifically.

In 2007, Apple released the iPhone, a mobile device with a focus on usability and features, including a touch screen navigation interface. The iPhone included a digital camera, text messaging, visual voicemail, a portable media player and an Internet client, with email, web browser and Wi-Fi connectivity. It also supported third-party

applications, available from the App Store, launched in 2008 (Apple Inc., 2010). The iPhone represented a sizable step in the evolution of mobile phones and was among the first to earn the label of smartphone, since it allowed greater software customization by the users through third-party applications and enabled increased connectivity (Alahuhta, 2010). Table 1 presents a timeline of the important devices in the evolution of mobile phones, adapted from an Infographic (2010).

Table 1: Mobile devices throughout time (after Infographic, 2010)

Year	Device Name	Weight	Standby time	Talking time	Characteristics & Sales
1983	Motorola Dynatac 8000k	794g	7 h	0.5 h	Available in brown, gray and gray-brown 7 character red LED display
1989	Motorola Microtac 9800	349g	8h	0.75h	Features included address book and currency calculator 8 character red LED display Mouth piece located at the base of the phone First “flip-phone “design Pop out antennae for aesthetics only
1993	Nokia 2110	170g	30h	2.7h	Memory for up to 250 names and numbers Monochrome LCD with 4 x 13 characters First use of context sensitive buttons Vibration feature added
1998	Nokia 5110	133g	180h	3.3h	Support for 30 ringtones Monochrome 5 lines LCD with dynamic size font Including the games: Logic, Memory and Snake One of the first mainstream consumer mobile phones
2004	Motorola RAZR v3	95g	280h	7h	MP3 and 24 channel polyphonic ringtones 256k colour VGA camera 640 x 800px Over 100 million sold Thinnest ever phone at the time of release at 15mm thick
2007	iPhone	135g	250h	8h	Wi-Fi, Bluetooth and GPS support 320 x 400px capacity touchscreen 2Mpx camera Sold over 700.000 in the first weekend.

As mobile technologies developed, demand for more services and more features expanded with each leap forward. Although 3G technology is still widely used, the increased demand for greater digital communication has created a market for devices that will meet these desires (Rijshouwer and Van Berkel, 2010), which has in turn spurred the development of 4G networks and 4G-capable devices. Although the Apple iPhone was at one time considered the pinnacle of advanced mobile technology, many mobile phones and companies have now stepped up to meet the demand for increased mobile phone versatility. Ratsameethammawong and Kasemsan (2010) note that the latest mobile devices embrace state-of-the-art technology, including bigger touch screens with higher resolution, built-in GPS technology, Bluetooth, Wi-Fi, and operating systems that are faster and capable of handling many tasks simultaneously.

From a sociological perspective, the growth of mobile technology has had a profoundly universalizing effect. The gap in telephone usage between poor and rich countries has shrunk significantly (Geser, 2005). Research has shown that in spite of cultural differences, most people around the world use their phones for generally the same activities, namely enhancing their social connectedness and making their lives more convenient (The Economist, 2009; Geser, 2005). While certain details, such as icons, are in some sense culturally dependent, there is evidence that even this gap is closing (Kim and Lee, 2005). Similarly, citizens of different nations may have unique names for mobile devices—"handy" in Germany and Finland, "mobile" in the UK, for instance—though usage patterns are roughly comparable. Broadly speaking, then, mobile phone manufacturers have obeyed the maxim of form following function, designing devices that serve specific, universal functions (Geser, 2005).

2.4. Mobile services

Mobile services are defined as any service that can be operated on a mobile device, including both voice and data services (Villalonga, Strohbach, Snoeck, Sutterer, Belaunde, Kovacs, Zhdanova, Goix and Droegehorn, 2007). Given than many markets have surpassed 100% handset penetration (meaning some individuals have more than one mobile handset), mobile users are now attracted by new and compelling mobile services (Mylonopoulos and Sideris, 2006). As mobile services evolved, the mobile market was given new opportunities to purchase new mobile products and content, which contributed to varied consumer demand (Winterbottom, 2006). This demand represents significant growth for the telecommunications industry (Massey, Khatri and Ramesh, 2005).

Mobile content services include messaging, rich voice, mobile music, mobile TV and video, mobile games, mobile gambling and mobile personalized content. In this research, they will be combined in one global analysis. It is important, however, to discuss the mobile services studied in this dissertation to understand how the hardware, software and network elements influenced their evolution and development to date, as a means to contextualize the study of the needs that drive their adoption.

With all these services available and the demand to use some of them simultaneously, service providers continually strive to find new and improved ways to meet these demands while still remaining cost effective for the company. Tsai, Sung and Huang (2010) note there is an on-going balancing act between resource management, system capacity and user gratification. This has led to expanding services and continually improving technological benchmarks worldwide. These enhancements have included

increased mobility and more support to ensure quality service (Tsai, Sung and Huang, 2010). This growth and development has led to what is referred to as the Next Generation Wireless Network (NGWN) (Hongguang, Zhenzhen, Shanmugalingam, Cuiting and Crespi, 2010).

NGWN has unique features that are intended to keep the focus on quality of service (QoS), but have an added focus on social networking opportunities, location services, rich media content, etc. Hongguang, Zhenzhen, Shanmugalingam, Cuiting and Crespi (2010) explain how the "evolution of Web 2.0 has brought a significant impact on the Internet service provisioning by encouraging the contribution from end user for contents and services creation" (p. 1). These end user services continue to evolve as companies strive to juggle increasing infrastructure, service and content while maintaining cost-effective measures.

2.4.1. Messaging

Messaging via mobile phones has evolved significantly. From simple text short message services (SMS), messaging service has grown to include texts and graphics (picture messaging), then to digital media input (multimedia message service- MMS) and then new content types of mobile multimedia (Ling, 2000). Technically, SMS refers to a communications protocol, defined as part of the GSM (Global System for Mobile Communications) series of standards in 1985, described in section 2.2. Since the 1990s, the use of SMS has grown rapidly, being a fast, cheap and personal way to convey a direct message between two people (Ling, 2005). During the second half of 2002, SMS evolved into Multimedia Messaging Service, or MMS. The Multimedia Messaging Service allows MMS-enabled device users to attach multimedia objects, such as audio, video,

images and rich text to messages and exchange them with other mobile device users. MMS technology represented the trigger for the revolution in mobile media services, beginning with still pictures and animated presentations, followed by video (Coulombe and Grassel, 2004; Nokia, 2002), supported by ever more powerful hardware. "Face Time," developed by Apple for their iOS devices, and similar video communications tools, may be replacing traditional SMS functions, although the need for short, rapid messaging will likely never fade completely.

SMS and MMS seemed to be relatively redundant features of the mobile phone initially, but have become an astonishing success (Gupta, 2003). The reason for this success originates from the SMS's unique advantages over non-voice services. It is a convenient information exchanging method between mobile users, and its mechanism is time and cost saving (Gupta, 2003), as the network cost to send/receive messages is very low. In fact, despite the difficulty of writing using a small keyboard limited to 160 characters and the limitations of the poor batteries of the handsets, mobile texting is extensively adopted, especially among young people (Ling, 2005).

The evolution from texting and graphic messages has led to a revolution involving social media. Facebook, Twitter, Delicious and Pinterest are just a few of the social media sites regularly visited by the younger generation. As previously discussed, this has impacted both the services offered and mobile device capacity. Messaging is no longer a matter of text or pictures but is a matter of accessing social media sites at any time from any place. Next Generation Wireless Networks have allowed mobile users to achieve this level of access (Khan, Qadeer, Ansari and Waheed, 2009).

2.4.2. Rich voice

From simple voice capabilities, mobile voice services have evolved into rich voice services. What differentiates "voice" and "rich voice" services is the addition of advanced voice capabilities. These capabilities include, for example, VoIP (which allows the delivery of voice communications and multimedia sessions over the Internet) and voice-activated net access and web-initiated voice calls, such as Skype, Vonage and Lingo, to name a few (Booth, 2010). The adoption of mobile rich voice can be hindered by a number of variables, such as dependency on an Internet connection (network) and its associated price, for example, as in the case of traditional VoIP (Aksahin, 2007). The adoption of mobile rich voice is discussed in this research in Chapter Five.

2.4.3. Mobile music

In parallel with the evolution of mobile texting and rich voice, mobile music has also significantly developed as a mobile content service. The first form of mobile music widely adopted were ringtones (Gopinath, 2005). Conceptualized in Finland by Vesa-Matti Paananen, the Add2Phone founder, the ringtone was responsible for 30% of the SMS in Europe, as users would send ringtones to each other using this service (Shalit, 2002).

According to Fredrikson and Paanane (2010), new prospects were offered with mobile music, offering new artistic, commercial and socio-cultural opportunities for music listening. In fact, the mobile phone was considered the most influential mobile device (Dornbush, 2005), followed by the MP3 player, which represented the importance of music "on the go" for the market. The advancement in richer media capabilities allowed the switch from monophonic ringtones, simple series of musical notes played one at a

time, to polyphonic ringtones, with real voices and real instruments. It was followed by additional music applications like streaming audio clips, animated content, album cover screen savers and artist information (Steinbock, 2007).

Adding to individual preferences for mobile music is the increasing demand for mobile technologies that cater to mobile genres and favourites. Through extensive research by Bull (as cited in Beer, 2010), mobile music devices "enable the 'management', 'reorganisation' and 'negotiation' of everyday experiences and environments" (p. 469). Each of these opportunities requires the technology and innovation to facilitate these demands within the confines of the mobile device form factor.

2.4.4. Mobile TV and video

Messaging has merged into the inclusion of social media and mobile music has merged into platforms that "remember" previous music selections so as to make further recommendations (Beer, 2010). Mobile TV is the next form of mobile content that is merging to embrace more than merely TV programs. Mobile TV is the combination of the two bestselling consumer products in history: television and mobile phones (Schatz, Wagner, Egger and Jordan, 2007). The recent addition of mobile TV to mobile platforms could be attributed to the consumer's familiarity with traditional television. Mobile TV and video could potentially appeal to billions of consumers for its similarity to traditional TV, despite its format and content being different (Jenkins, 2006). Indeed, a European Commission press release predicted that by 2016, mobile TV and other mobile video will be the leading form of Internet traffic (2013).

Despite the similarities, mobile TV is not simply traditional TV content broadcast to the mobile device (Jenkins, 2006). Mobile TV and video content are based on the

exploitation of the unique characteristics of the mobile device, creating innovative and interactive video services. Consumers don't seem to watch mobile TV in the same way they consume traditional TV content in their houses (Orgad, 2009). The reasons why mobile and traditional TV are different include not only limitations of the mobile device (such as small screen, limited battery life and memory), but also consumer habits. Traditional TV is watched in consumer's living rooms and bedrooms, while mobile TV seems to be preferred by consumers during periods outside of working hours: commuting time, waiting for a meeting, school or work break or as a supplement to ordinary TV at home. In addition, consumers who use mobile TV prefer to access short episodes (or bursts) of video content, instead of consuming full-length programs or films (Lloyd, 2006). One study (Winterbottom, 2006) showed that active mobile TV viewers spend 7 to 15 minutes in each viewing session. Their short length creates the need and opportunity for original, specifically designed mobile content, or else repurposed and repackaged traditional TV content and films suited for mobile. Long-form downloadable content is set to become more available for mobile as mobile handsets and networks improve (Winterbottom, 2006). Recent research by Borges, Rita and Pagani (2011) suggests that "value," in concert with the principles of uses and gratifications theory, may be an important component of mobile TV adoption and diffusion.

2.4.5. Mobile games

One of the largest mobile application areas that users are prepared to pay for is mobile gaming (Penttinen, Rossi and Tuunainen, 2010). Mobile gaming companies and online game providers have been established since the early 2000s, and mobile game market value has increased remarkably, as the number of mobile players grows (Yoon, Ha and

Choi, 2004). Penttinen, Rossi and Tuunaine (2010) claim that mobile games are expected to continue their rapid growth as mobile devices add processing power and battery life, and as screen size and resolution become more suited to running games. A deeper understanding of values and needs of potential games' users is needed.

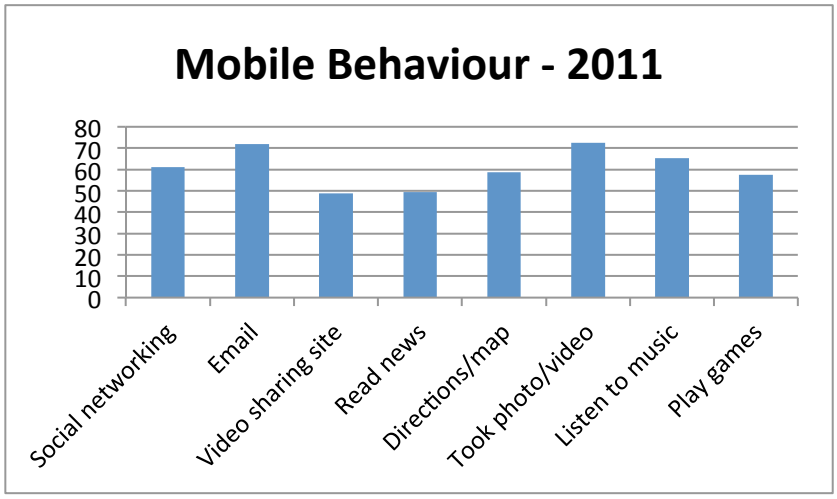
2.4.6. Mobile personalized services and user-generated content

Being a highly personal, always-carried and always-on device, the mobile phone has become an extension of the individual's identity, meaning that it has been adapted to individual preferences (Steinbock, 2007). When it comes to mobile content, users have very different preferences, which lead to the necessity for personalized, customizable content. Personalized content attempts to meet users' needs in a variety of ways (Steinbock, 2007).

The content used for mobile personalization varies generally according to the users' region and gender (Winterbottom, 2006). It includes logos, which are simple black and white images, generally sized to fit small screens, and designed to identify a brand; icons, black and white graphics based on generic images, designed to identify a feature; wallpapers, which are colour images that cover the whole of a larger screen; screensavers, colour (animated or not) images appearing when the device is not in use; themes, also known as skins, which are thematic combinations of wallpapers, screensavers and ringtones; greeting cards, images that users send to each other to perform the role of a traditional greeting card; avatars, graphic representation of a person for chat, messaging (instant messaging), games, dating, social networking communities and finally caller ID functions. (Winterbottom, 2006).

In summary, based on the analysis performed in section 2.4, it is possible to observe that current literature provides strong evidence for the deployment of mobile content across underlying networks, devices and mobile services, many of which have developed rapidly, enabling the availability of said content. As illustrated in Figure 1 (Google/MMA, 2011), it is possible to observe that different types of mobile services (and therefore mobile content) are adopted in a heterogeneous manner at present (i.e., mobile messaging is more successfully adopted than mobile television). The vertical axis represents percentages of adoption.

Figure 1: Mobile user's behaviour– average percentage (Google/MMA, 2011)



The data above stems from joint research conducted by Google and the Mobile Marketing Association to identify typical mobile user behaviours. Data was collected via surveys, and the chart shows the percentage of user who regularly engage in the stated activities via their mobile devices. Clearly, there are high preferences for email, photo/video, music and social networking mobile capabilities. Likewise, a significant proportion of mobile users use their devices to play games, read news, share videos and

get directions. Accordingly, the greater the content a phone has, the greater its adoptability among consumers. This rationale extends to developing countries as well. Maceli (2011) noted that "[a]s the cellular market in developed areas reaches near saturation levels, consumer demands will shift from simply wanting coverage and devices, to wanting worldwide converged mobile devices (smartphones) and new, enticing applications" (p. 31). This sheds light on the fact that developing markets are yet to experience advanced content.

The heterogeneity may indicate that some types of mobile content are more successfully meeting individual's requirements. Other explanations for this heterogeneity are social, cultural, cost and market-related variables, which will not be examined in this dissertation and are subject to further research. However, this research aims to provide insights on how to address some of the individual motivational variables that influence the adoption of mobile content, thereby providing greater understanding of the adoption of the above types of mobile content collectively.

2.5. Infrastructural and economic challenges to the adoption of mobile content

The widespread adoption of mobile devices has created a very strong relationship between users and devices. Mobile phones are used and carried most of the time and the number of services enabled through these devices is growing. It has become a highly personal and trusted device, and a management tool for business, work and leisure (Steinbock, 2007). The mobile phone has transformed into a highly personalized reflection of one's identity. Despite the successful global adoption of mobile phones, a

number of constraints, both infrastructural and economic, that interfere in the adoption of mobile content have been identified, many of which are linked to product design.

Previous research on the usability of mobile phones has identified the following challenges as key issues for the adoption of these services: [1] *user interface*, including overcoming the difficulty in accessing and navigating services and content, as well as difficulty in using multiple applications simultaneously (Singh, 2003); [2] *the mobile handset form*, where the challenge is to design the handsets so that the overall experience is enhanced (Jung, Peres-Mira and Wiley-Patton,2009); [3] *mobile handset capacity*, because there has to be enough memory to store downloaded content (such as full-track downloads, video, games, etc.) in the mobile handset (MacMillan, 2003); and [4] *mobile handset battery life*, where increased battery life is a requirement for rich media applications for mobile handsets (Knoche and McCarthy, 2004). These four elements are some of the variables that influence or hinder adoption of mobile services, since individuals tend to adopt more mobile services if their mobile phones are equipped with technologies that allow mobile content to run smoothly on their hardware.

Other issues impacting the adoption of mobile content include network speed and coverage. 2G and 2.5G networks were not able to provide the required speed to deliver streaming video at an acceptable quality. For 3G and 3.5G networks, the latency has been reduced, but the network coverage still leaves much to be desired (Zhang, Yuan and Archer, 2002). Another obstacle in the adoption of mobile content is the cost of data services, which is one of the key variables mitigating against greater adoption of rich-media services (Gordon, Janik and Meyer, 2004). Additionally, with the advent of newer technologies, there is some reluctance to embrace the updated technology due to

perceived risk. For example, although mobile banking may represent a convenience, consumers are reluctant to use it due to the perceived risk with potential fraud or security breaches (Kadušić, Bojović, and Žgalj, 2011). In the mobile banking context, Ha, Canedoli, Baur and Bick (2012) discovered that in addition to perceived risk, perceived usefulness, perceived compatibility and perceived cost were major factors in adoption generally. In the same vein, Tao (2011) found that "expectation confirmation, perceived ease of use and perceived usefulness affect users' satisfaction, further determining their post-adoption [behaviour]" (p. 242). Post-adoption behaviour of previous users impacts whether those users make recommendations to friends, family, or colleagues or offer complaints. Dependent upon whether recommendations or complaints are given, further adoption of content is either amplified or stifled. This in turn affects the overall growth curve of mobile content adoption.

Despite the challenges and inhibitors to mobile content, research indicates an increase in the number of mobile subscribers: from 2 billion in 2005 to more than 6 billion in 2012 (International Telecommunications Union, 2012). This arguably indicates the growing demand for and importance of mobile technology and suggests potential business opportunities and potential revenue for mobile content provision.

2.5.1. Mobile technology use in Ireland and Brazil

As previously mentioned, the role of culture in the adoption of technology has provided a rich vein of knowledge and insight. Geser (2005) explained that mobile technology has quickly become transcendent, narrowing gaps both between and within nations. In the developing world, the growth and relative affordability of mobile communications technology has resulted in many of these societies "leapfrogging" the development of

fixed line telephony systems. While the case has been made that technology diffusion will one day eliminate all vestiges of the "digital divide", more time and more data is required to see whether that hypothesis bears up.

Because this research explores mobile technology adoption in two countries—Ireland and Brazil—it's necessary to explore some fundamental differences in these samples. Economy, culture and population density are among the most obvious differences. Brazil's population is 203,429,773, while Ireland's is 4,670,976. Adult literacy in Brazil stands at approximately 90% for the years 2007 to 2011 (UNICEF). In 1995, Ireland's National Adult Literacy Agency reported an adult literacy rate of approximately 75%, however, the agency may have been operating with a stricter definition of literacy. Geopolitically and economically, Ireland is a member of the European Union and fully industrialized. Brazil is still technically in the developing world, but lawmakers are making decided steps to further the Latin American nation's upward mobility.

Researchers have conducted various studies to analyse technology adoption in both countries (Hernandez and Mazzon, 2007; Dasgupta, Agarwal, Ioannidis and Gopalakrishnan, 1999; Ramsey, Ibbotson and McCole, 2008; Finfacts, 2012). They have identified numerous variables that significantly affect technology adoption within bounded geographic and cultural regions. Teenagers have embraced mobile technology in Ireland at an extremely high rate. The exact rate depends on characteristics such as location, socioeconomics and the emergence of Web 2.0 features (instant messaging, social networking) (Cawley and Hynes, 2010). Mobile technology has planted its flag in Ireland, but in the last few years, the telecom market has suffered from underinvestment, mismanagement and poor broadband uptake. Revenue has fallen by 1.2%. The major variables behind this fall are the country's economic sluggishness and

consumers' unwillingness to spend disposable income on mobile technology, which for many falls into the category of luxury when incomes are tight (Research and Markets, 2012).

A 2011 study by the United Nations International Telecommunications Union found that the total Internet users round the globe totalled 2.3 billion, with an annual growth rate of 8% (Zickuhr and Smith, 2010). Brazil ranked eighth in Internet usage from 2008 to 2011. Seventy-nine percent of Brazil's residents were regular users. This evidence shows that that technology adoption in this region is rapid and widespread. Teachers, bankers and other service sector personnel use this technology (Brinkerhoff, 2006). Even remote regions of Brazil are linked via mobile networks. Well-designed information and communication systems ensure that governments can identify and address many more problems than they could in years past.

According to one survey, smartphone usage in Ireland stood at 42% (relative to total mobile usage) in 2011 (Allen, 2010). In Brazil, which is home to nine million smartphone users, the rate is a mere 9% of all mobile phone users. This disparity in smartphone adoption may have an impact on relative mobile content adoption rates, as smartphones are ideally suited to dynamic mobile content, whereas non-smartphones are less so.

The penetration rate of mobile phone subscriptions is 121% in Ireland and an astonishing 132% in Brazil (BuddeComm, 2013; Central Bank, 2012). That means that many citizens of both countries have more than one mobile subscription in their name. Therefore, on this one measure at least, no significant difference exists between these two nations—although, as mentioned before, the rate of smartphone adoption is

significantly less in Brazil for a whole host of reasons. Noteworthy differences also exist in terms of the uses to which mobile services are put in Ireland and Brazil. Another study indicated that most Brazilians do not depend on mobile banking services (Cruz, Neto, Muñoz-Gallego and Laukkanen, 2010), whereas in Ireland both ecommerce and mobile banking are widely accepted. Reasons for this reluctance include complexity, perceived risk, fewer smartphones and insufficient advantage for most consumers.

In 2011, KPMG conducted a global study investigating the shift toward and various applications of mobile devices. Researchers found that during the previous year, almost four percent of respondents had dispensed with their landline phone (Cousens and Schram, 2011). Suzanne Lynch (Irish Times, 2012) cited the Accenture report showing that 77% of Internet users in Ireland accessed the web via a mobile device, compared with the global average of 69%. The same report included the observation that mobile Internet access is also prevalent in Brazil, South Africa and Russia, where the lower entry cost of mobile technology versus personal computers make it a favourable choice.

In summary, the penetration of mobile technology into Ireland and Brazil has taken different paths, though evidence points toward an eventual convergence as the digital divide shrinks. For the time being, citizens of Brazil and Ireland expect different things from mobile technology. The Irish are more likely to have smartphones and engage in Internet banking and other goal-oriented, sophisticated tasks. Brazilians have just as many mobile devices and have roughly equal access to the Internet via mobile networks, although they typically employ said devices for more socially oriented tasks. This research will certainly consider the effects of demographic and cultural differences between Brazil and Ireland. However, the research design is not intended to answer specific questions on this topic.

Within the scope of the present research, the use of samples from two different countries is intended to tentatively examine the notion that the much-ballyhooed digital divide remains as powerful as years past, or whether the rapid adoption and diffusion of technology (in this case, mobile technology and its accompanying mobile content and services) has acted to level the playing field and increase the opportunities for upward mobility. Similarly, the research may point towards the similarities or differences in the adopter groups representing different countries and demographic, economic and cultural backgrounds.

2.6. Discussion

In order for mobile services and content to reach the market, they need to be acceptable and desired by the end users, while also able to generate profitable business for the organizations involved (Prins, 2008). According to Bollier (2006), the current mobile technological and content economy and culture is in a period of transition. A move is underway from a "push" economy, which attempts to anticipate consumer demand to create standardized products, to a "pull" economy, which provides open and flexible production platforms that produce customized products and services that serve localized needs. "Pull" economies are demand-driven, meaning products and services are assembled in customized ways to serve specialized or local needs in a rapid manner. This research lends credence to this idea of transition by deepening the understanding of consumers' individual preferences. It considers what certain groups of potential users perceive to be variables that affect their adoption of mobile content. This research performs statistical analyses to determine if these perceived needs for mobile content actually affect their adoption within the specific groups. A multidisciplinary approach

helps to identify a set of user needs for mobile content and then compares whether these needs differ between each category of adopters, classified according to the moment in time each group decides to adopt (purchase or download) mobile content.

Mobile technologies have been evolving at a considerable pace, provoking significant changes in society, behaviour and quality of life, by enabling fast and reliable communication, information and entertainment on the move (Winston, 2003). However, the constant change and development of mobile phones, networks and services represent rapidly changing technological choices, even for savvy users (Qualasvirta, 2005). The variety of service providers, contracts, services and features available can be overwhelming to mobile phone owners (Jarvenpaa, 2003; Biljon, 2007). Less experienced users are often confused about the functions and services offered by the providers (Dunlop and Brewster, 2002) and don't know how to solve eventual problems found using these features (Ziefle and Bay, 2004). In addition, the speed with which mobile technologies evolve makes it even more difficult for customers to obtain information about which technologies and services are available, and being oblivious of their existence, they don't adopt them (Biljon, 2007; Følstad and Rahlff, 2005). To aggravate this situation, there seems to be little time and interest invested from the technology companies to understand their users' needs and to improve their understanding of the mobile technologies available (Biljon, 2007). Therefore, an opportunity exists to increase adoption of mobile content and other mobile technologies by increasing customer's awareness towards mobile technology, based on further research.

As consumers become comfortable with technology, their knowledge, use and expectations of technology likewise increase. Since new technology fosters innovations, the development process is necessarily ongoing (Maceli, 2011).

All of the enhancements with mobile technology have undoubtedly impacted society as a whole in myriad ways. Understanding how these mobile developments influence the creation of mobile content is of the utmost importance as it has been clearly established that users of the mobile content are the drivers of consumption. Armed with this knowledge, product designers will be able to streamline the content development process, which will in turn provide for potentially greater financial gain—the bottom line for all consumer product developers. Chang, Chen and Liu (2009) found that pervasive mobile technology has changed the landscape of Internet use, with over 65% of mobile phone users in Japan now accessing the Internet through their phone. This has had a direct impact on web browser development. A voice-enabled web system (VWS) was paramount in this development due to increasing demand from consumers. This technology allows for consumers to utilize voice commands to perform tasks. Voice-activated action is an evolutionary step in the use of mobile phones as mere communication devices.

Jo, Pan and Kaski (2011) echo the sentiments of the importance of understanding the link between the development of mobile technology and mobile content, particularly as it relates to the response to consumer needs. Social networking has become a mainstay of most modern societies, impacting the development of mobile content along the way. Jo, Pan and Kaski studied the development of social networks and mobile technology and concluded that developing models was the most conducive method to fully understanding and developing new technology in this realm:

> …building simple empirical-observation based models…..by incorporating the process of human task execution by priority-based queuing with the basic processes of friendship-network formation by cyclic and focal closure mechanisms enable us to better understand the underlying mechanisms of real co-evolutionary networks. (p.48)

Each of these studies establishes a cyclic connection between development of mobile technology and mobile content.

2.7. Summary

This chapter contextualizes mobile content, aiming to describe the context of this study. To that end, this chapter reviewed the evolution of networks (section 2.2), devices (section 2.3) and mobile services (section 2.4) that supported and enabled the currently available mobile content. The chapter has briefly discussed the forms of mobile content included in this research, analysing their adoption status to date. These forms include mobile messaging (section 2.4.1), mobile rich voice (section 2.4.2), mobile music (section 2.4.3), mobile TV and video (section 2.4.4), mobile games (section 2.4.5), and mobile personalized and user generated content (section 2.4.6). The chapter also described the infrastructural challenges that might hinder the adoption of mobile content (section 2.5), including devices and network limitations. Finally, this chapter explored some quantitative data within the two study countries of Brazil and Ireland (section 2.5.1).

The key point observed in this chapter is that the rapid development of mobile phones, networks, devices and services enabled the newly created need to communicate on the move. As consumers enjoyed more methods for contact with their peers, the demand

and the technological grounds for the development of mobile content was simultaneously created. The chapter also demonstrated that the rapidly changing products, services and features might overwhelm users while choosing the services that are more appropriate to their needs, as many less technically oriented users are unfamiliar with the most up-to-date, rapidly evolving technologies. A way to make it easier for potential users to understand mobile products, networks and services is by directly mapping how each technology addresses users' mobile needs (Biljon, 2007). This chapter contributes to this by deepening the understanding of users' mobile content needs, not only aiming to offer users content which is more relevant and useful to them, improving their adoption rates, but also being a step towards improving the users' understanding of these complex technologies.

3. CHAPTER THREE: TECHNOLOGY ADOPTION

3.1. Introduction

This chapter aims to contextualize this dissertation within a consumer behaviour research perspective, including adoption of mobile content, and within the wider body of research on both micro-level (individual) and macro-level (group) approaches. It provides a critical overview of seminal models for the adoption of innovations, uses and gratifications (micro-level) and diffusion of innovations (macro-level) literature. It is the contention of this researcher that these traditional models have stood the test of time and are more than adequate to begin a description of the adoption of a novel technology, i.e. mobile content. At the same time, this research will provide insight as to whether such models remain powerfully predictive in the face of what amounts to a global technological revolution. As a whole, the research is underpinned by a set of 10 Mobile Content Needs, or MCN. Ultimately, this combination of technological variables and behavioural variables enables the construction of a holistic view of technology adoption.

In a micro-level analysis, this chapter focuses on critically examining the models and frameworks created to describe and predict the adoption of technological innovations, exploring the roots of the adoption of innovations and uses and gratifications research fields. The role of motivation and human need are included as integral components. In addition, this overview shows how different models have evolved to explain the adoption of innovations, their uses and their importance to the area. It also elaborates

an analysis of the ten different variables chosen for use in this research, which will be later used as the basis for the conceptual framework proposed here.

At a macro-level, this chapter discusses the contribution of Rogers (1983) and Moore (1991), who both produced seminal works describing how adopters can be categorized into appropriate groups, profiling the groups, and highlighting differences between those groups. Rogers' classification of adopters into categories of Innovators, Early Adopters, Early Majority, Late Majority and Laggards will be extensively used in this thesis. Of similar importance is Moore's (1991) re-reading of Rogers' work and his analysis of the gap that exists between Early Adopters and Early Majority, which is discussed in Chapter Five of this dissertation. While the work of Rogers and Moore obviously predates the advent of mobile content and efficient, global telecommunications, it is believed that the essential ideas more or less persist. One of the essential tasks of the present research will be to assess that notion.

In the broader context, this dissertation aims to enrich the understanding of the adoption of a specific innovation, namely mobile content media. It examines two viewpoints in the innovation adoption research: consumer behaviour—using adoption and diffusion of innovations, and uses and gratification approaches and psychology—exploring human motivation, and identifies common variables between these two viewpoints that influence the adoption of innovations. Both of these approaches have demonstrated substantial validity and rigor throughout years of testing and analysis. Finally, this dissertation uses these variables to make some generalizations toward creating a model for the adoption of mobile content using statistical analysis. Quantitative analyses will be examined in detail in the forthcoming chapters.

This chapter will first discuss various theoretical models of innovation. Specifically, the following theoretical constructs will be examined: Technology Acceptance Model (TAM); Technology Acceptance Model 2; Theory of Planned Behaviour; Unified Theory of Acceptance and Use of Technology; Theory of Reasoned Action; and Social Cognitive Theory. A brief analysis of the role of culture in technology adoption will follow the discussion of innovation. The remaining sections will explore the literature surrounding motivation and needs theory, as well as uses and gratifications theory. Finally, the final section outlines the 10 Mobile Content Needs, which serve as the focus for the study.

3.2. Innovation

Innovation is a complex theoretical concept discussed in a wide variety of scientific, sociological and economic fields. Product developers frequently employ the term, especially in the high-tech industry (Florida, 2004). Innovation involves original, revolutionary shifts that affect the current way in which a particular process works (Florida, 2004). Innovation, however, must be understood from the perspective of innovators as well as from the role of the innovations. Innovators and innovations form a dynamic process that carries both the critical thought necessary to question current products, services and notions, and the openness to allow for the necessary risks to be taken for new solutions, products and services to be envisioned.

Particularly important to this thesis is the role that technological innovation has had. Technological innovation is what allows closed systems to change and adapt in response to adverse circumstances (Toffler, 1971). At a more practical level, technological innovation is said to play a crucial role in the development of consumer electronic products, computational programs and Internet services, among other

domains (Florida, 2004). The growth of these industries has been exponential and overtly visible for anyone who has tracked the development of these technologies in the past quarter century. This growth, argues Florida, is directly related to the continuous innovation that exists within the industry.

Additional research efforts have attempted to draw a distinction between innovative and non-innovative entities (Ettlie, Bridges and O'Keefe, 1984; Dewar and Dutton 1986; Subramanian 1996; Toole 1998). For instance, Subramanian (1996) found that stability in market conditions affected the level of innovativeness in a study of firms in the banking industry.

It is beyond the scope of this thesis to dig deep into the various theoretical constructs and ramifications swirling around the term innovation. However, the role that innovators and innovation plays has been an important and indispensable part of the empirical literature explored (e.g. Sawng and Han, 2007; Revels, Tojib and Tsarenko, 2010; Patsiotis, Hughes and Webber, 2012).

3.2.1. Adoption of innovations

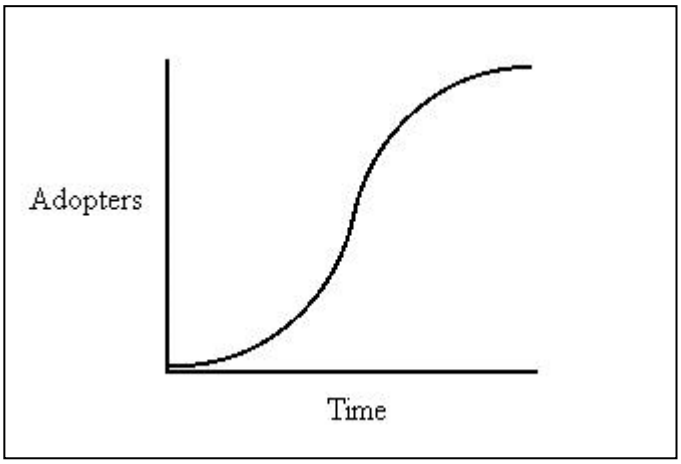
In the context of adoption of technology, different concepts are used to describe the process, such as diffusion, adoption, appropriation and domestication. Although these concepts have much in common, their contexts differ slightly. In this section, these terms will be elaborated and placed within a research context.

Diffusion research typically investigates the spread of products, services or ideas through a population. Adoption research, on the other hand, refers to the stage in which a product, service or idea is selected for use by an individual or organization. The

adoption of innovation is a particular kind of diffusion that refers to the acquisition of a new product, service or behaviour. Diffusion and adoption research have the same academic antecedents and share some theoretical overlap (Ling and Pedersen, 2002).

Gabriel Tarde (1903) can be considered the first influential contributor to the field of innovation adoption. He found that most innovations obey an S-shaped rate of adoption, plotting the original S-shaped innovation curve (see Figure 2, below). The curve represents the general adoption rate of an innovation. The idea of the curve is that successful innovations go through a period of slow adoption before experiencing a sudden period of rapid adoption and then a gradually levelling off.

Figure 2: Tarde's s-shaped curve of innovation adoption.



In an attempt to achieve more granularity and deeper understanding of adoption, researchers have elaborated several conceptual models to explain the adoption process. Many of these models have become effective, multidisciplinary tools with almost limitless applications. It is from these models that the 10 MCN identified in section 3.8 are distilled. The following section explains the most important of these adoption of innovation models.

3.2.2. Theories of adoption and their application

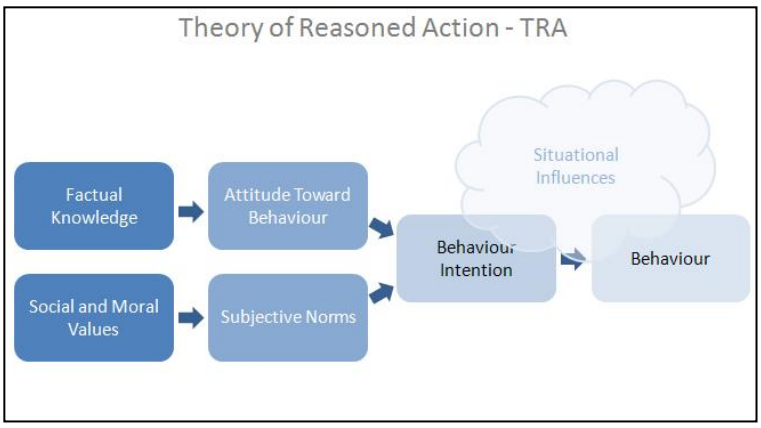
Adoption research is reviewed here on the basis that this thesis also aims to study the adoption of innovations from an individual or micro-level viewpoint. The articles and studies reviewed here were selected based on search results obtained from databases such as ABI (American Research Journal Indexing Database) and EBSCO (Communications & Mass Media Complete), using a combination of keywords relevant to this dissertation, such as: *innovation adoption, mobile content, mobile phones, adoption of technology, models of adoption of innovation*. The search results were analysed and only publications that dealt primarily with individual perspectives of adoption of innovations, and not including articles on organizational, institutional and occupational adoption of innovations, were selected for review. The results returned from the databases were based mainly on influential work that included models and frameworks including Diffusion of Innovations (DOI); Theory of Reasoned Action (TRA); Theory of Planned Behaviour (TPB); Theory of Acceptance Model (TAM) and Social Cognitive Theory (SCT). Some work that predates the current age of widely available Internet and telecommunications technology was included on the strength of its interpretive or explanatory power. In other words, seminal research that has maintained its position and relevance, regardless of technological changes, clearly has value in any discussion of innovation adoption.

Some publications, however, combined different methods and external conceptual variables in order to better predict the adoption of innovations, including Venkatesh, Morris, Davis and Davis (2003); Marez, Vyncke, Berte, Schuurman and De Moor (2007); and López, Molina and Bouwman (2008).

This section will briefly present and discuss the most relevant work within adoption of innovations research and outline how these models have been applied to more recent technology domains, including mobile phone services. The decision to use influential work focusing on several key theoretical frameworks to study the adoption of innovations is widely supported by previous research: Oh, Ahn and Kim (2003) assert that TPB, TAM and DOI serve as a good starting points in the process of investigating individual level variables affecting the adoption of innovative technology, while López, Molina and Bouwman, (2008) claim that TRA and TPB have been extensively used to examine the acceptance of Internet services. On the other hand, Deans, Gray and Harvey (2010) assert that TRA and TAM help to determine intentional variables that hinder adoption processes. Looking at these models together assisted the researcher in selecting the 10 variables comprising the Mobile Content Needs.

The Theory of Reasoned Action (TRA), developed by Fishbein and Ajzen (1975), attempts to explain an individual behaviour through that individual's behavioural intention. These intentions are, in turn, affected by the individual's attitude toward the behaviour and the individual's perception of the subjective norms regarding such behaviour. It proposes an expectancy value model for the characteristic of "attitude". In this model, an individual's attitude towards performing the target behaviour—adopting an innovation—is itself determined by his or her beliefs regarding the consequences of performing the target behaviour, as well as the evaluation of these consequences. Figure 3 (below) illustrates this model.

Figure 3: Theory of Reasoned Action – TRA (after Fishbein and Ajzen, 1975)



This theory assumes that people are usually rational beings, making use of available information and considering the consequences of their actions before they decide to proceed with a given behaviour (Ajzen and Fishbein, 1975). This assumption of rationality allows researchers to formulate conclusions such as "user intentions have a strong impact on consequent adoption of the service" (Verkasalo, 2008, p. 43).

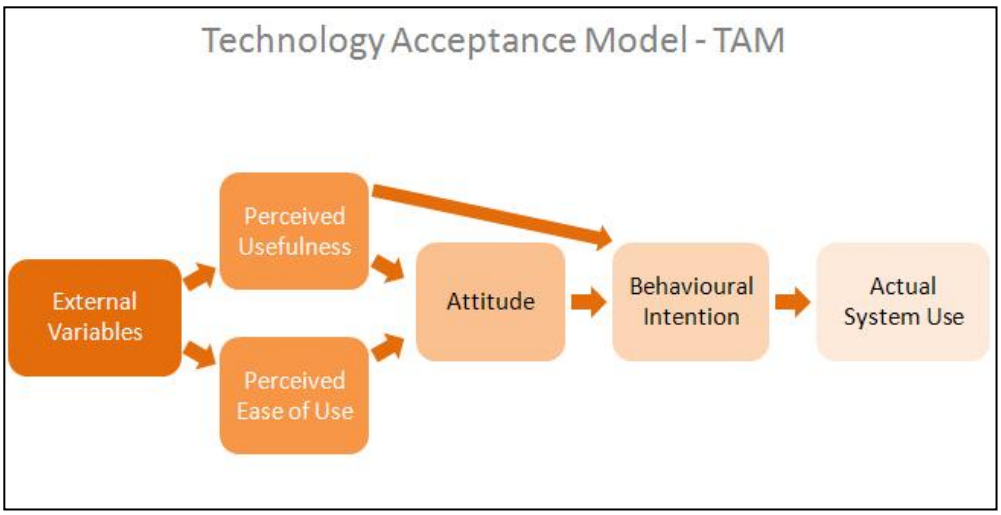
The TRA is the basis for much subsequent work on the diffusion and adoption of innovations, such as Van Slyke, Ilie, Lou and Stafford (2007); López, Molina and Bouwman (2008); Miller (2005); Hale, Household and Greene (2003); and Sheppard, Hartwick and Warshaw (1988). The importance of the TRA to adoption of innovations research was its contribution to the development of a well-organized model that explains behaviour. Later researchers used the TRA model as a basis for the development of their own refined models, which used the variables proposed by the TRA as starting points for their model-building process. Van Slyke, Ilie, Lou and Stafford (2007), for example, use the TRA as a base from which they can justify the relation between a perceived critical mass within public consciousness and the adoption of a communication technology. More specific to this thesis, these authors focus too on the adoption of mobile content (instant messaging) and argue that "using a survey is

particularly appropriate for testing existing theories, such as the TRA. By using a survey, we can investigate the perceptions and intentions of a large number of subjects, which may not be practical with qualitative methods" (Van Slyke, Ilie, Lou and Stafford, 2007, p. 276).

Peslak, Ceccucci and Sendall (2010) likewise studied the TRA as it relates to the adoption of instant messaging. Although instant messaging is typically a software program that is used on a computer, there are implications from the study that have relevancy to all technology adoption. Specifically, the study found that "women value perceptions of ease of use and visibility more than men, while men value perceptions of relative advantage" (p. 265). Furthermore, "[w]omen focus more on the social aspects, while men focus more on task completion" (p. 265). Each of these findings has implications for further understanding for all technology adoption.

Based on Ajzen and Fishbein's (1975) TRA model, Davis (1989) developed the Technology Acceptance Model (TAM) to explain how users come to adopt and use a technology. Davis found two variables that explain and predict the adoption of innovation. The first variable was perceived ease of use (PEOU), which is an individual's perception of the effort required to use a particular technology or system. The second variable was called perceived usefulness (PU), which refers to the degree to which a person believes that a particular technology or system would enhance his or her job performance. Figure 4 illustrates the TAM model schematically.

Figure 4: Technology Acceptance Model (after Davis, 1989)



According to the TAM, perceived usefulness and perceived ease of use influence consumers' attitudes and behavioural intention, which predicts actual system use. Davis concluded that an individual behaviour might be attributed to the individual's perceptions regarding the usefulness and ease of use of the innovation. A study of 230 users of an IT innovation using the TAM, undertaken by Agarwal and Prasad (1999), examined the relationship between individual differences between perceptions and their respective acceptance of the innovation. Their results revealed the following as predictors of adoption of the IT innovation: individual differences, perceived usefulness, ease of use, attitude and behavioural intentions. The results showed that individual level of education, previous similar experience, training, and experience with technology have significant influences on technology acceptance.

This thesis also collects data on individual differences in the adoption of innovations. However, in contrast to the work of Agarwal and Prasad (1999), this thesis seeks to identify differences between adopter groups (i.e., Rogers' categories of adopters) rather than individual differences. The use of the TAM to identify group differences is also a widespread practice in the field of information and communications technology. A few

recent examples include Lee (2009), who explores the variables influencing the adoption of Internet—perceived risk and perceived benefit—or Chen, Sun, Wible and Kuo (2010), whose work starts from a TAM model and explores the variables that affect intention to adopt an online learning system.

Hu, Chau, Sheng and Tam (1999) studied the applicability of the Technology Acceptance Model in explaining physicians' decisions to accept telemedicine technology. 421 physicians from Hong Kong hospitals participated in the study. The results confirmed that usefulness is a significant determinant of attitude and intention, but failed to confirm the same for perceived ease of use. Another study in 1999 by Al-Gahtani and King tested and extended the TAM model in the context of online learning systems. The research involved 329 final year university students in the UK. They found that relative advantage of the system contributes most strongly to attitude and satisfaction.

In 2001, Chau carried out an empirical assessment of a modified TAM model surveying 185 clerical and administrative staff. The result of this study showed that the perceived near-term usefulness had the most significant influence on behavioural intention. Perceived long-term usefulness also exerted a positive, but lesser impact. Chau's research validated the importance of usefulness in the adoption of innovations and informs the choice of this variable for the present study.

López, Molina and Bouwman integrated Diffusion Theory and the TAM by linking variables like traditional antecedents, behavioural intention and ease of use to diffusion variables like social influence and perceived benefits such as flexibility and status. (2008). Their aim was to identify the social variables that influenced the adoption of mobile services. Their study concluded that the opinions of friends and relatives have a

significant impact on the adoption of mobile services (López, Molina and Bouwman, 2008). More recently, the TAM has been used as the model for investigations regarding e-learning content and e-shopping software (Lee, Hsieh and Hsu, 2011; Lim and Ting, 2012). E-learning content is not widely employed on mobile devices to date, yet e-shopping is becoming a much more accepted use of mobile phone technology. According to Lim and Ting (2012), the TAM has the "consistent capability to explain a substantial portion of variances between behavioural intention and actual behaviours derived mainly from research into the purchase of technology-related products" (p. 50).

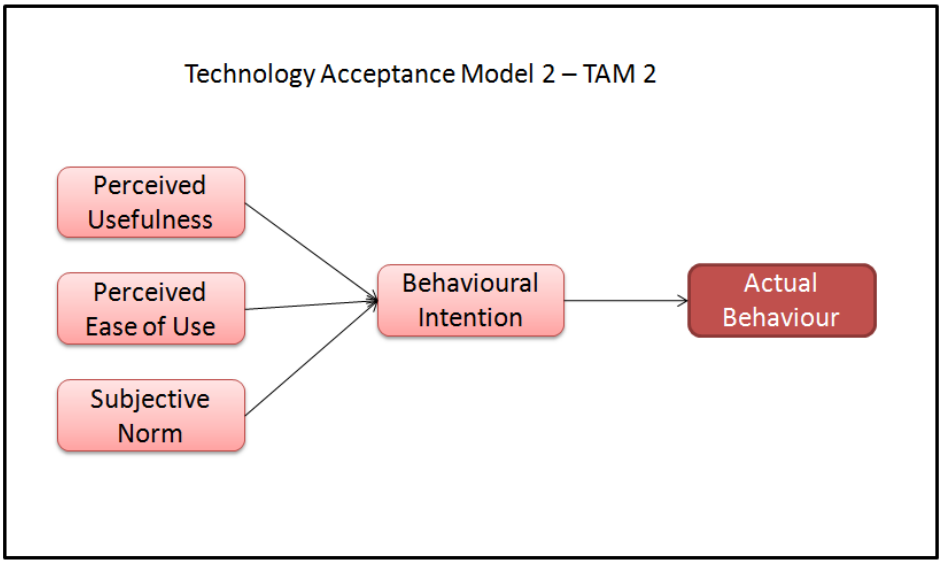
Since its introduction, the TAM has been the most influential model used to predict and explain the adoption of technology-related innovations, as well as associated behaviours. The model has been applied to the study of individual adoption of technological innovations, such as adoption of mobile payment systems (Chandra, Srivastava and Theng, 2010), mobile banking adoption (Lin, 2011), mobile user behaviour (Zhou, 2011), personal computer acceptance (Igbaria, Iivari and Maragahh, 1995; Lin and Wu, 2004), and Internet purchasing (Olson and Boyer, 2003). It has also been used to examine adoption of management IT in small to medium enterprises (Riemenschneider, Harrison and Mykytyn, 2002) and the adoption of innovation in software (Kohn and Husig, 2006). In 2011, Hajialiasgari, Kheiri and Salehahmadi conducted a general review on the applications of the TAM model. They concluded that individual use of a new system is definitely influenced by individual perceptions (p. 875). Their support for specific variables (usefulness or utility, ease of use, and perceived usefulness) is explored in greater detailed in Chapter Five.

Criticisms of the TAM model's focus on technology prompted the development of the expanded TAM models (TAM+, TAM 2). Zarmpou, Saprikis, Markos and Vlachopoulou

(2012) used the TAM+ to model users' acceptance of mobile services. Their improved TAM+ "includes behavioural intention, perceived usefulness, perceived ease of use, trust, innovativeness, relationship drivers, and functionality" (p. 225). Their conclusions stay closely in line with the TAM: "Behavioural intention is directly affected by perceived usefulness, innovativeness and relationship drivers" (p. 226).

Venkatesh and Davis (2000) sought to overcome criticisms of the TAM model by expanding it to include a Subjective Norm influence variable in their model (TAM2). Subjective norm was previously defined as "a person's perception that most people who are important to him think he should or should not perform the behaviour in question" (Fishbein and Ajzen, 1975, p. 302). The figure below schematically illustrates TAM2:

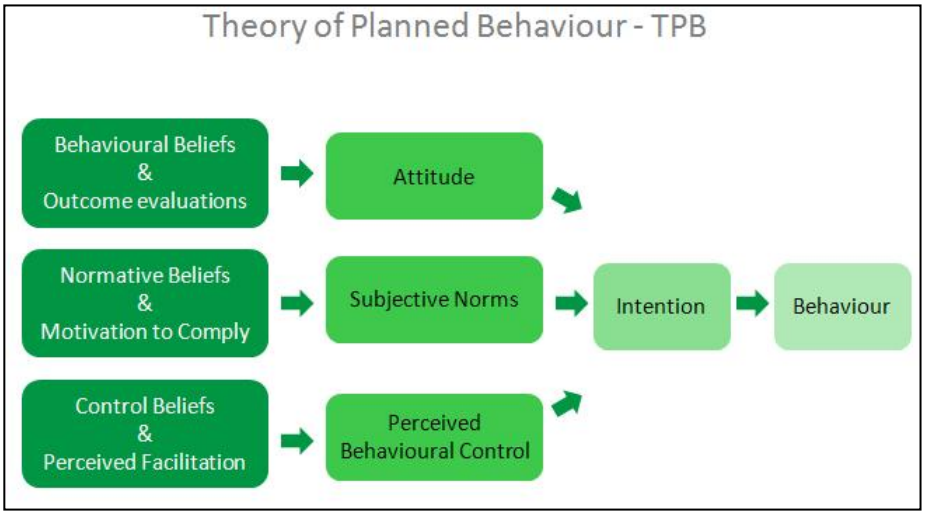
Figure 5: Technology Acceptance Model 2 - TAM2– (after Venkatesh and Davis, 2000)



The results of their study showed that both social influence processes, such as subjective norm, voluntariness, and image, and cognitive instrumental processes, such as job, relevance, output quality, result demonstrability, and perceived ease of use significantly influence adoption of innovations.

The Theory of Planned Behaviour (TPB) developed from the Theory of Reasoned Action (TRA), but expanded the model by including perceived behavioural control as another influencer or determinant of intention and behaviour (Ajzen, 1991). The TPB posited that individual behaviour might also be explained by behavioural intention, which in turn is affected by the individual's attitude toward the behaviour. However, behaviour is not affected only by attitudes as with the TAM, but also by subjective norms (as with TAM2) and perceived behavioural control. The TPB defines behaviour as an individual observable response in a target situation. Figure 6 illustrates the model.

Figure 6: Theory of Planned Behaviour (Ajzen, 1991)



This theory (TPB) is therefore guided by three kinds of considerations: behavioural beliefs, normative beliefs and control beliefs. Behavioural beliefs are beliefs about the likelihood of the consequences of the behaviour, as to the extent the individual perceives the act as desirable or favourable. An example might be whether an individual believes that smoking is harmful. Normative beliefs refer to the degree to which individuals' peers affect their intentions (Ajzen, 1985, 1991; Ajzen and Fishbein, 2005). Control beliefs are the individual's beliefs about the presence of variables that facilitate or impede the performance of the behaviour. It includes two main facets: the degree to

which individuals see themselves as sufficiently knowledgeable, skilful, disciplined and able to perform the act, which is termed internal control or self-efficacy, and the extent to which individuals feel that other variables, such as the cooperation of colleagues, resources or time constraints could inhibit or facilitate the behaviour, which is termed external control (Kraft, Rise, Sutton and Roysamb, 2005; Ajzen, 2002). The TPB is a framework that helps explain behavioural change in people. It is a theory that predicts deliberate behaviour, because it can be "planned", and emphasizes that human behaviours are governed not only by personal attitudes, but also by social pressures and a sense of control.

Researchers have used the TPB to understand individual acceptance and use of different technologies. White, Al-Gahtani and Hubona (2007) utilize the TPB to predict intention to use computer technology in Saudi Arabia, while also examining the influences of potential moderating variables in the model. Their choice for the TPB was not incidental and was meant to better explain adoption of technologies in Saudi Arabia, where social pressure and self-control are patent cultural markers. Deans, Gray and Harvey (2010) use the TBP to explain the adoption of mobile marketing in Malaysia, also motivated by the presence of strong social influences on individuals. Their research findings suggested, however, that the "relative advantage of mobile marketing is the strongest influence in building consumers' intention decision to adopt mobile marketing" (p. 36).

De Marez, Vyncke, Berte, Schuurman and De Moor (2007) reached similar conclusions on the adoption determinants of mobile marketing, yet validated as well the significance of social variables, such as the influence of opinion makers for early adopters. Their research, in which they use the TPB to explore the adoption of mobile content, is especially interesting for this thesis. Their stated goal, similar to the present research,

was to help mobile marketers design and deploy more efficient and better targeted campaigns with respect to the use/adoption of mobile news and mobile television (De Marez, Vyncke, Berte, Schuurman and De Moor, 2007).

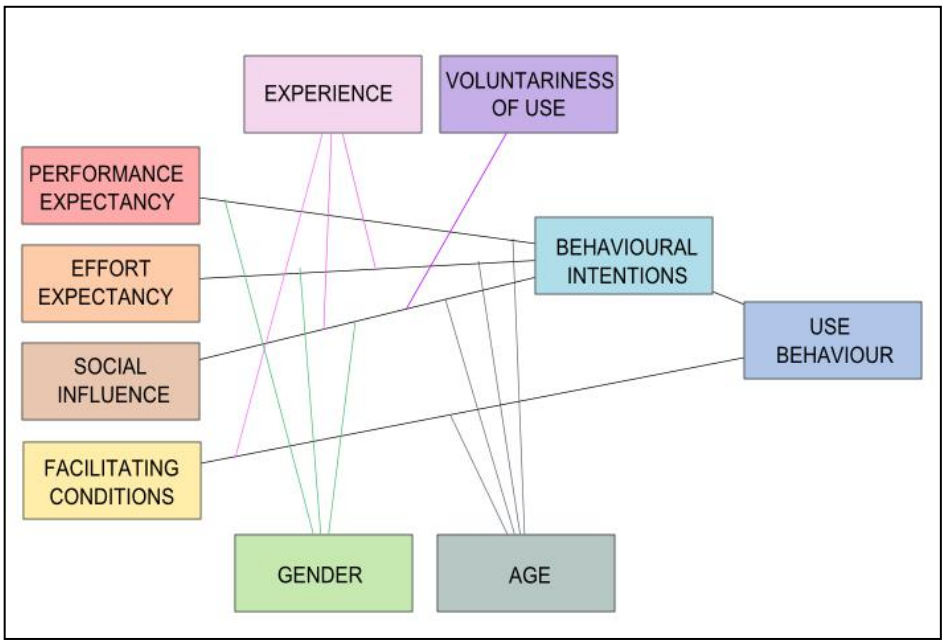
Mathieson (1991) compared the TAM with the TPB in a school study and identified six variables which influence students' use of technology: ease of use; usefulness; attitudes; subjective norms; behavioural control and intention to use. He further concluded that the TAM is easier to apply to individuals than the TPB, and that the model provides more specific information for product design and development. Along these lines, López, Molina and Bouwman (2008) argue that the TRA and TPB have been successfully used to examine acceptance of Internet services (IS). The Model of PC (personal computers) Utilization, or MPCU (Thompson, Higgins and Howell, 1991), also noted that individual behaviour may be determined by the individual's attitudes toward an innovation, social norms, facilitating conditions, and the perceived benefits and consequences of behaviour.

In 1995, Taylor and Todd adapted the TPB into a new model—the Decomposed Theory of Planned behaviour (DTPB)—by combining the TPB variables and the TAM attitude variable. The TPB has also been used to study the individual adoption of different technological innovations, such as adoption of IT (Harrison, Mykytyn and Riemenschneider, 1997) and adoption of web-based e-commerce (Riemenschneider and McKinney, 2001, 2002; Grandon and Mykytyn, 2004).

Another adaptation of the TPB was introduced by Venkatesh, Morris, Davis and Davis (2003), who developed the Unified Theory of Acceptance and Use of Technology (UTAUT). Their research found that individual behaviour might be attributed to

behavioural intention, which in turn may be influenced by the individual's perception of performance expectancy, effort expectancy, social influence and facilitating conditions. They reported that these relationships are moderated by gender, age, experience and voluntariness of use. Their approach is a combined review and consolidation of eight models of earlier research including the TRA, TAM, Motivational Model, TPB, combined theory of TPB/TAM, MPCU (Thompson, Higgins and Howell, 1991), Diffusion of Innovation and Social Cognitive Theory. Figure 7 illustrates the relationships established in the model.

Figure 7: UTAUT model (after Venkatesh, Morris, Davis and Davis, 2003)



The UTAUT framework proposes four key variables (performance expectancy, effort expectancy, social influence and facilitating conditions) as direct determinants of usage intention and behaviour. Gender, age, experience and voluntariness of use mediate the impact of the four key variables on behavioural (usage) intention and use behaviour. UTAUT's contribution is useful because it included 41 independent variables predicting intentions of use and 8 independent variables predicting behaviour. This is an

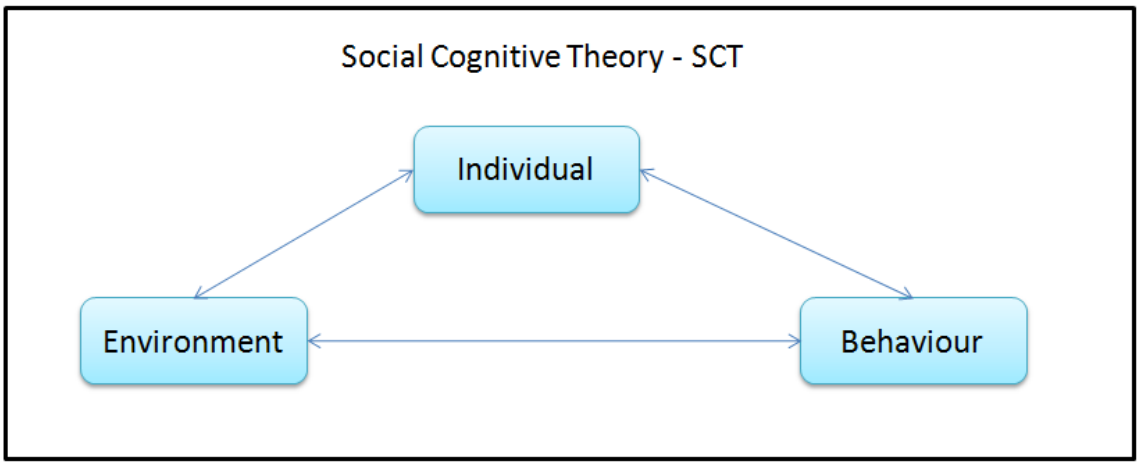
important implication of the model, as it clearly indicates that the adoption of innovations cannot be explained simplistically or with only a few variables. The model requires the analysis of many different aspects to predict an individual's adoption of a technological innovation. Echoing the TAM, the UTAUT model has been mainly used to examine the adoption of technology products (Venkatesh, Morris, Davis and Davis, 2003; López, Molina and Bouwman, 2008). Although UTAUT has not been as widely used as the TAM, it has gradually drawn researchers' attention and has been recently applied to exploring user acceptance of mobile technologies (See Carlsson, Carlsson, Hyvonen, Puhakainenand Walden, 2006; Min, Ji and Qu, 2008; Park, Yang and Lehto, 2007) (Zhou, Lu and Wang, 2010). Zhou, Lu and Wang have, for instance, recently used UTAUT to explain mobile banking adoption (2010) and continuance of usage of mobile Internet in China (2011). In both cases, the purpose of using UTAUT is to test a large range of variables affecting individual behaviour. In 2010, the researchers found that performance expectancy, task technology fit, social influence and facilitating conditions have significant effects on user adoption. In addition, they also found a significant effect of task technology fit on performance expectancy (Zhou, Lu and Wang, 2010). Thanks to the ability that UTAUT gives researchers to test individual behaviour in a more complex way, it allows for more interesting conclusions to be formulated:

> "In addition, we found that task technology fit has an obvious effect on performance expectancy. Thus service providers need to improve the task technology fit. They can segregate the market and provide differentiated services to niche users. For example, student users may be more concerned with the usage cost and variety of functions, whereas working

professionals may focus more on the reliability and ease-of-use of mobile banking" (p. 765).

In 1986, a further adoption model was developed by Bandura: Social Cognitive Theory (SCT). The model originated in social learning theory, a branch of psychological theory, which seeks to explain the behaviour of humans and animals. The model has been extensively used to predict both individual and group behaviour. Bandura (1986) affirms that personal variables, behaviour and environment reciprocally influence each other. The pattern of behaviour he identifies is as follows: [1] individuals influence the environment they exist in, but are influenced by environmental variables such as social pressures; [2] behaviour is affected by environmental variables, which in turn is affected by behaviour; [3] behaviour is influenced by an individual's personal and cognitive variables, which in turn affect behaviour. Figure 8 below represents this triadic reciprocating interaction.

Figure 8: Social Cognitive Theory - SCT (after Bandura, 1986)



This model has been used to predict individuals' behaviour towards technology. Sneddon, Soutar and Mazzarol (2009) found making sense of new innovations to be an important element in the adoption of the technology: "...the equivocal nature of new

technologies requires specific cognitive models and sense-making capabilities that enable a user to represent and understand the events associated with them" (p. 253). This association is what leads to perceived value and use, previously established as being of paramount importance.

In the field of adoption of innovations, SCT has been applied to study computer acceptance and usage (Hill, Smith and Mann, 1987; Miura, 1987; Sacks and Belissimo, 1993; Compeau and Higgings, 1995, 1999; Harrison, Mykytyn and Riemenschneider, 1997; Stephens and Shotick, 2001; Shotick and Stephens, 2006), e-commerce adoption (Eastin, 2002), online search acceptance and use (Kuo, Chu, Hsu and Hsie, 2004), electronic services acceptance (Hsu and Chiu, 2004) and use of the World Wide Web (Hsu, Chiu and Ju, 2004), email adoption (Lee, 2004) and, more recently, the use of the Internet for purchasing and information management (Celuch, Murphy and Callaway, 2007). SCT and its subsequent refinements have contributed significantly to the field as they incorporate social and psychological perspectives into the study of adoption of innovations. Such perspectives are used in this research through the incorporation of these model variables, as discussed in Chapter Five.

3.2.3. Diffusion of innovations

While adoption research explores the stage in which a product/service/idea is selected for use by an individual or organization, diffusion research typically investigates the spread of products, services or ideas through a population. In the context of this research, the populations in question are Rogers' five categories of adopters. As previously mentioned, adoption and diffusion are two sides of the same theoretical coin: adoption is the singular act, whereas diffusion is the accumulation and

propagation of those single acts throughout a designated group. An early contribution to the field was made by Ryan and Gross (1943), who described the diffusion of hybrid seed among a group of Iowa farmers. They discovered that diffusion was not a result of rational or economic decision making, but rather a social process of innovation spread from earlier to later adopters (Valente, 1995). Valente's social definition evolved into a social-psychological approach to determine the relationships between innovations and attitude, values and group attachments. Griliches (1957) later concluded that diffusion of innovation significantly depends on the technology supplier's activities in adapting the product, service or ideas to local conditions. Importantly, in doing so Griliches incorporated the environmental context into innovation research. Subsequently, Lionberger (1960) traced the importance of community norms, traditionalism versus modernism, social status and opinion leadership in the informal transmission of new farming ideas via word of mouth. These contributions popularized diffusion models across an array of scientific fields, where they were employed to address a myriad of different problems. Diffusion models were first introduced in marketing studies in the 1960s, and have since been widely adopted to predict the adoption of new technologies. More details on the extensive use of such models can be found in Yeong-Wha and Hyun-Soo (2007) and Mahajan, Muller and Bass (1990).

In 1983, Rogers, in his third edition of *Diffusion of Innovations,* put forward the concept of *Diffusion of Innovations for Individuals* (DOI). This research sought to examine adoption of innovations from an individual, rather than from a collective point of view. Rogers' theory quickly gained popularity and has been highly influential, among others, in order to understand the adoption of Internet and communication technologies, from

the use of mobile hardware to mobile banking software (Hajialiasgari, Kheiri and Salehahmadi, 2011; Mallat, 2007).

Rogers, summarizing the findings of previous studies, suggested that an individual's behaviour is determined by that individual's perceptions. Rogers also confirmed that the adoption of new ideas follows a normal, S-shaped distribution (1983), as previously described by Tarde (1903). Rogers defined adoption as "planned or spontaneous, quick or slow, complete or incomplete, but most importantly a process, not a single, unitary event" (p. 21). In another important contribution, Rogers found that the following external or social conditions may accelerate or slow the process: whether the decision is made collectively, by individuals, or by a central authority; the communication channels used to acquire information about an innovation, whether mass media or interpersonal; the nature of the social system in which the potential adopters are embedded, its norms, and the degree of interconnectedness; and the extent of change agents' promotion efforts, for example, advertisers and development agencies.

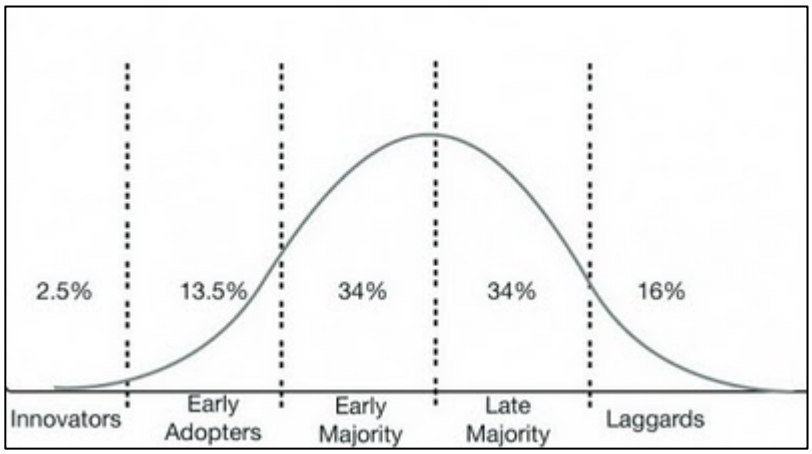
In addition, Rogers identified five variables that affect the adoption rate of any particular innovation in his *Rate of Adoption Model*. They were: the perceived attributes of innovations; the type of innovation-decision (such as authority, collective or optional); the communication channels used to spread the innovation; the nature of the social system in which the innovation spreads; and the extent of the change agents' promotion efforts. He separates the *diffusion process*, in which innovation permeates through society and groups, from the *adoption process*, which is most relevant to the individual, and defined the adoption process as "the mental process through which an individual passes from first hearing about an innovation to final adoption" (p. 35). He further identified the five steps of the adoption process as: knowledge (awareness);

persuasion (interest); decision (evaluation); implementation (trial); and confirmation (adoption).

> "Throughout the adoption process, the individual seeks knowledge of and skills which will ultimately affect the adoption process. For a potential adopter, the process will proceed through the various steps and lead to adoption, or alternately, lead to rejection of the innovation." (Rogers, 1995 edition, p. 35)

Rogers (1962) proposed categories of adopters, and sought to standardize those categories within diffusion research. It is this categorisation, shown in Figure 9, which will be used throughout this research. It should be noted that the current research seeks to use these categories of adopters as built-in "groups" for study within the large population, rather than modifying or extending the original work.

Figure 9: Rogers' Categories of Adopters



Rogers suggested that Innovators are the first group to adopt an innovation and identified their profile to include: risk taking, young, high social class and sociable individuals with easy access to scientific information and other Innovators. Typically, Innovators enjoy a socioeconomic status that provides a comfortable amount of disposable income. They are venturesome and intelligent individuals, and they enjoy

being on the cutting edge (Rogers, revised edition 1995). Perhaps not surprisingly, they correspond to a minority 2.5% of the population. An innovation's possible benefits make it exciting for them; they imagine the possibilities of an innovation and are eager to give it a try. Innovators are willing to adopt a technology that is neither popular, mass produced, affordable, nor standardized. These individuals are willing to do so because of their inherent interest in technological innovation. Innovators, says Rogers, have lifestyles that connect them with large networks of like-minded people (1962).

Innovators have a pivotal role in the diffusion of technologies. They understand a technology's development, and their opinion has great influence on other individuals. Their important role as opinion leaders has been argued for in much of the empirical literature explored in this research. The role of Innovators couples seamlessly with many of the theories on innovation mentioned above. Innovations are said to be put into practice by forward-thinking individuals who are willing to takes risks, but most importantly, who have the capacity to understand the role of the innovation within a specific field (Laurin, 1999). From companies' perspectives, Innovators can provide valuable feedback loops, which allow them to make improvements to their innovative products in order to reach a greater audience. As such, the role that Innovators and innovation play in mobile technologies should not be neglected by product developers and marketers (Fagerberg, Srholec and Verspagen, 2010).

A high degree of risk tolerance is characteristic of the Innovators, meaning that they will adopt technologies that may ultimately fail, but given their financial resources, it is a loss that can be absorbed or endured (Rogers, 1962). Their relevance when studying mobile services and content has been reported, for instance, in the adoption of multimedia mobile content (Sawng and Han, 2007). Innovators have also been said to

play an important role in the diffusion of mobile services (Revels, Tojib and Tsarenko, 2010). The characterisation of Innovators as interested in becoming opinion leaders and gaining popularity as such has been reported, for example, when asserting that companies have adopted mobile banking first as part of a branding initiative (Patsiotis, Hughes and Webber, 2012).

Innovators are followed by Early Adopters, the second group to adopt an innovation. In general, Early Adopters are considered opinion leaders within their community. They are also generally young, with high social status, advanced education and access to financial means. They correspond to 13.5% of the population.

As with Innovators, Early Adopters are typically younger than average and have an affluent social status. Their adopting choices, however, are more discrete and less risky than those of innovators. This means that Early Adopters carry out a much more conscious and rationalized decision process before "buying in" to a new technology (Rogers, 1962). It is most probably this conscientious decision-making process that grants them the highest degree of opinion leadership and which makes their opinions respected ones from the point of view of other members of a social group. Strategies with a motivational emphasis are said to be most effective in targeting this group, given their greater aversion to risk. Along these lines, their capacity as opinion leaders makes them a crucial segment for marketers within any industry.

In the context of mobile services and content, Early Adopters have been shown to act with the intention to become opinion leaders, in line with Rogers' predictions (Revels, Tojib and Tsarenko, 2010). Mobile banking, furthermore, is reported to have gotten a push forward by being offered to Early Adopters who previously expressed interest in

the service. Banks responded quickly because of the expected appeal of mobile banking for a vast majority of consumers who would be eager to learn more about it from independent opinion makers (Patsiotis, Hughes and Webber, 2012).

The third group to adopt an innovation, after Early Adopters, Rogers classed as Early Majority. These represent 34% of the population, are classed as low and very low opinion leaders, and tend to follow the trends set up by Early Adopters. Early Majority individuals are expected to deliberately adopt new ideas just before the average member of a system. Their decisions are taken only when considerable support for the innovation has been developed (by Innovators and Early Adopters). A variable degree of adoption time characterizes these individuals' decisions. Nevertheless, adoption takes significantly longer than for Innovators or Early Adopters. The Early Majority tends to have above average socioeconomic status, above average contact with Early Adopters, and will seldom hold positions of opinion leadership in a system (Rogers, 1962).

In keeping with Rogers' theory, the Early and Late Majority groups are reported in the adoption of mobile banking (Patsiotis, Hughes and Webber, 2012). Naturally, the scope of the Early Majority makes it a crucial segment for marketers. However, the best strategies to reach this adopter group will depend on its size as well as on its communication with the earlier adopter groups.

On the other hand, the Late Majority group, corresponding to the next 34% of the population, adopts innovation after they perceive the average member of society has already done so. They have a high degree of scepticism, lower social status and less financial access. Because of their scepticism, individuals in the Late Majority group tend

to require social pressure as part of their motivation to adopt a new product or service. In order to reach the Late Majority, intervention strategies that help them to overcome barriers are needed to get them to join the earlier adopter groups. Their scepticism is at least partly related to their below average socioeconomic status and education, as well as their relatively small contact with Innovators.

When referring to mobile content, the Late Majority's patent hesitance constitutes an ever-present challenge for mobile content creators (Sawng and Han, 2007). Being able to assess the size of the Late Majority is important for any assessment of their role in the diffusion of technology.

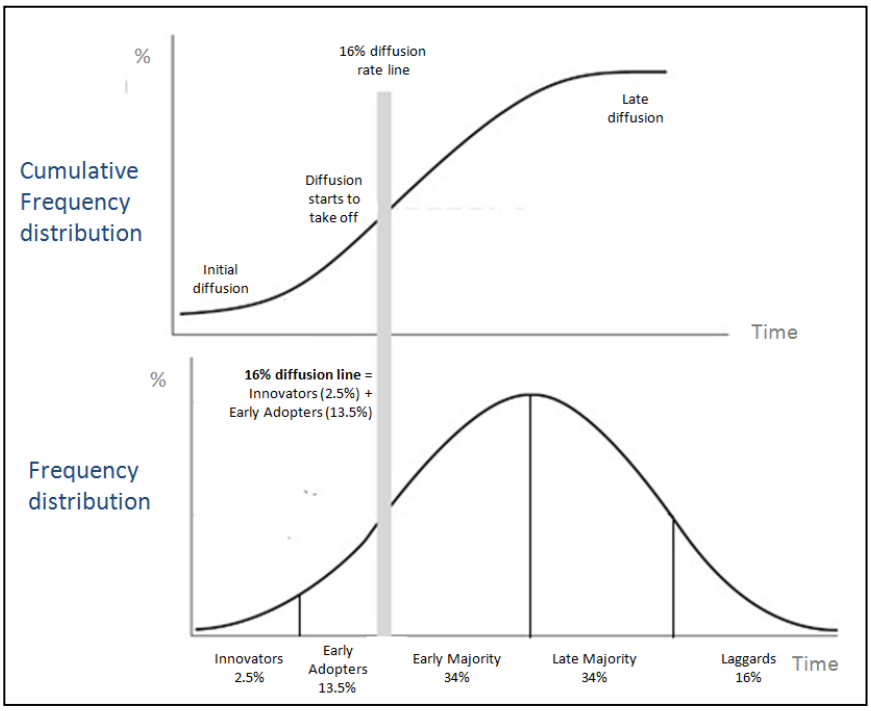
The last group to adopt an innovation is termed Laggards, corresponding to the next 16% of the population. They are described as being averse to change and are generally in the older age bracket. They are more focused on tradition and have lower social status and financial resources. (Rogers, 1962). A prevalent feature in this group is the lack of intention of their members to become opinion leaders. Their main social networks are built upon tradition, mainly including family and close friends. Laggards' intentions to adopt are highly marked by their age, education and financial constraints. All of these variables contribute negatively in the adoption of innovations, because they limit the influence of opinion leaders and Innovators on the one hand and, on the other, they tend to further diminish their perception of the functional value behind innovations.

In the adoption of mobile content and services, Laggards have been characterised as being fearful of the lack of security as well as the complexity of the Internet and computer user interfaces, respectively (Patsiotis, Hughes, and Webber, 2012).

Rogers' categories of adopters are extensively used throughout this research. They serve as the basis for a comparison of how the needs for mobile content are perceived differently through the five groups present within the population. This thesis compares the results for perceived Mobile Content Needs (MCN) for each of the adopter categories and identifies how each group differs in its needs for the adoption of mobile content. This is discussed further in Chapters Four and Five.

Rogers' theory also posits that these five types of adopters are represented by the bell-shaped graph at the bottom of Figure 10; at the top of the figure is Tarde's S-shaped curve, formed by cumulative frequency distribution of innovation diffusion. The 16% line marks the cut-off point between Innovators and opinion leaders (Early Adopters), and it is the point where the S-shaped curve increases dramatically. This indicates that the key innovation diffusion occurs amongst opinion leaders (or Early Adopters). This corresponds to Rogers' 16% diffusion rate theory (Rogers, 1995).

Figure 10: Roger's 16% diffusion rate theory



The 16% (combined 2.5% of Innovators and 13.5% of Early Adopters) diffusion rate theory affirms that although Innovators purchase products at the earliest stages soon after their release, they tend to focus on products' novelty value rather than on any essential benefits that might appeal to the majority of consumers. Early Adopters, on the other hand, tend to focus on newly available uses and the perceived benefits of the innovation, which may differ from those that the innovation's developers originally had in mind. In this way, the role Early Adopters play in the diffusion lifecycle is to envision practical uses for innovations, thereby locating the innovation's place in the market. Moreover, Early Adopters are regarded as having greater influence over other consumers, and for this reasons they are considered the key drivers of product diffusion.

Moore (1991) re-examined Rogers' diffusion theory and determined that Early Adopters hold the key to diffusion theory. He claims that for "high technology" innovations there is a chasm impeding product diffusion to a larger market beneath the frequency distribution curve in Rogers' theory. The author demonstrates that the gap, or what he terms "chasm", between initial market (innovators and early adopters) and the mainstream market (early and late majorities) cannot be easily bridged. Moore points out that unless companies get over this chasm, innovations are restricted to a small scale initial market and don't break into the mainstream.

The rationale for the existence of the chasm between Early Adopters and Early Majority is built as following: whereas Early Adopters are looking to stay ahead of the competition with products that nobody else is using, the Early Majority wants to keep up and use reliable products that many other people are using. Moore saw that it was

therefore necessary for product and service providers to take appropriate steps to target the Early Majority from the very beginning in order to bridge the chasm and gain mainstream market access. Moore's theory is used as a basis for the research analysis in Chapter Five.

3.3. Culture and demographic effects on technology adoption

Researchers from various disciplines have long understood that national cultures play a role in the adoption of technology. Likewise, within countries, demographic variables have a complex influence on why and how individuals choose to adopt or ignore particular technologies or innovations.

Although his work was initially grounded in management research, Hofstede (1984) outlined four dimensions for the categorizing of different cultures. They were: individualism-collectivism, uncertainty avoidance, power distance and masculinity-femininity. A collectivist description does not necessarily refer to any specific political structure. Rather, it refers to how people see themselves within their larger community. Typically, Western countries are strongly individualist, whereas the developing world retains stronger "grassroots" social network structures. Power distance refers to the perception of strength within a social network. In essence, power distance is a measure of how connected people feel to the various enforcement mechanisms within their community and state. The dimension of masculinity-femininity has been the source of much debate and confusion. Hofstede classified masculine societies as ones where individuals are generally task oriented; in feminine societies, individuals are people oriented, as the theory goes.

At the level of culture, a couple of Hofstede's dimensions have been shown to significantly modulate technology adoption. Lee, Trimi and Kim (2013) found that in the case of cultures that they classified as individualistic, such as Brazil and Ireland—wherein members seek out information from personalized, independent channels and opinion makers—innovativeness is a major factor at the individual level in deciding to adopt a technology. In contrast, members of collectivist or communal cultures tend to defer to local social nets and direct word of mouth.

Stump, Gong and Chelariu (2010) uncovered evidence that a society's level of individualism plays a major role in the rate of technology adoption. Similarly, they also found that the manner in which societies perceive time has an effect on mobile phone adoption and diffusion rates. According to the researchers, cultures can be broadly categorized as either monochronic or polychronic. A monochronic culture, such as Ireland, is one that micromanages its time, with strict schedules and a tendency for its members to approach task and duties one at a time. To adopt a catch phrase, monochronic cultures are "clock watchers." Polychronic cultures, such as Brazil, are less time-oriented and more willing to take on several tasks at once, often without strict deadlines. Generally, the Western world and the Pacific Rim are monochronic cultures, whereas Latin America, India and many nations with the Middle East and Africa are typically polychronic. Stump, Gong and Chelariu (2010) claimed that polychronic cultures might adopt mobile phones more rapidly and easily.

Within societies everywhere, the idea of the digital divide has received much attention. Briefly, the digital divide refers to differences in technology adoption and diffusion between the rich and poor, young and old, as well as between ethnic majorities and minorities. Indeed, digital divide is something of a catch-all term, and is strongly context

specific. In the context of this research, the digital divide might be exemplified by the varying adoption of innovation rates between the different categories of adopters; for instance, innovators are at the absolute cutting edge, whereas a certain segment of the population will resist adopting a technology until it's nearly obsolete. However, recent research has suggested that while demographic stratification is still strong nearly everywhere, the divide may be shrinking (Lee, 2010). In Brazil specifically, a recent study (De Souza e Silva, Sutko, Salis and de Souza e Silva, 2011) indicated that the rich/poor dichotomy grossly oversimplifies the issue of mobile phone use and adoption. Researchers found that despite limited resources, residents of Rio de Janeiro's slums found ways (sometimes subversive or extra-legal) to adopt mobile phones.

Understanding the role that the cultural dimension has in the adoption and diffusion of innovations is particularly important from an academic point of view when performing comparative studies. From a developer's point of view, however, it is an essential aspect as it may be a crucial guide for investments related to marketing and advertisement.

Culture is said to pre-exist a study, and, hence, to mould the attitudinal component behind decision making. These attitudinal predispositions would, in short, either allow individuals to adopt innovations faster and more straightforwardly, or would on the contrary make them more resistant towards adoption. This means that socio-cultural beliefs and habits can be said to work as hindrances for new innovations. Empirical literature often argues that societies can, in general terms, be conceived as either individualistic or collectivistic (Richard, Arthur, Kim and De Souza, 2011, p. 29). Consequently, the authors report stark differences in the rates of adoption and diffusion between Korea and the United States (p. 30).

The weight of culture then would be the way in which it encourages individuals to adopt innovations that support cultural beliefs and standards. The implication is that individuals would naturally resist innovations that directly or indirectly challenge such cultural habits. In the study noted above, the authors highlight the weight that a variable like popularity or social influence has in certain societies—a value which would have no practical justification, and which would be explained through the existence of cultural variables.

Along these lines, Coggio (2010) argues that individuals in the Netherlands were more reluctant to adopt organizational changes that took place at an individual level, while being more open for those that were directed towards the group as a whole. He contrasts this with the opposite results, which he reported from a population in the United States.

The role that culture can play in driving an individual's attitude has informed a considerable volume of innovation research. Specifically, recent studies have sought to understand the characteristics of the innovation at stake from the point of view of culture being a hindrance or a support (Richard, Arthur, Kim and De Souza, 2011). Cultural variables force developers to think of their products as multifaceted and as serving more culture-specific purposes (Schrage, 2004). Schrage's point here is to understand how, for instance, social media may be used for different purposes across cultures: as an alternative to mainstream news, as a file sharing community, or as a matchmaker for lonely individuals. In practice, however, his point is that the weight of each construct is likely to vary from country to country – as this research also suggests in its results. Schrage does not imply that cultural variables must necessarily explain

different rates of adoption. A researcher must judge with a keen eye the weight that each culture may have in explaining the role of particular constructs.

In summary, while the digital divide has long been a dominant factor in the discussion of technology and its adoption, the conversation may be subtly shifting toward the ways in which that divide is being eroded. True, dichotomies persist in technology adoption, however, identifying the means and methods by which these dichotomies perpetuate themselves may in some sense accelerate the process of their disintegration. Combining together samples that include both Ireland and Brazil, as the current research does at one stage of data analysis, may reveal points where mobile, digital technology is laying siege to barriers once thought insurmountable. As discussed in section 2.5.1, the raw numbers related to mobile adoption in these areas are informative and provide a suitable groundwork for exploring the means and ends for adoption among different segments of society. Further research is necessary to clarify these vast and interrelated socio-technological issues.

3.4. Motivation and needs

All behaviour, including whether a person adopts innovative content or new technologies, is motivated by some trigger. An entire study of the psychology of behaviour has been adapted and expanded to include potential reasons and determinants of behaviours (Weiner, 1992). Behaviours are often motivated by needs, as addressed by the seminal and highly influential work of Maslow (1943). For this reason, understanding what underlies behaviour, particularly as it pertains to technology adoption, aids in the understanding of the ten Mobile Content Needs studied in this research.

Motivation derives from the Latin root "to move" (*movere*), giving the idea that motivation is a trigger to movement. As defined by Geen (1995), motivation refers to the initiation, direction, intensity and persistence of human behaviour. Initially, motivation research aimed to improve work productivity. By studying how to motivate employees, for example, companies would be able to increase their production and thus their profit. Motivation has also been studied by educational researchers seeking to achieve higher educational results from students (Cofer and Appley, 1967). With time, motivation research has been expanded to different fields of research, including behavioural research, such as consumer behaviour, to investigate what drives consumers to purchase or adopt goods and services.

In the growing age of technology, businesses investing time and capital into providing innovative products could benefit from understanding what motivates consumers to make technological purchases. In the context of adoption of innovations, motivation has been found to have a strong impact on determining the behaviour of the individual adopting an innovation (Brunstein and Maier, 2005). In addition, field literature proposes that examining the adoption of innovations, such as adoption of mobile technologies and services, has demonstrated that adoption is influenced by individual or motivational variables (Steverink and Lindenberg, 2006; Qualasvirta, 2005; Geser, 2004).

Based on previous research linking motivational variables and the adoption of technologies, this discussion aims to map the Mobile Content Needs (MCN) identified in this chapter onto a motivational framework based and adapted from human needs theories, previously applied to explain the adoption of other types of technological innovations. To do so, it is necessary to present the theoretical foundation of human

motivational theories relevant to the field (3.4.1). This is followed by an analysis of relevant research linking human needs and adoption of innovations, which leads to an analysis of how human motivational theories, particularly Maslow's hierarchy of needs, have been adapted to the context of adoption of innovations (section 3.5). Maslow's hierarchy of needs is then adapted to the context of adoption of mobile content using both motivational theories and the variables identified as possibly relevant for the adoption of mobile content in section 3.5.1 This is followed by a discussion of how the other (auxiliary) variables identified in this research (innovativeness and adopter's categories) relate to human motivation.

3.4.1. Research directions

In the early 20th century, the theory of instincts posited that solely innate biological forces drive humans, resulting in particular behaviour. Humans would be biologically programmed to survive and instincts were viewed as unlearned, uniform and universal behaviour patterns. The theory of instincts held that all humans are the same in this respect and share a set of instinctive behaviours (McDougall, 1926).

In the 1920s, the theory of instinct was critiqued as too simplistic. Researchers had never been able to agree on a list of instinctive behaviours. They started to disagree about whether instincts were universal, leading to the acknowledgement that instincts are dependent on individual differences. It was then replaced by the drive theories, first suggested by Zajonc (1965). The drive theory, also referred to as the drive reduction theory, affirms that individuals are born with certain psychological needs, and when these needs are not satisfied, a negative state of tension is created. Satisfying these needs returns the individual to a state of relaxation, or at least equilibrium.

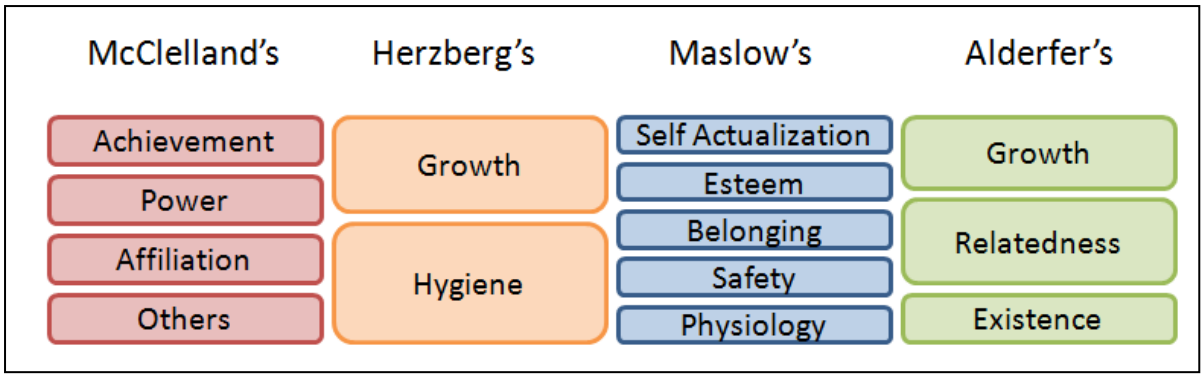
Today, theories of motivation investigate needs and motivations from several different perspectives, which can be classified either as process theories, reinforcement, instrumental, and expectancy or content theories (Bandura, 1986). Process theories focus on the type of goals by which individuals are motivated. The approach examines how individuals are motivated or how their behaviour is energized, directed and maintained. Examples of this approach are Adams' Equity Theory (Adams, 1962) and Vroom's Expectancy Theory (Vroom and Kenneth, 1968). Reinforcement theories examine behaviour modification or conditioning based on individuals' past actions. The reinforcement theory or operant conditioning theorists such as Skinner (1986) and Will (1985) address how motivation can persist over time. Instrumental theories investigate whether extrinsic rewards, such as high economic gain, are valued more than intrinsic rewards such as job satisfaction. Instrumental theories explore the relationship between individuals and work motivation. Goldthorpe, Lockwood, Bechhofer and Platt (1968) pioneered this approach, concluding that for some people, work is only a means for financial reward. For these people, intrinsic aspects of work are not prioritized. Lastly, content theories presume that people are driven to satisfy a specific need and investigate the needs that energize and direct behaviour. Theorists include McClelland (1973), Alderfer (1972), Maslow (1987) and Herzberg (1968).

This research studies the adoption of mobile content and the needs that individuals seek to fulfil when adopting it. This literature review describes how content theories of motivation can be used to study the adoption of innovation, in particular, the adoption of mobile content. Later, motivational theory will be linked to the ten Mobile Content Needs discussed near the beginning of this chapter.

3.4.2. Content theories of motivation

Content motivation theories, such as those of McClelland (1973), Alderfer (1972), Maslow (1987) and Herzberg (1968) are most appropriate in the context of adoption of innovations, since they posit that needs drive behaviour, which in this research refers to the behaviour towards adoption of innovation. Despite their intrinsic differences, these approaches share similar concepts of the human needs that affect behaviour, as illustrated in Figure 11 below.

Figure 11: Content Theories of Motivation- compared needs



The above diagram shows that human needs identified by seminal research fall into theoretically similar categories, although underlying research may go in different directions. They are each arguably derived from Murray (1938), who described needs as a potentiality or readiness to respond in a certain way under given circumstances. He recognized that some needs are temporary and changing, while others are deep seated in their nature, which he called psychogenic needs. Two main types of psychogenic needs were identified by Murray—primary needs, which are based upon biological needs, such as oxygen, food, independence and achievement, and secondary needs, such as the need for nurturing, which plays a major role in our personality. Murray divided these needs into twenty-seven categories. According to his findings, individuals tend to

have a certain level of each need. The main contribution of Murray's research was the understanding that personality is driven by secondary needs, such as achievement, dominance, affiliation and nurturance. The core psychogenic needs identified by Murray provided the theoretical basis for later research on content motivational theories.

Murray's research was a predecessor of Herzberg's motivation theory (Herzberg, 1959), primarily used in human resource management. The theory was referred to as the two-variable theory because it identified two variables that motivate people: hygiene and growth needs. Hygiene variables affect individuals' job dissatisfaction when present, but do not create job satisfaction. Examples include supervision, interpersonal relations, physical working conditions and salary. Growth needs include variables that motivate employees when present, such as achievement, advancement, recognition and responsibility, leading to job satisfaction.

Criticisms of Herzberg's theory (Jain, 2005) include research methodology limitations, such as subjects being asked to recall events, which can produce biased and highly subjective responses that required interpretation by the researcher. Moreover, the theory was found to be more applicable to knowledge workers than manual workers (Jain, 2005). Also contrary to Herzberg's theory, Shipley and Kiely (1989) found that salespeople consider money a significant motivator, and that Herzberg's theory was too simplistic in many instances. However, Herzberg's research contributed to the existing body of research on motivation by proposing a novel and simplified two-variable model with a new organization of human needs leading to job satisfaction.

In 1961, the psychologist David McClelland, who specialized in human motivation, expanded upon Herzberg's approach by describing three types of motivational needs

that occur in varying degrees in all individuals: [1] need for achievement, which refers to an individual's need for accomplishment and feedback; [2] need for authority and power, in which individuals tend to show a strong need to be influential, effective and make an impact; and [3] need for affiliation, which motivates interaction with other people. In a later study (McClelland, 1973), he noted that most people exhibit a combination of these three needs, at different levels, that evolve over time and are shaped by life experience.

McClelland's theory (1965) is considered the most useful content motivational theory (Redmond, 2009) because more empirical evidence was found to support McClelland's needs theory than the alternatives. His research encouraged changes in corporate behaviour through training programs and matching motivational needs with job situations (Redmond, 2009). McClelland contributed to the deepening of the understanding of which needs influence behaviour and how these needs can be combined and changed among different individuals.

In another important contribution to the field, the ERG motivational theory (Alderfer, 1972), primarily developed for human resource management studies, also describes three levels of needs: [1] existence, which corresponds to psychological and safety needs, such as the need for food and air; [2] relatedness, which comprises social and external esteem needs, such as the need for family, friends and co-workers; and [3] growth, which includes the need for self-actualization and internal esteem, such as the need for creativeness, productiveness and meaningfulness of tasks. Alderfer suggests that existence needs have priority or are of a higher level than relatedness needs, which then have priority over growth needs. However, the ERG theory recognizes that the

order of importance of these categories may vary for each individual. Alderfer's theory suggests that the satisfaction of higher levels needs can be met before the satisfaction of lower levels.

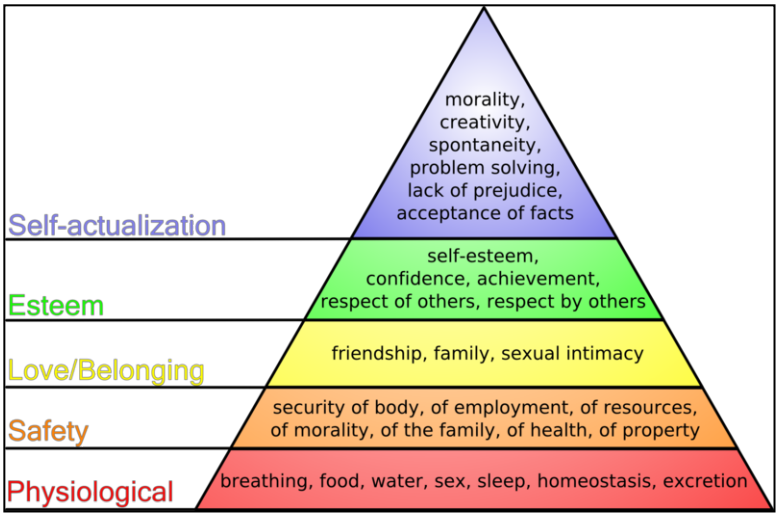
Hunter, Rauschenberger and Schmitt (1990) reviewed Alderfer's ERG theory and stated that it recognizes differences among people and how they affect the needs of an individual in life, using Alderfer's need questionnaire. Alderfer's need measurements can be very difficult to obtain because so much time must to be spent with the subject (Value Based Management, 2009). However, the main contribution of this theory is that Alderfer notes that it is possible for an individual to regress to lower-level needs when high-level needs cannot be satisfied. He created a model of progressive needs, where the hierarchical aspect is not rigid, and needs may be satisfied simultaneously and in different orders for each individual.

Perhaps the most important contribution to content theories of motivation was made by Maslow (1987), who introduced what it is commonly known as Maslow's Hierarchy of Needs. Displayed in the shape of a pyramid, the hierarchy is made up of five levels of needs. The most basic human needs are represented at the bottom of the pyramid, and more complex needs on the top. According to Maslow, once the lower level needs in the pyramid are met, individuals can move on to the proceeding, more complex levels of the pyramid, which differs from Alderfer's (1972) approach. In other words, individuals will only have more complex needs once the most basic needs in the pyramid are met.

Maslow's most basic needs (physiological needs) concern physical requirements for subsistence, such as need for food, water, sleep and sex, among others. The next level, a person's physiological needs (safety needs) represent the need for safety and security.

Above this level in the pyramid, there is a need for love, friendship and intimacy, in which the needs become more psychological and social, classed as relatedness needs. Further up, there is the need for personal esteem and self-actualization (esteem needs), followed by the human need for growing and developing as a person seeks to achieve their individual potential (self-actualization needs). Figure 12 shows a representation of Maslow's pyramid.

Figure 12: Maslow's original Hierarchy of Needs (after Maslow, 1987)



In addition, Maslow (1987) posited that an individual's needs change with his or her circumstances and a different mix of needs is seen from individual to individual. This dissertation examines the differing needs of mobile content consumers occupying different stages of the mobile content lifecycle, investigating if these needs change according to the individual's time of adoption.

Van Biljon (2007), Huitt (2004) and Yang (2003) have raised criticisms of Maslow's hierarcy. These criticisms include the failure to support the hierarchical arrangement of needs, the fact that the order of needs varies from individual to individual and across cultures, and the uncertain movement of needs from level to level. Despite the criticisms

and lack of conclusive research support, Maslow is still being used and represents a valuable starting point for examining individual differences in motivation (Schiphorst, 2006). Leontiev (2008) noted that Maslow's theory of needs has been one of the most popular and often cited theories of human motivation.

Some researchers refer to Maslow's theory while making specific references to mobile phones, including Schiphorst (2006), whose study explores the notion of affect and tactile feedback of mobile phone design with Maslow's needs. Katz and Sugiyama (2005) also observed that the need for safety and security in Maslow's model can be linked with the desire for power and security associated with mobile phones. Further research linking Maslow's theory and the adoption of innovations is presented in the following section.

3.5. Motivation and adoption of technology

Human needs have been considered important variables in understanding the individual adoption of mobile phones (Geser, 2004), as well as fundamental in the discovery of users' motivational needs for technology adoption (Qualasvirta, 2005). This section discusses how previous research has linked motivational variables and the adoption of innovations.

Deci and Ryan (2000) claim that basic psychological needs provide a basis for predicting goal attainment leading to performance and wellbeing outcomes. Meanwhile, Kwon and Chidambaram (2000) examined patterns of mobile phone usage, showing that users' motivations and perceptions are influencers of the use of mobile phones. Shang and von Dran (2000) also linked the two research fields, noting that the absence of hygiene variables, as described by Herzberg (1959), is responsible for customer

dissatisfaction in the context of adoption and use of technology, while motivational variables contribute to user satisfaction.

Moreover, Wood and Swait (2002) investigated the degree to which the need for cognition (the extent to which individuals enjoy and engage in cognitive activities) and need for change relate to individual adoption of innovation. Their findings show that both needs help predict whether individuals will adopt an innovation. Because adoption models still have low predictive power to determine if a product or service will be adopted or not in the market, the discovery of a significant relationship between needs for cognition and change within adoption of innovation is an important step to demonstrate the importance of considering motivational variables in the process of adoption of innovations. Jarvenpaa (2003) also explored the links between mobile phones and motivational variables, classifying mobile services guided by user needs. Jenson (2004) argued that mobile phones are used so that people can fulfil their motivational needs.

Researchers such as Van Biljon, Kotze and Marsden (2007) and Qualasvirta (2005) maintained that the investigation of motivational needs is a fundamental requirement for the understanding of technology adoption. In addition, Steverink and Lindenberg (2006) argued that it is more useful to understand consumers' needs rather than consumers' goals and resources within the adoption process, while Wei (2008) explored the patterns of relationships between mobile phone use, motivations and demographics, suggesting that different motivations predict different use of mobile phones.

Van Biljon, Kotze and Marsden (2007) use the findings from previous motivational studies (Marcus and Chen, 2002; Kwon and Chidambaram, 2000; Venkatesh and Davis, 2000; Davis, 1989; Maslow, 1987; Herzberg, 1968) to relate motivational needs to the adoption of mobile phone usage, explaining how needs influence adoption of mobile phone devices. They developed a model (MOPTAM – Mobile Phone Technology Adoption Model) that included social variables and infrastructural variables in mobile phone adoption. According to the researchers, the model is a departing point to link mobile phone use and motivational needs, but it lacks the modelling of the features associated with each usage space (motivational need), which is then accomplished at a later publication (2008). The authors consider the motivational human theory variables discussed in the earlier study to determine how needs influences usage, then linking needs with mobile phone features.

Collectively, the researchers featured above correlate motivational needs with adoption of innovations. It is therefore useful to consider motivational (human) needs in the process of understanding the variables that lead to adoption of technological innovations. Based on this assumption, the next section discusses how human motivation has been linked to adoption of innovations using broader constructs and models that help predict technology acceptance.

3.5.1. Formulating the research questions

As described above, it is useful to consider motivational needs as a starting point to understand the variables that influence mobile phone usage. Previous literature has used the models presented to study the adoption of innovations: in particular, the adoption of mobile phones using Maslow's (1987) hierarchy of needs and the correlate

of human needs and perceived needs (Schiphorst, 2006; Katz and Sugiyama, 2005; Yang, 2003; Ryan and Deci, 2000; Institute for Management Excellence, 1997). These and related studies are explored in this section. The aim is to find a basis for the correlation of human needs with the possible variables affecting the adoption of mobile content proposed in this research (MCN) (section 3.8).

Human needs and psychological motivation are integral to the current research. Therefore, a more explicit definition of terms is in order. Human needs, as used in this section, refer mainly to the psychological correlate that accompanies all human experience. In other words, there is an emotional content to all human interactions with technology at large and, specific to this thesis, with mobile services and mobile content. This argument does presume that certain emotions will always be reported by an individual, no matter what the activity at hand. Rather than simple emotions (positive or negative), the psychological needs referred to here are complex bundles of feeling and motivation. They are not simple and subjective "states of mind". It is because the emotional content that accompanies an experience is multifaceted that objective psychological needs can play an important role in understanding the adoption of technologies. The comparison of reported experiences, based on empirical studies, sheds light on the basic needs and expectations that inform motivations. This becomes relevant for businesses, too, because they add a new facet to their products: user experience. User experience adds richness to the development stages of a product by introducing, for instance, a layered understanding of functionality, as well as helping to identify the weight that a product's design may have for the consumer. User experience has become increasingly essential for businesses and developers: Everyone involved in the development of a product or service—designers, developers, business leaders, and

project managers—must have the same focus on the reported experience of the end user (Corrigan and Miller, 2011).

The assessment of a user's experience is not a straightforward task. Reasoned theory and credible evidence must inform the process. Exploring various empirical methods of user experience analysis is now common practice in the design of new technologies, including tablets, laptop computers and mobile phones (Corrigan and Miller, 2011). The growing importance of the empirical analysis of human needs owes much to Maslow's hierarchy of needs. Therefore, it is worthwhile for this section to expand further on them.

The Institute for Management Excellence (1997), borrowing from Maslow (1987), proposed that individuals have three primary needs and six secondary needs (with some individual variance). The fulfilment (or lack) of these needs are expected to positively or negatively affect the adoption of mobile phones. They include: [1] the individual need to feel safe and secure (security); [2] the need for new experiences (adventure); [3] the need for independence and spontaneity (freedom); [4] the need to trade information and knowledge with others (exchange); [5] the need to organize and lead (power); [6] the need to expand horizons (expansion); [7] the need to accept yourself and be accepted by others (acceptance); [8] the need to socialize (community); and [9] the need to be seen, heard and felt (expression).

Previous studies of technology use and adoption, as well as studies specific to mobile services, have reported on the relative weight of each of these particular needs. Ling and Yttri (1999) argue that mobile phone adoption is related to three main motivational variables: [1] safety and security (i.e. calling for help in emergencies); [2] image (self-

presentation); and [3] esteem (personal expression). All of those variables correspond to Maslow's safety and esteem layers presented in section 3.4.2. Molina and Bouwman (2008) describe the importance of "security" as a psychological need. They argue that users' reluctance to use advanced services through their mobile phones means that providers must work harder to show the value/safety of such services (López, Molina and Bouwman, 2008). Tamminen, Oulasvirta, Toiskallio and Kankainen (2004) also highlight the importance of security in a study on the adoption of mobile phones.

Security is an interesting variable that would seemingly be explained by the shared information that accompanies Internet usage (including mobile), in addition to its natural advantages (accessible in case of emergency) and disadvantages (falling prey to hackers). One would never consider using mobile banking services without a clear satisfaction of security needs. However, this same security need, conditioned by the share-ability of the environment, will point any research of mobile services into exploring needs related to sociability, where social networks are exemplary.

Still, social networking cannot be reduced to "social needs". Sangwan (2005) has shown, in this respect, that functional needs, emotive needs, and contextual needs influence virtual community usage. However, research cannot ignore the importance of social variables. Ling (2000) reports that the main motivations for the adoption of mobile phones in adolescents are variables such as social networking and peer approval (relatedness needs). On the other hand, the main adult motivators for mobile phone use are family and security (safety and relatedness layers). Research has also identified the need for relatedness as significant for the use of mobile phones in Finland (Roos, 2000; Ryan and Deci, 2000).

Similar studies using Maslow's (1987) hierarchy of needs are abundant. Several of them deserve more attention. Gonsalves (2008) and Conley (2007) elaborated and adapted the hierarchy of needs with the aim of identifying how they would affect the adoption of online communities. They suggest that the five levels of Maslow's hierarchy can be used to understand consumer needs and, in turn, to identify a base set of expectations and needs for the adoption of this technology.

Krasnova, Hildebrand, Gunther, Kovrigin and Nowobilska (2008) employed their adapted version of Maslow's hierarchy to assess its relevance within the context of social networks. Their results suggested that the satisfaction of individual needs is an important determinant of user participation in online social networks. The uses of Maslow's hierarchy have most surely not been limited to online communities.

Pereira (2008) elaborated a hierarchy of needs based on Maslow's (1987) to explain the extent of usage of information and communication technology (ICT) applications in the everyday life of end users. Pereira concluded that ICT applications that addressed identified hierarchical needs are more likely to provide relative value and therefore experience faster adoption. Moreover, Cherubini, Oliveira, Hiltunen and Oliver (2011) also used Maslow's hierarchy of needs to identify human needs that support the adoption of contextual services. These contributions clearly show the empirical value of Maslow's hierarchy. It has repeatedly provided useful insight into the adoption of technologies. The current research has chosen to adapt them for the study of the adoption of mobile content based upon this history. Overall, the aforementioned studies agree and confirm Grosso's (2001) statement that the hierarchical needs theory can be useful in explaining why individuals may fulfil their needs in online communities.

In addition, the importance of human needs, and Maslow's hierarchy in particular, is by no means exclusive to Internet services or online communities. On the contrary, its findings extend to a range of user experiences with technology. Timo and Kallinen (2012) conducted, for example, a study focused on user experience with technology, which could include computers, mobile phones and "smart" technology in general, for example technologies with which the user must interact in order to achieve expected results. In their study, autonomy, competence and high self-esteem were all salient psychological elements of satisfying experiences (Timo and Kallinen, 2012). This study followed a division of experiences—satisfying or dissatisfying—with the purpose of identifying particular psychological needs depending on whether an experience was negative or positive. Furthermore, they based their study on Hazzenzahl (2008, 2010), who found that the majority of the satisfying experiences were not "social" (Hassenzahl, 2010, p. 357). These studies shed some light on how all psychological needs are not fulfilled all the time, even in an ideal experience. On the contrary, there may be experiences that trigger certain psychological needs, while at the same time neglecting others. This conclusion helps to spark debate with respect to the influence that technologies may have on human behaviour, such as helping or hindering individuality, sociability, etc. In terms of mobile content needs, there is no presumption in this respect. Of course, the results may also contribute to precisely this debate: sociability versus autonomy, more sharing versus more security. The research here does not aim at comparing negative and positive experiences, but instead wishes to focus on positive experiences, that is, experiences that actually motivate adoption.

Emotions such as active, strong, proud, alert, and determined correlated with the fulfilment of needs and perceived hedonic and pragmatic qualities of technological

products in the context of most satisfying experiences with technology (Hassenzahl, 2008). Furthermore, argues Hassenzahl, "competence was the most salient psychological need in positive user experiences, followed by autonomy and relatedness" (p. 358). Positive experiences, therefore, would seem to relate strongly with an individual sense of self, which means that users expect an experience to be both self-empowering and relatable with others' experiences.

The goal of creating products that generate empowering user experiences is most probably universal to business, and therefore important for this research. Marcus and Chen (2002), for instance, made a study for Samsung in which they linked mobile phone usage and consumers' needs. As one of the leading providers of mobile phone technologies, the company wanted to generate a suite of product ideas to be incorporated into specific products for the near future, with the objective of developing ever more useful personal mobile devices. Although using a different terminology for needs (usage spaces), their variables were seemingly in line with the well-known hierarchy mentioned above. Researchers identified the need for information (previously argued as a contextual need associated with physiological need), self-enhancement (self-actualization), relationships (relatedness) and entertainment (self-actualization) as motivational variables that affect not only the adoption of mobile phones but also each other (Marcus and Chen, 2002). Sarker and Wells (2003) also studied the motivations for mobile device usage and adoption from the perspective of the consumers' needs. Their study reports that social variables (relatedness) are instrumental in the use and adoption of handheld, hybrid mobile devices offering both voice and data features. Tamminen, Oulasvirta, Toiskallio and Kankainen (2004) also

found social variables to be influential in the adoption of mobile phones, next to privacy and security, and orientation and navigation.

By now, it should be no surprise that "[by] capitalizing on psychology, business and end-user empathy, continuous feedback cycles, and communication, organizations will have the power to strategically influence and drive customer behaviour" (Miller and Corrigan, 2011, p. 16). The current research intends to make a direct contribution in that regard. The psychological perspective on the user's experience, placed in the context of Maslow's hierarchy, results in a powerful tool for both future research and the development of products and services, including those at stake here: mobile content and services.

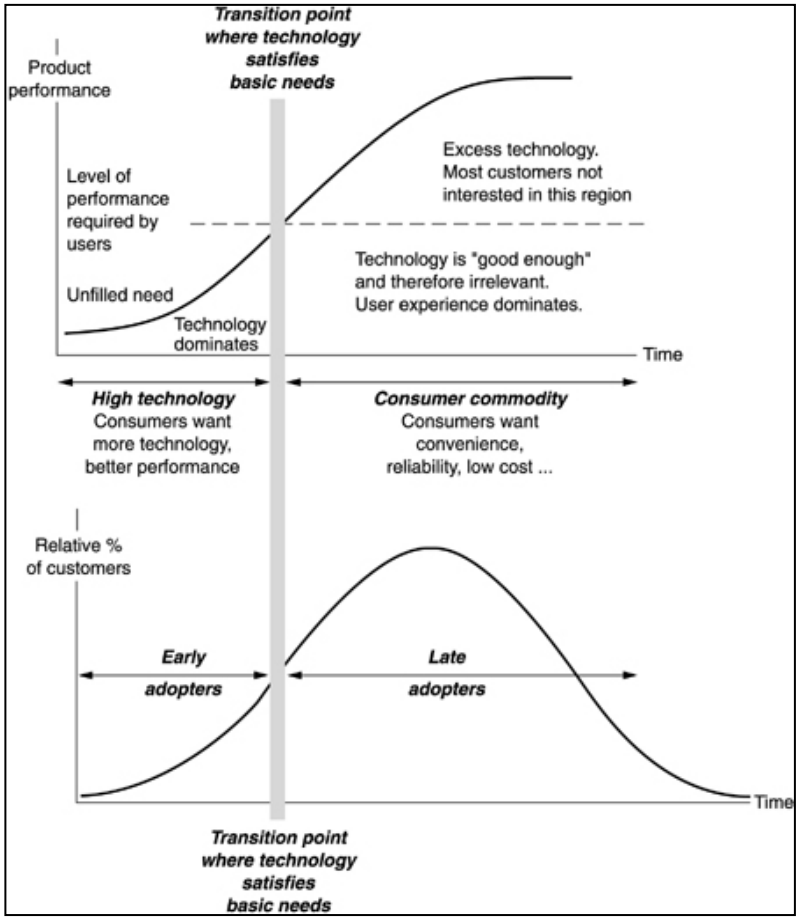
The overview of the literature explored in this section suggests that motivational human needs and Maslow's hierarchy of needs in particular influence the individual perception, use and adoption of innovations. Therefore, these needs can be expected to influence the perception of use and adoption of mobile content. Forthcoming sections will explore the links between motivational variables and the adoption of technological innovations. In addition, these links will support the choice of the independent variables selected for this research, as well as being used to describe the variables affecting the adoption of mobile content needs. This will be further explained in the section that follows.

3.5.2. Motivation, adopter categories and innovativeness

Motivation studies have a compelling association with adopter categories. An important contribution to this field of thought was made by Norman (1998), based on Christensen's (1997) work. Norman found that individuals adopt innovations in

different ways, according to the needs they seek to fulfil. For Innovators and Early Adopters, for example, when an innovation is released, they demand better technological functionality and more features. In this way, attributes such as price, inconvenience or inelegant appearance are not important issues for adopters, given their individual adopter characteristics. At later stages, however, the profiles of the buyers change dramatically. Early Majority, Late Majority and Laggards demand efficiency, pleasure and convenience attributes from the products and services they are prepared to purchase. In other words, in the beginning of the adoption cycle, customers' needs are different than the other stages of adoption, as shown in Figure 13 (Norman, 1998):

Figure 132: Changing needs within the adoption process and adopter's categories (after Norman, 1998)



As illustrated in Figure 13, Innovators and Early Adopters, who are the consumers at the initial phases of adoption of a product or service, perceive their needs in terms of increased technology and performance. Later consumers have their needs focused on convenience, reliability and low cost. In order for a product or service to be widely adopted, it should therefore possess both characteristics from the beginning of the adoption cycle or evolve to the point that delivers convenience, reliability and low cost to later consumers.

In respect of innovativeness, Huffman, Ratneshwar and Mick's (2000) research linked innovativeness and motivation by noting that most of the current innovativeness scales focus on hedonic purchase motivation. They examined four facets of consumer innovativeness, finding that innovativeness can be motivated by four types of variables: [1] functional (usefulness, handiness, compatibility, efficiency, comfort, ease, quality, reliability*)*; [2] hedonic (variation, pleasure, fun, fantasy, excitement, enjoyment, creativity, tension, experimentation, desire, stimulation, urge satisfaction, escape from routine, discovery); [3] social (status, standing, prestige, distinction, opinion leadership, manipulation, visibility, social reward, trendiness, symbolism, showing success, sense of belonging, image); and [4] cognitive (knowledge, information, intelligence, wisdom, eagerness to learn, logical thinking, insight and understanding, reason, brainpower, stimulation of the mind) variables. Their research demonstrates a clear link between individual innovativeness and the adoption of technological innovations. Huffman and his colleagues' study is used as a basis for the analysis performed in this research, which deepens the understanding of innovativeness on an individual level in the adoption of mobile content.

3.5.3. Motivational variables and mobile content needs

Building on the research discussed earlier in this chapter, this section maps the main variables identified as affecting the adoption of innovations and their relationship with Maslow's hierarchy of needs. It proposes, therefore, that human motivation influences the adoption of mobile content in five stages, each with a direct correspondence to Maslow's hierarchy of needs. The proposed Mobile Content Needs can be contextually related to Maslow's hierarchy of needs as follows:

1. **Functionality & utility**: Based on Sangwan's (2005) research that functional needs affect the adoption of online virtual communities, functionality and utility are proposed variables that relate to Maslow's physiological needs as they represent the most basic needs for mobile content adoption. While humans need food, air and shelter, among other things, to fulfil their most primary needs, it is suggested that users of mobile content's primary concerns are if the content is somehow useful and functional at a basic level in one or more aspects of their lives so that the content can be enjoyed on other levels (Huffman, Ratneshwar and Mick, 2000).
2. **Reliability & compatibility:** In the context of adoption of mobile content, reliability and compatibility provide assurance to potential mobile content users of safety and security and that, by adopting a specific mobile content, they will not be negatively affected in other aspects of their experience (Katz and Sugiyama, 2005). This relates to Maslow's safety needs (Huffman, Ratneshwar and Mick, 2000; Cherubini, Oliveira, Hiltunen and Oliver, 2010).
3. **Popularity & communication** are associated with Maslow's relatedness/belonging layer (Ling, 2000; Roos, 2000; Ryan and Deci,2000,

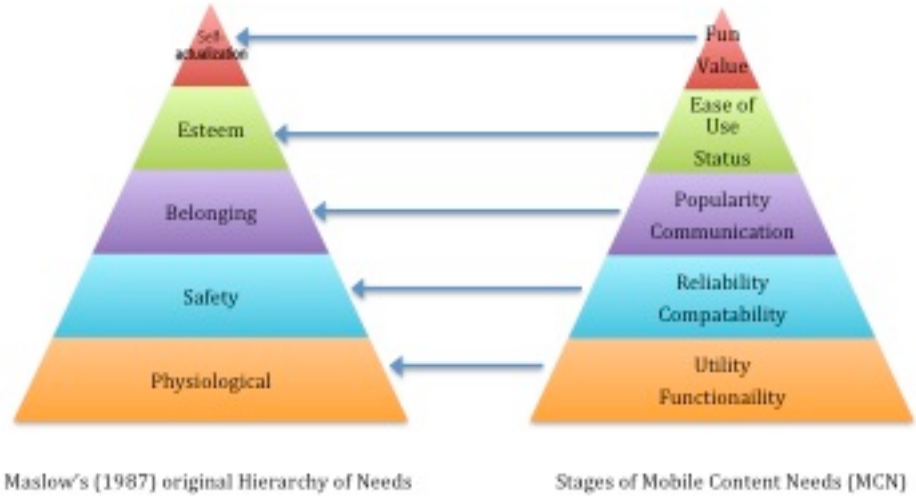
Huffman, Ratneshwar and Mick, 2000), as they refer to how importantly individuals perceive whether mobile content can facilitate interaction and contact with their peers, to help enhance social communications and community.

4. **Ease of use & status** can be related to Maslow's esteem needs, as ease of use can relate to self-perception of skills necessary to use a technology (Jenson, 2004; Jokela, 2004), and status is defined by Maslow himself as a need belonging to the esteem layer. Leung and Wei (2000), Blinkoff (2001) and Ozcan and Kocak (2003) also noted the influence of status in the adoption of mobile phones, supporting the decision to include status as a possible variable influencing the adoption of mobile content in this research.
5. **Value & fun** can be related to Maslow's self-actualization needs, including the desire to grow intellectually and emotionally, and provide aesthetic fulfilment and curiosity. Fun relates to emotional and aesthetical fulfilment, as well as curiosity. Value, on the other hand, can be associated with intellectual growth aspects of Maslow's self-actualization layer of needs (Cherubini, Oliveira, Hiltunen and Oliver, 2010; Huffman, Ratneshwar and Mick, 2000).

Figure 14: Stages of Mobile Content Needs (MCN) as related to Maslow's Hierarchy of Needs shows a representation of the direct correspondence between the five stages of Maslow's (1987) original Hierarchy of Needs and the five stages of adoption of mobile content. In each stage of adoption there are two mobile content needs. Similar to Maslow's Hierarchy of Needs, in the stages of mobile content needs the most basic of the

ten mobile user needs are represented at the bottom of the pyramid, and more complex needs on the top.

Figure 14: Stages of Mobile Content Needs (MCN) as related to Maslow's Hierarchy of Needs



Maslow (1987) argued that an individual's needs change with his or her circumstances and that there is variability in these needs across individuals. In this study, similar ideology is employed to examine the varying needs of mobile content users occupying different stages of the mobile content lifecycle, investigating how these needs change according to the individual's time of adoption.

Specifically, the ten variables (or Mobile Content Needs) are hypothesized in this research as potential influencers or modifiers of the adoption of mobile content, and are mapped into end users' ability to satisfy Maslow's hierarchy of contextual needs adapted for mobile content adoption. An elaborated statistical analysis and discussion of the results will be conducted in Chapter Five, to offer evidence as to whether or not the ten variables above influence the adoption of mobile content within each of the five categories of adopters.

3.6. Applying adopter groups research to business

This thesis brings together a comprehensive picture of diffusion research and adopter groups. The purpose is to offer an explanatory framework for the adoption of mobile services and content. In addition to its academic value, this research attempts to understand current business needs within the context and lessons of current, ongoing academic research. The role that adopter groups play for marketing purposes is important because they can be translated into consumer insights and marketing strategies. This section will focus on how adopter groups research has helped to narrow this gap. It will show how research on adopter groups plays, and can play in the future, an important role for businesses and marketers of mobile content and services.

Companies view adopter groups as market segments. The question, then, for high-tech companies is how to target these market segments appropriately. More pressingly, companies must learn how to target the Early Adopters in a way that will take advantage of their leading role within the adoption process. By leveraging the power of the Early Adopters, companies can gain insights on how to help their products spread to the rest of the adopter groups in a natural manner.

Understanding diffusion processes means understanding the motivations behind adopter groups and the dynamics through which adoption spreads across groups through time. Empirical literature has for its most part assumed that adoption variables remain constant throughout the diffusion process (Chiu, Fang and Tseng, 2010). The first issue noted by researchers is that there is a chasm between Early Adopters and the rest, especially when it comes to new technological products (Thierry, Striukova and Landau, 2009). This chasm results from the non-linear nature of technology adoption.

Thierry, Striukova and Landau (2009) researched innovation in the audio industry, where a phenomenon of both academic and business interest has taken place in the last decade. The industry's long-term market leader lost its ability to "cross the chasm"; it became unable to spread its innovative products beyond early adopters (p. 38).

Sony, despite being a leader in technology innovation, failed to understand and put into practice the dynamics of diffusion and the unique motivations that ruled over each adopter group (Thierry, Striukova and Landau, 2009). Understanding the theoretical aspects of diffusion processes is a great advantage. However, as this case shows, understanding the theory may not be enough, because "the diffusion of innovation does not solely depend on characteristics intrinsic to the innovation. There are other characteristics such as costs, communicability, divisibility, profitability and social approval that affect the distribution of innovation" (p. 40). Simply put, there are contextual variables that researchers must consider. These variables cannot be reduced to contingencies. On the contrary, their importance lies in the support they lend to businesses and individuals—support that encourages the diffusion of technologies. In terms of mobile content and services, this support may include things such as the existence of broadband technologies, the competitive/regulated environment of the telecommunications markets, and the level of education that predominates throughout a population. Adopter groups will be conditioned by these variables. Diffusion of technology will respond positively to a supportive environment. Still, this fact does not reduce the importance of clearly identifying adopter groups.

Understanding the motivations of adopter groups is essential because of the non-linear aspect of technology diffusion (Thierry, Striukova and Landau, 2009). In other words, the expected characteristics that rule over adopter groups must always undergo

empirical confirmation. This, however, should not undermine the valuable role that research based on adopter groups has had in providing the academy and business with a better understanding of technology adoption (Rogers, 2003; Revels, Tojib and Tsarenko, 2010; Wenger, White and Smith, 2010; Thierry, Striukova and Landau, 2009).

Understanding the dynamic behind adopter group intentions is then a second and perhaps an even more important aspect. Researchers suggest that it should be tested by working across different models (TRA, TPB, UTAUT, etc.) (Chiu, Fang and Tseng, 2010). Research based on adopter groups, such as that being carried out here, can then play a pivotal role for businesses by helping them delineate manners in which to implement the knowledge gained. But it is also important from an academic point of view, because by forcing a more practical approach it creates better standards for the scientific endeavour as such.

How has the knowledge gained from adopter group research helped businesses?

First, this knowledge has provided concrete guidance on the direction of marketing efforts. These efforts should be directed mainly toward the potential early adopters upon the first introduction of a product (Chiu, Fang and Tseng, 2010). Along these lines, managing the perception of early adopters is an important part of the marketing effort. This means taking advantage of their interest and their ability to see the convenience of new technologies, as well as of their roles as opinion leaders.

Marketing strategies, moreover, should not simply be deployed at once and for all groups. The importance of the early adopters lies precisely in the pivotal role that they can play for later adopters. Early adopters can bridge the aforementioned chasm. As the case of Sony showed, it is not only simply a matter of persuading early adopters to use

their products. It is also a matter of understanding the internal dynamics of this particular group of adopters. If they are opinion leaders, whose opinions display concerns regarding the product's diffusion to other groups, then such opinions must be taken seriously. Perhaps the biggest role of adopter groups, in this respect, is to show how a product changes and adapts, so as to be adopted later by larger majorities (Chiu, Fang and Tseng, 2010).

Overall, the research provides many lessons on adopter groups, but these lessons may vary depending on the particular technologies at stake. Studies on adopter groups have consistently shown that there are risks involved in being an early adopter. From a business-to-business (B2B) perspective, this risk manifests as the potential loss of an investment (Tehrani, 2005). If a company chooses to be an early adopter, it must do so with the certainty of having return on investment that will justify the risk. Research has also shown that being an early adopter, however, carries a positive social perception. Companies that adopt new technologies are viewed as innovative, as pushing boundaries, making savvy investments, etc., and these perceptions can have a big boost on a company's brand or image (Tehrani, 2005). In short, from a B2B or commercial point of view, early adoption is good for a company's bottom line (Tehrani, 2005). However, the logistics involved are never simple. The task must be put into practical business terms, because becoming an early adopter implies not only structural, but also attitudinal changes.

The current research aims to contribute to the discussion of early adoption within the business environment. The hope is to show that adopter group research continues to provide valuable lessons for marketing purposes. What past research has confirmed is that the continued usage of diffusion of technology research and its explanatory power

across technologies of all sorts serves as a great theoretical support for empirically based research, which focuses on a concrete set of technologies or technological products.

3.7. Uses and gratifications approach

Uses and gratifications theory has been applied in many different research fields, varying both the type of artefacts examined and the way the theory has been applied to the research subjects. Chua, Goh and Lee (2012) looked at the specific gratifications found in contributing to or retrieving content from social media service. They found that entertainment ("fun") was a major factor in content contribution, while retrieval often served informative uses. In a study of Twitter users, Chen (2011) found that long-term, regular users were satisfying a deep need for connectedness and camaraderie. Other researchers have investigated how mobile content, and particularly social media, might facilitate the process of identity creation and management (Dunne, Lawlor and Rowley, 2010). Young and de Abreu (2012) explored the dividing line between normal use and problem use, or "Internet addiction," attempting to show how uses and gratifications might spiral into a feedback loop. This section concentrates on two main areas of research. The first is how uses and gratifications theory has developed from its origins as an alternative to the effects-based media research to present day refinements. The second examines how uses and gratifications theory has been applied to study the adoption of technology, in particular mobile phones and services.

3.7.1. Research directions

Gratification theory has been studied as a motivational variable for media consumption since the origin of mass communication research (McQuail, 1983). It in turn derived

from media effects research (Katz, Gurevitch and Haas, 1973), which examined the mass media audience for motives and patterns of media selection in the consumption of media, such as newspaper articles (Berelson, 1949) and radio (Cantril and Allport, 1935; Herzog, 1940; Warner and Henry, 1948). However, these theories failed to associate the identified needs with gratifications fulfilled by them (Katz, Gurevitch and Haas, 1973). The state of gratification theory was therefore in question, with researchers struggling to introduce a functionalist paradigm (Palmgreen, Wenner and Rosengren, 1985). As a result, Blumler and Katz (1973) proposed a uses and gratifications approach, probably originating from a functionalist paradigm of the social sciences but strongly supported by the functional theory of communication, which explores the media's effects on the audience. The approach was also explored by Klapper (1963), who suggested that the media element used within the uses and gratifications approach should be more specific of which needs provide which particular gratifications and consequences for the individual.

Based on Klapper, subsequent research formalized the theory, studying how social and psychological needs affect mass communication media. Katz, Gurevitch and Haas (1973) viewed mass media as a means for individuals to connect (and disconnect) themselves with other individuals. In the attempt to codify the research field, Katz, Blumler and Gurevitch (1974) suggested that five particular elements are important assumptions for the uses and gratifications approach: [1] the audience is active and goal-orientated; [2] media choice is user initiated; [3] other sources of need satisfaction compete with media; [4] individual media users are able to identify motives and interests to be fulfilled by media; and [5] audience orientations should be explored on their own terms, without the influence of cultural significance. The study has been extensively critiqued;

Blumler (1979), for example, affirmed that uses and gratifications lacked an overlying theory, and that media research should be linked to social circumstances.

Further research then explored sub-classification of uses and gratifications elements, such as Cutler and Donowski (1980), who proposed that gratifications could be separated into two categories: content (particular medium messages) and process (usage of media itself) gratifications.

In 1981, Windhal suggested that uses and gratifications research and traditional media effects should be merged, emphasizing both the sender of the communication as well as the content itself. In the late 80s and early 90s, researchers focused on examining how needs and gratifications influence new technologies (Lin, 1993; Walker and Bellami, 1991; LaRose and Atkin, 1991; Palmgreen and Rayburn, 1987; Rubin and Rubin, 1985).

In the early 90s, contributions concerning the nature of the audience as passive or active were proposed (Rubin, 1993). Theoretical correlatives to the five-variable model of personality (Finn, 1997), indicating that personal individual variables are related to the use of media, formed the basis of Lin's (1999) study. This study connected human motivation (deficiency needs and self-actualization needs) with the uses and gratifications research. This thesis builds on Lin's prerogative that motivation and adoption of innovations are inter-related, and explores their relationship by identifying common elements from both research fields and arriving at some generalizations to aid in formulating a model to predict the adoption of innovation, as described in Chapter Four. McGuire's (1974) research also studied the audience's motivation, based on a general theory of human motivation and needs. McGuire distinguishes between two types of need, cognitive and affective, and structured sixteen general paradigms of

human motivation. This demonstrated the existence of a link between the two research fields – uses and gratifications and motivations.

Uses and gratifications research has been critiqued in the communications research literature. McQuail (1994) suggested that the uses and gratifications approach seems to work best when applied to specific types of media, where motivation is present. According to Ang (1985), this approach is limited in three further aspects: it is an individualistic approach, not taking into account the social context of media use; it pays little attention to media content, concentrating more on the reasons for the use of media, and less on the retrieval of actual output from the content; and lastly the approach views media as always functional to the audience. While this thesis is informed by use and gratifications research it seeks also to avoid such criticism by studying the adoption of media from an individual point of view, and focusing on a specific type of media content, namely mobile content.

3.7.2. Applications to adoption of technology

The uses and gratifications approach has gained substantial popularity in the study of the adoption of technological innovations. The reason behind its popularity is that the uses and gratifications research is "largely intended to identify the psychological needs that motivate the use of a particular medium to gratify those needs" (Huang, 2008, p. 407). In essence, not only does this theory allow a researcher to study innovation from the perspective of the individual, but, more importantly, it allows for the researcher to evaluate the importance of the medium. When used in combination with other approaches, as with this thesis, it allows for a better understanding to emerge of the relationship between medium and content.

Researchers have employed the uses and gratifications approach to study the adoption of technological innovations in many areas, such as bulletin, political and message boards (Rafaeli, 1986; Garramone, Harris and Anderson, 1986; James, Wotring and Forrest, 1995), e-commerce (Huang, 2008; Korgaonkar and Wolin, 1999; Stafford and Stafford, 2001; Stafford, Stafford and Schkade, 2004), the Internet (Flaherty, Pearce and Rubin,1998; Ferguson and Perse, 2000; Flanagin and Metzger, 2001), virtual communities (Heisler and Crabill, 2006; Wise, Hamman and Thorson,2006; Fernback, 2007) and, most recently, instant messaging (Mesch, Talmud and Quan-Haase, 2012) and e-books (Shin, 2010).

The uses and gratifications approach has, furthermore, gained popularity in studies related to the adoption of Internet technologies. It has proven to be an effective method for understanding the sociability variable, i.e., how people see the use of a new medium as a way to come in contact with others (Mesch, Talmud and Quan-Haase, 2012).

Its usage to study the adoption of mobile services, which is of particular interest in the context of this research, is equally extensive (Dimmick and Sikan, 1994; Leung and Wei, 1999, 2000; Graham, 2000; Hoflich and Rossler, 2001; Sherry, Kozinets, Storm, Du-Hachek, Nuttavuthisit and De Berry-Spence, 2001). More recently, Choi, Kim and McMillan (2009) applied the uses and gratifications approach to study the intention to adopt mobile TV.

Listening to music on mobile phones has become one of the most widely accepted uses of new technological advances. Lonsdale and North (2011) analysed four uses and gratification studies as they relate to listening to music. The findings support that much of music listening is done for the regulation or enhancement of mood. This broad use

crosses genders and age groups. These findings further support the widely accepted practice of listening to music on one's phone. As innovative technology, it speaks directly to the gratification derived from listening to music on any device.

As Albarran (2009) explains, the uses and gratifications approach has been widely used in the study of communications technology. Specifically, in the context of study the use of technology, it pertains to how the "audience (or consumer) is active in selecting information, entertainment, and technologies that satisfy basic wants or needs, also known as gratifications" (p. 96). A study conducted on 1,320 young (18-25 years old) Latinos analysed how they are using their phone and what particular gratifications they desire to obtain from the use of their mobile phone. The study found that although the demographic of the participants could be lumped into one category of Latinos, within each country, there were at times vast differences in the use and expected gratifications of mobile phone use. For this reason, it is prudent to understand at a greater level what drives use and perceived gratification.

Overall, these studies sought to identify gratifications: variables that users want or variables that motivate them to adopt web and mobile technologies. Such variables will be examined later in Chapter Five as contributors to a theoretical generalization of the complex dynamics of the adoption of mobile content.

Uses and gratifications theory focuses on medium rather than content, providing the researcher a distinct vantage point when it comes to mobile technologies. Given the immense variety of mobile content that is available to the user, the question of the medium is often dismissed too quickly. Such dismissal risks ignoring the weight of the medium, which is crucial when investigating motivations, because it raises questions

related to availability, convenience, and sociability, among others. The user-centric perspective of the uses and gratifications approach provides a theoretical framework for understanding the reasons that bring consumers to mediated online spaces where commerce transpires (Shin, 2010).

Along similar lines, ignoring the medium results in the false equivalency of content types, without attention to the specificities of the media involved (as if the purpose and experience of reading the news on paper should remain the same online) (Huang, 2008). It is for these two reasons that this research profited from uses and gratifications research and theory.

3.8. Mobile Content Needs

This section describes the 10 Mobile Content Needs that serve as the foundation for this study. In no particular order, they are: Innovativeness; Utility and functionality; Fun; Ease of use; Status; Popularity—subjective norm; Reliability; Communication—social influence; Value—relative advantage; and Compatibility.

The 10 MCN were arrived at after a deliberate process of examining the literature and extracting a corpus of influential variables related to adoption of innovation. The researcher examined 98 relevant articles to create the master list of potential variables for predicting the adoption of mobile content. Working from within this list, the next step was to highlight variables that occurred more often than others. Conceptually similar variables were grouped together and, when possible, collapsed into a single, inclusive term. Ultimately, the literature pointed toward 10 variables as being the most significant. The group was given a collective name—Mobile Content Needs—and then, in the course of the research, tested as to whether they had predictive power for the

adoption of mobile content within each of the categories of adopters in Brazil and Ireland.

The following table shows examples of studies in the areas explored in this research, in addition to studies that used mixed approaches and variables used in this research (MCN) that help predict the adoption of innovations.

Table 2: Research Contributions for MCN

MCN	References Adoption and U& G	Motivation references	Mixed studies references
Functionality	(Robey,1979)(Moore & Benbasat, 1991)(Adams, Nelson and Todd, 1992)(Igbaria & Davis, 1995)(Agarwal & Prasad, 1997;1998)(Algahtani & King, 1999)(Venkatesh & Davis, 2000)	(Herzberg, 1959) (McClelland, 1973) (Huffman, Ratneshwar, Mick, 2000)	(Cheong & Park, 2005) (Julius & Khasawneh, 2002) (Dickinger, Arami, & Meyer, 2006) (Julius & Khasawneh, 2002) (Choi and Haque, 2002) (Pagani, 2004)
Usefulness	(Davis, 1989)(Igbaria & Davis, 1995)(Hu, Chau, Sheng & Tam, 1999)(Chau & Hu, 2001)(Horton, Buck, Waterson & Clegg, 2001)	(Herzberg, 1959) (Huffman, Ratneshwar, Mick, 2000)	(Yu, Liu, & Yao, 2003) (Pedersen & Ling, 2002) (Cheong & Park, 2005) (Yang, Chatterjee, & Chen, 2004) (Dickinger, Arami, & Meyer, 2006) (Constantiou, Damsgaard and Knutsen, 2005)
Reliability	(Goodhue & Thompson, 1995)	(Herzberg, 1959) (Alderfer,1972) (Maslow, 1987) (Huffman, Ratneshwar, Mick, 2000)	(Yu, Liu, & Yao, 2003) (Pedersen & Ling, 2002) (Nysveen, Pedersen, & Thorbjørnsen, 2005) (Harris, Rettie, & Kwan, 2005) (Julius & Khasawneh, 2002) (Barnes & Huff, 2003) (Hung, Ku, & Chang, 2003) (Khalifa & Sammi, 2002) (Luarn & Lin, 2005) (Pedersen, 2005)

Compatibility	(Goodhue & Thompson, 1995)(Algahtani & King, 1999)(Chau & Hu, 2001)	(Huffman, Ratneshwar, Mick, 2000)	(Pedersen & Ling, 2002) (Cheong & Park, 2005) (Dickinger, Arami, & Meyer, 2006) (Knutsen, Constantiou, & Damsgaard, 2005) (Barnes & Huff, 2003) (Hung, Ku, & Chang, 2003) (Pagani, 2004) (Wu & Wang, 2005) (Yang K. , 2005) (Luarn & Lin, 2005)
Popularity	(McQuail, Blumler & Brown,1972)(Ajzen,1991)(Fishbein and Ajzen, 1975) Ajzen,1991)(Venkatesh & Davis, 2000)(Chau & Hu, 2001)	(McClelland, 1961) (Maslow, 1987) (Huffman, Ratneshwar, Mick, 2000)	(Harris, Rettie, & Kwan, 2005) (Julius & Khasawneh, 2002) (Haque, 2004)
Communication	(Venkatesh & Davis, 2000)(Venkatesh, Morris, Davis &Davis, 2003)	(Herzberg, 1959) (McClelland, 1961) (Alderfer,1972) (Huffman, Ratneshwar, Mick, 2000)	(Harris, Rettie, & Kwan, 2005) (Barnes & Huff, 2003) (Knutsen, Constantiou, & Damsgaard, 2005) (Pagani, 2004) (Khalifa & Sammi, 2002)
Status	(Kats, Gurevitch & Haas,1973)(Thompson, Higgins & Howell, 1991)(Algahtani & King, 1999)	(Huffman, Ratneshwar, Mick, 2000)	(Kim, Chan, & Gupta, 2005) (Harris, Rettie, & Kwan, 2005) (Julius & Khasawneh, 2002) (Haque, 2004) (Hung, Ku, & Chang, 2003) (Wu & Wang, 2005) (Wang, Lin, & Luarn, 2006) (Luarn & Lin, 2005)

Ease of Use	(Davis, 1989)(Ajzen,1991)(Compeau & Higgins, 1995)(Igbaria & Davis, 1995)(Goodhue & Thompson, 1995)(Agarwal & Prasad, 1997; 1998; 1999)(Algahtani & King, 1999)(Hu, Chau,Sheng& Tam, 1999)(Venkatesh ,2000)(Venkatesh & Davis, 2000)(Chau & Hu, 2001)(Horton, Buck, Waterson & Clegg, 2001)(Venkatesh,Morris, Davis &Davis, 2003)	(Murray ,1938) (Herzberg, 1959) (McClelland, 1961) (Alderfer,1972) (Maslow, 1987) (Huffman, Ratneshwar, Mick, 2000)	(Pedersen & Ling, 2002) (Nysveen, Pedersen, & Thorbjørnsen, 2005) (Harris, Rettie, & Kwan, 2005)
Value	(Kats, Gurevitch & Haas,1973)(Goodhue & Thompson, 1995)Agarwal & Prasad, 1997) (Venkatesh & Davis, 2000)	(Herzberg, 1959) (Alderfer,1972) (Maslow, 1987) (Huffman, Ratneshwar, Mick, 2000)	(Kim, Chan, & Gupta, 2005) (Barnes & Huff, 2003)
Fun	(McQuail, Blumler & Brown,1972)(Kats, Gurevitch & Haas,1973)(Agarwal & Prasad, 1998; 1999)(Algahtani & King, 1999)(Venkatesh ,2000)	(Murray ,1938) (Huffman, Ratneshwar, Mick, 2000)	(Nysveen, Pedersen, & Thorbjørnsen, 2005) (Kim, Chan, & Gupta, 2005) (Pedersen & Ling, 2002) (Dickinger, Arami, & Meyer, 2006)

From a utilitarian perspective, there are a series of motivations that must be identified to rationalize mobile technology adoption. Individuals expect a function to be fulfilled when they interact with a new technology (e.g., mobile banking must provide well-known banking services). In addition, technology should offer novel but unintimidating ways of doing things (e.g., social media file sharing). As such, Utility and functionality, Ease of use, and Value are the most clearly utilitarian motivations in this research. Their use in studies of mobile services and technologies adoption is widespread (Amirkhani, Hajialiasgari and Salehahmadi, 2011; Zarmpou, Saprikis, Markos and Vlachopoulou, 2012).

The opposite end of the spectrum concerns motivations that are not explained by functionality, that is, by a clearly definable utilitarian motive. This research considered three constructs that fall within this rubric: Fun, Status or popularity, and Communication—social influence. These constructs have been described in recent literature on the adoption of mobile services (Amirkhani, Hajialiasgari and Salehahmadi, 2011; Verkasalo, 2008).

Finally, one can argue that covering both of the aforementioned theoretical lenses may not provide enough focus to generate a clear picture of the situation. Consequently, this research profited by casting a wider net. Several recent studies on the adoption of mobile services and technologies helped to highlight the importance of Reliability, Innovativeness and Compatibility when considering an inclusive list of potential mobile content needs (Zarmpou, Saprikis, Markos and Vlachopoulou, 2012; López, Molina and Bouwman, 2008; Amirkhani, Hajialiasgari and Salehahmadi, 2011). The arguments in favour of these constructs relates to the interest they can provide for marketers. For providers of mobile services, reliability is an important marker, for it relates to the existence of a critical mass: i.e., knowing when a technology will be fully embraced, and, thus, when a push in the demand can be expected. Compatibility is also essential for marketers and for those studying consumer behaviour. The investment made or avoided in making technologies and software compatible can have long-lasting effects. Innovativeness, moreover, is a construct that often accompanies several of the theoretical models discussed in the following sections, where it is often deemed as a driver of behavioural intention (Zarmpou, Saprikis, Markos and Vlachopoulou, 2012).

It is, in addition, possible to argue that some variables have similar definitions and can be merged or mapped onto a corresponding variable. This further explains the

reasoning behind the selection of highly specific Mobile Content Needs. Detailed definitions of each MCN are provided below. These definitions make the case for how some MCN might be logically grouped under a single construct, should further research build a case for such a grouping. In Chapter Five, these will be considered as independent variables, which are tested statistically to determine their influence in the adoption of mobile content within each of the five categories of adopters.

Innovativeness

Innovativeness, which is the propensity for an individual to adopt a new tool or technique, has been flagged as an important variable in the adoption of technological innovations (Kuo and Yen, 2009; López, Molina and Bouwman, 2008; Sulaiman, Jaafar and Mohezar, 2007; Lu, Yao and Yu, 2005; Al-Qirim, 2005; Wymer and Regan, 2005; Lee, 2004; Thong, 1999; Thong and Yao, 1995). Innovativeness is therefore incorporated in this study as an independent variable. The reason behind the use of this variable is properly summarized by López, Molina and Bouwman: "Innovative people have a more positive perception of usefulness, and are more likely to start using advanced mobile services. This would suggest that firms that operate in the industry should segment their customers on the basis of personal innovativeness, and adapt the services to their specific needs" (2008, p. 363).

Utility and functionality

Perceived usefulness was developed as part of the Technology Acceptance Model (TAM) (Davis, 1989). It was defined as "the degree to which a person believes that using a particular system would enhance his or her job performance" (Davis, 1989, p. 320). More generally, and more to the point of this thesis, Utility and functionality can be

conceived as the degree to which a technology enables an individual to achieve a particular objective.

Previous studies have pointed out that, together with ease of use, perceived usefulness is an important influence in the adoption of innovations (Adams Nelson and Todd, 1992; Davis, Bagozzi and Warshaw, 1989; Goodwin, 1987; Hill, Smith and Mann, 1987; Amirkhani, Hajialiasgari and Salehahmadi, 2011; Verkasalo, 2008), as it affects the "attitudes" variable, described later in this chapter.

Perceived usefulness has been applied to a variety of studies in the technological context (Zhou, Lu and Wang, 2010). In fact, previous studies affirm that IT user acceptance is influenced to a large extent by perceived usefulness (Szajna, 1996; Karahanna and Straub, 1995), by virtue of being the highest correlated variable with system usage (Al-Gahtani and King, 1999; Thompson, Higgins and Howell, 1991). For instance, Igbaria, Iivari and Maragahh (1995), who used the TAM model and the perceived usefulness variables to study the adoption of personal computer, determined that perceived usefulness had a significant effect on system usage, which was confirmed by Ling and Wu (2004) in a similar study in Taiwan. In an individual context, it has been extensively used to predict adoption of IT-based services (Massey, Khatri and Montoya-Weiss, 2007; Yang and Padmanabhan, 2005). The variable has also been validated as a predictor of user acceptance in technological systems (Venkatesh, Morris, Davis and Davis, 2003; Alghatani, 2001; Karahanna and Straub, 1995). This thesis is informed by this previous literature and inspects the role of perceived usefulness in the adoption of mobile content. However, usefulness in this research is interpreted and measured as two complementary variables: Functionality—which refers to the features

available for the user through the innovation, and Utility—which refers to how these features can be applied in practice by the user.

Fun

The definition of "fun" has been adapted from early marketing studies which posit that intrinsically motivated "hedonistic" feeling plays an important role in the adoption decision (Hartman, Shim, Barber and O'Brien, 2006; Holbrook and Hirschman, 1982). In the uses and gratifications approach, McQuail, Blumler and Brown (1972) included "diversion" as one of the primary variables for media use. They defined diversion as an emotional release, or escape from routine and problems. In the technological context, the degree to which technology products entertain their consumers has been shown to have a strong influence in a consumer's decision to adopt them (Childers, Carr, Peck and Carson, 2001; Verkasalo, 2008; Zhou, 2011). Enjoyment is also considered an influence in the use of the World Wide Web (Moon and Kim, 2001; Atkinson and Kydd, 1997). Teo, Lim and Lai (1999) noted that individuals adopt technologies because their use is enjoyable, and that perceived enjoyment has a direct impact on Internet usage. In addition, Lee, Suh and Wang (2003) found that it is an influential variable in the adoption of Internet shopping, and Bruner and Kumar (2005) found that the adoption of handheld Internet devices is directly linked to a variable classed as fun. Based on these definitions of enjoyment and their role in the adoption of technology, this thesis examines whether fun (or enjoyment) has a direct impact on the adoption of mobile content.

Ease of Use

Defined as "the degree to which a person believes that using a particular system would be free of effort" (Davis, 1989, p. 320), the concept of ease of use derives from the TAM, and it was extensively borrowed by models such as the Theory of Planned Behaviour (TPB), which redefined the variable as "perceived behavioural control" or "the perceived ease or difficulty of performing the behaviour" (Ajzen, 1991, p. 188), and in the Diffusion of Innovations model, as "complexity", which is defined as "the degree to which an innovation is perceived as difficult to understand and use" (Rogers, 2003, p. 257).

Ease of use has been associated with a person's perception of the difficulty of using a new technology. It has been identified as an essential variable in the study of adoption of innovations (Davis, Bagozzi and Warshaw, 1989) and has been widely used as support in many surveys (Zarmpou, Saprikis, Markos and Vlachopoulou, 2012). Other researchers defined "ease of use" as "control beliefs", "effort expectancy" or "perceived ease of use" (Im, Kim and Han, 2008; Venkatesh, Morris, Davis and Davis, 2003; Chau and Hu, 2001; Horton, Buck, Waterson and Clegg, 2001; Venkatesh,2000; Venkatesh and Davis, 2000; Agarwal and Prasad, 1999; Algahtani and King, 1999; Hu, Chau, Sheng and Tam, 1999; Compeau and Higgins, 1995; Igbaria and Davis, 1995; Goodhue and Thompson, 1995). It has been considered a critical component in the adoption process (Amirkhani, Hajialiasgari and Salehahmadi, 2011; Polancic, Hericko and Rozman, 2010; White, Al-Gahtani and Hubona, 2007; Lin, Shih and Sher, 2007). A direct and positive effect on attitudes towards technological innovation has been attributed to ease of use (Van Slyke, Ilie, Lou and Stafford, 2007; Gentry and Calantone, 2002; Karahanna and Straub, 1999; Agarwal and Prasad, 1998). For the purpose of this thesis, the above

definitions are combined in the term Ease of use, which indicates the perceived effort from an individual to adopt mobile content.

Status

The concept of status derives from Rogers' definition of "Relative Advantage" (Moore and Benbasat, 1991) and his statement that "one of the most important motivations for almost any individual to adopt an innovation is the desire to gain social status" (Rogers 1983, p. 215). Applied to the context of information systems, Moore and Benbasat (1991) built upon Rogers' five variables that affect the adoption of innovations and generated eight variables that impact the adoption of IT innovations. They included a variable classed as "image" and defined as "the degree to which use of an innovation is perceived to enhance one's image or status in one's social system". The variable has been used in other important studies such as the Unified Theory of Acceptance and Use of Technology (UTAUT) (Venkatesh and Davis, 2000). The theory suggests that subjective norm (popularity) influences image where "important" members of an individual's social group believe he or she should accept new technology, thus correlating to that individual's acceptance.

Recent research has expanded on the idea of "image" by identifying two distinct classes of status: "hubristic" status and "prestige" status. In the context of information technology, prestige status is far more relevant, as this kind of status privileges traits such as pro-sociality, individuality, as well as unique skills and expertise—all fair descriptions of innovators (Cheng, Tracy and Henrich, 2010). A cultural study by Yoon, Hacker, Hewitt, Abrams and Cleary (2012) demonstrated that status has ripple effects on many other aspects of personality, including social wellbeing. Zillien and Hargittai

(2009) made a convincing case for how social status impacts a user's expectations of technology. Essentially, higher-status users tend to engage in "capital enhancing" activities more so than lower-status users. A Korean study (Park, Kim and Lee, 2010) further demonstrated the differences in consumption and adoption patterns of mobile content relative to individual characteristics, including social status.

Status is also present as a variable in the uses and gratifications approach, which is centred in the idea that people use media in order to meet needs and obtain gratification. Within this approach, Katz, Gurevitch and Haas' (1973) seminal work identified "status" as one of the 35 needs to be met by media within the so called "integrative needs" (Severin and Tankard, 1997). Katz and his colleagues' project was repeated and validated 20 years later in 1990 (Adoni, 1995; Katz, Hass, Weitz, Adoni, Gurevitz and Schiff, 2000). Status as a variable is also present in seminal work within the uses and gratifications approach where a category of needs for media is defined as "companionship" (Greenberg, 1974; Rubin, 1977, 1984; Palmgreen and Reyburn; 1979) and "social compensation" (Finn and Gorr, 1988). The uses and gratifications approach has been used to provide insights into the adoption of mass media, such as newspaper, radio, television and the Internet (Ruggiero, 2000). In this thesis, the role of Status is examined as a variable in the adoption of mobile content.

Popularity—Subjective norm

The subjective norm variable derives from the Theory of Reasoned Action (TRA) model, and it is included in both the TAM (Amirkhani, Hajialiasgari and Salehahmadi, 2011), TAM2 (Venkatesh and Davis, 2000) and the TPB models (White, Al-Gahtani and Hubona, 2007; Ajzen, 1991). It is defined as "a person's perception that most people who are

important to him/her think he/she should or should not perform the behaviour in question" (Fishbein and Ajzen, 1975, p. 32), but it also relates, in the context of mobile content adoption, to how many of the individual's peers also perform the same behaviour, which would ultimately indicate approval. "Popularity", as it is termed in this thesis, was also termed "Personal Relationships" or "Normative Beliefs" within Uses and Gratification research as well as adoption research, where it is recognized for its importance as an influence in the adoption of innovations (McQuail, Blumler and Brown, 1972; Chau and Hu, 2001).

Reliability

Previous research indicates that users who place a premium on reliability typically wait longer to adopt new technologies, preferring to wait until more data and feedback are available on the technology (Norman, 1998; Abrantes and Gouveia, 2011). In the Task-Technology Fit theory, Goodhue and Thompson (1995) postulated that system reliability is a significant predictor of individual performance towards a technological system. In a technological and individual context, reliability has previously been validated as a potential determinant of consumers' willingness to adopt technology-based services (Parasuraman, Zeithaml and Berry, 1988; Lee, Lee and Eastwood, 2003). This thesis examines reliability as a variable influencing the adoption of mobile content.

Communication—Social influence

Extending their original TAM model, Venkatesh and Davis (2000) included the variable "usage intentions in terms of social influence", among others, to better explain the adoption of innovations in the updated version of their model (TAM2). The model suggests that social influences have a direct influence on intention of use. The influence

of this variable had been suggested by previous research (Hartwick and Barki, 1994; Karahanna and Straub, 1999; Taylor and Todd, 1995) as well as in research using the UTAUT model (Zhou, Lu and Wang, 2010; Zhou, 2011). In addition, Lin, Shih and Sher (2007) posited that the variable plays an important role in technology acceptance, as did Wetzels (2007), who found a significant relationship between social influence and attitude towards use, and Verkasalo (2008), who asserted its influence on the adoption of online messaging. The communication variable is also present in the uses and gratifications approach. McQuail, Blumler and Brown (1972) included "social integrative needs" as one of the primary variables for media use in their seminal work, which they defined as the need for interaction with family and friends.

There appears to be a clear acceptance in the literature that social influence plays a role in the adoption of innovation. However, this thesis explores one aspect of social influence, specifically the ability of the user to maintain contact with his or her peers, which is termed "Communication".

Value—Relative advantage

Relative advantage is defined as "the degree to which an innovation is perceived as better than the idea it supersedes" (Rogers, 2003, p. 229). It has been identified as one of a few variables consistently related to adoption in meta-analyses, which combine several studies addressing this variable (Parthasarathy and Bhattacherjee, 1998; Plouffe, Vandenbosch and Hulland, 2001; Van Slyke, Ilie, Lou and Stafford, 2004a; Tornatzky and Klein, 1982). The variable was examined in practice through the Perceived Components of Innovation Model (Moore and Benbasat, 1991) and found to be a powerful predictor of adoption intention (Plouffe, Hulland and Vandenbosch,

2001). Relative advantage was examined in numerous seminal studies using the adoption of innovations and uses and gratifications approaches, which used similar terminology, such as "cognitive needs" (Katz, Gurevitch and Haas, 1973), and "relative advantage" (Van Slyke, Ilie, Lou and Stafford, 2007; Goodhue and Thompson, 1995). "Perceived value" has also been extensively researched in the marketing context. Chen and Dubinsky (2003) suggested again that this is a real variable influencing decisions to adopt a product or innovation.

The variable Value used in this thesis relates to "relative advantage" in the sense that it represents part of its meaning. Relative advantage can be redefined as: [1] the perceived value of an innovation; [2] perceived value of possible substitutes or competitors for the innovation; and [3] how much the difference between perceived values impacts the potential adopter. This research is focused not on one innovation in particular, but a type of innovation (mobile content); consequently the perceived value of a competitor or innovation substitute is not applicable.

Compatibility

In another of his seminal studies, *Diffusion of Innovations*, Rogers (1995) defined the characteristics that determine an innovation's rate of adoption and included the variable compatibility. He defined compatibility as the degree to which an innovation is perceived as being consistent with the existing values, past experiences, and needs of potential adopters.

Many studies used this variable to identify compatibility as an influential variable in the adoption of innovations in different subject fields. Examples include Goodhue and Thompson (1995), who explained the adoption of innovations using the definition of

compatibility, and Amirkhani, Hajialiasgari and Salehahmadi (2011), who used it to explain the adoption of mobile marketing. They proposed that individual behaviour can be explained by the degree of similarity between the characteristics of innovations and the individuals' activities. While testing the TAM model, Al-Gahtani and King (1999) examined a set of variables that included compatibility. They found it to be a significant predictor of adoption of innovations, using 329 final year university studies. In 2001, Chau and Hu performed a study comparing the TAM and TPB in Hong Kong and also found that compatibility was a significant predictor of innovation adoption. In the technological context, "compatibility" has been applied to study consumer adoption of technological innovations, as in Saaksjarvi (2003), who built a conceptual model based on knowledge and compatibility. Compatibility will be used as a variable to help predict the adoption of mobile content, as detailed in Chapter Five.

3.9. Summary

This thesis builds on findings from uses and gratifications research that demonstrate how psychological and behavioural variables can be combined to examine and predict innovation adoption. The end result is a combined-variable model that proposes to help predict adoption of mobile content. In addition, the uses and gratifications approach also suggests that individuals can use the same medium for different purposes (Roy, 2009). In this way, the same media content may meet different types of needs, according to different audiences' gratifications expectations. In this thesis, the gratifications sought by different individuals from the same media are further explored through the identification of the differences in the perception of needs in the adoption of mobile content between adoption groups (Chapter Five).

The literature review presented above has demonstrated that research on the adoption of innovations can be divided into four categories: [1] research seeking to find determinant variables from an individual (micro level) viewpoint; [2] explanatory research on the macro level (societal), seeking to find the determinants of adoption of innovation in this wider perspective; [3] consequences or effects of adoptions of innovations to the individuals (micro-level); and [4] consequences or effects of adoption of innovations at a macro-level.

This thesis aims to determine the variables influencing the adoption of mobile content within groups of adopter categories. In addition, this thesis inspects the adoption of innovations at a micro-level or individual point of view, later grouping individuals in macro-level groups, and performing another analysis based on data collected from individuals.

In summary, this chapter has been presented in four parts. The first part consisted of a critical overview of the seminal models of adoption and diffusion of innovation, and the theories regarding the cultural context in technology studies. Part two consisted of an exploration of the theoretical foundation of motivation and needs theory, which is another micro-level approach to technology adoption. This was followed by a discussion of uses and gratifications, demonstrating how this line of research has been frequently applied to technology adoption. The discussion of the ten variables influencing mobile content needs, presented as the concluding section, drew upon the findings of all the previously mentioned theoretical approaches.

This chapter, furthermore, adapted useful and relevant constructs from a variety of theoretical models in an apparently seamless fashion. In reality, there is on-going

debate surrounding the literature mentioned because it is also the interest of the researchers to find evidence that favours one model over another. Most papers cited tend to acknowledge the advantages of some or all models. For instance, López, Molina and Bouwman (2008) defend the use of the TRA and TBP when examining the adoption of mobile services given their accepted use in the adoption of Internet services. The challenges in understanding technology diffusion across adopter groups show that business can better employ the sharing and sociability aspects, which are characteristic of mobile Internet services, to boost the diffusion process (Maguire, 2011).

From another viewpoint, instrumentalist arguments are also a common justification for favouring one model rather than another. Along these lines, Van Slyke, Ilie, Lou and Stafford (2007) choose the TRA because they want to use "behavioural intention to use" as a dependent variable (p. 271). While instrumentalist purposes may justify the use of a particular model before audiences who already share their perspective on any specific model, it may certainly not be enough when dealing with problems that have not been widely researched.

Meta-analyses like Schepers and Wetzels (2007) appear also to assess the virtues of a single model. In particular, they argue in favour of the continued usage of the TAM because of its more consistent results throughout the literature. Lastly, authors like Hajialiasgari and Salehahmadi argue in favour of extracting variables that have been proven to be influential and developing a model based on them, rather than blindly sticking to one particular model (Amirkhani, Hajialiasgari and Salehahmadi, 2011). The proposed conceptual model combines technological variables and behavioural variables in the construction of a coherent image of technology adoption.

The way this thesis has unfolded, therefore, has taken into account the different forms of justification and tried to analyse the best approach to the adoption variables at hand, i.e., Mobile Content Needs. From the literature reviewed in this chapter and the debate briefly delineated above, one quickly sees that an either or disjunction comes through: approaches that focus on the individual or micro-level versus approaches that focus on the macro- or societal level. This either/or disjunction creates a gap, where approaches that use both micro- and macro-levels of analysis find a relevant place. This thesis aims to address this gap in the literature and studies the adoption of mobile content from an individual viewpoint and considers how analysis of the individual impacts on the macro-level group decisions (categories of adopters). Finally, this thesis seeks to gain a better understanding of the adoption of mobile content within Rogers' adopter groups by drawing on the most important and time-honoured work in these two areas, and also on motivational research, as discussed in section 3.4.

Through this process, this thesis identifies ten variables (MCN) derived from some of the most influential models in the adoption literature and analyses how these variables are present in each of the cited models. These concepts are further elaborated in Chapter Four, and analysed from a macro-level viewpoint in Chapter Five.

4. CHAPTER FOUR: METHODOLOGY

4.1. Introduction

This chapter describes the research process, design and methodology of this dissertation. The chapter is divided into three sections. The first section of this chapter discusses the aims of this study. The second section reports on the research methodology, explaining the research methods used and discussing sampling, instrumentation and choice of factors. The third section of this chapter presents the research design and describes in detail the steps taken throughout the research process.

4.2. Methodologies

Individuals are unique, with each person having a different composition of characteristics, both physical and psychological. For this reason, each individual has different needs, and therefore, they may use products, services and ideas in different ways. Individuals may be categorized according to these different characteristics. One way to group these different people, taking into account how prone they are to adopt new ideas or innovations, is through adopter categories, based on Rogers' categories of adopters (2005). This categorisation, despite not reflecting all the individual preferences of its members, groups individuals (or potential adopters of innovations) into five categories, with different approaches to consumption, and different patterns of behaviour.

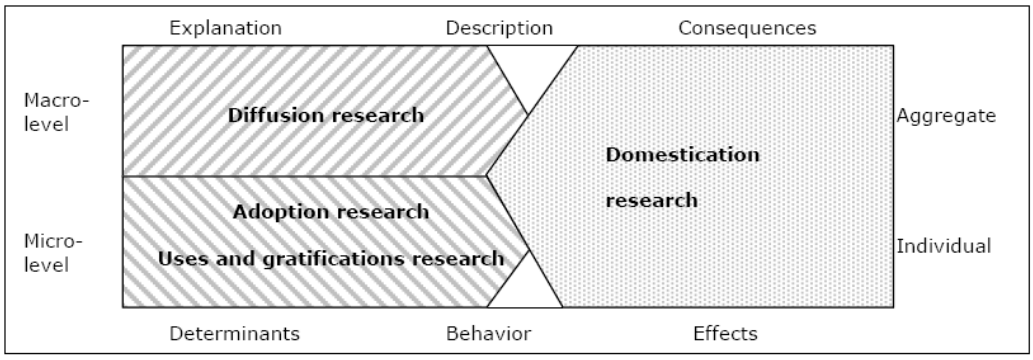
Using Rogers' categorization of adopters of innovation, one of the goals of this research is to identify differences between adopter groups in terms of their preferences and needs throughout the process of adoption of innovation, from the moment when the

innovation is first released until it is considered obsolete. The innovation discussed in this research relates to mobile content. The identification of these differences may be able to inform mobile content producers and marketers how to produce evolving mobile content that speaks to people's needs in each category of adopters. The second goal of this investigation is to understand if evidence exists that consumers' perceptions of Mobile Content Needs (MCN) can help predict the adoption of mobile content.

Pedersen and Ling (2002) modified classical adoption research to study mobile Internet service adoption. They conceptualised four research directions in the adoption of technologies relevant to the understanding of the adoption of mobile services. They first identified diffusion research, which aggregates technology diffusion or adoption in an industry, community or society in general. The second research direction they explored was adoption research, or the study of adoption and use of technology in a specific organization. Third, they identified uses and gratifications research, which studies the gratifications that adopters seek when adopting different kinds of media. Lastly, they described how domestication research studies the societal consequences of the technology when actually introduced into people's lives.

Figure 15 illustrates the scope of the technology adoption research directions identified by Pedersen and Ling (2002), which highlights the nuanced and intricate aspects of settling upon a particular methodology:

Figure 3: Research directions in mobile service adoption (Ling and Pederson, 2002)



More broadly, these research directions can each be categorised as either micro-level theories that examine individual adopters and specific innovations or products or macro-level theories that investigate institutions and systemic change initiatives. Furthermore, some lines of research, namely domestication research, blend aspects of micro-level and macro-level research.

This dissertation aims to explore the adoption of innovation from a micro or individual level and generate some tentative suppositions that can serve as foundation for more extensive research. It focuses on what each potential adopter expresses in terms of their needs to adopt an innovation and specifically, his or her need to adopt mobile content. The emphasis is on the determinants of adoption behaviour rather than the effects of the behaviour for the individual or society. As a second step, this research examines the similarities and differences between groups of adopters in the adoption of mobile content. In so doing, this research draws on both adoption research and uses and gratification theories, as described in detail earlier in Chapter Three. In addition, a statistical post-analysis of the micro-level results from adopter groups' perspective is performed, based on a diffusion of innovation framework.

Broadly speaking, the study of technology adoption may be described as determinist or instrumentalist (Ling and Pedersen, 2002). Deterministic studies regard technology as the primary agent of social change. In this framework, the process of technology adoption is seen as a series of revolutionary advances that are beyond human control. Consequently, the focus is on an innovation's technical characteristics. Successful adoption and diffusion is the assumed result of an innovation's technological capabilities. The innovation's developer is viewed as the primary change agent. In instrumentalist studies, the process is seen as evolutionary, and the causes of change are found in social conditions and in human aspirations for change and improvement. Thus in these studies, the focus rests on the user (i.e., adopter) of a technology and the technology's value as a tool to bring about desired change.

Human control over the innovation is a key issue, and it is considered essential to understand the social context in which it will be used and the function that it will serve. This research is mainly adopter based and instrumentalist, as it discusses the role of the adopter's perceived needs in the adoption of mobile content. It focuses on three interconnected strands: mobile phones and content, diffusion and adoption of innovation, and consumers' motivation and needs, investigating individual and group adoption of mobile content and the determining factors rather than the consequences.

4.3. Research philosophy

Research philosophies (paradigms) are accepted models or patterns that guide a research area or domain. They influence how research should be conducted, by whom and with what degree of involvement (Olivier, 2004). A research philosophy represents a way of looking at the world, interpreting what is seen and deciding which things are

genuine, valid and noteworthy (Rubin and Rubin, 2005). Worldview is defined as a basic set of beliefs that guide action (Guba, 1990), as well as the general orientation or nature of a research. According to Rubin and Rubin (2005), there are three core traditions of research worldviews: positivism (or post-positivism), social constructivism (or interpretivism) and critical realism. For the purposes of this dissertation, an explication of positivism and social constructivism/interpretivism is called for.

Positivism (or post-positivism) has historical roots in the physical sciences, such as chemistry, physics and astronomy. It is typified by quantitative research, and it is based on rigorous, systematic and repeatable data capturing methods. Positivism assumes that the identification and assessment of causes can clarify or explain real-world outcomes (Smith, 1983). In the positivist scientific method, research starts with theory, which is reduced into a small set of factors, hypotheses and research questions. Data relevant to the factors is collected, and then necessary revisions are performed.

Social constructivism/interpretivism has historical roots in the interpretive social sciences, such as anthropology and sociology. It is considered as qualitative research philosophy and does not rely on numerical or statistical analysis, but assumes that knowledge is gained through social constructions such as language, consciousness, shared meanings, documents, tools and other artefacts (Kein and Myers, 1999).

The objective of this research is to analyse how innovativeness and perceived Mobile Content Needs (MCN) influence the actual adoption of mobile phone content and the differences in motivations for acquiring mobile content among groups of potential adopters. Given that the research questions necessitate robust data-gathering procedures and sophisticated analyses, this research adopts a primarily quantitative

research paradigm. Nevertheless, certain limitations in the design prevent a complete generalization of the results; instead, the current research posits certain generalizations as possible kernels of deeper inquiry. In this sense, the current research seeks to refine a complex problem and identify the most fruitful avenues for future research.

A largely quantitative approach to the research questions promises a better understanding of the adoption of mobile content, taking into account personal and individual needs that may foster or hinder their adoption using robust statistical analysis. Mobile content adoption is indeed a multi-faceted problem, involving both people and technology, as well as the numerous relationships formed therein. A mixed methods approach, as explained by Johnson, Onwuegbuzie and Turner (2007), was originally considered as a paradigm for the current research. However, the volume of data collected, as well as the statistical analyses to which that data was put, clearly describes a quantitative/positivistic philosophy. The only aspect of the research that pushes the boundaries of the positivistic envelope is the sampling method; snowball sampling, and the rationale for its choice as this study's sampling method, will be discussed in detail in section 4.4.1.

A positivist approach is defined by its empirical nature and its evidence-based perspective on phenomena. From a methodological perspective, the approach followed by this thesis can be deemed positivistic based on three main characteristics: First, because it is interested in generating knowledge that can be communicated according to objective standards (Burnell and Morgan, 1980). The term 'objective', it must be noted, is not simply meant to highlight the lack of arbitrary or unexplained results. It is in particular used as a descriptor of clearly measured and measurable evidence. The use of empirical data in this research aims at establishing objectivity at the level of the

variables (independent and dependent), as well as at the level of the instruments used (the statistical tools chosen are not subject to interpretation). Second, this research stays within positivist territory given its commitment to instrumentality (Burnell and Morgan, 1980). The instrumentality of the knowledge advanced here has three concrete effects: 1) all knowledge gathered is subject to transformations according to proven tools of analysis, 2) all results can be replicated and remain consistent with other researches, which are conducted under equal conditions, and 3) it is meant to have practical purposes, that is, to be useful for those who have a vested interest in the scientific and practical consequences that derive from a better understanding of the motivational forces impacting the behaviour of potential adopters of mobile content. Third, this research is put forward under the 'positivist' assumption that asserts that knowledge is cumulative (Burnell and Morgan, 1980).

In summary, this research adopts a positivist approach towards the research problem. However, the sampling method does put limits on the generalizability of the results. Hence, the ultimate aim of the research will be to validate the results via a comparison with existing literature, as well as to show that another avenue for mobile content adoption research exists, name within-group research. The current research posits that much can be gained by looking at Rogers' adopter groups in isolation. In addition, the research will focus on two levels of analysis: individual levels and group levels of adoption and their determining factors. The research will take place within the context of three theoretical approaches: diffusion of innovations research (macro-level approach); uses and gratifications research (micro-level approach); and adoption research (also a micro-level approach). This research will develop general statements and reflect upon the extant literature as a litmus test of its potential validity.

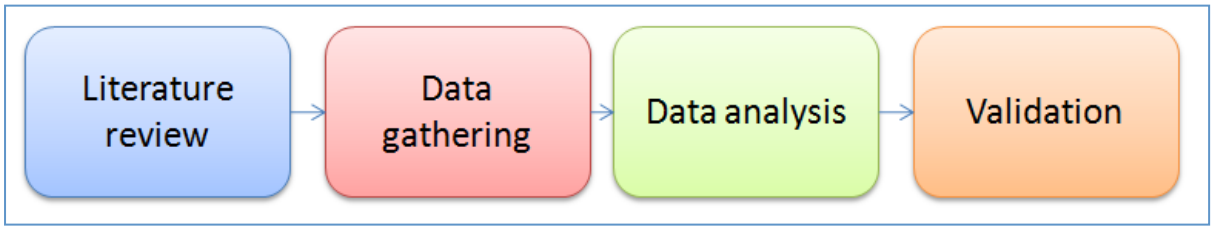
4.3.1. Research method

According to Pather and Remenyi (2004), quantitative research, by definition, delivers measurable results. Typical instruments include surveys with standard questionnaires, experiments and statistical analyses (Olivier, 2004). The research method adopted here was a survey-based method using a standard questionnaire format. According to Babbie (1990), surveys provide quantitative descriptions of attitudes and opinions of a population through the study of a sample. Babbie includes cross-sectional studies using questionnaires for data collection within this technique, with the intent of generalizing from a sample to a population. Since the research participants were studied at one point in time only, this research is cross-sectional. Surveys were conducted with groups being investigated. Because of the use of snowball sampling, the sample cannot be categorized as randomly selected or representative of the population. However, there are legitimate arguments for the use of snowball sampling, beyond mere convenience. This type of research is considered appropriate for developmental psychology, social science, education, among other areas (Creswell, 2009), which indicates that the method is appropriate for this research.

4.4. Research design

The research process had four main parts, with each part of the research used as input for the following part, as illustrated in Figure 16:

Figure 4: Research process



The first part involved a comprehensive literature review (Chapters Two and Three), which analysed the three most relevant research themes: the evolution of mobile phones and mobile content, innovativeness and adoption of innovations, and motivational needs and the relationship between needs, innovativeness and mobile content.

The literature review examined factors that have influenced human behaviour in terms of adoption of innovations. This research combined the factors studied in the literature into a table, and selected the ten most cited factors to become the initial factors used in this research—the ten Mobile Content Needs, or MCN. These factors were studied in terms of their power to predict the adoption of mobile content, in combination with measurements of innovativeness.

The literature review is followed by the research instrument design and data gathering process. Data gathering was divided into three phases: a pilot phase (January/2008 to May/2008), Questionnaire 1 (June/2008 to January/2009) and Questionnaire 2 (March/2009 to June/2009). Questionnaire 1 comprised subjects from both Brazil and Ireland, while Questionnaire 2 comprised subjects from Ireland. This geographic division is what will provide potential comparative insights between the two nations. Later, a combination of the samples will point toward similarities, or potential universalities within the adoption process. The specific choices of Brazil and Ireland was a case of serendipitous convenience. The researcher has strong networks in both of these nations, while the pronounced differences in these nations has the possibility of being highly informative in the final analysis.

The next phase of the research was the analysis of the data collected. All data collected was input into a statistical software package (SPSS version 17), where it was analysed so that the research questions can be answered with the highest possible precision and accuracy. Findings were then subjected to statistical analysis and validation, described later in this chapter.

4.4.1. Sampling

Snowball sampling refers to a process by which a first round of sampled individuals lead or 'refer' the researcher to additional members of the hidden population, which, in turn, could lead to further members, and so forth, creating a snowball effect. The strengths of snowball sampling have to do with cost efficiency, time saving and with allowing researchers to access the potential qualified respondents via the network of existing interpersonal relationships (Hsu, Wu, Cou-Chen and Chen, 2013; Lin and Sunb, 2009; Frank and Snijders, 1994). In the context of the current research, snowball sampling was selected partly for convenience and partly for its ability to access 'hidden' populations. Because there are countless mean for acquiring mobile phones and therefore mobile content, no single avenue for drawing out an adequate, complete sample population presented itself. This is especially the case considering that, ideally, that a cross-section representing all adopter groups was the desired outcome. The researcher's social and professional networks, however, would potentially include members of all Rogers' adopter groups; building out from this central point, it has been possible to arrive at a sizable number of subjects from each group who would otherwise be inaccessible.

In organizational studies, to begin with, one such study uses snowball sampling with the aim of evaluating management competencies, based on perception and industry needs. The researchers involved gather data from different sources, including surveys, interviews, and reviews, in order to arrive at statistically relevant samples (Jeou-Shyana, Hsu Hsuanc, Liu, Linb and Chang-Yene, 2011). Their research's objective, similar to the research developed here, is to provide the industry (managers, and educators, and researchers) with a prescriptive approach for best practices within the industry (Jeou-Shyana, Hsu Hsuanc, Liu, Linb and Chang-Yene, 2011). Furthermore, the authors present their findings as 'empirical findings' (Jeou-Shyana, Hsu Hsuanc, Liu, Linb and Chang-Yene, 2011, p. 1050). Given that the authors' purpose—identifying the relevant management competencies—snowballing sampling is especially useful, because it allows the authors to come in contact with more consumers willing to provide the necessary feedback—the needed data—without which their approach could not be evidence-based and, thus, positivistic.

Another interesting study uses snowballing sampling to gather data on the number of students engaged in university protests (Lomicky and Hogg, 2013). Relevant to the research undertaken here is that these authors are exclusively interested in the role of online communication channels as the originators of such engagement (Lomicky and Hogg, 2013). Again, they are faced with the advantages and the challenges of a population which is not easy to identify in its entirety, but which nonetheless doesn't hinder their empirical perspective on the impact of digital or online channels as preferred mediums for on and off campus protests. This study's objectives also included a somewhat prescriptive element couched within their conclusions: to understand whether the role of online communication channels (social media, blogs, and alumni

sites) was significant to engage students in protest and, if so, which one had a larger weight on the summoning process (Lomicky and Hogg, 2013).

In this study, in addition, frequency analysis and Chi-square tests were performed on the categorical data, as the most reliable way to discern significant differences among the variables to provide a better understanding of the data (Lomicky and Hogg, 2013). Such statistical tools will deliver reliable or trustworthy results only if the evidence gathered is taken as objective—which is, to repeat, one of the basic tenets of a positivist approach. It remains true that these authors warn against generalizing their findings, which may lack representativeness, but not objectivity, which is the element at stake when discussing whether snowball sampling adheres to a positivist perspective. The authors, hence, do state that their results stay in line with previously reported cases that had not used snowball sampling, which argues in favour of objectivity (Lomicky and Hogg, 2013).

The use of snowball sampling seems to be such a frequent approach in quantitative analysis that researchers argue snowball sampling needs further exploration. The conventional wisdom has always been that snowball sampling was only appropriate for use in qualitative analysis, but clearly that view has shifted (Kumar, 2011). Following that line of discussion, it is safe to say that to a certain extent, it is perhaps the interpretative aspects of snowball sampling that demand a stricter assessment.

The use of snowball sampling in the adoption literature, in particular in the adoption of online technologies, is frequent. Most recently, for instance, e-loyalty has been reported to be affected by variables like perceived ease of use and use (Hsu, Wu, Cou-Chen and Chen, 2013). Using the TAM model, these authors based their findings on data gathered

through snowball sampling, and which corresponded to the hard-to-find aspect, characteristic of the population at stake—frequent users of e-commerce platforms, which are an illustrative case of a hidden population. The reasons for this, they argue, have to do with the lack of trust in delivering what is viewed as sensitive information or information that may be used by marketers and which may prompt unsolicited contact (Hsu, Wu, Cou-Chen and Chen, 2013).

Moreover, a methodological study focusing on the use of snowball samples to analyse hard-to-reach social media populations reported snowball sampling as the growing method of choice across disciplines like Management and Organizational studies, Quantitative Marketing, and Information Technologies (Baltar, Fabiola, Brunet and Ignasi, 2012). This research highlighted, among others, the use of snowball sampling in research related to innovation studies, from which a few cases are worth mentioning, even if in passing: one study gathered data through snowball sampling to arrive at conclusions about the use and adoption of innovative learning systems (digitally based) (McEachron and Bach, 2012), while another study used the sampling method to evaluate the impact of different social networks in the creation of leisure-contact networks (Illenberger, Kowald, Axhausen and Nagel, 2010).

Overall, the use of snowball sampling seems to be a growing and acceptable trend within positivistic disciplines, where evidence-based approaches are fundamental to their findings and theories. The research that is developed here can, therefore, be seen as one such effort. Likewise, in the cases of the studies mentioned above, the use of snowball sampling conforms to a positivistic approach and stays in line with the positivist principles of quantitative analysis and objective measurement.

To summarise, snowball sampling was chosen as the sampling method of this research because of cost and practicality considerations. Secondarily, the target population of study is the owners of mobile phones who choose not to make use of mobile content, as well as the owners of mobile phones who do download and use mobile phone content. Identifying adopters within different levels in the adoption lifecycle is not a trivial task, and since snowball sampling is considered a good technique to access an ample cross-section of adopter, it was considered appropriate to use it within this research.

4.4.2. Sampling considerations

According to Babbie (2007) and Kennedy (1993), there are some important considerations in the design of sociological studies. Although this study is not strictly sociological, the basic principles can be generalized across disciplines. This study has carefully considered the following:

Population of study

The population of study includes individuals who own mobile phones in Brazil and Ireland. However, for the reasons mentioned above, the results of this research cannot be generalized for the population, and instead will serve as group case studies. Brazil was chosen as one of the research sites because the researcher responsible for this study is originally Brazilian and has many contacts in Brazil. Ireland was chosen as the second research site as it is where the researcher was physically allocated while doing this research, and so had access to many respondents.

Sampling stages

Sampling generally involves either a single or a multistage approach. In single-stage sampling, the researcher has access to names in the population and can sample the people directly. In a multistage (or clustering) procedure, the researcher first identifies clusters (groups or organizations), obtains names of individuals within those clusters, and then samples within them. In the case of this research, a single-stage sample was used, since no groups or organizations were involved.

Stratification

This research uses the approach of grouping the participants into subgroups or categories (adopters of mobile content) and analysing the impact of each subgroup on the outcome, as suggested by Creswell (2008). Stratification means that specific characteristics of individuals (i.e., both females and males) are represented in the sample and the sample reflects the true proportion in the population of individuals with certain characteristics (Fowler, 2002). This study did not involve stratification of the population before selecting the sample. This makes sense because the research results were not generalized. In addition, this is a high-cost procedure that, for budget reasons, was not used in this study.

Sample

For the pilot study, 8 respondents participated in the survey between January and May 2008. For questionnaire number one (June/2008 to January/2009), the sample size was 525 respondents. For the second questionnaire (March/2009 to June/2009), the sample size was 96 respondents. The total sample size is 621 respondents.

4.4.3. Survey design

This subsection discusses the variables in the study, distinguishing dependent and independent variables, as well as control variables, and continues with a description of the actual survey design. According to Bennett, Khangura, Brehaut, Graham, Moher, Potter and Grimshaw (2011), a survey method is often used to gather information from a subset of people, noted as the sample population from which generalisations are then drawn. As previously discussed, the sample population was gathered through snowball sampling, so generalisations will not be drawn for the general populous but rather will be drawn to facilitate greater understanding and direction regarding the research questions.

Research variables

The variables of this study can be seen in Table3:

Table 3: Research Variables

Variable Name	**Related questionnaire items**
Independent Variable: **Individual adoption of mobile content (Actual Use)**	Questions 6- 17
Dependent Variable: **Needs for mobile content (MCN)**	Questions 18 - 20
Dependent Variable **Individual level of innovativeness.**	Question 21

This research investigates if there is a significant relationship between Actual Use (i.e., adoption of mobile content), Mobile Content Needs (MCN) and Innovativeness within the context of mobile content adoption. In addition, it seeks to understand how the perceived needs for mobile content adoption differ between each of the categories of adopters (as defined by Rogers) in the two study countries. Ultimately, the results are intended to reveal how different categories of adopters respond to innovation, which will indirectly highlight the mobile content product life cycle.

The data collection method for this research is a survey design. Numerous advantages argued in favour of a survey design, including the economy of the design, rapid turnaround and flexibility in terms of survey administration (Babbie, 1990; Fowler, 2002); online and paper were used here, but in-person interviews, telephone and focus group were are also options with this design. In the context of the overall research methodology, surveys allow for the quantification of the subject perception into a numerical rating, which was necessary to quantify individual innovativeness, level of mobile content need fulfilment, and actual use. This quantification enabled the identification and classification of each individual within Rogers' categories of adopters.

Practicality was another motivation for selecting a survey design. Because they are relatively quick to prepare and deploy, surveys were perfectly suited to the time frame available for this research. Furthermore, the limited resources available to the typical doctoral candidate make self-administered surveys a highly economical choice. In terms of data evaluation, surveys make possible the coordination and analysis of relatively large samples, as well as the examination of multiple variables—a desirable attribute

within the current research. In addition, a well-conceived survey with standardized questions and minimal ambiguity leads to more precise measurements and less subjectivity (Babbie, 1990; Fowler, 2002). Lastly, a survey design lends itself well to the particular kind of tabulation and data analysis that will be conducted later in this research.

Additionally, Creswell (2008) explains survey instruments are often used in research to "describe the relationship among variables or compare groups" (p. 414). Due to the anticipated nature of perceived mobile content needs impacting the adoption rate of innovative mobile content, understanding the relationship between the two is essential to investigating the research questions. Furthermore, the nature of the study dictated that survey information could be gathered at one point in time, thereby negating the need for a longitudinal study and solidifying the study as cross-sectional.

This research used a mixed model (hybrid) mode survey type for the questionnaires, which is a combination of web-based, or Internet survey administered online (Sue and Ritter, 2007; Nesbary, 2000) and on paper (Fink, 2002). Both online and paper questionnaires were self-administered. The next section presents the advantages and disadvantages of each type of survey, explaining why both modes were used in this research.

Online surveys

For online questionnaires, the advantages include low cost, flexibility and time savings, since online questionnaires allow researchers to collect large volumes of data with lower cost including saving in printing cost, travel cost, phone, and venue. However, response rate does not guarantee quality, and it takes more time to prepare an online

survey than a paper one (Harris, 1997), because most of the times it is not necessary to consider dependencies between questions on paper ones, and it is necessary to consider usability of an online survey in a deeper level than on paper. The respondent of an online questionnaire should be given the feeling of how much of the survey is left for him/her to complete at each point.

Data accuracy of online questionnaires is also an advantage, since responses can be exported to spreadsheets and statistical programs automatically, which saves time and costs and prevents typing mistakes. Data can be automatically validated, leading to low data errors.

Online surveys also offer wider access to research populations. Online questionnaires can be useful in providing direct access to certain research populations without the need of any "cultural gatekeepers" who might restrict access to such groups (although Internet access is a requirement). They also enable greater potential access to small specific population sub-groups. They can be useful for contacting socially and physically isolated groups.

This type of survey also provides anonymity. An advantage of an anonymous survey which online surveys facilitate, are that the interviewer bias is reduced or eliminated (Harris, 1997). In addition, respondents are more likely to answer socially threatening or embarrassing questions.

Another advantage of online surveys includes respondent acceptability, since online questionnaires are quicker to complete compared with face-to face ones. In addition they can be completed at a time and place convenient to the respondent. They are often more popular than onsite surveys (Madge and O'Connor, 2002).

The online survey instrument used in the study was FeedbackFarm™, which is an online application, which allows users to create online surveys and gather customer, market or any type of feedback (FeedbackFarm). This web application was chosen following the testing of many online survey creators and servers including SurveyMonkey, SurveyGizmo and Zoomerang. The reasons for this were:

1. **Cost:** it is free to use for the size of questionnaire and number of respondents used;
2. **Reporting:** FeedbackFarm reported Likert Scale results in a proper and useful way for the research, which was not offered within the other web applications. FeedbackFarm associated a number (1-5) to each of the items of the questionnaire, according to the respondents' choice within the Likert Scale.
3. **Exporting:** It was possible to export the files to MS Excel (data was transformed and later exported to SPSS).

According to FeedbackFarm's terms and conditions of use, the collection of data for this research as well as the storage of associated data is permitted.

Paper surveys

Paper surveys were administered for both first and second surveys of the data gathering process. The advantages of these types of surveys include reduced cost, control over the pace in which the survey is answered and no interview-evaluation apprehension by the respondent, since it is a written survey (Sax, Shannon, Gilmartin and Bryant, 2004). Disadvantages include the control of the respondent over the survey: they may not return the completed survey on time; they may forget to send them or not

complete it. In these cases, their responses cannot be computed (Sax, Shannon, Gilmartin and Bryant, 2004). Because the surveys were self-administered, there was no one to explain ambiguities or to encourage respondents to complete the survey. For this reason, the survey was tested and re-tested so that it was easy to understand and had minimized ambiguities.

The surveys applied here are cross-sectional, with data collected at what can be considered a certain point in time (between 2008 and 2009). The surveys are generally used to investigate or establish a relationship between the dependent and independent variables of a research in a particular time (Trochim, 2006). Since the goal of this research is to inspect the relationship between the mobile content needs and adoption of mobile content at one point in time, the cross-sectional approach was the one chosen for this research.

4.4.4. Research Questions

According to Creswell (2009), researchers write either research questions or hypotheses. Research questions were chosen over hypotheses because this research aims to examine the relationship between the dependent and independent variables with unexpected results. It is therefore more appropriate to use research questions instead of hypotheses in this case. The aim of this research is to better understand one aspect of the adoption of mobile content innovations: the role of perceived needs.

Previous research (Rogers, 1995) has identified that each category of adopters (Innovators, Early Adopters, Early Majority, Late Majority, Laggards) has different profiles and different personal characteristics. This research examines if these differences between the categories of adopters go beyond personal characteristics. It

examines whether different groups of adopters are influenced by personal individual needs associated with the innovation. In the case of this research, the innovation being studied is mobile content—content that can be viewed, used and downloaded directly into one's mobile phone.

To identify if and how perceived mobile content needs influence the adoption of mobile content, the following research questions were developed:

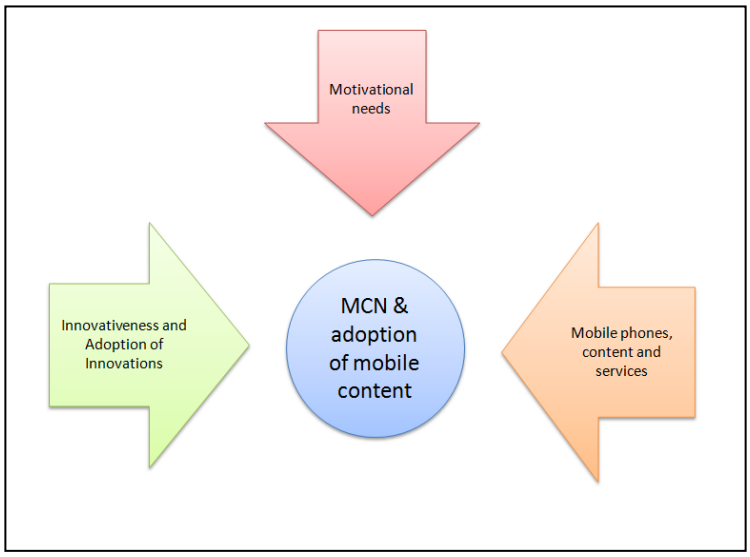
1. **What are the differences in the perception of needs for mobile content among different categories of adopters?** The aim of this research question is to identify whether and how each of the MCN is perceived differently by the five types of adopters at different stages of the adoption lifecycle.
2. **Can a theoretical framework incorporating user's innovativeness and needs to acquire mobile content (MCN) be used to predict mobile content adoption?** This research question seeks to understand if MCN and innovativeness contribute to the existing body of research in the field of innovation by helping predict the adoption of mobile content innovations, as well as to create a framework using these variables. This framework will ideally suggest further questions and areas of inquiry in an organic fashion.

4.4.5. Relating the literature to survey design

This subsection discusses how this research uses the literature reviewed to make an appropriate methodological choice, that is, a methodology that best addresses the research questions that are being raised here. The literature reviewed was divided into three research fields: mobile phone and mobile content, innovation adoption, and

innovativeness and motivational needs. The illustration below (Fig. 17) shows how the literature review relates to the research aims.

Figure 5: How research literature feeds methodology



The three fields of research are discussed in Chapters Two and Three of this dissertation. Chapter Two introduced the target innovation studied in this research and described not only its evolution but the enablers for the appearance of mobile content. Chapter Three discusses innovativeness, the adoption of innovations as well as motivational needs and their links with adoption research.

Chapter Two addressed the evolution of mobile content including music, TV and video, mobile games, mobile gambling, mobile personalization, mobile communities and user generated content and mobile portals. The aspects considered included: [1] user interface (Singh, 2003); [2] the mobile handset form (Jung, 2009); [3] mobile handset capacity (MacMillan, 2003); and [4] mobile handset battery life (Knoche and McCarthy, 2004). These relate to functionality.

The second research theme is the literature on innovation and innovativeness. Previous research has associated innovativeness (propensity to adopt new things) with adoption

of innovations (Frank, 2006; Yang, K, 2005; Yu, Liu and Yao, 2003; Hung, Ku and Chang, 2003). Two different types of measurements were used in this research: consumer innovativeness and domain specific innovativeness. The use of two measurements provides a more comprehensive and sophisticated view and understanding of the available theories of adoption of innovative products and services. This wider view will serve as a starting point for research in the field of adoption of innovations, along with presenting models and variables for adoption of innovation, which will be used to compose the MCN (mobile content needs) used in this research.

The third research theme is the research on motivational needs and its links with the adoption of these innovations. Chapter Three described the most frequently used content motivational theories, which serve as a basis for analysis of needs for the adoption of mobile content, the MCN, as explained earlier in this chapter. As was shown, the weight of motivational needs has grown rather than diminished as research has progressed. When it comes to the adoption of technologies, a series of studies, including Jenson (2004), Biljon, Kotze and Renaud (2008), and Marsden (2007), have continued to reaffirm the direct link between adoption and motivational needs. This point is properly taken in this thesis, where the theoretical approach has remained within these lines. By leaning upon the literature and following the dominant arguments, the research has resulted in the careful selection of the ten Mobile Content Needs (MCN) used here.

Table 4 presents the rationale for each subset of questionnaire items. Questions 1-10 establish all relevant demographic variables and so do not rely on the literature as such. Actual use is captured in questions 11-17; section 4.4.6, and more specifically Davis (1989) provided the basis for these items. Questionnaire items 18 and 19 address the

Mobile Content Needs. Table 5 in the current section illustrates the pertinent connections between the literature and the various factors. The Doman Specific Innovativeness (DSI) (Pagani, 2007) provides the rationale for items 20 and 21, as well as the work of Hurt, Joseph and Cook (1971). Pages 157-158 include a detailed discussion of DSI.

Table 4: Rationale for questionnaire items

Questionnaire Item	Comment
1–10	Demographics
11–17	Actual use: based on Davis (1989) - rationale for each item explained in section 4.4.6 , pages 153-155
18–19	Factors (MCN): based on literature, section 4.4.5, pages 148-149, table 5
20–21	Innovativeness scales: Pagani's (2007) Domain Specific Innovativeness (DSI) scale, page 157-158, and Hurt, Joseph and Cook, 1971

A number of factors could be considered within adoption research, which in turn can be associated with psychological motivational factors (Deci and Ryan, 2000; Jenson, 2004). The table below contains factors that were demonstrated to be correlated with innovativeness. The motivational factors associated with the adoption of mobile content were then identified to become the MCN studied in this research. Table 4 (below) defines the scope of this study, since not all are taken into consideration.

Table 5: Previous research linking MCN and Adoption of innovations

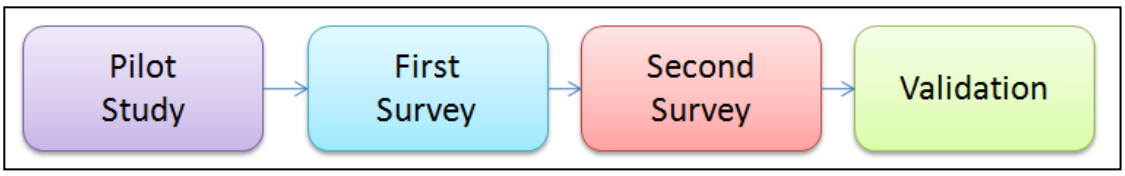
Factor(s)/ Variables	Researchers	Derived MCN
Contents and functions availability and quality	(Cheong and Park, 2005;Julius and Khasawneh, 2002;Dickinger, Arami, and Meyer, 2006;Julius and Khasawneh, 2002;Haque, 2004;Pagani, 2004)	**Functionality**
Usefulness, performance expectancies	(Yu, Liu, and Yao, 2003;Pedersen and Ling, 2002; Cheong and Park, 2005)(Yang, Chatterjee, and Chen, 2004; Dickinger, Arami, and Meyer, 2006; Knutsen, Constantiou, and Damsgaard, 2005)	**Usefulness**
Compatibility, prior experience, relevant past knowledge	(Cheong and Park, 2005;Knutsen, Constantiou, and Damsgaard, 2005;Barnes and Huff, 2003;Wu and Wang, 2005;Yang K. , 2005)	**Compatibility**
Trust, Risk, Security, perceived credibility, privacy issues associated with using a service	(Yu, Liu, and Yao, 2003;Julius and Khasawneh, 2002;Barnes and Huff, 2003;Wu and Wang, 2005;Wang, Lin, and Luarn, 2006;Luarn and Lin, 2005)	**Reliability**
Ease of use, complexity, effort expectancies	(Pedersen and Ling, 2002;Cheong and Park, 2005;Dickinger, Arami, and Meyer, 2006;Knutsen, Constantiou, and Damsgaard, 2005;Barnes and Huff, 2003;Hung, Ku, and Chang, 2003;Pagani, 2004;Wu and Wang, 2005;Yang K. , 2005;Luarn and Lin, 2005)	**Ease of use**
Subjective norm (peer influence, external influences, normative beliefs, others recommendations)	(Yu, Liu, and Yao, 2003;Pedersen and Ling, 2002;Nysveen, Pedersen, and Thorbjørnsen, 2005;Harris, Rettie, and Kwan, 2005;Julius and Khasawneh, 2002;Barnes and Huff, 2003;Hung, Ku, and Chang, 2003;Khalifa and Sammi, 2002;Luarn and Lin, 2005;Pedersen, 2005)	**Popularity**
Expressiveness, image, lifestyle enhancement	(Pedersen and Ling, 2002;Nysveen, Pedersen, and Thorbjørnsen, 2005;Harris, Rettie, and Kwan, 2005)	**Status**
Exposure to service through marketing	(Harris, Rettie, and Kwan, 2005;Barnes and Huff, 2003;Knutsen, Constantiou, and Damsgaard, 2005;Pagani, 2004;Khalifa and Sammi, 2002)	**Communicati on**
Relative advantage and perceived value	(Kim, Chan, and Gupta, 2005;Barnes and Huff, 2003)	**Value**
Enjoyment, playfulness	(Nysveen, Pedersen, and Thorbjørnsen, 2005;Kim, Chan, and Gupta, 2005;Pedersen and Ling, 2002;Dickinger, Arami, and Meyer, 2006)	**Fun**

As can be observed in Table 5, researchers have been exploring the adoption of technological innovations extensively, and they have identified a collection of motivational factors that influence the adoption of mobile entertainment content innovations. Chapter Three has shown how these motivational factors find a theoretical justification in the psychology of human needs. Maslow's hierarchy is probably the most reliable source in this respect (Krasnova, Hildebrand, Gunther, Kovrigin and Nowobilska, 2008; Oliver 2011). In the table above, one quickly notices that expectations and motivational factors all have a strong reliance on Maslow's efforts, and, again, this thesis has equally tried to profit in this respect. Overall, the literature gives a theoretical base that is tractable, empirically based and which has proven to be of great value for past and on-going research in the field. Lastly, the Mobile Content Needs chosen as dependent variables are not meant to contest the theoretical base related to motivational factors, but on the contrary support it, thus, joining the efforts of much of the literature previously mentioned. Furthermore, given the ever more rapid pace of technological change on the global scale, this research will shine a light on the question of what effects culture and demographics are still having on adoption of innovations.

4.4.6. Data collection

The data collection for this study was done in four phases, as shown in Figure 18, below. The underlying objective of the survey methodology is to provide self-reported data on the relationships between consumers and their mobile devices. As such, the survey questions seek to quantify and qualify, in broad strokes, the ways in which users in both studies countries actually use their mobile phones.

Figure 6: Research Data Gathering



The first version of the survey was a pilot study, tested to validate its ease of use and understanding of the questionnaire. It formed the basis of the two subsequent versions of the research survey (paper and online questionnaires), which were used in two different versions of the questionnaire (first and second surveys). The differences between the first and second is that the analysis and feedback from the first survey allowed improvements on the second survey, in which there were also included more recent measures of innovativeness and an improved question formulation. The second survey, with 96 respondents, used different measurement for influencing factors and new organization of needs. The four stages of data validation are described in detail below.

Pilot study

Before the actual data gathering for this study, a pilot version of the survey was designed, consisting of a set of potential questions surrounding mobile content usage. This preliminary study was conducted in the form of face-to-face interviews. The pilot study collected responses from 8 individuals. These served as inputs for the design of the first survey. The participants were asked to identify questions and items that were confusing or ambiguous, as well as to identify possible other problems they may have encountered in the questionnaire. Several problems were found at the pilot study. Since the researcher is not a native English speaker, some questions were not fully comprehensible to the respondents. This issue was addressed by reformulating the

questions and items. The language department at the third level institution where the research was conducted was contacted and they assisted on the re-design of the questions. The survey was quite long and lacked an appropriate structure. The issue was addressed by dividing the questionnaire into sections, which dealt with the different groups of questions addressed (innovativeness, adoption, needs). The questionnaire's appearance was considered "quite dull" by one of the respondents. The issue was addressed by applying an aesthetically pleasant format throughout the document, the use of colours and the inclusion of relevant illustration, as shown in the Appendix III.

First Survey

The first survey collected 525 responses from residents in Brazil and Ireland. The first survey comprised the bulk of total usable responses. Convenience and accessibility required that some surveys were completed online, while others were paper-based. The details and distribution are further examined in the Results chapter. The purpose of this survey was to unearth data relating to the main variables of the research, as follows:

1. **Level of innovativeness:** defined as the basic willingness to depart from existing technologies beyond the current state of art (Kimberly, 1981).
2. **Perceived mobile content needs (MCN):** measures created for this research that assessed individuals perception of how much they value each mobile content needs when adopting an innovation.
3. **Actual use**: a measure created for this survey that assesses individuals' attitude towards adoption of mobile content. More specifically, it measures how much an individual actually downloads and uses mobile content.

The following subsections briefly explain how these variables were computed from the questions contained in the questionnaire.

Innovativeness

Two different methods can be used to measure and classify individual's level of innovativeness within adopter categories:

1. **Basic statistics:** the sample of respondents is divided according to Rogers' (2005) statistical prediction of normal distribution of adopters. Measuring innovativeness using this technique requires that the 2.5% of respondents who rated higher on innovativeness are considered Innovators, which is followed by 13.5% Early Adopters, 34% of Late Adopters, 34% Early Majority and 16% Laggards.
2. **Hurt's innovativeness scale** (Hurt, Joseph and Cook, 1977): is a specific innovativeness scale that uses twenty questions which are marked by respondents whether they strongly disagree, disagree, are neutral, agree or strongly disagree. Hurt, Joseph and Cook calculate individual levels of innovativeness mathematically, so that respondents can be classified as follows:

    - **Innovators:** Scores above 80
    - **Early Adopters:** Scores between 69 and 80
    - **Early Majority:** Scores between 57 and 68
    - **Late Majority:** Scores between 46 and 56
    - **Laggards:** Scores below 46

    In this scale, individuals who score above 68 are considered highly innovative, and people who score below 64 are considered low in innovativeness. Chapter Five explains how these results are related to these scores.

Actual use

Actual use is measured in this study as shown in Table 6 below.

Table 6: Studies performed in this research

Question	Reason to include in Actual Use	Items
(6) **Number of items of equipment owned by the subject <u>other than mobile phone</u>**	It indicated how technology-oriented the individual is. The more of this type of equipment they own, the more the individual is involved in the "technology world", and the higher is his/her attitude level.	MP3
		Broadband
		Photo camera
		PC
		Laptop
		Play Station
		Electronic Book
		Other
(11) Number of functionalities of the subject's Mobile phone?	This question accesses the type of mobile phone the respondent has without asking him/her for the model. This approach makes it easier for us to analyse attitude towards mobile phones without a cross-reference to all available models of mobile phones in the market. The more features the respondent have available in his/her mobile, the higher his/her score for attitude.	Calls
		SMS
		Pictures
		Videos
		Wi-Fi
		Internet
		Bluetooth
		Infrared
		Polyphonic Audio

		MP3
		Radio
		Skype
		Email
(12) How many types of mobile content the subject downloads for free?	The larger the amount of free downloads of mobile content by the respondent, the higher the possibility he is innovative in terms of mobile content.	Music
		Video
		Games
		Content
		Peer Content
		Other
(13) How many types of mobile content has the subjects paid for downloading?	The larger the amount of paid downloads of mobile content by the respondent, the higher the possibility he is innovative in terms of mobile content.	Music
		Video
		Games
		Content
		Others
(14) How many types of audio use for mobile phone?	The more types of audio the respondent uses, the more innovative he/she is.	Ringtones
		Radio
		MP3
		Others
(15) How many types of video use for mobile phone?	The more types of video the respondent uses, the more innovative he/she is.	Photos
		MMS

		Presentations (slides)
		Video download
		Video streaming
		SWIS
		Telephony
		Broadcast
		Other
(16)Frequency of download of mobile content	The more often the respondent downloads mobile content, the more innovative he/she tends to be towards this service.	Music
		Video
		Games
		Personalized content
		Peer Content
(17) Frequency of USE of mobile content	The more often the respondent makes use mobile content, the more innovative he/she tends to be towards this service.	Music
		Video
		Games
		Personalized content
		Peer content

Table 5 illustrates how the Actual Use variable is calculated in this study. For each row answered positively by a respondent, one point was scored. In this way, actual use was measured as the sum of rows checked by each respondent. It is the contention of the researcher that these specific questions have a direct correlation with Actual Use.

Likert scales

Both surveys used Likert-type scales to access respondent's attitudes, behaviours and opinions. (Tullis and Albert, 2008) describe a typical item in a Likert scale as a statement to which the respondents rate their level of agreement, where respondents are able to rate statements as following:

0. Strongly agree
1. Disagree
2. Neither agree nor disagree
3. Agree
4. Strongly agree

The purpose of using Likert scales here is to add a level of granularity to certain survey questions, particularly those where a Yes/No type of response is not sensible.

In addition to data collection using a Likert scale, ordinal data analysis was used. According to Mahmud, Chohan, Afshan and Qamar-ul-Hoda (2011), ordinal data is often collected in social science research. Due to clusters of individuals as part of the data sample, the data collected is considered of a clustered nature (Baoyue, Lingsma, Steyerberg and Lesaffre, 2011). The snowball sampling method placed the individuals in clusters according to association. The data analysis looked for correlations among the

clusters, specifically among the categories of adopters as designated by Rogers and described previously.

Mobile content needs

Mobile Content Needs used modified Likert scales to measure how much respondents perceive that each of the mobile content needs impact on their decision to adopt a mobile content.

The mobile content needs proposed in this research are Functionality, Utility, Reliability, Compatibility, Ease of Use, Popularity, Communication, Status, Fun and Value, as previously described in this chapter. Each of the Mobile Content Needs was then calculated according to its respective scores given by respondents on the questionnaires. Respondents were asked to rate (0: not important at all; 1: not important; 2: neutral; 3: important; 4: very important) the importance that each of the MCN have in their process of adopting mobile content. The results were calculated based on these scores, and they are described in detail in the Results chapter.

Second survey

Following the completion of the first survey by the first set of respondents and identification of some of its shortcomings, a second questionnaire was developed and completed by 96 subjects residing in Ireland, Brazil data having been collected in the prior sample. Among the differences from the first questionnaire, it uses a more recent version of measurement of innovativeness, which is based on Pagani's (2007) Domain Specific Innovativeness (DSI) scale. The DSI scale is a six-item Likert scale where three items are positively worded and three are negatively worded. This scale is considered a

reliable and valid way to measure the extent to which a consumer is an Innovator (as per Rogers' categories) in a specific product field (Pagani, 2007; Goldsmith and Hofacker, 1991) and it measures innovativeness as a personality trait. Furthermore, if validity testing on both surveys returns similar results, then that is a mark in favour of overall validity.

The new DSI scale used in this research is integrated with psychological and cognitive indicators, which is classified as a vicarious innovativeness scale. Vicarious innovativeness is associated with exploratory purchase behaviour (Price and Ridgeway, 1983) and adoption attitude in the 3G mobile domain (Pagani, 2004). Pagani integrates the traditional DSI scale with these psychological and cognitive indicators related to the mobile domain (Goldsmith and Hofacker, 1991).

The scale was chosen because of a combination of factors. It is more recent than the one used in the first questionaire , and it was repeatedly validated (Pagani, 2007; Goldsmith and Hofacker, 1991; Goldsmith and Flynn, 1995; Goldsmith, Freidenand Eastman, 1995). Studies attest the psychometric validity of the original DSI scale, and illustrate its usefulness for theoretical consumer research (Goldsmith, 2001; Goldsmith, 2000; Goldsmith and Litvin, 1998)and applied marketing (Litvin, 1996), which are fields of analysis that inform this study. However, for the second survey (or questionnaire), since DSI cannot be directly associated to categories of adopters, Rogers' percentage-based classification will be used for this end, as described in detail in Chapter Five. Overall, it is believed that refining the tools of measurement for the second survey will provide for more discrete analysis, while not jeopardizing the results as a set.

Rationale for the Use of Ordinal Data rather than Standard Analysis

The use of ordinal data in contrast with standard analysis (representational in general) presents for researchers a series of challenges with regards to the use of statistical operations, as well as to the accurate methods that should be used for measuring particularised variables. These two challenges can also be understood from a simpler perspective as theoretical and pragmatic, respectively. In this thesis, ordinal data analysis was chosen to better tackle the theoretical issues as well as the practical issues at hand. Given that the purpose of this research is to deliver an assessment of operational statistics that is relevant for both marketers and researchers in the social sciences, careful consideration of these challenges was deemed necessary.

The theory behind the use of ordinal data posits that ordinal measurements are accurate in describing order, while presenting problems if used to describe relative size or degree of difference between items of measure. When referring to ordinal data, the numbers assigned to objects or events will represent the rank order (i.e. 1st, 2nd, 3rd, etc.) of the empirical units assessed. Common examples include both dichotomous and non-dichotomous ordinal data. For instance, variables such as 'young' vs. 'old' when measuring age, 'sick' vs. 'healthy' when measuring a person's health, 'guilty' vs. 'innocent' when making judgments on courts, 'wrong' vs. 'right' when measuring truth value, etc., represent dichotomous ordinal data. Non-dichotomous data can include multiple values, such as 'completely satisfied', 'mostly satisfied', 'mostly dissatisfied',

and 'completely dissatisfied', which are common measurements of opinion in consumer satisfaction analyses[1].

The focus of this thesis on the diffusion of innovation (mobile content) means that dealing with and comparing adopter groups is essential for its conclusions. In addition, being able to compare similar samples originating from different populations makes a similar demand on the data collected. Given this experimental input, ordinal data appears as the best choice for the analysis at hand. The description of the data as representational is not a specific demand that this thesis makes (see section 5.3.1) and, hence, there is no statistical transgression in this respect.

Ordinal data, though, is not free of problems; statistical operations chosen to analyse ordinal data must take into account both its relation to a phenomenon (empirical propriety) as well as its strict usage of such operations, by remaining faithful to statistical theory. As mentioned above, the empirical needs that the object of study of this research presents make ordinal data the ordering structure that appears most accurate for the data collected (see section 5.3.1 on this research's use of snowball sampling). This section deals, therefore, with the problems that ordinal data poses for many statistical operations.

Coughlan (2006) considers the problems of ordinal data, which he refers to as the 'social scientist's dilemma'. In brief, this dilemma arises from working almost exclusively with ordinal data rather than ratio or interval data, raising the risk of

[1] This basic information appears in virtually all university textbooks, for instance: Hair JF, Black WC, Babin BJ, Anderson RE, Tatham RL (2006) Multivariate Data Analysis 6th ed. Pearson Prentice Hall, New Jersey.

contravening the permissible transformations of data through statistical analysis (Coughlan, 2006; following Weisberg, 1984).

Acknowledging the existence of this dilemma, one must keep in mind, is not a universally accepted position within the literature. Accordingly, Gaito (1986) argues that operational issues must not be confused with measurement of variables, but should be dealt with separately, thus avoiding much of the controversy behind many analyses in the social sciences (Coughlan, 2006). This would mean that dealing with the first aspect (as mentioned above) would allow for the use of statistical operations in a straightforward manner.

Moving away from Gaito's position revisits the main controversy behind the use of ordinal data, which Coughlan summarizes as follows:

> Gardner (1950) notes that ordinal scales are inadequate because they do not permit the determination of the amount of growth of an individual on a particular trait, and they do not permit the comparison of differences in performance of individuals on a particular trait. Perrault and Young (1980) conclude that many of the data that are relevant in marketing research are below the interval level (Coughlan, 2006, p 147).

In the context of the current research, the most relevant feature of Coughlan's summarised argument concerns the comparison of similar traits in individuals belonging to different groups—the representational aspects of this controversy have been justified in Chapter Five. To overcome these problems, Coughlan advises a series

of direct and relatively simple solutions[2]. These solutions are briefly articulated below. Their order does not reflect a hierarchy, for Coughlan argues that all are equally valid.

First, researchers should straightforwardly treat ordinal data as if it were interval data, which he notes works well under most circumstances. In other words, this data treatment does not reach false conclusions, nor does it assume the presence of certain properties. This solution is supported, among others, by Rigdon and Ferguson (1991) and Atkinson (1988).

A second solution outlined by Coughlan is to seek proper numerical assignments for the ordinal categories through maximising or minimising some statistical criterion, which means taking the data collected and putting it through a series of transformations to simplify its structural properties. The transformation of ordinal data to a simplified structure, he argues, has a rich history in statistics (Velleman and Wilkinson, 1993).

Finally, his third solution suggests developing statistics that may be used with both ordinal and nominal data. This is a pragmatic approach, which is in line with the approach taken in this thesis. This means using the data in a way that allows for greater precision to be achieved through statistical operations and testing (Coughlan, 2006).

To conclude, the "social scientist's dilemma" is, at its core, an issue of proper representation on the one hand, but, most importantly for the argument developed here, an issue of adherence to a scientifically accurate use of statistics. In other words, it concerns the use of statistics without hypostatising the data merely to reach a particular

[2]The author also notes that to improve the quality of measurements, through scaling or through data collection is another solution. However, it is hardly worthwhile discussing as it poses insoluble practical problems (Coughlan, 2006, p 150).

set of conclusions that would validate or remain critical to any given hypothesis. The dilemma, as Coughlan calls it, is not an unsurpassable obstacle faced by researchers, but simply a reminder to slow down and proceed carefully. Along these lines, Coughlan shows that clear, and for the statistically versed, simple solutions have been devised without jeopardizing the quality of an analysis. To maintain an empirical spirit given these considerations, researchers must hope for the data to select them rather than the other way around. Coughlan's solutions are highly useful tools to achieve this outcome. In summary, the use of ordinal data in this thesis follows Coughlan's recommendations and ensures that statistical operations are valid transformations as well as accurate empirical tools.

4.5. Data analysis

This research used SPSS, which is a statistical computer program for testing the major inferential research questions in the study. SPSS is a software package used for conducting statistical analysis, manipulating data and generating output such as tables and graphs that summarizes the data. SPSS is used here to do all analysis from raw data to results including basic frequencies, cross tabs, multiple response, factor analysis, regression. Some of the reasons why SPSS was the chosen tool for data analysis are that it is the most commonly used statistical software program in social sciences, and it has been used since 1968, after being developed by Nie and Hull (Verlen, 2009). Also, in the case of this research, my host University has an SPSS license that can be shared with researchers). Also, SPSS results and output can be easily exportable from SPSS to MS Excel and MS Word, which makes it more flexible for presenting and discussing research results.

The statistical package was used to confirm and validate the results obtained. Chapter Six elaborates more on the statistical analysis. The following aspects were also considered for the data analysis:

1. **Demographics:** contains information about the sample size and demographic information about respondents.
2. **Response bias** (respondent/non-respondent check for response bias): Response bias will be checked through data validation. Response Bias is the effect of non-responses on survey estimates (Fowler, 2002).

Since this research involves a large number of variables and thus is rather complex, the steps of data collection, manipulation, analysis and interpretation were organized as follows: Data manipulation and analysis was divided into four steps: preparation, descriptive analysis, inferential analysis and interpretation. This structure is used as a baseline to explain how data was manipulated and analyzed in this research. In the preparation phase, data was collected through pre-survey interviews and two self-reported (combined online and paper surveys) surveys. The data was then inputted into SPSS. Further manipulation and formatting was necessary so that the results could be calculated in order to answer the research questions. In the next phase, descriptive analysis, the variables associated with this research are presented in detail: actual use, individual innovativeness, mobile content needs and categories of adopters of mobile content. This phase is followed by inferential analysis, which investigates the relationships between mobile content perceived needs and adoption (actual use) and innovativeness. The last phase explores the different needs across adopter's categories and interpreting the results.

Data analysis can be separated into four main phases:

1. **Preparation**: has the following steps:
    a. **Gather data**: from surveys one and two. In this phase I have compiled all data collected online through FeedbackFarm and SuveyGizmo websites for both questionnaires. I have also incorporated the data collected through paper questionnaires into a single file using MS Excel. I chose MS Excel because it is easy to import .xls file data into SPSS. I chose not to input data directly into SPSS because the data needed to be checked beforehand, and MS Excel is more appropriate for this task.
    b. **Prepare data input**: it was necessary to perform a certain amount of data manipulation such as merging of columns, calculation of scores, and removal of ambiguous and incomplete cases before data could be exported to SPSS.
    c. **Data input**: in order to input data into SPSS, variables must be created and described and data must be organized in a certain way. This step used the data prepared previously and input into SPSS.
    d. **Data formatting:** additional data manipulation was necessary such as creating new variables, calculating new indexes and scores, etc. so that it would be possible to work with the dataset within SPSS.
2. **Descriptive analysis**: presents the demographic profile of the participants. This calculated distribution measures attributes such as country of residence, age, gender for the respondents of the surveys
    a. Dependent Variable *(actual use):* This step describes how the variable "Actual Use" was calculated and describes the distribution/frequencies of

the dependent variable. Actual use, in the case of this research, determines how much use each individual make of mobile content.

b. **Independent Variables**: introduces and describes the distribution/frequencies of mobile content needs (MCN) throughout the respondent sets (Innovators, Early Adopters, Early Majority, Late Majority and Laggards) and describes the frequencies of the respondents' levels of innovativeness, which is measured in different ways. In addition, it explains how these variables were measured and the calculations done to obtain the final results.

3. **Inferential analysis**: this part of the data analysis process includes analysis of combined variables, and answers the research questions proposed below:

   a. **The importance of mobile content needs (MCN) across adopter categories:** This step seeks to identify how each category of adopter perceives mobile content needs in the process of adoption of mobile content. It seeks to address the research question *"What are the differences in the perception of needs for mobile content among the different categories of adopters?"*

   b. **MCN and innovativeness framework:** This step seeks to understand how MCN and individual innovativeness relate to and predict the adoption of mobile content. In addition, it proposes a framework to describe this relationship. It seeks to address the research question *"Can a theoretical framework incorporating user's innovativeness and needs to acquire mobile content to be used to predict mobile content adoption?"*

The statistical tests used in this research are explained in section 4.4.1. The analyses undertaken in this research are illustrated in Table 7:

Table 7: How research questions are answered

Research Question	Process	Sample	Statistical technique
"What are the differences in the perception of needs for mobile content among the different categories of adopters?"	Respondents are divided into 5 groups (Innovators, Early Adopters, Early Majority, Late Majority, Laggards) according to their level of innovativeness. The ratings of MCN are compared among groups to verify if categories rate MCN differently; and which group rates each MCN differently.	Samples 1 and 2 combined	Kruskal-Wallis to identify, for each MCN, if at least two groups rate each MCN differently and then Dunn's test, to identify, for each MCN, which two groups rated MCN differently
"Can a theoretical framework incorporating user's innovativeness and needs to acquire mobile content to be used to predict mobile content adoption?"	A regression model is used to generate a framework using the dependent variables innovativeness and MCN and dependent variable actual use. The result is a model that helps predict the adoption of mobile content. The presence of MCN in the model will indicate if motivational factors affect the adoption of mobile content.	Sample 1 and Sample 2, separately. The results of both regressions are then compared and discussed.	Spearman's test to verify co-relations between participant variables and then regression (using quasi-likelihood approach) to determine the model to predict adoption of mobile content (Actual Use)

The research questions are addressed as follows. For research question *"What are the differences in the perception of needs for mobile content among the different categories of*

adopters?", the responses obtained by the two samples of the two surveys (first and second) were combined. That was possible because the questions that deal with this research question are the same for both surveys. After all data was combined, it was divided into five groups, according to the respondents' individual scoring of actual use and innovativeness. The five groups in which respondents were classified were: Innovators, Early Adopters, Early Majority, Late Majority and Laggards. Each of these groups was then treated as an independent group, or independent sample.

Within each of the groups, respondents were asked to rate the importance that each of the mobile content needs have in their decision to adopt an innovation. Respondents rated each need from 1 (not important at all) to 5 (very important). Note that the data collected is considered non-parametric, or not fitting to normal curve. The responses were put together and the means of the ratings given to each mobile content need was calculated. In the results and discussion chapter (Chapter Five), the rating of importance for MCN given by each group of adopter is compared. The analysis indicates whether each of the groups rates each of MCN similarly or differently. The results obtained will contribute to a deeper understanding of the influence of perceived needs in the adoption of mobile content, as well as an understanding on how the perception of needs varies with time throughout the innovation lifecycle, according to each category of adopters.

For the research question *"Can a theoretical framework incorporating user's innovativeness and needs to acquire mobile content to be used to predict mobile content adoption?"* each sample (1 and 2) was studied separately, and the results were compared. A regression model with the variables (independent) MCN, innovativeness

and (dependent) actual use was made and analysed and a framework was proposed with the aim to deepen the understanding of motivational factors in the adoption of mobile content.

For research question 1, the variables (MCN) were analysed using Kruskal-Wallis' test with correction for ties (Sheskin, 2000) followed by Dunn's test for the pairs of groups with corrections for tied values (Siegel and Castellan, 1988).

Correction for ties was used in Dunn's and Kruskal-Wallis' test because many survey respondents rated each MCN with the same score (according to the Likert scale defined early in this chapter). These scores were repeated throughout the data collected. In statistics, they are considered ties. Because this occurred frequently in the database collected for this research, a correction for ties had to be applied for Dunn's and Kruskal-Wallis' tests, so that the results were valid.

Kruskal-Wallis' test determined, for each MCN, if there was at least one group that had a significant difference in the ratings of importance of MCN in the adoption of mobile content. Dunn's test, then, will be applied to the dataset, comparing the groups in pairs, to discover which of the groups have significantly different ratings between each other.

For research question 2, the aim was to identify if MCN and innovativeness are predictive factors for the adoption of mobile content. This research used the regression model of "quasi-likelihood" with function of variance $V(\mu) = \mu^2$ (Paula, 2010; Neter, Kutner, Nachtsheim and Wasserman, 1986) to inspect how these variables predict the adoption of mobile content, measured by the Actual Use index, explained earlier in this section. The results were calculated in three different ways: [1] using only data collected by questionnaire 1 (Sample 1); [2] using only data collected by questionnaire

2 (Sample 2); and [3] using responses collected for both questionnaires (Total Sample = Sample 1 + Sample2), the results are then further compared and only one framework is elected the output of this research.

The statistical tests chosen for this study as well as the results are discussed in detail the next subsection.

4.5.1. Methods and references

This subsection describes the statistical methods and references used in the results chapter of this dissertation (Chapter Five) to explain the statistical data analysis.

The first research question of this research uses Kruskal-Wallis' test (corrected for ties) to see if there are any significant differences across groups for any of the variables being study (MCN). The test is followed by Dunn test to identify which groups have significant differences for these specific variables (MCN).

Why Kruskal-Wallis?

There are many techniques that allow the comparison of groups in the case of ordinal variables. Sheskin (2000) suggests the use of at least two methodologies: Kruskal-Wallis test and Chi-squared/Fisher exact test Kruskal-Wallis test checks whether, in a set of k independent groups ($k \geq 2$), there is at least two samples representing populations with different medians. It is a test for ordinal data, being an extension of Mann-Whitney's U test. Data has also been pooled together for total sample analysis; the research question results section of Chapter Five (5.6.2.) includes a discussion of why this kind of data pooling is acceptable and warranted.

The median test for independent samples for nominal data assumes that there are k independent groups, and that inside of each group, each observation is categorized as "above the median" or "below the median". In the case of observations equal to the median, it is inserted a third category "equal to median". If there are few observations equal to the median, it is possible to leave them aside. The test has this name when the Chi-Squared test in $r \times c$ tables or Fisher exact test is applied to test the hypothesis that each one of the k groups have equal proportion of observations above and below the median (against the alternative there is at least two groups with different medians). With big samples, the median test for independent samples is computationally identical to the Chi-Squared test for tables $r \times c$ (when $k \geq 2$). In the case of small samples, the test is identical to Fisher's exact test (when $k = 2$).

Considering all aspects for each test, it is taken into consideration the good use of information to choose the most appropriate test to apply in this research. Because the Chi-Squared test treats variables in a nominal scale and Kruskal-Wallis treats variables in an ordinal scale, it is reasonable to make the current comparison using via Kruskal-Wallis with correction for ties (Sheskin, 2000) and then run Dunn's test for the pairs of groups (categories of adopters: Innovators, Early Adopters, Early Majority, Late Majority and Laggards) with corrections for tied values (Siegel and Castellan, 1988).

Therefore, in order to compare the groups ratings for the ten variables (MCN), the following tests were considered: Chi-Square test for homogeneity/ Fisher exact test (Sheskin, 2000), Kruskal-Wallis test with correction for ties (Sheskin, 2000) and Dunn's test with correction for ties (Noether and Dueker, 1991; Siegel and Castelan, 1988), described in detail later in the following section.

Data Analysis

The data were statistically analyzed using the Kruskal-Wallis (Kruskal and Wallis, 1952) test, which is the statistical method most appropriate for Likert-type scales analysis, because it is non-parametrical, appropriate for ordinal data and does not require a normal data distribution. Kruskal-Wallis' test is a non-parametric test for a difference in central location (median) between two or more independent samples. The requirements for this test to be valid are that there are two or more independent samples measured on an ordinal or continual scale and that samples have similar shape distributions, although distributions need not be normal. Both assumptions are true for the sample analyzed in this dissertation. Kruskal-Wallis' test statistic is calculated as following (Sheskin, 2000):

$$H = \frac{12}{N(N+1)}\left(\sum_{k=1}^{K}\frac{R_k^2}{n_k}\right) - 3(N+1)$$

Where Rk = sum of the posts of the sample k (k=1, ..., K) and nk is the size of the sample k and N=n1+...+ nK. However, because the data collected for this research had too many ties.

In the case of this research, ties occur as follows, for example, respondent A rated the MCN "functionality" as "neutral" or "2". Respondent B also rated the MCN "functionality" as "neutral" or "2". Therefore, there is a tie between the ratings of "functionality". Kruskal-Wallis' test (as well as Dunn's test) don't work well if the database has too many ties), as in the case of this research. For this reason, a correction for ties had to be applied for both Kruskal-Wallis' and Dunn's test, so that the results obtained are valid.

Kruskal-Wallis' test statistic was adjusted to account for excessive number of ties, proposed by (Sheskin, 2000). The factor for tie corrections, H, is, in a certain way, influenced when ties occur between two or more results. The correction increases H, as shown in the formula below.

$$H_{corr} = \frac{H}{1 - \frac{\Sigma T}{N^3 - N}}$$

Where T = t^3 - t (t is the number of tied observations in a group of tied results).

In this way, the tie correction results in a small increase in the value of KW statistics, which provides a more powerful test of the alternative hypothesis. Let C be the tie correction factor the KW one-way analysis of variance by ranks:

$$C = 1 - \frac{\sum_{i=1}^{s} (t_i^3 - t_i)}{N^3 - N}$$

Where: s = The number of sets of ties
t_i = The number of tied scores in the ith set of ties

The notation $\sum_{i=1}^{s}(t_i^3 - t_i)$ indicates that [1] for each set of ties, the number of ties in the set is subtracted from the cube of the number of ties in that set and [2] the sum of all the values computed in [1] is obtained. This correction for ties adjusts the KW statistics for the dataset used in this research.

In addition, a correction for ties in Dunn's test was also implemented here, so that it would be possible to compare the groups between themselves, taking into consideration the high number of ties in the database.

Dunn's test corrected for ties

The test proposed by Dunn is described in (Dunn, 1964). The test statistic D is the magnitude of difference in mean ranks of groups i and j:

$$D = | Ri - Rj | \qquad [1]$$

C is the critical value to reject the null hypothesis

$$\mathbf{C = z_{\frac{\alpha}{k(k-1)}} EP} \qquad [2]$$

C, $z_{\frac{\alpha}{k(k-1)}}$ represents the average of zero and deviation of 1 $N(\mu = 0, \sigma = 1)$) being $\frac{\alpha}{k(k+1)}$ the area to the left. Note that k is the total number of groups being compared, two by two and EP is the standard error:

$$\mathbf{EP} = \sqrt{\frac{\mathbf{N(N+1)}}{\mathbf{12}}\left(\frac{\mathbf{1}}{\mathbf{ni}} - \frac{\mathbf{1}}{\mathbf{nj}}\right)} \qquad [3]$$

With total sample size N, ni and nj the sizes of groups i and j, respectively. In case of tied points, the standard error of the test statistic should be corrected:

$$\mathbf{EPcorr} = \sqrt{\left(\frac{\mathbf{N(N+1)}}{\mathbf{12}} - \frac{\mathbf{\Sigma T}}{\mathbf{12(N-1)}}\right)\left(\frac{\mathbf{1}}{\mathbf{ni}} - \frac{\mathbf{1}}{\mathbf{nj}}\right)} \qquad [4]$$

Where $\mathbf{T = t^3 - t}$ [5]

Where t is the number of observations tied for a group tied to results. Observe that the indexes are being simplified here. The notation ΣT indicates that T varies, as following:

$$T_u = t_u^3 - t_u$$

Where tu is the number of tied observations of the group u of tied results, where ΣT is:

$$\sum T = \sum_{\forall u} T_u$$

The function implemented in SPSS software is based on Siegel (1988), and calculates the critical value using [2] and [3], considering no draws.

It is therefore necessary to correct the standard error of critical value to account for the draws. Note that, in order to do this, it is enough to multiply the critical value by $\frac{\mathbf{EPcorr}}{\mathbf{EP}}$.

Thus, considering the standard error of the statistic described in [4] and [5], and the new critical value will be:

$$\mathbf{Ccorr} = z_{\frac{\alpha}{k(k-1)}}\ \mathbf{EPcorr} = \mathbf{C}\ \frac{\mathbf{EPcorr}}{\mathbf{EP}} \qquad [6]$$

In this work, $\frac{\mathbf{EPcorr}}{\mathbf{EP}}$ is the correction factor of the critical value for Dunn's test, which allows the comparison of the groups in this research, despite of the excessive number of ties in the dataset. The null hypothesis is rejected when D>C (when the observed difference is bigger than the critical – or acceptable – difference).

Quasi-likelihood

For the regression the model of "quasi-likelihood" was used with function of variance $V(\mu) = \mu^2$ (Paula, 2010; Neter, Kutner, Nachtsheim and Wasserman, 1986).

The quasi-likelihood model was chosen to be used in this research because it is a non-parametric regression model , ideal for use in rank, score or measurement type of data

(from Non-Gaussian population), named non-parametric data. Non-parametric regression models are used to predict values from another measurement variable; in this case, Actual use (Motulsky, 1995). Within regression models, quasi-likelihood was chosen to be the model used in this research after a series of attempts with other regression models such as Poisson and binomial distribution. This model allows greater variability in the data than other statistical models. Quasi-likelihood methods are relatively computationally simpler for fitting data exhibiting over dispersion when compared to fully specified probability methods. They are faster and more robust, because they use more straightforward algorithms to fit generalized linear morels (Wedderburn, 1974). For these reasons, the quasi-likelihood model allowed the best fit for the data in this research, and for this reason, it was chosen to be used to answer research question two.

The quasi-likelihood models were proposed by Wedderburn (1974). They can be interpreted as a generalization of the GLM (Generalized Linear Models), because they assume a function of variance for the variable answer (Actual Use), as well as a functional relation between the mean and the parametric vector β ; however, they don't require the knowledge of distribution of the answer. However, the quasi-likelihood model extends the idea of the GLM to more general situations, including co-relational variables. The distribution of the variable answer (Actual Use) will be determined when the chosen variance function coincide with the variance function of a distribution of the exponential family. If Y is the random variable of interest, it is assumed that $E(Y) = \mu(\beta)$ and $Var(Y) = \sigma^2 V(\mu)$, where $V(\mu)$ is a function of the mean μ and σ^2 and the dispersion parameter.

In summary, to analyze the data collected and answer this research question, the following statistical techniques were used: firstly, the Kruskal-Wallis test was found to be the most appropriate test to be used to answer this research question, since it is appropriate for non-parametric data, as collected by the surveys in this research. The test compares the scorings for each MCN between the groups (categories of adopters). This test indicates for each MCN, if there is at least one group that scored that MCN significantly differently, indicating that one group perceives that need differently from the other groups. After identifying if the groups rated each MCN the same way or not, Dunn's test was applied for each MCN and between each two groups of categories of adopters, in order to identify which groups rated each MCN significantly differently from each other. Dunn's test then answers the research question by identifying which group perceived each mobile content need differently. This information can be used, for example, to inform businesses of how a mobile content may evolve to meet the needs of its customers as the mobile content evolves in the mobile content lifecycle.

In addition, as described in this section, both tests (Kruskal-Wallis' and Dunn's) were corrected for ties because the data collected contains a large number of ties, as explained in this section. The results chapter (Chapter Five) presents the results obtained from the analysis described here.

Validation of the Results

The results of this study were validated through statistical tests. Where psychometric techniques are involved, test validity is defined as "the degree to which evidence and theory support the interpretations of test scores" (American Educational Research

Association, Psychological Association & National Council on Measurement of Education, 1999).

4.6. Summary

The first part of this chapter provided a brief overview of the research methods used in this research and considered the worldview and research methodology adopted.

It was followed by a description of the methods and research design for this research, including sampling strategies, variables used and research questions in this study. It then describes the literature review process and the study phases that followed it such as data gathering, and the plans for data analysis and validation of results. The next chapters of this dissertation will discuss Data Analysis and Interpretation of Results, in Chapter Five, followed by Chapter Six (Conclusion).

The next chapter, therefore, discusses the results obtained in this research, also further highlighting the calculations used to obtain those results and the statistical techniques used in this dissertation.

5. CHAPTER FIVE: RESULTS AND DISCUSSION

5.1. Introduction

This chapter presents the research results addressing the research questions proposed in this dissertation. The first research question explores whether potential mobile content consumers have consistent needs throughout a mobile content adoption lifecycle or whether these needs change across categories of adopters. The second research question investigates if these needs have a significant impact on the adoption of mobile content (actual use) when associated with a measurement commonly related to the adoption of innovations: individual innovativeness. A framework then is proposed to describe this relationship, aiming to contribute to the body of knowledge in the prediction of the adoption of innovations, more specifically the adoption of mobile content. Because the research focuses on groups rather than the whole population, the results are not generalisable; however, by making comparisons to existing literature, as was shown in section 4.3.1, the relevance and validity of the results may be enhanced or diminished as the case may be. Generally, for the present research, the results conform well to the literature reviewed.

5.2. Research Questions

As discussed in Chapter Three (theoretical background), as soon as a new product/service is released in the market, it follows an adoption lifecycle that can be divided into five stages (Rogers, 1962). When an innovation is initially released, the first individuals to adopt the technology are named Innovators, corresponding to 2.5% of the population, who are associated with the first stage of the adoption lifecycle. In the

second stage of the adoption lifecycle, the next 13.5% of the population adopts the innovation. The adopters of the innovation at this second stage are called Early Adopters. The adopters of the third stage are named Early Majority, corresponding to the next 34% of the population. The adopters of the fourth stage are named Late Majority, and correspond to the next 34% of the population; and the adopters of the fifth stage of the innovation adoption lifecycle are named Laggards, corresponding to the last 16% of the population to adopt an innovation, before it becomes obsolete. Rogers (2005) has identified that each of these categories of adopters have different profiles and different personal characteristics.

This research tested whether the differences between the categories of adopters go beyond personal characteristics; whether they are influenced by individual needs (or perceived needs) associated with an innovation. In the case of this research, the innovation being studied is mobile content (or the content that can be viewed, used and downloaded directly into one's mobile phone). Therefore, this research proposed a set of ten perceived needs associated with mobile content as predictors of the adoption of mobile content, the MCN (Mobile Content Needs), based on the literature reviewed in Chapter Three.

The first aim of this research is to investigate if each of the categories of adopters has different perceived needs when considering adoption of mobile content. Thus, the research question addressed is:

What are the differences in the perception of needs for mobile content among the different categories of adopters? In essence, this research question seeks to explore whether and how each of the MCNs is perceived differently by the five categories of adopters.

As discussed in Chapter Three, an important variable in predicting the adoption of innovation is innovativeness—that is, the propensity of an individual to adopt new technologies. This research investigates if innovativeness is associated with mobile content needs (MCN), that is, if it influences the adoption of an innovation. It will then suggest a framework that describes this relationship. The second research question in this dissertation is therefore:

Can a theoretical framework, incorporating users' innovativeness and needs to acquire mobile content, be used to predict mobile content adoption? This research question seeks to understand if MCN and innovativeness contribute to the existing body of research in the field of innovation by predicting adoption of mobile content. The results will provide fertile ground for future research that can more rigorously investigate these potential relationships using truly representative samples rather than the adopter group categories presented here.

The importance of analysing the existing links between mobile content needs, individual innovativeness, and adoption of mobile content can be explained from the point of view of its possible impact on the industry. Both innovativeness and mobile content needs are characteristics which developers and marketers of the industry can understand and use to their advantage. Understanding consumers' needs is an essential aspect of product development and can result in better products for the consumer as well as larger profits—due to greater demand—for businesses within the industry. Innovativeness, too, can serve an equally constructive purpose. Given that adoption of innovation is a process that depends on individuals' interest and curiosity for new technologies, understanding its actual influence on adoption can greatly impact the way in which products are presented and marketed to opinion leaders as well as to the

general public. In order to answer this question in a scientifically sound manner, this research puts forward robust data and statistical analyses that presents new insights and contributions to the current literature in the field of innovation diffusion and adoption.

To approaches these interrelated questions, three variables must be measured for the samples collected:

1. A measurement of how much respondents use and download mobile content, which will be called Actual Use.
2. A measurement of how likely the respondents are to adopt mobile content, called Innovativeness.
3. A measurement of how important respondents perceive mobile content needs to be, when adopting mobile content, which is here called Mobile Content Needs (MCN).

These measurements (Actual Use, Innovativeness and MCN—Mobile Content Needs) will be used to identify the role of Mobile Content Needs in the process of adoption of innovations. Therefore, they will need to be calculated before the research questions proposed can be answered. Table 8 summarizes the analysis performed in this research:

Table 8: Research Studies

Study	**Aim and method/analysis**	**Use**	**Sample**
MCN	Calculate individual scorings for each MCN	To answer research questions 1 and 2	Samples 1 and 2
Individual Innovativeness (Hurt)	Calculate individual scorings for individual innovativeness and present frequencies	To answer research question 2	Sample 1
Individual	Calculate individual scorings for	To answer research	Sample 2

innovativeness (DSI)	innovativeness and present frequencies	question 2	
Actual use	Calculate individual scorings for adoption of mobile content and present frequencies	To answer research question 2	Samples 1 and 2
Research question: How does the perception of the MCN evolve throughout the mobile content lifecycle?	[1] Find out if different categories of adopters rate MCN differently (KW test corrected for ties) [2] Find out which category of adopters rate each of MCN differently (Dunn's test corrected for ties)	To find if MCN evolve throughout mobile content adoption and how.	Samples 1 and 2 together
Research question: Can a framework be developed to model MCN and innovativeness in the context of adoption of mobile content, providing a more accurate lens through which to examine mobile content adoption?	To understand if there is a significant predictive relationship between MCN, innovativeness and the adoption of innovations (Actual use).	To find out if MCN and innovativeness predict the adoption of mobile content, and how.	Samples 1 and 2 separately

5.2.1. Research Question One

What are the differences in the perception of needs for mobile content among the different categories of adopters? This question explores how differently each category of adopters perceives MCN to be in the process of adoption of innovations:

The mobile content needs investigated in this research were defined in this dissertation and used in the questionnaires by our respondents. Each of the mobile content needs is described below, along with the results obtained from the responses of the questionnaires associated with them. This research measures perceived importance of needs (rather than just needs) because it is very difficult to measure the actual importance of an attribute to an individual, as opposed to measuring how important the

individual perceives an attribute to be. In this case, the context of these measured attributes is mobile content. As previously explained, the mobile content needs addressed in this research are functionality, utility, compatibility, reliability, popularity, communication, status, image, value and fun, which are defined below:

1. **Functionality** is defined in this research as the ability of a mobile content to provide content, which is functional and useful for the user.
2. **Utility** is defined here by how much individuals perceive a specific mobile content can be useful for their lives in any aspect.
3. **Reliability** is defined as how trustworthy respondents perceive the mobile content to be.
4. **Compatibility** is the ability of a mobile content to be used with the respondent's mobile phone without any errors or difficulties.
5. **Popularity** is defined by how many of the respondents' contacts (friends, workmates, family, etc.) the respondents perceive to be using a specific mobile content.
6. **Communication** is the ability of a mobile content to enable or facilitate communication between content users. Examples of mobile content with high communication levels are instant messaging, applications, interactive games (played with more than one player), among others.
7. **Status** is the perceived image of an individual by his peers and society. Expensive owned objects increase the perception of status of an individual in a society, as well as work position, money, among others.
8. **Ease of use** is the user's perception of how easy respondents perceived to be downloading, store, open and make us of a mobile content is.

9. **Value** is the perception of the contribution a given mobile content can provide to an individual.
10. **Fun** is the level of entertainment and enjoyment that respondents perceive a mobile content will provide to them.

Each of the mobile content needs listed above was rated by respondents according to the Likert scale (0= not important, 4 =very important). Respondents were then grouped into five categories of adopters based on their Innovativeness scores (Innovators, Early Adopters, Early Majority, Late Majority and Laggards) and in keeping with Rogers' (2005) categories of adopters, as discussed in the previous chapter. This way, it will be possible to observe how each category of adopter rated the importance of each mobile content need.

The samples used comprised data collected for both the first and second questionnaire, ignoring missing responses. The needs associated with each category of adopters were calculated using responses collected in the self-reported questionnaire. The questionnaire considered both the importance perceived for each mobile content need and their relative importance between each other.

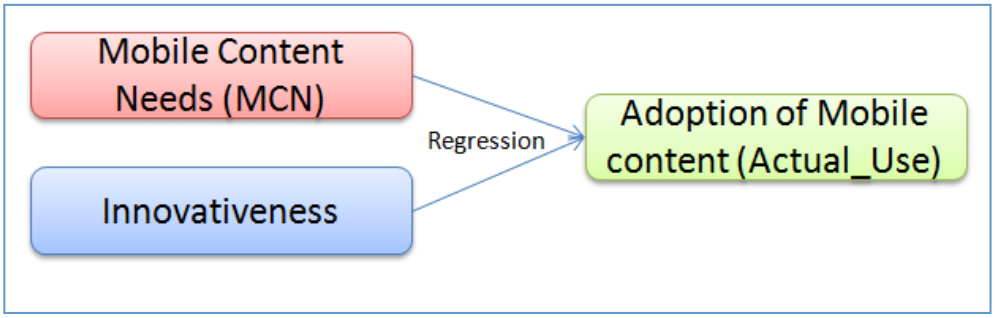
5.2.2. Research Question Two

The first research question explores the different needs consumers seek to fulfil when adopting mobile content. However, it is still undetermined if these needs have a significant impact on the actual adoption of mobile content. The second research question seeks to explore whether these needs help predict the adoption of mobile content associated with individual innovativeness. In addition, the research proposes a framework that describes this relationship. The second research question is: *Can a*

theoretical framework incorporating users' innovativeness and needs to acquire mobile content to be used to predict mobile content adoption?

This question can be illustrated by the schematic diagram below (Figure 19):

Figure 7: Research question 2: Relationship between MCN, innovativeness and Actual Use



In summary, research question two investigates if there is a significant predictive relationship between Mobile Content Needs (MCN), innovativeness and actual use.

5.3. Research Variables or Constructs

This research questions whether there is a significant predictive relationship between mobile content needs (MCN), innovativeness and actual use, as well as exploring the differences that each group of adopters have in their perception of mobile content needs (MCN). To answer the research questions, the following research variables or variables were used:

1. A measurement of how much respondents use and download mobile content: **Actual Use**.
2. A measurement of how innovative the respondent is towards mobile content, **Innovativeness**.
3. A measurement what respondents perceive their needs to be when adopting mobile content, **Mobile Content Needs** (MCN)

The next subsections describe the research variables and shows how they were calculated.

5.3.1. Actual Use

The Actual Use measurement indicates how much a subject downloads and makes use of mobile content and therefore the level of adoption of this innovation. A higher score corresponds to higher use and downloads of mobile content. The calculation of the index is explained later in this section. The answers collected here will be used for the classification of categories of adopters. Actual Use indices were calculated for each respondent for both questionnaire one and two together, as the questions are the same for both questionnaires.

Description of the sample in terms of actual use scorings and calculation

The Actual Use score was calculated based on the level of adoption of mobile content of each respondent. The more use and download a respondent makes of mobile content, the higher their score. The calculation of the actual use scores considered both use and download of mobile content. For downloads, mobile music and mobile video were examined. The sum of the scores for use and download equals the individual Actual Use score. The following aspects of adoption of mobile content were examined in this research to calculate mobile content Actual Use:

1. Frequency of mobile content use
    a. Mobile music use
    b. Mobile video use
2. Frequency of mobile content download

Results are described in detail below:

1. **Frequency of mobile content use**

To calculate the frequency of mobile content use, a table in the questionnaire was presented to the respondents so that they could indicate how often they use mobile content. For each category of content, for example music, video, games, etc. the respondents could choose their frequency of use. Points were associated with each frequency of use for each type of mobile content as following: never, 0 points; once a month, 1 point; once a week, 2 points; once a day, 3 points and more than once a day, 4 points.

The individual's score for this question is the sum of the points of each category of content for each respondent. This score is then added to the respondents' Actual Use score. The higher the respondents' mobile use frequency, the higher his/her Actual Use score is. Table 9 shows the distribution of scores for this question.

Table 9: Calculated mobile content download scores

	Frequency	**Valid Percent**	**Cumulative Percent**
0	325	58.1	58.0
1	70	12.5	70.6
2	62	11.1	81.7
3	40	7.1	88.8
4	19	3.4	92.2

5+	44	7.8	100
Total	560	100.0	

The table above presents the data collected for the scoring for frequencies of use of mobile content for our sample. Note that the majority of the respondents (58.1%) scored 0 points for this question. That means that the majority of the respondents do not use (frequency = never) any of the mobile content listed above. On the other hand, the respondents that do use these types of mobile content tend to use one or two types of it predominantly (since the percentage of the scores 1 and 2 points are 12.5% and 11.1%, respectively).

a. Mobile music use

The questionnaire also examined what types of mobile music were used by respondents. In this question, the respondents selected the types of audio used by them on their mobile phones, for example, ringtones, radio, mp3, etc. Interestingly, when it comes to the use of audio on mobile phones, most respondents (50.4% or 282) reported that they make use of one type of mobile audio only. 137 respondents (24.4%) declared that they don't use any type of audio content on their mobile phones. The remainder correspond to 16.2% (91 cases), 8.8% (49 cases) and 0.2% (1 case) of respondents that reported that they make use of two, three or four types of music on their mobile phones. For each type of mobile music used, the individual Actual Use index was added by 1. In this way, the more types of mobile music used by the respondents, the higher his/her Actual Use score.

b. Mobile video use

The same technique was used to calculate the level of mobile video use against the Actual Use scores of each respondent. Respondents received one point for each category of video used on the respondents' mobile phones, added to their Actual Use score. They could choose among the following categories: pictures, MMS, animated presentations, video download, video streaming, video telephony, broadcasting – mobile TV and Internet). The majority of respondents of this question (53.6% or 300 cases) make use of one type of mobile video only. 28.2% (n=158) subjects don't use video at all on their mobile phones. 13.7% (77 respondents) and 2.7% (15 respondents) make use of two or three types of mobile video, while 1.8% of the respondents (10 cases) make use of four or more types of mobile video.

2. Frequency of mobile content download

The next variable examined uses the same strategy as above. However, it doesn't examine the frequency of download, but frequency of use of each type of mobile content. They are different concepts because the former examines how often a respondent downloads content, and the latter how often he/she makes use of it. For example, one specific instance of mobile content can be downloaded once and used many times (high level of use and download) or, for example, downloaded once but never actually used (high download and low use). In the Actual Use score of this research, I have considered both cases.

55.2% (n=309) respondents claimed to never use any type of mobile content. Only 2% (or 10 respondents) scored from 10 to 20 points in this question, indicating that they make substantial use of mobile content. That means, for our sample, that few people (2% of the sample) use most of the mobile content consumed, while most respondents

use little or none of it. Table 10 summarizes the scores obtained by the respondents for mobile content use.

Table 10: Calculated mobile content use scores

	Frequency	**Valid Percent**	**Cumulative Percent**
0	309	55.2	55.2
1	54	9.6	64.8
2	46	8.2	73
3	43	7.6	80.6
4	33	5.9	86.5
5+	75	13.5	100
Total	560	100	

Calculation of Actual Use score

The individual Actual Use score is a consolidation of the individual scorings of individual frequency of use and download of mobile content, plus the points attributed to the types of mobile music and video used by each respondent. A table summarizing the scores calculated is shown below (Table 11: Consolidated Actual Use scores). It describes how much the respondents make use or download of mobile content.

Table 11: Consolidated Actual Use scores

	Frequency	**Valid Percent**	**Cumulative Percent**

0	82	14.6%	14.6%
1	18	3.2%	17.9%
2	24	4.3%	22.1%
3	29	5.2%	27.3%
4	31	5.5%	32.9%
5	43	7.7%	40.5%
6	52	9.3%	49.8%
7	53	9.5%	59.3%
8	50	8.9%	68.2%
9	48	8.6%	76.8%
10	45	8.0%	84.8%
11	41	7.3%	92.1%
12	29	5.2%	97.3%
13+	15	2.7%	100.0%

As described by Table 11, a large number of respondents (14.6%, n=82) claim not to make use of or download mobile content (Actual Use score = 0).

In summary, this section described how the questions were used to calculate individual Actual Use score, which is the representation of how much an individual makes use of mobile content in their life. In this way, this research observed that few people download or use mobile content. The values calculated here will be used as an input to answer the second research question of this dissertation.

5.3.2. Innovativeness

This research examines whether mobile content needs and innovativeness scores help predict the adoption of innovations. This subsection presents the results achieved for the calculation of individual scores for innovativeness and how the results were calculated. The final scores of innovativeness will be used as an input to answer the research questions of this dissertation.

In this study, innovativeness measures how prone an individual is to adopt, purchase or download mobile content. Innovativeness was measured, aiming to classify individuals according to their level of innovativeness and then place them within Rogers' adopter categories (1993).

This section analyses the frequency of responses of the measurements of innovativeness for the questionnaires. It also maps the distribution of frequencies of the measurements so that it reflects the most used model of classification of adopters of innovations (Rogers, 1993).

The innovativeness scores were calculated differently for questionnaire 1 and questionnaire 2. The reasons for that include the following:

1. To check if the results were the same if the measurements of innovativeness is different for two different datasets. Similar results may indicate that any of the two innovativeness measures can be used with no impact on the final result/model. Different results may indicate that differences in the assessment of innovativeness may impact on the variables that affect the adoption of mobile content;

2. To check if the framework/model proposed can be applied using two different measurements of innovativeness, which indicates flexibility of the model;

3. To verify which measure of innovativeness is easier to apply to this model. This may lead to better use of the model in the future;

4. To enrich the research with two different ways to calculate innovativeness, making better use and value of the available innovativeness scales and encouraging academic research;

5. To show the possibility of the model to use different ways to measure innovativeness that considered valid by previous literature.

The use of different measurements or scales of innovativeness may impact on the results. However, it will be possible to compare the results obtained for both measurements and determine which variables obtained in the model can be considered predictors of adoption of mobile content, regardless which two of the innovativeness scale was used. This is considered the main implication of the decision to use two different innovativeness scales in the findings.

Innovativeness data collection and data analysis is discussed in the subsections below.

Questionnaire one

For each question of Hurt's scale, respondents were required to select one of the following alternatives (Likert scale): strongly disagree (0 points), disagree (1 point), neutral (2 points), agree (3 points) and strongly agree (4 points) for each item. The total score for the innovativeness scale is the sum of the scores awarded for each item of the scale.

The subjects were evaluated individually and classified in adopters groups according to their own innovativeness scores. That means that, for this sample, the categorization of adopters didn't simply use Rogers' predicted adoption rates, but rather classified each subject individually.

The percentages of Early Majority respondents (48.9%) were higher than expected in this research compared to Rogers (34%). According to the thoughts of Geoff Livingston's manifesto "Welcome to the Fifth Estate" on the Buzz Bin (2011), high numbers, such as the collection of Hurt's scale for Early Majority, may represent that mobile content has become an acceptable content form for a significant portion of the studied sample. In the (Rogers') adoption curve, Early Adopters are responsible for pushing up the curve in promoting awareness and helping an innovation to achieve commercial standing. In this way, the Early Majority represents a sort of critical mass. These categories of adopters represent a crucial element in technology adoption, since they are the people presenting a product to the audience, instead of just experimenting. In this case, for the sample, mobile content may not be experimental anymore, but it is a consolidated service, with strong tendencies to not disappear in a short period of time.

Since the first three categories of innovation had percentages higher than expected, the next two categories of adopters (Late Majority and Laggards) had lower percentages of

collected data (8.7% and 1.2% respectively) than expected by Roger's model (34% and 16%). This can be explained, for example, by Moore (1999). The author, in his book claims that among other attributes, a market is defined by [1] a set of actual or potential customers [2] for a given set of products and services [3] who have a common set of needs or wants and [4] who reference each other when making a buying decision. Also, Moore expands upon the notion that part of what defines a high-tech market is the tendency of its members to reference each other when making a buying decision. He shows that there are cracks in Rogers' adoption curves between each phase of the cycle, representing a disassociation between any two groups, or the difficulty any group will have in accepting a new product if it is presented the same way as it was to the group to its immediate left. This large crack, so large it can be considered a chasm (Moore, 1999), is found between the Early Adopters and the Early Majority. Many or most high-tech ventures fail trying to make it across this chasm, as discussed earlier (Chapter Three).

Possible explanations for the differences between percentages predicted and collected is that the questionnaire is self-reported, the samples have relatively higher level of education and are more likely to be technological users and the respondents might have been tempted to claim they are more innovative than they actually are, and respond to Hurt's scale accordingly.

The differences in the percentages may also be attributable to the limitations of the sampling of this research. Despite the large number of respondents, the sample used a convenience sampling strategy (snowball sampling) to gather data. Therefore, the sampling is representative of a segment of the population, though perhaps not the population as a whole. Consequently, the percentage rates are not precisely in line with

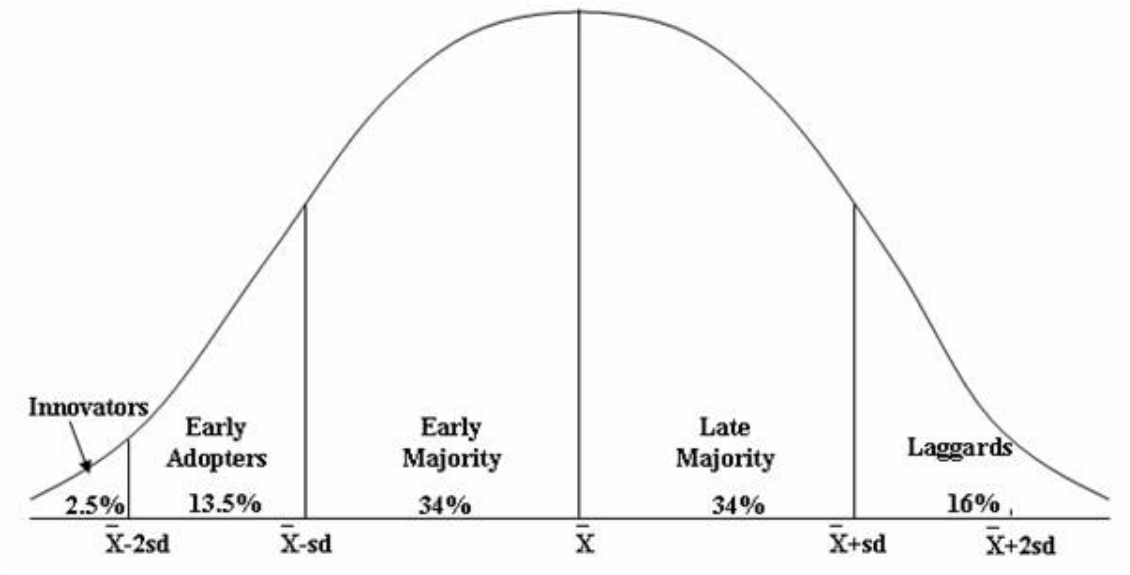
those predicted by Rogers (being just a model, one would not expect 100% synchrony at any rate).

Questionnaire two

For the second questionnaire, the categories to which each of the subjects belong to were accessed individually. The measurement of innovativeness used was DSI (Pagani, 2007). Based on the respondents' innovativeness scores, it is possible to define to which adopter category each respondent belongs to as following: respondents who are below the average -2 SD(standard deviations) (Innovators), people between the average - 2 SD and the average - 1SD (Early Adopters), people between the average – 1 SD and the average(Early Majority), people between the average and the average +1 SD (Late Majority), and people above that point and the cut-off point (Laggards).

Rogers uses time as a quantitative variable to categorize this variable, so people on the far left of the curve are predominantly *Innovators* (lower values of time). The variable measured in this work has a variable time in the opposite direction, hence the higher scores on the scale represent the Innovators. Therefore, Figure 20 below has been plotted with the variable "innovativeness" as it was collected, except that the categories in the graph appear in reverse. Before the laggards were those who were one standard deviation above the average, now these are the ones who area deviation below the average, as they are those who have lower scores on the "innovativeness" variable and, therefore, the least innovators according to the scale used.

Figure 8: Innovativeness scores in relation to adopter categories



The graph above, which illustrates Rogers' classification scheme, represents the foundation for the current research's categorization process, the main difference being that the sole variable has the opposite/reverse direction. Categories are calculated with cut-offs according to Rogers (i.e., in keeping with the relationships between the average and the standard deviation), and subjects are classified based on this pattern of responses. According to Jacobsen (1998), Rogers' categories are "ideal" types distributed across a continuum of innovativeness. In his thesis on the construction industry, Gore (2010) explains the methodological appropriateness of using Rogers' adopter categories as a starting point upon which to build a more nuanced, empirical case. In summary, the categories of adopters need not be taken as gospel, because real individuals do not fit so easily into categories. However, such categories are a necessary beginning point for any study of populations.

Results for the variable innovativeness

As a first step, cut-off points for the variable were established based upon the questionnaire results. The average of the variable "innovativeness" collected in this work was 15.260 points with a standard deviation of 7.293 points. Dividing this variable according to Rogers, the appropriate cut-off points are:

Average + 1 SD=15.26+7.293=22.553 points in the variable innovativeness.

Average - 1 SD=15.26-7.293=7.967 points in the variable innovativeness.

Average + 2 SD=15.26+(2*7.293)=29.846 points in the variable innovativeness.

Average - 2 SD=15.26-(2*7.293)=0.674 points in the variable innovativeness.

Therefore, those scoring above the average +2 SD (in this case, since the variable has its opposite direction to the variable *time* that Rogers uses) will be the Innovators. Those who are between the average +1 SD and the average +2 SD will be the Early Adopters. The Early Majority will fall between the average and the average +1 SD, while the Late Majority will fall between the average and the average -1 SD. Laggards will occupy the space below -1 SD.

The Kolmogorov-Smirnov test was applied to see if the variable "innovativeness" adjusts to a normal distribution, and it was discovered that that it adjusts with the statistical significance of P = 0.456., which is smaller than 0.5, and therefore means that it is within the 95% confidence interval used in this study.

Figure 21 below shows the variable "innovativeness" and the cut-off points as referenced in the preceding section. Here is presented the average as x with a plan diacritic symbol above (x bar) and the standard deviation as SD.

Figure 9: Histogram of the variable innovativeness

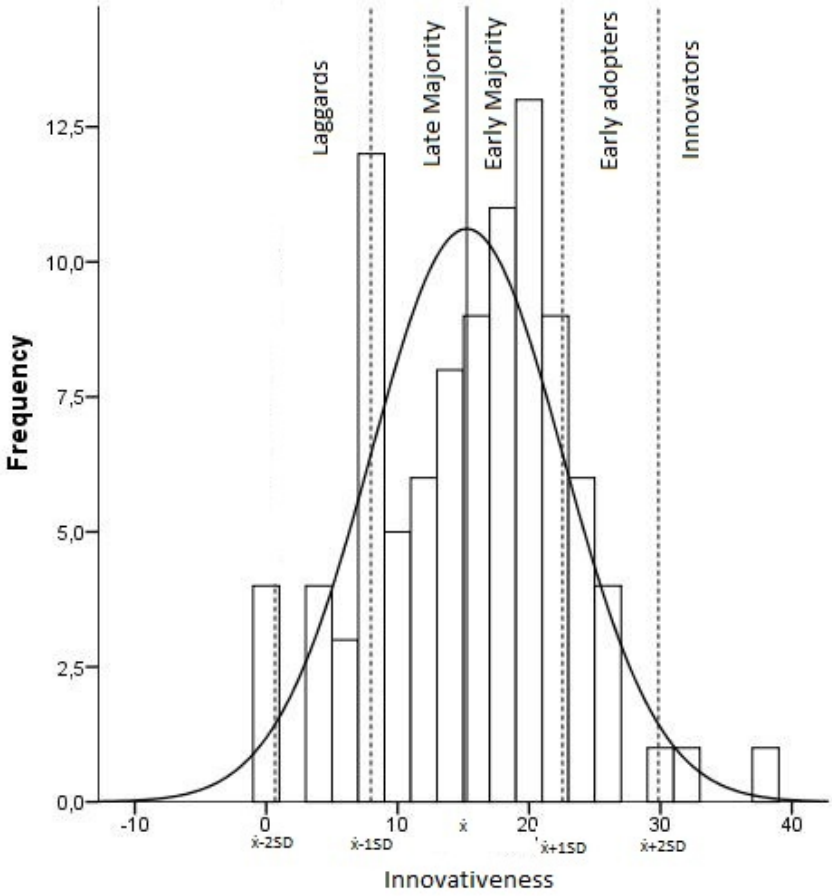
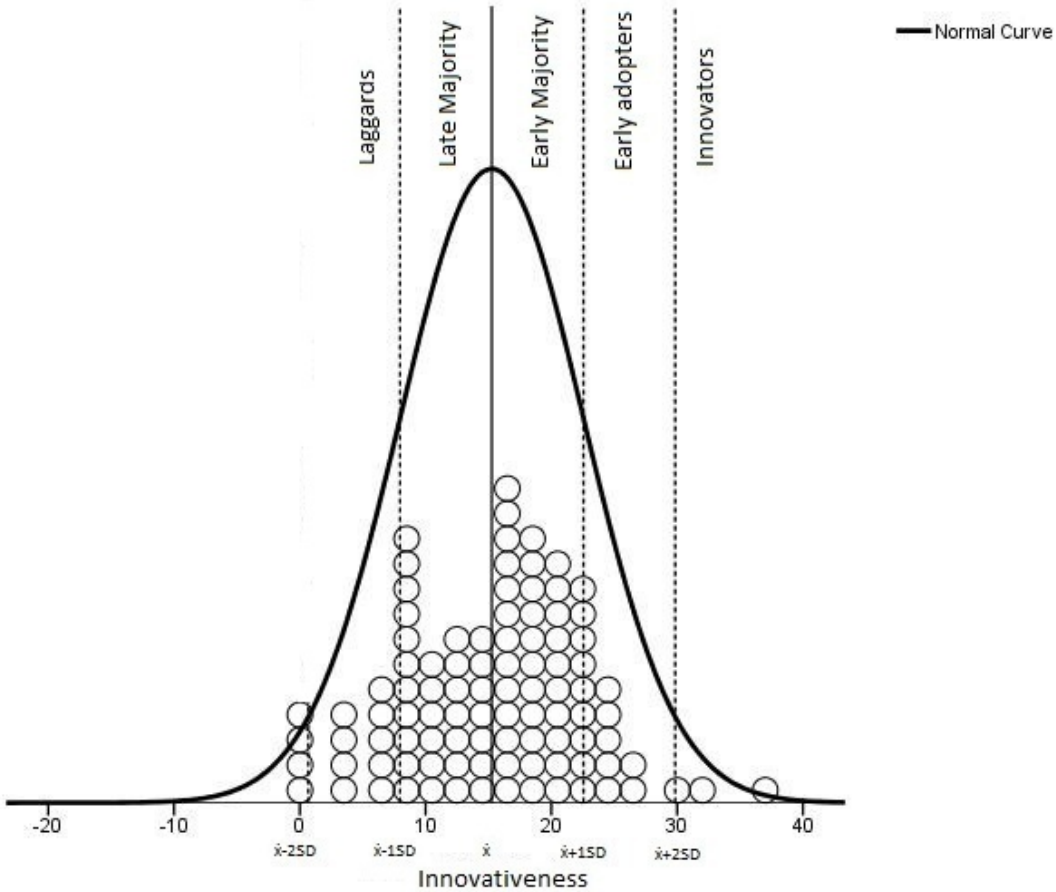


Figure 22 below shows the variable innovativeness and the cutoff points as previously referenced. Here is the presented the average as x with a plan diacritic symbol above (x bar) and the standard deviation as SD. The difference from the above graph is that in this one all points appear. The circles represent the subjects.

Figure 10: Dot plot of the variable innovativeness



Classifying the subjects

Furthermore, the frequency of subjects in sample 2 in each category is examined. As noted, one would expect, for example, to find 34% of respondents in the category of Early Majority, but given the relatively small sample size, the percentages are not always identical to those expected. For the purposes of the current study, however, it has been demonstrated that despite these small differences, one can assert that the variable "innovativeness" adjusts to a normal distribution. Each subject can then be individually classed in adopter groups in accordance to Rogers, taking into account the values of the average and the standard deviation. Table 12 below provides a frequency breakdown of subject classification.

Table 12: Frequency of the subjects in the categories of innovativeness

Classification	Frequency	%
Innovators	3	3.1
Early adopters	10	10.3
Early majority	40	41.2
Late majority	31	32.0
Laggards	13	13.4
Total	97	100.0

In summary, this section presented how each subject was classed within Roger's adopter category groups according to their innovativeness scores calculated in this study, which is the key point of this subsection, showing that Roger's research was used critically in this dissertation. The higher the subjects' scores for innovativeness, the higher is their level of innovativeness, so the higher they are individually classed within the adopters groups. This data will be used as to examine whether mobile content needs help predict adoption of innovations.

5.3.3. Mobile content needs (MCN)

In order to answer the research questions, it was necessary to access the subjects' scorings of their perceived needs for mobile content. As described earlier in Chapter Three, this research proposes ten mobile content needs (or MCN) as variables that help predict the adoption of mobile content. The research questionnaires collected this data using the most common statistical measures for descriptive statistics. Descriptive statistics allows the summarization of the data without allowing for conclusions related

to the research hypothesis (Trochim, 2006). The way this data was collected is explained in detail in Chapter Four.

In this way, data collected by respondents (Total Sample, n=621) indicated their perceived importance for each mobile content need (MCN). The tables for each MCN measured can be found in the Appendix I. Table 13 below summarizes the descriptive statistics collected for MCN.

Many aspects can be analyzed from the descriptive analysis of the MCN; however the following table summarizes three measurements: median and mode of the MCN studied. Median is a measure of the central tendency of the data, but to get the median number it is necessary to order the data from lowest to highest. The median is the number in the middle. Mode refers to the most frequent, repeated or common number in the data.

Table 13: MCN comparison of descriptive statistics

MCN	Median	Mode
Functionality	4	4
Utility	4	4
Reliability	4	4
Compatibility	3	4
Ease of use	3	4
Fun	2	0
Value	2	0
Communication	2	0

Popularity	0	0
Status	0	0

In this way, Table 13 indicates the measurements of central tendencies of the data (scorings of MCN) for the entire sample (n=621). It is possible to note that the highest means, medians and modes attributed to MCN were for Functionality (median=4; mode=4), Utility and Reliability (median=4; mode=4), Compatibility (median=3; mode=4) and Ease of Use (median=3, mode=4). These indicate that these variables are possible candidates to be influencers in the adoption of mobile content. The results obtained here will be used in the regression model later in this chapter, and the key findings in this section are limited to the descriptive statistics for MCN, which is important to inform the reader about the data collected.

5.4. Statistical Analysis

This section presents the statistical analysis performed to answer both research questions, describing how the analysis is performed in this research.

5.4.1. Statistical Operations

Empirical literature studying the diffusion and adoption of innovations is extensive across disciplines and topics. Spolaore and Wacziarg (2012) studied how human "relatedness" factors speed or slow the diffusion of innovations across international borders. A study of selected Dutch hospitals relied upon surveys and questionnaires to capture the diffusion of operational quality initiatives (Duckers, Wagner, Vos and Groenewegen, 2011). Toole, Cha and Gonzalez (2012) examined how geography and the

media influence technology adoption using quantitative data from a micro-blogging platform. Lastly, a thesis submitted to the University of Warwick attempted to quantify the factors influencing innovation adoption in Irish general practice (Bourke, 2011). The empirical aspect of these studies means that statistical operations and analysis are necessary in order to confirm or disprove commonly accepted theories. Each study, nonetheless, presents itself as a singular recollection of data. The way in which data are collected can vary widely from researcher to researcher: magnitude, geography, gender, age and other demographic variables tend to be different from one research to another. The reasons behind dissimilar data are not casual, but are, for the most part, purposefully intended to be so by the researcher's own questions. This thesis is no different, for it also collects particular data and attempts to propose a conclusive analysis relevant to its particular demographics. The statistical operations chosen were used to achieve three goals: [1] to provide clear understanding of the variables that have significant weight in the adoption of mobile content;[2] to deliver an analysis that meets the standards of the current literature on adoption of innovations; and [3] to deliver statistical results that are reliable, robust, and rigorous. This section will focus on the second and third goals: it will explain the reasoning behind the use of its statistical procedures and will put them in perspective with respect to procedures used by other studies on adoption of mobile services or content. First, a brief recapitulation of the procedures used is presented, in order to give remind the reader of the analysis performed before moving forward to other research papers.

The first aim of the statistical operations was to find the differences in perception between adopter groups, in order to answer the first research question (section 5.3.1). In order to compare the groups in the 10 variables three tests were used: the Chi-

Squared test for homogeneity/Fisher exact test (Sheskin, 2000), Kruskal-Wallis test with correction for ties (Sheskin, 2000) and Dunn's test with correction for ties (Noether and Dueker, 1991; Siegel and Castelan, 1988). To capture differences between groups, two main tests were used: a Kruskal-Wallis test, followed by Dunn's test. Both tests were used to capture differences between adopter groups and, hence, to know whether the perception of needs would indeed be different for different types of adopters, as well as how different such perceptions would be. This step was essential in order to claim the existence of different adopter groups characterized by different perceptions of an innovation and, as such, it is a central element of the theoretical discussion at stake: the validity of Rogers' diffusion of innovation theory.

Once adopter group differences were identified and weighed, the second aim of the statistical analysis is put forward: to explore the underlying structure that would link Mobile Content Needs (MCN) and innovativeness with prediction of *Actual Use*. For this part of the analysis a different set of statistical operations are used, because, it must be noted, the main issues at stake are the validity of the theory and the fitness or accuracy of the model. Spearman's rank is used to measure the strength of association between two ranked variables, after which a histogram is used to assess whether a generalized linear regression model is suitable to study the relation between the relevant variables. The strength of the associations is a necessary step prior to putting forward a regression, because without it there would remain a lack of clarity between causal relations and correlations. Once clear statistical relationships have been established, the research moves forward to study the weight of the independent variables at stake. This last part, in turn, plays an important theoretical step, because it helps also to prove or disprove the explanatory power of Rogers' diffusion of innovations theory when

referring to the adoption of mobile content. The use of the quasi-likelihood model allowed us, furthermore, to analyze the relationship between MCN and Actual Use, while also accounting for possible over-dispersion. Tabachnik and Fidell, for instance, recommend controlling for outliers by deletion of the variable responsible (Tabachnik and Fidell, 2007). An ANOVA model could have been an option of analysis for this research. However, given the previous steps taken, the quasi-likelihood model proves a simpler and more robust solution.

The steps taken in this research, which can be, for the sake of the argument, reduced to inter- and intra-group comparison and to identifying an underlying structure that would explain the relationship between the variables or constructs at stake poses similar—although by no means identical—challenges to the research on diffusion and adoption of innovations in general. Given the focus on mobile services and content as forms of innovation, the papers analyzed below belong to this field of study.

To study the adoption of mobile banking, Zhou, Lu, and Wang (2011) use Chi square tests to compare samples. This procedure is equally used in Zhou's study of mobile Internet (2011). One must take into account that the Chi square test is used in these cases with similar purpose to this research; the Chi-square is a common and robust test that should be used to examine the relationship between two discrete variables (Tabachnik and Fidell, 2007)

Again, the purpose of these authors here is to be able to assess the weight of the relationships between the constructs at stake and to be able to put forward a structural equation which properly represents those relations. These authors use a Structural Equation Model (SEM) to test their hypothesis and the significance of their constructs

(Zhou, Lu and Wang, 2010). They take an additional step by using Partial Least Squares (PLS), in order to confirm the validity of the predictor variables as well as to identify possible outliers (Zhou, Lu and Wang, 2010).

The functional value of SEM, for a researcher, comes from the fact that it combines variable analysis, canonical correlation and multiple regressions (Tabachnik and Fidell, 2007). This means that it helps the researcher deal with directly observed and latent variables. It allows for many independent (IVs) and dependent variables (DVs) to be analyzed, which is the not the case when using, for instance, factorial ANOVA, or ANCOVA. Tabachnik and Fidell (2007) recommend in these cases the use of factorial MANOVA or SEM. SEM, however, needs special handling when a researcher is dealing with ordinal data, which can be resolved using LISREL. The researchers explain that "[t]o convert an ordinal variable to a continuous variable the categories of the ordinal variables are converted into thresholds of the underlying, latent, normally distributed continuous variable" (Tabachnik and Fidell, 2007, p. 729). The LISREL software, however, provides this transformation, but not the SPSS, which was use in this thesis. This research did not choose this procedure in order to avoid this additional handling of ordinal variables as continuous variables. Rather than SEM, the quasi-likelihood model allowed for a much simpler and robust way for handling the data.

The use of PLS is common in the literature and can be found in Yu (2012), Venkatesh, Morris, Davis and Davis (2003), and Zhang (2010). The reason behinds its use has to do with its least restrictive character in comparison with other extensions of multiple linear regressions (Yu, 2012). Chian-Son Yu used variable loadings, composite reliability, and the average variance extracted (AVE) to assess convergent validities, while discriminant validity was assessed by examining whether or not the square roots

of AVE exceed the correlations between constructs (Yu, 2012). This is the same method followed by Zhou, Lu and Wang (2010).

It is argued, in turn, that discriminant analysis is a turned around MANOVA, because "we ask whether group membership is associated with statistically significant mean differences on a combination of DVs" (Tabachnik and Fidell, 2007, p. 375). A MANOVA model, however, works best with highly negative correlated dependent variables (Tabachnik and Fidell, 2007).

A similar purpose (comparison and identification of an underlying structure) is used in a research studying the adoption of mobile services by Versakalo (2008). This author chooses instead Path Analysis Model. This model is also an extension of multiple linear regression models and is used to capture dependencies between variables (e.g., their relationships). This model, however, was reported as a very poor fit, based on generalized factorial indices (GFI) (Versakalo, 2008).

Zhou (2011), whose purpose is to study the continuance usage of mobile Internet, departs slightly from adoption of innovation theory, but proceeds in a similar way, because its variable at stake (its dependent variable) is, naturally, a variable that captures actual use – continuance of use in this particular case. This author proceeded in 2 steps: [1] he examined the measurement model to test reliability and validity; and [2] he examined the structural model to test the research hypothesis and model fitness (Zhou, 2011, p. 212). Step one, includes three statistical operations. First, confirmatory factor analysis (CFA) was employed to test validity, followed by AVEs. In this case, discriminant validity is assessed in an almost identical manner as the paper mentioned above, by comparing square root of AVE and factor correlation coefficients. Factor

analysis follows text book recommendations on how to identify an underlying structure through data analysis, as well as to test theories (Tabachnik and Fidell, 2007), yet its use depends on the way comparison is being assessed. In this thesis it would have been an additional and unnecessary step. The route taken in both cases has as its goal the use of an accurate regression model to analyse the underlying structure. The use of SEM demands additional steps to ensure that the reliability and validity of the constructs at stake. Lastly, therefore, the second step taken by Zhou (2011) again uses structural equation modelling (using LISREL software) and a confirmatory check for fit indices (including GFI).

In conclusion, what this overview shows is that the purpose of the statistical operations used by other researchers follows closely the purpose of this thesis. It was clear as well that there is a preference in the literature for using LISREL, which, in turn, leads the researcher to use other statistical operations, like factor analysis and SEM, given that this research did a thorough effort to put forward a first step (comparison) which would allow, in turn, for a simpler yet more robust structural equation to be used (the quasi-likelihood model). It is the ability to present robust enough results through less complex operations and confirmatory analysis that gives merit to the statistical analysis developed in this research.

5.4.2. Tools

All tests were performed assuming the significance level (p-value) of 95%.

5.4.3. Objectives

There are two objectives for the data analysis performed here:

The first objective is to find groups that are significantly different in relation to the ratings of the 10 variables presented (MCN: functionality, utility, reliability, compatibility, ease of use, popularity, communication, status, value and fun), which will answer research question one.

The second objective is, firstly, to fit the most suitable regression model to predict the variable "Actual Use", using MCN and individual innovativeness. In the case of this research, the regression model will explain the relationships between these variables to predict the adoption of mobile content; secondly, to fit the regression model for both samples together and for each sample individually, which will answer research question two.

5.5. Research samples

The research was conducted in three phases: a pilot phase (January/2008 to May/2008), Questionnaire one (June/2008 to January/2009) and Questionnaire two (March/2009 to June/2009). Two different questionnaires were designed to collect the data, using different samples. Respondents were self-selected, meaning that they chose to be selected rather than randomly selected. Three samples are analysed throughout this study: [1] the total sample, which is a combination of the sample collected for questionnaire one and two together; [2] sample one, which is the sample collected by questionnaire one; and [3] sample two, which is the sample collected for questionnaire two. Combining samples is potentially a point of contention, but this was addressed by including additional demographic variables in the regression, which allows the two samples to be pulled and analysed together. Therefore, it is statistically sound to combine the samples and obtain a single set of results as presented in this chapter.

5.5.1. Demographic analysis (sample one)

For questionnaire one (n=525), 58.8% (309) of respondents were male and 38.7% (203) were female. 2.5% (13) of the respondents chose not to answer this question.

The majority of respondents of questionnaire one reside in Brazil (87.4% or 458 respondents). Nineteen respondents reside in Ireland, corresponding to 3.6% of respondents. The remainder live in other countries. The age groups of the respondents ranged from 20-24 to more than 60 years old. The most frequent age group was between 25-29 years old (39.3%).

In addition, 61.3% (303) of respondents were single, and 28.9% (144 respondents) were married and 9.8% responded "other". 0.4% (2) of the respondents completed only primary school, while 6.3% (33 respondents) completed secondary school, and 2.1% (11) have further education. Most (60.7% of the valid responses, n =318) of the respondents have finished university (2.7% completed a master's degree and 19.9% completed a doctor's degree). Other education qualifications correspond to 4.8% (25 cases) of the respondents, and missing responses for this question represented 3.1% of the sample (16 cases).

When it comes to the type of mobile payment plan adopted by our sample in questionnaire one, respondents reported a slight preference for monthly bill plans. Pre-paid plans corresponded to 40.9% of the sample (208 respondents), while post-paid bills were the chosen plans for 51.2% of the respondents (259 subjects). Missing responses and other plans (such as special employee's plans) were reported by 7.9% of the respondents (40 cases).

The research included a question on how much people spend on their mobile payments per month. The monthly cost of mobile phones is fairly well distributed. Less than €20 per month (20% of the respondents); €20 to €49 per month (28%), €50 to €99 per month (18%) and €100 to €199 per month (20%). 9% of the respondents spend more than €200 per month. This data indicates that respondents fall within a range of cost awareness, and includes many high-end users.

The questionnaire also reveals the percentages of the respondents who own a 3G phone. 3G technologies enable faster data transmission speeds, greater network capacity and more advanced network services, enabling rich mobile content, as described in Chapter Two. 11.1% of the respondents (58 cases) declared they already own a 3G mobile phone, 4.6% (24 respondents) reported that they plan to purchase a 3G phone within 3 months. Almost one third (31.3% of the respondents or 165 cases) self-reported that they would acquire a 3G phone the following year (to 2010). Almost half of the respondents (48%) didn't intend to purchase a 3G phone within 1 year.

5.5.2. Demographic profile (sample two)

Questionnaire two was completed by a smaller sample (96 respondents), of which 46.9% were male (n=45) and 53.1% (n=51) were female. The predominant age group was from 25 to 29 years old, corresponding to 43.8% (42 subjects) of respondents. They were predominantly graduate students. The second largest age group was from 25 to 30 years old (18.8%; n=18), followed by respondents from 20-24 years old (11.5%; n=11). Other age groups each represented less than 10% of the sample. Given that the questionnaire was completed by staff and students in a third level college, it is easy to understand why 88.5% of the respondents (85 cases) had postgraduate degrees. 10.4%

of the respondents (n=10) had completed a primary degree, while 1% (1 subject) self-reported his level of education as "Further Education".

5.5.3. The role of culture

This thesis concerns two populations, Brazil and Ireland. These populations exhibit the typical demographic (population size, amount of urban centres) and socioeconomic (GDP per capita or violent crimes) differences. Despite these marked socio-demographic differences, this research has avoided jumping to any conclusions. Instead, the research leans on empirical evidence in order to identify what constructs have significance.

In terms of technology adoption, however, certain evidence is worthy of notice. In a study on the adoption of mobile banking, based on a Brazilian representative sample, it is reported that young, educated males are more likely to adopt mobile banking services (Püschel, Mazzon and Hernandez, 2010). The authors also suggest that older banking users may be reluctant to adopt mobile banking. Younger, educated males, they argue, are typically already frequent users of other Internet services, which is not the case with an older population. Cultural variables do not offer an easy explanation for this disparity. The main point here is that culture may play a role, but its role cannot be presumed as determinant. Brazil and Ireland, therefore, may appear as dramatically different from the point of view of cultural variables, yet one cannot too quickly conclude that the adoption of any one innovation must be different in both countries.

Research in Ireland shows that teenagers have a higher rate of mobile phone adoption than older adults (Cawley and Hynes, 2010). In addition, the authors also argue that socio-economic conditions and country location have an effect on these same adoption

rates. Teenagers in general, they argue, would be more eager to interact with and learn how to use 'smartphone' technologies. Similar results on the adoption of mobile phones for a population under twenty-five are reported by Garner and Vieira (2011). Their study examined Brazil's urban centres. As these two studies show, cultural differences may play a less significant role than age under certain circumstances. Exposure to particular technologies may have more to do with the existence of those technologies throughout the life of any one individual than on cultural differences. That being said, it remains true (as this thesis suggests) that the statistical significance of certain constructs does have cultural implications.

One must also keep in mind that the cultural dimension has a strong crossover with the existence of certain socioeconomic conditions. The main issue, as noted earlier in this thesis, with populations like the Brazilian one (and Latin America in general) is the persistence of stark inequality, which accentuates the effect that socioeconomic variables have on the adoption of technologies. This is confirmed by researchers who, for instance, find little evidence of disparate rates of technology adoption when comparing populations with similar socioeconomic status, yet coming from different geographies (Donner, 2008).

In conclusion, the cultural dimension must be taken into account when performing comparative studies, but researchers must abstain from assuming that differences reported must derive from cultural particularities. The best way to judge the weight of culture is by closely analysing the significance of the various constructs that are being tested. This implies as well that the choice of constructs must be made with at least a partial understanding of the cultural differences that are said to exist in the different populations at stake. This thesis made an effort to do precisely that: to take cultural

differences into account prior to the selection of specific constructs—both anecdotal and theoretical evidence was deemed relevant in order to do so.

5.6. Results

The subsections below present the results obtained for the data analysis for research questions one and two respectively.

5.6.1. Research Question One

This research question aims to find out if groups representing Rogers' adopter categories rate mobile content needs differently. The question is answered in two steps:

1. The Kruskal-Wallis test is run for the data, indicating, for each mobile content need, if at least one group of adopters rated MCN significantly different than the others;
2. Dunn's test is applied to each MCN, indicating which groups rated MCN significantly differently

These two tests will answer the research question one by indicating if MCNs are perceived differently among the groups and which groups perceive MCN significantly differently.

Kruskal-Wallis test

Table 14 presents the p-values for the Kruskal-Wallis test with test statistics corrected for ties. All variables were significant, aside for the variable popularity. That indicates that there should have, for each of the variables (but not popularity) at least two groups with different medians for each of the variables below (MCN).

Table 14: Kruskal-Wallis tests comparing groups in 10 variables (MCN)

Variable	Valid N	Missing	Test Statistics	Corrected Statistics	P-value corrected statistics
functionality	619	2	57.01	86.45	**0.0000**
utility	619	2	44.43	54.32	**0.0000**
reliability	619	2	42.58	52.73	**0.0000**
compatibility	619	2	33.52	36.01	**0.0000**
popularity	618	3	5.97	7.00	0.1056
communication	618	3	22.17	23.63	**0.0001**
status	618	3	8.50	11.31	**0.0198**
ease of use	618	3	37.25	40.01	**0.0000**
value	618	3	47.77	51.45	**0.0000**
fun	618	3	38.40	40.70	**0.0000**

As illustrated by Table 14, the Kruskal-Wallis test indicates that all MCN (aside from popularity) should have been rated significantly differently by at least two groups. The Kruskal-Wallis test is used to give the data a first overall look and decide what test should be applied after it to analyze the data. In this case, Kruskal-Wallis indicated potential differences between groups, and therefore Dunn's test can be applied to each MCN. Now Dunn's test will be applied to find out which groups rated each MCN significantly differently from each other.

Dunn's tests

The next tables present Dunn's tests, with the differences between median ranks observed in the samples 1 and 2 together, the critical differences to reject the equality

hypothesis and the critical differences with correction for ties, which is the correction adapted to the tie data. The groups in the tables below correspond to the following:

0: Innovators

1: Early Adopters

2: Early Majority

3: Late Majority

4: Laggards

In Table 14, Dunn's test shows significant difference between groups 0 and 2 (Innovators and Early Majority), between groups 1 and 2 (Early Adopters and Early Majority) and between the groups 2 and 3 (Early Majority and Late Majority) for the variable "Functionality". That means that these groups rated the MCN "Functionality" significantly differently from each other.

FALSE, as shown in Table 15, occurs when the observed difference of scores obtained between the groups (Observed Diff) is smaller than the calculated corrected critical difference of scores obtained between the groups (Corrected Critical Diff). On the other hand, TRUE in Table 15 means that the observed differences between the scores of two groups (Observed Diff) is greater than the calculated corrected critical differences of scores obtained between these groups (Corrected Critical Diff). Therefore, significant differences between scorings for each group pairs are indicated by the word TRUE.

Table 15: Dunn's test for the variable "functionality"

Variable "functionality"				
Groups	Observed Diff	Critical Diff	Corrected Critical Diff	Diff

0-1	4.42	72.43659	58.83	FALSE
0-2	**98.87**	**67.15112**	**54.53**	**TRUE**
0-3	41.45	83.21559	67.58	FALSE
0-4	33.18	125.10805	101.60	FALSE
1-2	**94.44**	**49.51824**	**40.21**	**TRUE**
1-3	37.03	69.76831	56.66	FALSE
1-4	28.76	116.59677	94.69	FALSE
2-3	**57.41**	**64.26376**	**52.19**	**TRUE**
2-4	65.69	113.38880	92.08	FALSE
3-4	8.27	123.58228	100.36	FALSE

For the variable “Utility”, Dunn’s test (Table 16) shows significant difference between the groups 0 and 2 (Innovators and Early Majority), 1 and 2 (Early Adopters and Early Majority) and 2 and 3 (Early Majority and Late Majority).

Table 16: Dunn’s test for the variable “utility”

Variable "Utility"				
Groups	Observed Diff	Critical Diff	Corrected Critical Diff	Diff
0-1	29.042515	72.43659	65.51	FALSE
0-2	**104.396924**	**67.15112**	**60.73**	**TRUE**
0-3	13.546584	83.21559	75.26	FALSE
0-4	31.784679	125.10805	113.14	FALSE
1-2	**75.354409**	**49.51824**	**44.78**	**TRUE**
1-3	15.495931	69.76831	63.10	FALSE
1-4	2.742164	116.59677	105.45	FALSE
2-3	**90.85034**	**64.26376**	**58.12**	**TRUE**
2-4	72.612245	113.38880	102.54	FALSE

3-4	18.238095	123.58228	111.76	FALSE

For the variable “Reliability”, Dunn’s test (Table 17) indicates significant difference between the groups 0 and 2 (Innovators and Early Majority), 1 and 2 (Early Adopters and Early Majority) and 2 and 3 (Early Majority and Late Majority).

Table 17: Dunn’s test for the variable “reliability”

Variable "Reliability"				
Groups	Observed Diff	Critical Diff	Corrected Critical Diff	Diff
0-1	16.783847	72.43659	65.09	FALSE
0-2	**94.157867**	**67.15112**	**60.34**	**TRUE**
0-3	4.386222	83.21559	74.78	FALSE
0-4	19.645963	125.10805	112.42	FALSE
1-2	**77.37402**	**49.51824**	**44.50**	**TRUE**
1-3	12.397625	69.76831	62.69	FALSE
1-4	2.862116	116.59677	104.77	FALSE
2-3	**89.771645**	**64.26376**	**57.75**	**TRUE**
2-4	74.511905	113.38880	101.89	FALSE
3-4	15.25974	123.58228	111.05	FALSE

For the variable “Compatibility”, Dunn’s test (Table 18) shows significant difference between the groups 0 and 2 (Innovators and Early Majority) and 1 and 2 (Early Adopters and Early Majority).

Table 18: Dunn’s test for the variable "Compatibility"

Variable "compatibility"

Groups	Observed Diff	Critical Diff	Corrected Critical Diff	Diff
0-1	2.475234	72.43659	69.89	FALSE
0-2	**87.154688**	**67.15112**	**64.79**	**TRUE**
0-3	43.875776	83.21559	80.29	FALSE
0-4	5.3147	125.10805	120.70	FALSE
1-2	**84.679454**	**49.51824**	**47.77**	**TRUE**
1-3	41.400542	69.76831	67.31	FALSE
1-4	7.789934	116.59677	112.49	FALSE
2-3	43.278912	64.26376	62.00	FALSE
2-4	92.469388	113.38880	109.40	FALSE
3-4	49.190476	123.58228	119.23	FALSE

Kruskal-Wallis test didn't identify significant differences between the groups for the variable "Popularity". This can be visualized on Table 19 that Dunn's test didn't show differences between the groups.

Table 19: Dunn's test for the variable "Popularity"

Variable "Popularity"				
Groups	Observed Diff	Critical Diff	Corrected Critical Diff	Diff
0-1	22.4156738	72.68880	67.10	FALSE
0-2	15.7085834	67.44080	62.26	FALSE
0-3	13.9757448	83.40280	76.99	FALSE
0-4	15.6337535	125.12020	115.51	FALSE
1-2	38.1242573	49.43830	45.64	FALSE
1-3	36.3914187	69.65560	64.30	FALSE
1-4	38.0494273	116.40850	107.46	FALSE

2-3	1.7328385	64.16000	59.23	FALSE
2-4	0.0748299	113.20570	104.51	FALSE
3-4	1.6580086	123.38270	113.90	FALSE

For the variable “Communication”, Dunn’s test (Table 20) found significant differences between the groups 1 and 2 (Early Adopters and Early Majority) and 1 and 3 (Early Adopters and Late Majority).

Table 20: Dunn’s test for the variable "Communication"

Variable "Communication"				
Groups	Observed Diff	Critical Diff	Corrected Critical Diff	Diff
0-1	6.903109	72.68885	70.40	FALSE
0-2	57.871799	67.44080	65.31	FALSE
0-3	72.218583	83.40282	80.77	FALSE
0-4	81.584384	125.12021	121.17	FALSE
1-2	**64.774907**	**49.43831**	**47.88**	**TRUE**
1-3	**79.121692**	**69.65569**	**67.46**	**TRUE**
1-4	88.487492	116.40856	112.74	FALSE
2-3	14.346784	64.16002	62.14	FALSE
2-4	23.712585	113.20576	109.64	FALSE
3-4	9.365801	123.38279	119.49	FALSE

Despite Kruskal-Wallis test indicating that there are at least two groups with different means for the variable “Status”, Dunn’s test was not able to detect between which groups this difference is. It is not mandatory that Dunn’s test is in perfect synchrony with Kruskal-Wallis, as there is no theoretical connection between these two tests.

Dunn's test is indicated because, as well as Kruskal-Wallis, consider the mean posts (ranks) in its statistics. Because Dunn's test is a more elaborate test than Kruskal-Wallis, in this research, we will assume that there are no significant differences between the groups for the variable "Status" (Table 21).

Table 21: Dunn's test for the variable "Status"

Variable "Status"				
Groups	Observed Diff	Critical Diff	Corrected Critical Diff	Diff
0-1	5.321854	72.68885	62.99	FALSE
0-2	19.478391	67.44080	58.44	FALSE
0-3	35.906035	83.40282	72.28	FALSE
0-4	77.981793	125.12021	108.43	FALSE
1-2	24.800245	49.43831	42.84	FALSE
1-3	41.227889	69.65569	60.36	FALSE
1-4	83.303647	116.40856	100.88	FALSE
2-3	16.427644	64.16002	55.60	FALSE
2-4	58.503401	113.20576	98.11	FALSE
3-4	42.075758	123.38279	106.92	FALSE

For the variable "Ease of use", only four groups were not significantly different among themselves: 0 and 1 (Innovators and Early Adopters), 2 and 3 (Early Adopters and Early Majority), 2 and 4 (Early Majority and Laggards), and 3 and 4 (Late Majority and Laggards) (Table 22).

Table 22: Dunn's test for the variable "Ease of use"

Variable "ease of use"				
Groups	Observed Diff	Critical Diff	Corrected Critical	Diff

			Diff	
0-1	13.11057	72.68885	70.14	FALSE
0-2	**87.31963**	**67.44080**	**65.08**	**TRUE**
0-3	**97.35256**	**83.40282**	**80.48**	**TRUE**
0-4	**155.15126**	**125.12021**	**120.74**	**TRUE**
1-2	**74.20905**	**49.43831**	**47.71**	**TRUE**
1-3	**84.24199**	**69.65569**	**67.22**	**TRUE**
1-4	**142.04069**	**116.40856**	**112.33**	**TRUE**
2-3	10.03293	64.16002	61.91	FALSE
2-4	67.83163	113.20576	109.24	FALSE
3-4	57.7987	123.38279	119.06	FALSE

Dunn's test identified significant differences between the groups 0 and 2 (Innovators and Early Majority); 0 and 3 (Innovators and Late Majority); 0 and 4 (Innovators and Laggards); 1 and 2 (Early Adopters and Early Majority) and 1 and 3 (Early Adopters and Late Majority) for the variable "Value" (Table 23).

Table 23: Dunn's test for the variable "Value"

Variable "value"				
Groups	Observed Diff	Critical Diff	Corrected Critical Diff	Diff
0-1	39.47924	72.68885	70.04	FALSE
0-2	**125.45143**	**67.44080**	**64.99**	**TRUE**
0-3	**107.46133**	**83.40282**	**80.37**	**TRUE**
0-4	**147.31197**	**125.12021**	**120.56**	**TRUE**
1-2	**85.97219**	**49.43831**	**47.64**	**TRUE**
1-3	**67.98208**	**69.65569**	**67.12**	**TRUE**

1-4	107.83273	116.40856	112.17	FALSE
2-3	17.99011	64.16002	61.82	FALSE
2-4	21.86054	113.20576	109.08	FALSE
3-4	39.85065	123.38279	118.89	FALSE

For the variable “Fun”, Dunn’s test (Table 24) showed significant differences between the groups 0 and 2 (Innovators and Early Majority), 1 and 2 (Early Adopters and Early Majority), and 1 and 3 (Early Adopters and Late Majority).

Table 24: Dunn’s test for the variable "Fun"

Variable "fun"				
Groups	Observed Diff	Critical Diff	Corrected Critical Diff	Diff
0-1	13.852848	72.68885	70.61	FALSE
0-2	**81.607993**	**67.44080**	**65.51**	**TRUE**
0-3	66.618506	83.40282	81.01	FALSE
0-4	89.553571	125.12021	121.54	FALSE
1-2	**95.460841**	**49.43831**	**48.02**	**TRUE**
1-3	**80.471355**	**69.65569**	**67.66**	**TRUE**
1-4	103.40642	116.40856	113.07	FALSE
2-3	14.989487	64.16002	62.32	FALSE
2-4	7.945578	113.20576	109.96	FALSE
3-4	22.935065	123.38279	119.85	FALSE

In summary, using Kruskal-Wallis test corrected for ties, as well as Dunn’s test corrected for ties, it was possible to observe significant differences between some of the categories of adopters’ rate of importance for each of the mobile content needs studied

in this research. Table 25 summarizes the findings of the statistical analysis performed for this research question, indicating which MCN were ranked differently by each groups of adopters compared in pairs, indicated by "X" in the table below.

Table 25: Dunn's test for the 10 variables of study (MCN)

Group comparison for all MCN										
Groups	**functionality**	**utility**	**reliability**	**compatibility**	**popularity**	**communication**	**status**	**Ease of use**	**value**	**fun**
0-1										
0-2	X	X	X	X				X	X	X
0-3								X	X	
0-4								X	X	
1-2	X	X	X	X		X		X	X	X
1-3						X		X	X	X
1-4								X		
2-3	X	X	X							
2-4										
3-4										

X indicates that observed differences (Observed Diff) between the scores of the paired groups (in each row) are greater than the calculated corrected critical differences (Calculated Corrected Diff), which indicates significant differences in the scorings between those two groups.

Therefore, it is possible to conclude that all MCN (excluding Popularity and Status) are perceived to have different levels of influence in the adoption process by the adopter's

categories. Note that the groups that perceive MCN most differently are 1 and 2 (Early Adopters and Early Majority) and 0 and 2 (Innovators and Early Majority). On the other hand, the group 0 and 1 (Innovators and Early Adopters), 2 and 4 (Early Majority and Laggards) and 3 and 4 (Late Majority and Laggards) seem to perceive the importance of MCN to be similar in their adoption of mobile content.

The results of this research question show that groups of adopters seek to fulfil different needs when it comes to the adoption of mobile content needs. By consolidating Table 24 and the MCN rankings, it is possible to decide, from the groups that rate MCN significantly differently, which has rated each attribute higher. The output of this analysis is shown in the Table 26:

Table 26: Higher and lower scores comparison table

Groups	functionality	utility	reliability	compatibility	popularity	communication	status	Ease of use	value	fun
0-1										
0-2	↓	↓	↓	↓				↓	↓	↓
0-3								↓	↓	
0-4								↓	↓	
1-2	↓	↓	↓	↓		↓		↓	↓	↑
1-3						↓		↓	↓	↓
1-4								↓		
2-3	↑	↓	↓							
2-4										
3-4										

Table 26 presents the comparison between the ratings that were found significantly different for each MCN and each category of adoption. The symbol "↑" shows that the first group scored significantly higher than the first group (i.e., for MCN fun, groups 1-2 , group 1 – Early Adopters – scored significantly higher than group 2 – Early

Majority). The symbol "↓" shows that the first group scored lower than the second group.

Note that (with the exception of groups 2-3 for functionality and 1-2 for fun) all symbols in table 26 indicate "↓", which means that the second group rated significantly higher than the first group for the relative MCN. Also, observe that the first group is always a smaller number than the second group. That indicates that the first group is higher in the adopters' categorization than the second group. Further discussion on this is carried out in the discussion chapter.

That means that the earlier groups of adopters (closer to Innovators group) rated MCN lower in general than later groups of adopters (closer to the Laggards group). Significant differences in the perception of MCN observed were between the following groups:

- **Innovators and Early Majority** for functionality, utility, reliability, compatibility, ease of use, value and fun;
- **Innovators and Late Majority** for ease of use and value;
- **Innovators and Laggards** for ease of use and value;
- **Early Adopters and Early Majority** for functionality, utility, reliability, compatibility, communication, ease of use, value and fun;
- **Early Majority and Late Majority** for communication, ease of use, value and fun;
- **Early Majority and Laggards**: ease of use
- **Early Majority and Late Majority** for functionality, utility and reliability.

Further discussion on this topic is included in Chapter Six.

In addition, individuals were classed in adopters' categories according to their level of innovativeness, as explained previously in this chapter: the higher an individual level of innovativeness is, the lower it is the group he will be classed as (i.e.: an individual with extremely high innovativeness score will be classed as Innovator; an individual with extremely low innovativeness score will be classed as Laggard).

Therefore, for the groups with significantly different ratings, groups with higher levels of innovativeness rated MCN lower than individuals with lower levels of innovativeness, with the exception of fun (being rated higher by Early Adopters than by Early Majority) and functionality (being rated higher by Early Majority than by Late Majority).

The concluding sections of this chapter discuss the implications and opportunities presented by these results, as well as how it can be applied in the market with the objective to optimize innovation adoption, improve marketing campaigns, and contribute on consumer behaviour analysis and with the existing body of knowledge on adoption of innovations.

5.6.2. Research Question Two

This subsection seeks to answer the research question *"Can a theoretical framework incorporating user's innovativeness and needs to acquire mobile content be used to predict mobile content adoption? "*

The following steps will be taken to answer this question:

1. *Sample comparison,* to understand the similarities and differences between the samples (1 and 2) so that it is possible to combine them (or not) in the analysis.

2. *Preliminary analysis using Spearman's test*, to check the relationship between the variables MCN and innovativeness in order to create a model to help predict Actual Use of mobile content.

   Choose regression model, plotting the histogram of Actual Use scores and perform an analysis to identify which type of model can be used for the data regression, in order to create a model to predict the adoption of mobile content.

3. *Apply chosen regression model*, to create the framework to predict the adoption of mobile content. The regression will be applied three times: [1] using the Total Sample (sample 1 and sample 2 together); [2] Using only Sample 1; and [3] using only Sample 2. The results obtained for each sample will be then compared. For the three cases, the quasi-likelihood model will be used. The quasi-likelihood model is explained in detail later in this chapter.
4. *Compare the results obtained* for the total sample, sample one and sample 2, and create one model to predict the adoption of mobile content in this dissertation.

The steps outlined above are explained in detail in the subsections below.

Comparison among the samples

In order to compare the groups in the 10 variables, the Chi-Squared test for homogeneity/ Fisher exact test (Sheskin, 2000), Kruskal-Wallis test with correction for ties (Sheskin, 2000) and Dunn's test with correction for ties (Noether and Dueker, 1991; Siegel and Castelan, 1988) were used.

Table 27 presents the descriptive measurements and the p values for Pearson's Chi-squared test. The tests indicates significant differences among the samples for the variables

Table 27: Chi-Squared tests comparing characteristics between the samples

Characteristics		Sample 1	Sample 2	P
Categories of age	0	12 (2,3)	-	0,306
	1	14 (2,7)	-	
	2	85 (16,3)	12 (12,4)	
	3	201 (38,4)	42 (43,3)	
	4	95 (18,2)	18 (18,6)	
	5	33 (6,3)	7 (7,2)	
	6	22 (4,2)	8 (8,2)	
	7	19 (3,6)	5 (5,2)	
	8	16 (3,1)	3 (3,1)	
	9	15 (2,9)	2 (2,1)	
	10	11 (2,1)	-	
Gender	Male	321 (61,3)	45 (46,4)	0,009
	Female	203 (38,7)	52 (53,6)	
Country	Ireland	30 (5,8)	97 (100,0)	<0,001
	Brazil	458 (88,2)	-	
	Others	19 (3,7)	-	
	Prefer not to answer	12 (2,3)	-	
Education	0	18 (3,4)	-	<0,001
	1	33 (6,3)	-	
	2	11 (2,1)	10 (10,3)	
	3	318 (60,8)	1 (1,0)	
	4	104 (19,9)	86 (88,7)	
	5	14 (2,7)	-	
	6	25 (4,8)	-	
Year	2008	513 (97,9)	-	<0,001
	2009	11 (2,1)	97 (100)	
Online/paper	Online	454 (86,6)	97 (100,0)	<0,001
	Paper	70 (13,4)	-	
Rogers categories	Innovators	68 (13,0)	2 (2,1)	
	Early adopters	145 (27,7)	13 (13,4)	
	Early majority	260 (49,6)	34 (35,1)	
	Late majority	45 (8,6)	33 (34,0)	
	Laggards	6 (1,1)	15 (15,5)	

According to Rogers (1991, the groups (adopters categories) should have been distributed as following: Innovators = 2.5% of the population; Early Adopters: 13.5%; Early Majority: 34%; Late Majority: 34% and Laggards: 16% of the population.

When performed the Chi-squared test for adjustment on sample 1, we can observe that the observed data don't adjust to the expected values according to Roger's classification (P<0,001). For sample 2, the adjustment is very good (P=0,998), as expected. When working on data from samples 1 and 2 together, these frequencies cannot be adjusted to the expected frequencies according to Rogers (P<0,001). These results are presented on tables 28, 29 and 30 below.

Table 28: Chi-Squared test for adjustment for sample 1

Roger's classification	Observed	Expected
Innovators	68	13,1
Early Adopters	145	70,7
Early Majority	260	178,2
Late Majority	45	178,2
Laggards	6	83,8
Total	524	

P<0,001

Table 29: Chi Squared test for adjustment for sample 2

Roger's classification	Observed	Expected
Innovators	2	2,4
Early Adopters	13	13,1
Early Majority	34	33,0
Late Majority	33	33,0
Laggards	15	15,5
Total	97	

P=0,998

Table 30: Chi Squared test for adjustment for total sample

Roger's classification	Observed	Expected
Innovators	70	15,5
Early Adopters	158	83,8
Early Majority	294	211,1
Late Majority	78	211,1
Laggards	21	99,4
Total	621	

P<0,001

The samples 1 and 2 for *actual_use* were compared using the Mann-Whitney's test. The data is presented on table 31, where the median and the interquartile interval are presented (Percentile 25 and Percentile 75) of the questions, and the p-value obtained in the test. There are statistically significant differences for the variables *utility, reliability, ease of use,* and *actual use*.

Table 31: Mann-Whitney test for the comparison between the samples

Variable	Sample 1	Sample 2	P- value
Functionality	4 (2-4)	4 (3-4)	0,636
Utility	4 (2-4)	4 (3-4)	0,004
Reliability	4 (1-4)	4 (3-4)	<0,001
Compatibility	3 (0-4)	3 (2-4)	0,092
Popularity	0 (0-2)	0 (0-2)	0,765
Communication	2 (0-3)	2 (0-3)	0,152
Status	0 (0-1)	0 (0-2)	0,808
Ease of use	3 (1-4)	0 (0-1)	<0,001
Value	2 (0-3)	2 (0-3)	0,280
Fun	2 (0-3)	2 (0-3)	0,303
Actual Use	5 (3-10)	15 (12-21)	<0,001

In order to establish possible differences in the questions and the result *actual_use* among the categories of the characteristics that differ among the samples (which turn these characteristics into potential confusion factors), the necessary comparison were made.

For the comparison of the questions and the result among the characteristic variables with two categories (gender, year, online/paper) the Mann-Whitney test was used. On the ones with three or more categories (country and education), the Kruskal-Wallis test was used. Tables 32 through 36 present the results, describing the variables by the means and the interquartile interval (percentile 25 to percentile 75).

For the variable "gender", there was no statistically significant different, and therefore, this variable is not a confusion factor.

Table 32: Mann-Whitney test for gender comparison

Variable	Male	Female	P-value
Functionality	4 (2-4)	4 (3-4)	0,650
Utility	4 (2-4)	4 (2-4)	0,563
Reliability	4 (2-4)	4 (2-4)	0,247
Compatibility	3 (0-4)	3 (0-4)	0,611
Popularity	0 (0-2)	1 (0-2)	0,170

Communication	2 (0-3)	2 (0-3)	0,411
Status	0 (0-1)	0 (0-2)	0,071
Ease of use	3 (0-4)	3 (0-4)	0,590
Value	2 (0-3)	2 (0-3)	0,976
Fun	2 (0-3)	2 (0-3)	0,851
Actual Use	7 (3-13)	7 (3-13)	0,976

For the variable "Country", a significant difference was found for the variables reliability, ease of use and actual_use. *Reliability* (Ireland vs. Brazil and Ireland vs. Prefer not to answer), *ease_of_use* (Ireland vs. Brazil, Ireland vs. Others), *actual_use* (Ireland vs. all the other categories).

Table 33: Kruskal-Wallis test for country comparison

Country	Ireland	Brazil	Others	Prefer not to answer	P-value
Functionality	4(3-4)	4(2-4)	4(2-4)	4(1-4)	0,827
Utility	4(3-4)	4(2-4)	4(3-4)	3(1-4)	0,122
Reliability	4(3-4)	4(1-4)	3(1-4)	3(1-4)	0,024
Compatibility	3(1-4)	3(0-4)	2(1-3)	2(0-4)	0,516
Popularity	0(0-2)	0(0-2)	1(0-2)	1(0-2)	0,847
Communication	1(0-3)	2(0-3)	2(1-4)	3(0-4)	0,095
Status	0(0-1)	0(0-1)	0(0-2)	0(0-2)	0,564
Ease_of_use	0(0-2)	3(1-4)	3(2-4)	3(0-3)	<0,001
Value	2(0-3)	2(0-3)	2(0-3)	1(0-3)	0,645
Fun	2(0-3)	2(0-3)	1(0-3)	3(0-3)	0,708
Actual Use	13(9-20)	6(3-11)	4(2-6)	5(3-11)	<0,001

For the variable "education", there were significantly different differences for the variables *utility, reliability, compatibility, ease of use and actual_use*.

Table 34: Kruskal-Wallis test for comparison among categories of education

Education	0	1	2	3	4	5	6	P-value
Functionality	4(0-4)	4(4-4)	4(4-4)	4(2-4)	4(3-4)	4(3-4)	4(0-4)	0,125
Utility	3(0-4)	4(3-4)	4(3-4)	4(1-4)	4(3-4)	4(2-4)	3(0-4)	0,021
Reliability	4(0-4)	4(3-4)	4(4-4)	4(1-4)	4(3-4)	4(3-4)	3(0-4)	0,012
Compatibility	2(0-4)	3(2-4)	3(2-4)	3(0-4)	3(1-4)	4(2-4)	1(0-3)	0,033
Popularity	0(0-1)	1(0-2)	2(0-2)	0(0-2)	1(0-2)	0(0-2)	0(0-3)	0,519
Communication	0(0-1)	2(2-3)	2(0-3)	1(0-3)	2(0-3)	3(0-4)	2(0-3)	0,054
Status	0(0-0)	0(0-2)	0(0-2)	0(0-1)	0(0-2)	0(0-1)	0(0-1)	0,807
Ease_of_use	3(0-4)	3(2-4)	3(0-4)	3(1-4)	1(0-3)	4(2-4)	3(0-4)	<0,001
Value	2(0-4)	2(0-4)	2(0-3)	1(0-3)	2(0-3)	2(0-3)	1(0-3)	0,371

Fun	1(0-3)	2(1-4)	2(1-3)	2(0-3)	2(0-3)	3(0-3)	1(0-3)	0,557
Actual use	5(4-9)	7(3-12)	10(6-15)	5(3-11)	10(4-17)	5(3-7)	6(3-14)	<0,001

For the variable "year of collection" there were significant differences for the variables *utility, reliability, ease-of-use* and *actual use*.

Table 35: Mann-Whitney test for comparison of the year of collection of data

Year	2008	2009	P-value
Functionality	4(2-4)	4(3-4)	0,600
Utility	4(2-4)	4(3-4)	0,004
Reliability	4(1-4)	4(3-4)	0,001
Compatibility	3(0-4)	3(2-4)	0,127
Popularity	0(0-2)	1(0-2)	0,578
Communication	2(0-3)	2(0-3)	0,188
Status	0(0-1)	0(0-2)	0,772
Ease_of_use	3(1-4)	0(0-2)	<0,001
Value	2(0-3)	2(0-3)	0,196
Fun	2(0-3)	2(0-3)	<0,001
Actual use	5(3-10)	15(10-21)	<0,001

For the variable *online/paper* there were no significant differences on any variables studied.

Table 36: Mann-Whitney test for comparison of data collection (online/paper)

Online/Paper	Online	Paper	P-value
Functionality	4(3-4)	4(3-4)	0,771
Utility	4(2-4)	4(3-4)	0,922
Reliability	4(2-4)	4(2-4)	0,521
Compatibility	3(0-4)	3(0-4)	0,414
Popularity	0(0-2)	1(0-2)	0,587
Communication	2(0-3)	1(0-3)	0,594
Status	0(0-1)	0(0-1)	0,333
Ease_of_use	3(0-4)	3(2-4)	0,086
Value	2(0-3)	2(0-3)	0,756
Fun	2(0-3)	2(0-3)	0,508
Actual use	7(3-13)	6(3-11)	0,177

To evaluate the association between the potential confusion factors and Roger's categories on the total sample, the Chi-Squared test was performed for the total sample, and the results are presented in Table 37 below. Rogers' adopter's categories are associated by the test with the characteristic variables of gender, country, education and year of collection.

Table 37: Chi-Squared test for comparison of the characteristics within Roger's categories

Rogers Classification		Innovators	Early Adopters	Early Majority	Late Majority	Laggards	P-value
Categories of age	0	1 (1,4)	4 (2,5)	7 (2,4)	-	-	0,324
	1	3 (4,3)	5 (3,2)	6 (2,0)	-	-	
	2	10 (14,3)	32 (20,3)	40 (13,6)	13 (16,9)	2 (9,5)	
	3	30 (42,9)	60 (38,0)	106 (36,1)	35 (45,5)	12 (57,1)	
	4	11 (15,7)	25 (15,8)	62 (21,1)	11 (14,3)	4 (19,0)	
	5	8 (11,4)	7 (4,4)	18 (6,1)	7 (9,1)	-	
	6	5 (7,1)	5 (3,2)	15 (5,1)	5 (6,5)	-	
	7	-	3 (1,9)	18 (6,1)	2 (2,6)	1 (4,8)	
	8	1 (1,4)	6 (3,8)	10 (3,4)	1 (1,3)	1 (4,8)	
	9	1 (1,4)	8 (5,1)	5 (1,7)	2 (2,6)	1 (4,8)	
	10	-	3 (1,9)	7 (2,4)	1 (1,3)	-	
Gender	Male	53 (75,7)	93 (58,9)	162 (55,1)	46 (59,0)	12 (57,1)	0,041
	Female	17 (24,3)	65 (41,1)	132 (44,9)	32 (41,0)	9 (42,9)	
Country	Ireland	7 (10)	21 (13,5)	49 (16,7)	35 (45,5)	15 (71,4)	<0,001
	Brazil	60 (85,7)	124 (80,0)	229 (78,2)	39 (50,6)	6 (28,6)	
	Other	2 (2,9)	6 (3,9)	9 (3,1)	2 (2,6)	-	
	Prefer not to answer	1 (1,4)	4 (2,6)	6 (2,0)	1 (1,3)	-	
Education	0	2 (2,9)	7 (4,4)	9 (3,1)	-	-	
	1	6 (8,6)	6 (3,8)	20 (6,8)	1 (1,3)	-	
	2	2 (2,9)	5 (3,2)	10 (3,4)	2 (2,6)	2 (9,5)	
	3	38 (54,3)	90 (57,0)	159 (54,1)	28 (36,4)	4 (19,0)	
	4	19 (27,1)	44 (27,8)	69 (23,5)	43 (55,8)	15 (71,4)	
	5	1 (1,4)	4 (2,5)	8 (2,7)	1 (1,3)	-	
	6	2 (2,9)	2 (1,3)	19 (6,5)	2 (2,6)	-	
Year	2008	64 (91,4)	143 (90,5)	255 (86,7)	45 (57,7)	6 (28,6)	<0,001
	2009	6 (8,6)	15 (9,5)	39 (13,3)	33 (42,3)	15 (71,4)	
Online/paper	Online	56 (80)	140 (88,6)	261 (88,8)	74 (94,9)	20 (95,2)	0,057
	Paper	14 (20,0)	18 (11,4)	33 (11,2)	4 (5,1)	1 (4,8)	

These possible confusion factors will be added to the regression so that it is possible to understand their influence in the adoption of mobile content for each sample, as discussed in this chapter.

Preliminary analysis

The next step is the preliminary analysis. The preliminary analysis examines if there is a dependent relationship between MCNs and actual use, which indicates if the variables are good candidates for regression.

The Spearman's test allows us to assess how well the relationship between two variables can be described using a linear function. A perfect Spearman correlation of +1 or -1 occurs when each of the variables is a perfect function of the other. Initially, a Spearman correlation matrix was created between the variable answer (Actual use) and the co-variables (MCN and innovativeness), to indicate which of them are related linearly. That would give the researcher orientation to fit the appropriate model for the data gathered.

Spearman's rank correlation coefficient is a non-parametric (which means not related to any type of distribution) measure of statistical dependence between two variables. Spearman's correlation was chosen here because the measured MCN and innovativeness (X variables) are ordinal variables. The logic for using this correlation is the following: X variables highly correlated with the answer Y (Actual use) tend to enter the model while X variables highly correlated amongst them tend to compete in the model, resulting in just one of the competing variables to enter the model. This occurs because the summing linear models of the type Y=a0+a1X1+...+akXk search for the best linear combination of the X matrix to follow the Y direction (in a vectorial context). X variables very correlated among themselves can be seen as vectors that point to the same direction, so that only one of them is then needed. A linear model is therefore a combination of X vectors, where a variable Xz supplies a direction and its coefficient adjust its length.

Table 38: Spearman correlation between actual use and co-variables

	country	gender	age_group	Education	functionality	utility	Reliability	compatibility	popularity	communication	status	ease_of_use	value	fun	Actual_use
country	1.0000	-0.0591	0.0067	-0.2049	-0.0235	-0.0875	-0.1217	-0.0338	0.0216	0.1006	0.0523	0.2992	-0.0330	-0.0247	-0.3567
gender	-0.0591	1.0000	0.0440	0.0516	0.0182	0.0232	0.0465	0.0204	0.0551	-0.0330	0.0725	0.0217	-0.0012	-0.0075	0.0012
age_group	0.0067	0.0440	1.0000	0.2123	-0.0113	-0.0258	-0.0276	-0.0283	-0.0057	0.0411	0.0221	-0.0561	-0.0364	-0.0063	0.0135
Education	-0.2049	0.0516	0.2123	1.0000	-0.0605	-0.0071	0.0036	-0.0349	0.0379	0.0301	0.0103	-0.1616	-0.0038	-0.0097	0.1231
functionality	-0.0235	0.0182	-0.0113	-0.0605	1.0000	0.7376	0.7200	0.5758	0.3267	0.4469	0.2143	0.5650	0.4609	0.4907	0.2533
utility	-0.0875	0.0232	-0.0258	-0.0071	0.7376	1.0000	0.7795	0.5846	0.2979	0.4184	0.2083	0.4999	0.4113	0.4037	0.2661
Reliability	-0.1217	0.0465	-0.0276	0.0036	0.7200	0.7795	1.0000	0.6418	0.3282	0.4579	0.2263	0.5044	0.4138	0.4298	0.2886
compatibility	-0.0338	0.0204	-0.0283	-0.0349	0.5758	0.5846	0.6418	1.0000	0.3783	0.5088	0.3052	0.4823	0.4911	0.5291	0.2493
popularity	0.0216	0.0551	-0.0057	0.0379	0.3267	0.2979	0.3282	0.3783	1.0000	0.5678	0.5758	0.4122	0.4647	0.4346	0.2312
communication	0.1006	-0.0330	0.0411	0.0301	0.4469	0.4184	0.4579	0.5088	0.5678	1.0000	0.4264	0.5332	0.5147	0.5235	0.2211
status	0.0523	0.0725	0.0221	0.0103	0.2143	0.2083	0.2263	0.3052	0.5758	0.4264	1.0000	0.3059	0.5105	0.4485	0.2633
ease_of_use	0.2992	0.0217	-0.0561	-0.1616	0.5650	0.4999	0.5044	0.4823	0.4122	0.5332	0.3059	1.0000	0.4455	0.4575	-0.0154
value	-0.0330	-0.0012	-0.0364	-0.0038	0.4609	0.4113	0.4138	0.4911	0.4647	0.5147	0.5105	0.4455	1.0000	0.5830	0.3073
fun	-0.0247	-0.0075	-0.0063	-0.0097	0.4907	0.4037	0.4298	0.5291	0.4346	0.5235	0.4485	0.4575	0.5830	1.0000	0.2863
Actual_use	-0.3567	0.0012	0.0135	0.1231	0.2533	0.2661	0.2886	0.2493	0.2312	0.2211	0.2633	-0.0154	0.3073	0.2863	1.0000

In Table 38, most variables combined in pairs have Spearman's correlations between 0.3 and 0.6. Also note that the variables "Value" "Country" are the only ones that have Spearman's correlations between 0.3 and 0.6 with the answer Actual Use; while the other variables have Spearman's correlation between 0 and 0.3 with the answer; this variable (Value) may enter the model. Observe that the if the variable "Utility" enters the model, the other variables "Functionality" and "Reliability", which have correlation between 0.6 and 0.8 with "Utility" will not enter the model. This result is hardly surprising, as individuals may see these MCN as complementary or even as denoting similar practical attributes of an innovation. The variable "Functionality", however, is chosen given that it gathers both the "usefulness" and "trustworthiness" aspects of the other two variables. For these reasons the correlation suggests which variables should be included in the model.

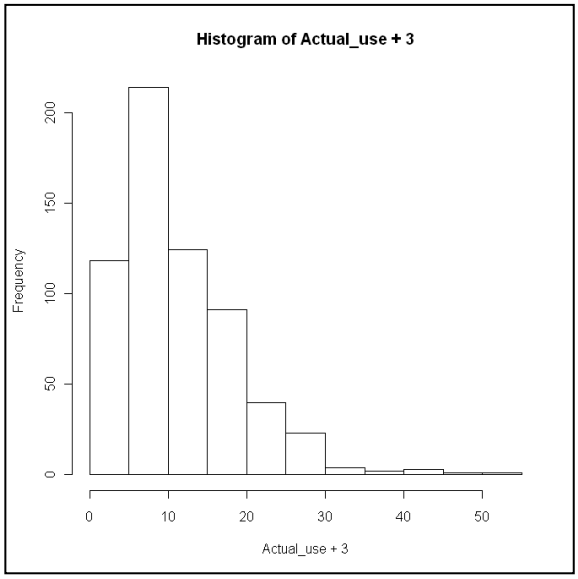
Choose regression model

After finding out the relationships between the variables for the regression model, the histogram for the total sample (sample one and sample two together) is plotted. Histograms are necessary in order to make it possible to identify the regression model to better fit the data gathered in this dissertation.

Samples one and two – total sample

Figure 23 shows a histogram of the distribution of the variable Actual use, built to assist on the choice of the best suited model to fit the data, as explained below.

Figure 11: Histogram of Actual Use + 3 (constant)



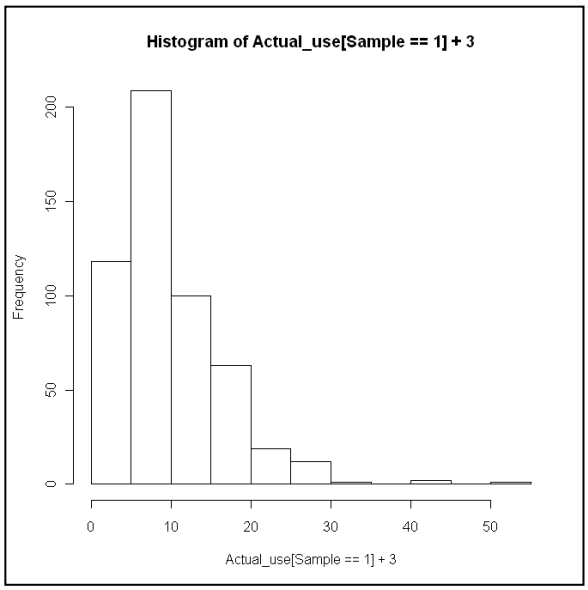
Above is the histogram for the variable "Actual use" + 3 in Figure 20 for the total sample (Sample 1 + Sample 2), with n=621. The histogram shows clear asymmetry, indicating that it could be adequate to use a GLM (Generalized Linear Model) (Neter, Kutner, Nachtsheim and Wasserman, 1996; Paula, 2004, 2010) to explain the answer. Various attempts were made to find the best fit model for the data, including the basic linear model and Poisson, among others.

The constant 3 was summed to the model so that it would converge. This was done because, by definition, the gamma distribution is strictly positive. In this way, when a constant is summed, the distribution is shifted and it is then possible to model the data. In order to make use of the final model, it is enough to subtract 3 from the result obtained.

Sample one

Figure 24 shows the histogram created for the variables “Actual_use” + 3 filtered for the sample who answered questionnaire number 1, with n=524. Sample 1 represents 524/621=84.4% of the total sample (n=621).

Figure 12: Histogram of "Actual use" + 3 for Sample = 1

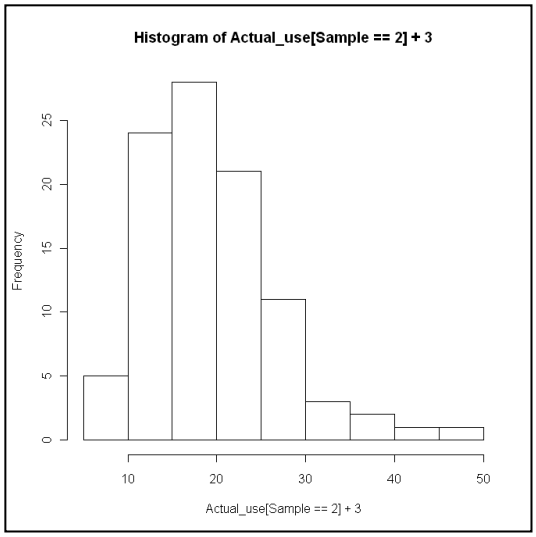


As well as the total sample histogram, this sample’s histogram is also clearly asymmetrical; indicating that the same model, GLM, can be applied to explain the answer.

Sample two

Figure 25 shows the histogram for the variable “Actual_use” + 3 filtered for the Sample 2, with n = 97. Sample 2 represent 97/621 = 15.6% of the total sample and it also show clear asymmetry and indicates that it may also be adequate to make use of GLM’s explanatory power.

Figure 13: Histogram of "Actual_use" + 3 for Sample = 2



The method with best fit for all samples (total sample, sample one and sample two) was the quasi-likelihood model (Paula, 2004, 2010), as described below.

Apply regression model – quasi-likelihood model

A quasi-likelihood model is a linear additive model of the type Y=a0+a1X1+…+akXk, similar to a normal linear model. The difference between them is that the quasi-likelihood model is more general and it allows that the model is adjusted for non-normal Y (Actual Use). The quasi-likelihood model helps the comprehension of the relationships between X (MCN and Innovativeness) and Y (Actual use). It is a dispersion tool to predict unobserved Y to X relationships between those variables.

In the pursuit for the best fit to try to explain the variable Actual use, a quasi-likelihood model was fitted, with function of variance $V(\mu) = \mu^2$ (Paula, 2004, 2010; Neter, Kutner, Nachtsheim and Wasserman, 1996). The variance function $V(\mu) = \mu^2$ was used because it defines Y+3 ~ gamma in the model (confirmed by the histogram and diagnostic plots later in this section) that is best adjusted to the data. The other alternatives considered

were $V(\mu) = 1$ (normal), $V(\mu) = \mu^{\square}$ (Poisson) and $V(\mu) = (\mu(1-\mu))$) (Binomial), as described by Paula (2004, pg. 196-197).

Let Y_i be Actual_use relative to the i -th person. Making $\sigma^2 = 1$ and supposing that $\mu, y \geq 0$, then $Y_i + 3 \sim G(\mu, 1)$ where

$$\mu_i + 3 = \alpha_0 + \alpha_1 utility_i + \alpha_2 status_i + \alpha_3 easy_{of_{use_i}} + \alpha_4 value_i + \alpha_5 fun_i,$$

Total sample (sample 1 + sample 2)

The output for the proposed model (quasi-likelihood) for the complete dataset (Sample 1 + Sample 2) shown below.

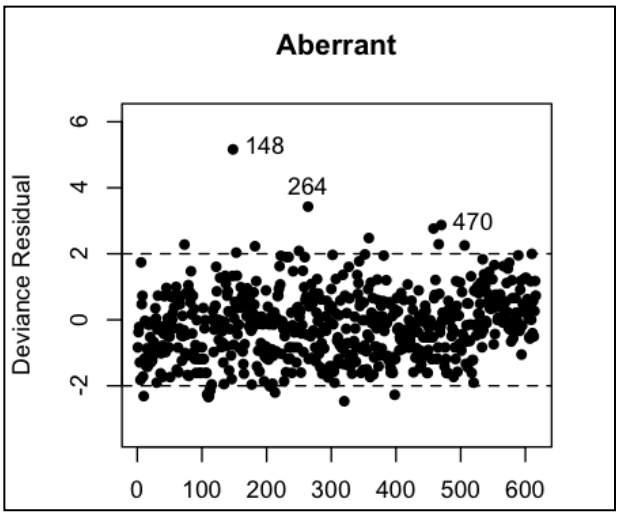
```
glm(formula = AU ~ country + utility + status + ease_of_use +
    value + fun, family = Gamma(link = identity))

Deviance Residuals:
     Min        1Q    Median        3Q       Max
-1.29560  -0.47374  -0.08886   0.25577   2.72025

Coefficients:
            Estimate Std. Error t value Pr(>|t|)
(Intercept)   9.9746     0.5844  17.068  < 2e-16 ***
country      -1.9256     0.3917  -4.916 1.14e-06 ***
utility       0.9319     0.1955   4.766 2.35e-06 ***
status        0.7568     0.3050   2.482 0.013345 *
ease_of_use  -1.0620     0.1934  -5.491 5.86e-08 ***
value         0.6989     0.2314   3.020 0.002632 **
fun           0.7450     0.2211   3.370 0.000799 ***
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

```
(Dispersion parameter for Gamma family taken to be 0.3405513)

Null deviance: 235.31  on 615  degrees of freedom
Residual deviance: 180.30  on 609  degrees of freedom
5 observations deleted due to missingness)
AIC: 3845.9
```

Note that the dependent variables that entered the model were Country, Utility, Status, Ease of Use, Value and Fun, with coefficients of (-)1.926, 0.932, 0.757, -1.062, 0.699, and 0.745 respectively, and significance of (Country, Utility, Ease of Use, and Fun) between 0 and 0.001, (Status) between 0.01 and 0.0501, (Ease of Use) between 0.01 and 0.05, (Value) between 0.001 and 0.01, and (Fun) between 0 and 0.001. These results stay in line with our initial predictions. It is important to notice the negative signs for the variables Country and Ease of use. The latter, in particular, would be explained by the theoretically predicted interest of innovative individuals to adopt technologies which seem complex rather than simple. This attitude responds to the behavioural expectations of individuals who want to be seen as innovative, therefore, as being able to perform actions which others may not or, at least, which have not achieved a critical mass of adoption. The other variables were not significant.

Figure 26 shows the diagnostic plot. Diagnostic plots are used to detect problems with the fitting of the regression model. In this case, they indicate the Outliers.

Figure 14: Diagnostic plot- outliers – for the model of quasi-likelihood with variance function of V(M)=M^2 with identity link



The main candidate for outlier is respondent number 148. An outlier may indicate a sample peculiarity or may indicate a data entry error or simply a respondent that thinks and behaves differently from the expected. Since human beings are very complex, outliers are expected. The outliers occur only for the variables functionality and status, as shown in Figure 26.

On the "Outliers" plot there are 26 points outside the trust interval of 95%, indicated by a circle. Because there are 621 values and 26/621 = 4.19%, it is possible to affirm that the maximum of 5% of values are outside this interval. The trust interval of 95% represents that the interval has a minimum of 95% trust. In this way, it is expected that a maximum of 5% of the observations are outside of this interval, which is what occurs here, validating that the model chosen is a good fit for the data collected.

Figure 15: Outliers

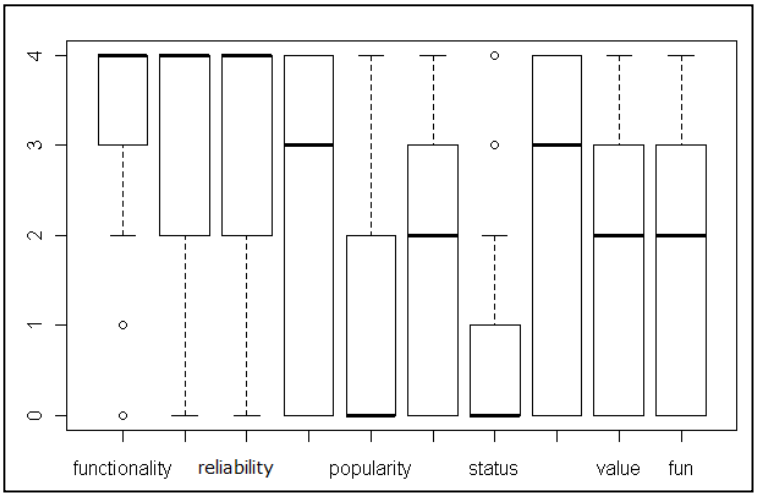
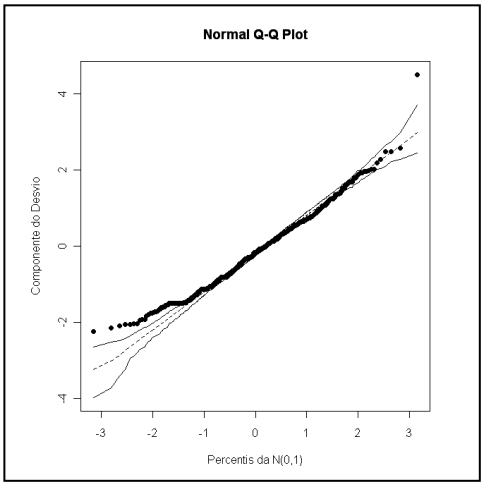


Figure 27 shows the envelope plot, also known as the Q-Q-plot. The plot suggests that the dispersion was partially controlled by the proposed model, given that the negative residues are above the mean. The trust bands provide the error margins for these observations. This plot can be thought of in the following way: if the variable Actual use would follow exactly a gamma distribution, the observation marks would be distributed exactly over the line.

The likelihood-ratio test compares the fit of two models: the model created with the null model (Paula, 2004). The likelihood ratio indicates how many times more likely the data are under one more than the other. The likelihood ratio model is used here to calculate the p-value to decide if it is possible to reject the null model in favour of the alternative model (the model proposed in this study). The likelihood ratio test for the total sample is shown in Figure 28.

Figure 16: Envelope plot for the quasi-likelihood with variance function of V(μ)=μ^2with identity link.



The test likelihood-ratio returns p-value of 1 — P{X2609<180.3} = 1.0000, which indicates good fit. Therefore, using the techniques explained above, the likelihood regression proposed partially explains or predict adoption of innovation (Actual use of mobile content) for the total sample. It returned a framework that can be schematically represented by Figure 29:

Figure 17: Schematic representation of Quasi-likelihood regression for total sample

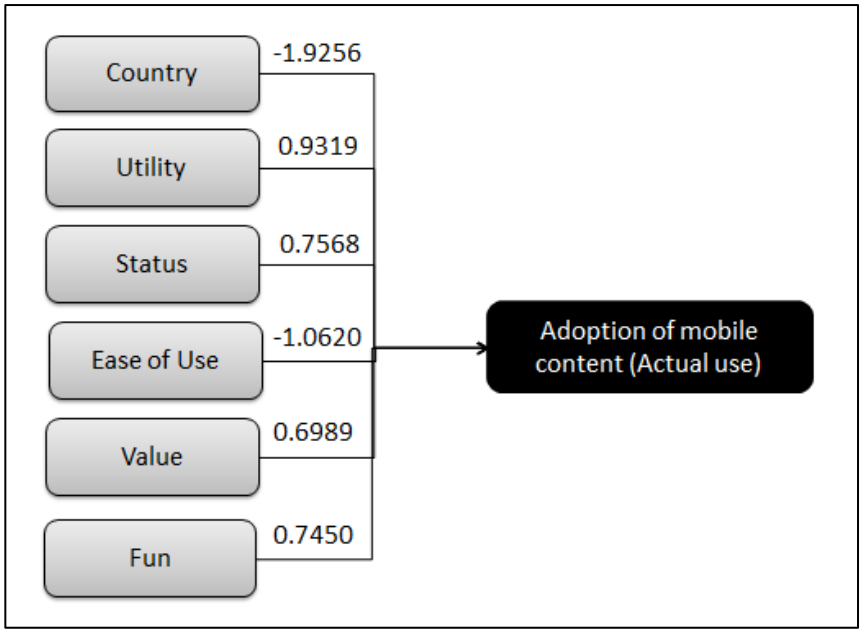


Figure 29 represents schematically the predictive relationship of MCN (utility, status, ease of use, value and fun) and country and their coefficients for the adoption of mobile content (Actual use), according to the fitted quasi-likelihood model described. Coefficients are numerical values that indicate how strong the predictive relationship is between the variables (MCN, Innovativeness and Actual Use)

In other words, it is possible to affirm that the variables represented in Figure 29 help predict the adoption of mobile content for the total sample gathered in this dissertation. This means that the variables Country, Utility, Status, Ease of Use, Value and Fun were found to be significant predictors of the adoption of mobile content.

Sample one

This subsection performs the regression in the data collected using the first questionnaire (sample one) in order to find a model that helps predict the adoption of mobile content (Actual use).

The output for the proposed model for the dataset using Sample 1 at SPSS statistical package is shown below. The constant 3 was added to the model so that it would converge.

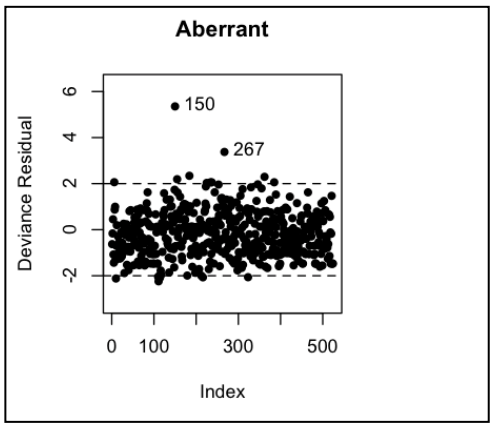
```
Call:
glm(formula = AU1 ~ utility[Sample == 1] + status[Sample == 1] +
    ease_of_use[Sample == 1] + value[Sample == 1] + fun[Sample ==
    1] + Innovativeness[Sample == 1], family = Gamma(link = identity))

Deviance Residuals:
    Min       1Q   Median       3Q      Max
-1.2065  -0.5094  -0.1389   0.2390   2.8778

Coefficients:
                          Estimate Std. Error t value Pr(>|t|)
(Intercept)                 7.4635     0.4269  17.482  < 2e-16 ***
utility[Sample == 1]        0.6006     0.2385   2.518  0.01209 *
ease_of_use[Sample == 1]   -0.4989     0.2522  -1.978  0.04848 *
value[Sample == 1]          0.7643     0.2370   3.225  0.00134 **
fun[Sample == 1]            0.6494     0.2408   2.697  0.00722 **
```

```
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

(Dispersion parameter for Gamma family taken to be 0.3855981)
(Dispersion parameter for Gamma family taken to be 0.3875676)

Null deviance: 181.58  on 523  degrees of freedom
Residual deviance: 160.08  on 519  degrees of freedom
AIC: 3168.1
```

The dependent variables that entered the model were Utility, Ease of Use, Value and Fun with coefficients of 0.60, -0.498, 0.764, 0.649 and respectively, and significance for (Utility and Ease of Use) between 0.01 and 0.05, between 0.01 and 0.05, (Value) between 0.01 and 0.05, (Fun) between 0.01 and 0.05. It is worth noticing that as with the previous model, all significant variables retain their positive sign (except Ease of use which remain negative). This result reinforces the theoretical predictions expected as well as our analysis on the demographic differences involved. The other variables were not significant.

Figure 30 shows the diagnostic plot – Outliers – for the fitted model for sample 1.

Figure 18: Diagnostic plot (Sample 1) Outliers - for the model of quasi-likelihood with variance function OF V (μ) =μ^2with identity link

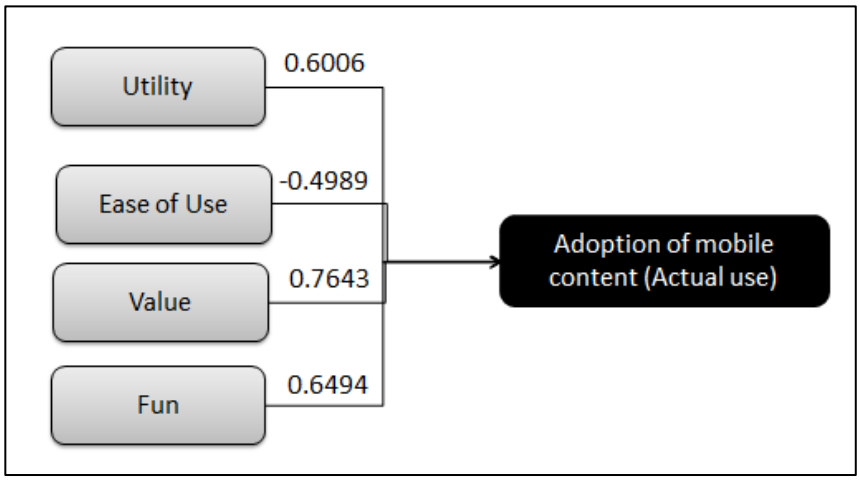


In the outliers plot, there are 19 points out of the trust interval of 95%. Because n=524 and 19/524 = 4.57%, it is possible to affirm that the maximum of 5% of values are outside this interval.

The above plot (Figure 30) shows the envelope plot for Sample 1. It suggests that the dispersion was partially controlled by the proposed model, as the negative residues are above the mean. However, the likelihood-ratio test returns p-value of$1 - P\{X^2_{519}<160.1\}$ = 1.000, which indicates a good fit.

In summary, the model proposed to partially explain or predict adoption of innovation (Actual use) for the Sample 1 returned a framework that can be schematically represented by Figure 31.

Figure 19: Schematic representation of Quasi-likelihood regression for Sample 1



The results obtained for sample 1 alone differ from the results obtained for the total sample (1 + 2). In that the former includes the variable "country" as a statistically significant predictor of adoption of innovations, which is not surprising since the samples differ between each other and the countries analysed is also different between them. Further comparison between results obtained in different samples is performed in Chapter Six.

Figure 31 represents schematically the predictive relationship of five MCN (utility, ease of use, value, fun) and their coefficients for the adoption of mobile content (Actual use), according to the fitted quasi-likelihood model described.

Sample two

The second dataset, with data collected from the respondents of the questionnaire, 2 is analysed here. The dataset included a different measurement for innovativeness than the one used for Sample 1. This time, innovativeness score is calculated according to the DSI innovativeness score.

The output of the proposed model for the dataset using Sample 2, (SPSS statistical package) is shown below. The other variables were not significant.

```
Call:
glm(formula = AU2 ~ communication[Sample == 2] + fun[Sample ==
    2], family = Gamma(link = identity))

Deviance Residuals:
     Min        1Q    Median        3Q       Max
-1.25642  -0.20828  -0.04342   0.18709   0.82457

Coefficients:
                           Estimate Std. Error t value Pr(>|t|)
(Intercept)                 14.6260     0.9120  16.037  < 2e-16 ***
communication[Sample == 2]   1.7602     0.5842   3.013  0.00333 **
fun[Sample == 2]             1.3068     0.5279   2.475  0.01510 *
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

(Dispersion parameter for Gamma family taken to be 0.1060175)

    Null deviance: 13.996  on 96  degrees of freedom
Residual deviance: 10.110  on 94  degrees of freedom
AIC: 631.3
```

Note that the dependent variables that entered the model were Communication and Fun, with coefficients of 1.76 and 1.307 respectively, and significance levels of (Communication) between 0.001 and 0.01 and (Fun) between 0.01 and 0.05. The other variables were not significant.

The outliers plot (Figure 31) shows only 4 points outside of the trust interval of 95%. As n=97 and 4/97 = 4.12%, it is possible to affirm that the maximum of 5% of values are outside this interval.

Figure 20: Diagnostic plot for the quasi-likelihood model with identity link

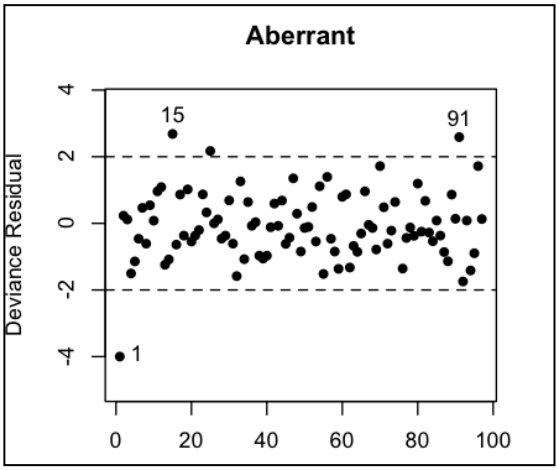
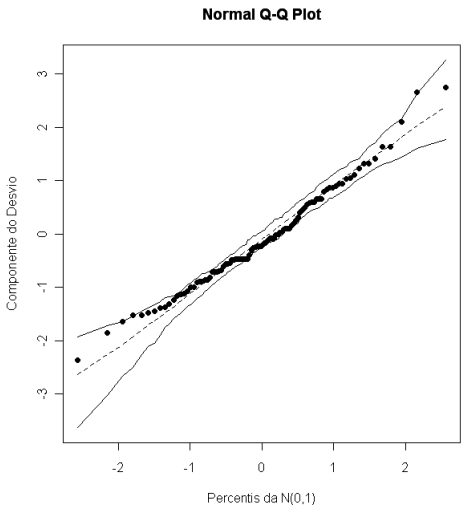


Figure 33 shows the envelope plot, suggesting that the dispersion was partially controlled by the proposed model, as the negative residues are above the mean. However, the likelihood-ratio test returns p-value of 1 —P{X294<10.1} = 1.0000, indicating a good fit.

Figure 21: Envelope plot for the quasi-likelihood model for sample 2



In summary, the model proposed to partially explain or predict adoption of innovation (Actual use) for the Sample 2 returned a framework that can be schematically represented by Figure 34.

Figure 22: Schematic representation of Quasi-likelihood regression for Sample 2

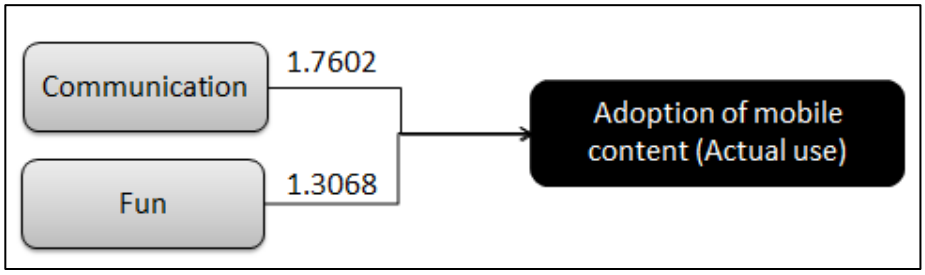


Figure 34 represents schematically the predictive relationship of two MCN (communication and fun) and its coefficients for the adoption of mobile content (Actual use), according to the fitted quasi-likelihood model described for Sample 2.

Comparison of results for total sample, sample 1 and sample 2

Table 39 summarizes the results achieved in the regression using the almost-likelihood model for the Total Sample, Sample 1 and Sample 2. The "X" represents the variable (MCN and innovativeness), which were found to be significant in the prediction of Actual Use for each sample studied.

Table 39: Comparison of model samples - regression model

	Total Sample (n= 621)	Sample 1 (n=525)	Sample 2 (n=96)
Functionality			
Utility	X	X	
Reliability			
Compatibility			

Popularity			
Communication			X
Status	X	X	
Ease of use	X	X	
Value	X	X	
Fun	X	X	X

Note in Table 39 that the variables found to predict Actual Use for the Total Sample and Sample 1 are the same (except from Innovativeness, which is present for Sample 1 but absent in the Total Sample model). On the other hand, the model created for Sample 2 differs from the other two models. The differences observed between samples and a detailed discussion of the results herein obtained is further elaborated in the concluding sections of this chapter. Since the total sample combines samples 1 and 2, the results to be considered in this research are that the MCN that affect the adoption of mobile content are Utility, Status, Ease of Use, Value and Fun.

Status, to begin with, is deemed significant in a study based on a sample taken from China (Zhou, 2011). The authors of this second study ascribe the importance of status in the Chinese sample to cultural particularities. In short, they find the cause of its significance on the historical weight that hierarchies have had in China (Zhou, 2011). This cultural particularity cannot be taken as explanatory of the same result in Brazil. Moreover, demographic variables may not be the cause of this result.

5.7. Demographic analysis

Working with samples gathered from different populations may result in the emergence of confusing variables. Typically, these variables are usually ascribed to the social and cultural variables that are said to explain the particularities of each sample. However, it is also true that cultural differences should not be presupposed from the start as they also create an unnecessary bias for the research. In addition, there is much to be learned from comparing results gathered from populations that are said to be culturally divergent. The research here has been based on two different samples, one of which is comprised mainly of Brazilian respondents and a second of Irish respondents. This section's purpose is to compare these two demographics and to understand how they fit into the context of the larger research.

First, socioeconomic variables (income, education) are expected to influence the adoption of mobile technologies and services in Brazil. A 2011 study targeting only the marginal population of the Brazilian Favelas found a higher-than-expected use of mobile phones (De Souza and Sutko, 2011). Penetration of mobile phones was indeed nearing 90%, but important caveats must be considered. This study reported that the high penetration of mobile phone usage within this population was accompanied by a limited use of advanced mobile services (De Souza and Sutko, 2011). Smartphone technologies are still lagging. The reason for this has to do with the costs of entry, which in practice mean: having a bank account, being able to get a yearly subscription, and the security risks of possessing a smartphone (De Souza and Sutko, 2011). Furthermore, this study reported that a lack of understanding of the value or usefulness of mobile services as well as hesitation to adopt, due mainly to fear of hidden costs, was also

responsible for its limited use in comparison to the high percentage of mobile phone users (De Souza and Sutko, 2011). Finally, this study notes that similar results were found during a previous study of a socioeconomically similar sample from Uganda (Burrell, 2010). These studies seem to highlight the weight that socioeconomic variables have when studying populations that have access to the technologies in principle, but may lack the skills needed to assess their value, as well as the needs to profit from their use. For example, mobile banking has no purpose for someone without a bank account.

The main issue with sample populations like the Brazilian one (and Latin America in general) is the persistence of stark inequality, which amplifies the effect that socioeconomic variables have on the technology adoption. This is confirmed by researchers who find little evidence of disparate rates of technology adoption when comparing populations with similar socioeconomic status, but different geographies (Donner, 2008). This would then refine the argument regarding demographic differences in the direction of socioeconomic variables, rather than cultural habits or values. The underlying question would then go along the lines of how tech-savvy must a population be in order to have adopter groups that closely resembles Rogers' groups.

Besides socioeconomic variables, urban versus rural is an important demographic variable to take into account when examining technology adoption in Brazil (Puschel, Hernandez and Mazzon, 2010). Rural populations would profit little from the adoption of mobile technologies as they still cannot rely on, for instance, reliable Internet connections or broadband speeds, which are requirements for many advance mobile services (e.g., video, music, etc.). However, given the construction of sample #1 of this research, there would seem to be little or no reason for concern regarding the relevance

of the socioeconomic variables noted. In the statistical results reached, it was noted that education is indeed related to the constructs utility, reliability, compatibility, ease of use and actual_use. Similar results were reached in a study based on a Saudi Arabian population (White, Al-Gahtani and Hubona, 2007), where the researchers explicitly mention that education is inaccessible for a considerable part of the population (poor women). The positive relation between education and these variables seem to be in agreement with the studies mentioned above.

The second sample of this research was made up mainly of Irish respondents. Ireland, as part of the EU and as a country whose economic success, especially in the 80s and 90s, rallied the income of its population, receives special attention by technology providers. In practice, this means that iPhone, Android, Windows, Java and Symbian operating systems have since 2008 designed a series of product development strategies aimed at targeting the needs and expectations of a Western European middle class (Rabe, 2009). In this respect, adopter-based technological development would be more and more present in this part of the world. Although one cannot rule out that catering to an EU population could, in fact, be seen as catering for a socioeconomically similar population elsewhere. The weight of demographic variables is, again, difficult to assess, for cultural and social differences may not necessarily imply rejection of technologies. For the demographics concern here, one could expect higher rates of adoption in an Irish sample. In principle, however, the samples here are not meant to be representative of an entire population. The importance of demographic variables should be judged according to the results, which is the topic of the next section.

5.7.1. Demographics and assessment of results

For sample 1, utility, ease of use, value, fun and country were reported as significant variables in the adoption of mobile content.

Ease of Use is deemed significant by studies based on samples that, at least at first glance, can be said to carry strong cultural differences: Greece, Iran, the United States and China (Zarmpou, Saprikis, Markos and Vlachopoulou, 2012; Amirkhani, Hajialiasgari and Salehahmadi, 2011; Van Slyke, Ilie, Lou and Stafford, 2007; Zhou, Lu and Wang, 2010). This comparison would seem to support the lack of relevance that cultural particularities have in the adoption of mobile services. With that in mind, this research can expect that the total sample would carry no conflicting variables, as would have been the initial suspicion. The significance of the variable value was confirmed in samples taken from the United States (Van Slyke, Ilie, Lou and Stafford, 2007; Parthasarathy and Bhattacherjee, 1998; Plouffe, Vandenbosch and Hulland, 2001; Van Slyke, Ilie, Lou and Stafford, 2004a). The demographics of the U.S. population vary widely, though, making demographic specificities less explanatory as elsewhere. Fun, which was reported as significant for both samples was also found significant for a study based on a Finnish sample (Verkasalo, 2008) and for a Chinese sample (Zhou, 2011). Given the obvious cultural differences between all these populations, it seems accurate to conclude that demographic (cultural) variables are not relevant when it comes to the variable enjoyment.

For sample 2, only communication and fun were significant. Both of these variables are also reported to be significant in two studies based, nonetheless, on two very culturally divergent populations: Finland (Verkasalo, 2008) and China (Zhou, Lu and Wang, 2010;

Zhou, 2011). This would seem to be an argument against the relevance of cultural variables and would make the explanation revolve instead around socioeconomic variables. Given that the sample of this research is not representative of Ireland as a whole, this comparison helps to highlight the weight that age and education may have in the results.

Finally, Utility, Status, Ease of Use, Value, Fun and Country were significant in the total sample. Not surprisingly, Country also demonstrated significance.

Overall, it is likely that the samples studied here have a demographic constitution, which, even if not representative of their respective countries, still would have had an impact on the results obtained. However, most importantly for the discussion of the results of this research, the comparison with other studies on the adoption of different mobile services seem to show that demographic particularities do not have major effects, that is, do not bias the results in a strictly predictable manner. This conclusion would, in turn, help to validate the use of the samples conducted in this research.

5.8. Validation of the results

The results of this study were validated through statistical tests, as presented in the previous chapter. Where psychometric techniques are involved, test validity is defined as "the degree to which evidence and theory support the interpretations of test scores" (American Educational Research Association, Psychological Association & National Council on Measurement of Education, 1999). Psychometrics is the field of study concerned with the theory and technique of educational and psychological measurement, which includes the measurement of knowledge, abilities, attitudes and

personality traits. This section presents an analysis of the threats to validity of this research and how these threats are treated.

5.8.1. Threats to Validity

Possible threats to validity are identified and treated so that data collected can generate the more accurate results. Two types of validity threats are considered: internal and external:

Internal validity threats are experimental procedures, treatments or experiences of the participants that threaten the researcher's ability to draw correct inferences from the data in the experiment. Table 40 identifies possible threats for internal validity and explains how these threats were avoided within this research.

Table 40: Threats to internal validity

Type of threat to internal validity	Description of threat	Actions that can be taken to avoid threat
Regression	Participants with extreme scores might be selected for the experiment.	The scores should regress toward the mean. Extreme scores can be discarded before processing the results.
Selection	Since the selection is not random, participants can be selected who have certain characteristics that predispose them to have certain outcomes (Creswell, 2009)	Analysis will be performed for all the samples collected and demographic data will be explicated within the dissertation. The results will not be generalized.
Desistance	Because the survey is long, participants may give up on answering the survey, completing it only partially	Non-completed survey or cases will be automatically discarded
Testing	Because the survey is very long, participants can give up giving honest answers, and	A validity test through a face-to-face interview will validate the results obtained.

	randomly choose answers for the survey	
Survey instrument	Results might be different for the online and paper version of the survey, because the means may influence relationship with technology.	The results for both questionnaires will be analyzed separately and then compared afterwards.
Social Desirability Bias	Social Desirability Bias (Nancarrow & Brace, 2000) is the tendency of respondents to give answers they think will "make them look better" on the eyes of others and the evaluator.	(Dillman, et al., 2008) report that surveys conducted in person or over the phone tend to provide more positive feedback than web surveys. Therefore, part of the threat will be treated using web surveys.

- **External Validity:** Occur when the inferences taken are drawn incorrectly (Creswell, 2009). The techniques used to avoid threats to external validity are summarized in the Table 41 below:

Table 41: Threats to external validity

Type of threat to external validity	Description of threat	Actions that can be taken to avoid threat
Interaction of selection	Because the groups are not randomly selected, the results cannot be generalized	The results are not going to be generalized.
Interaction of history	The results of this experiment are time-bound. So they cannot be generalized to past and future situations	The results will not be generalized to past and future situations.

5.9. Discussion

This section discusses the research results and reflects on them. It analyses and compares the results obtained with results expected from an analysis of the existing literature and discusses how this research contributes to the scientific body of

knowledge. It incorporates insights into the findings, presents what was learned and discusses some practical applications of the research findings.

5.9.1. Reflection on results

Previous research has shown great growth in the number of users of mobile technologies, and to the related increase in the services delivered via mobile phones (Vatanparast, 2010). As underlying technologies evolve and develop, mobile services are gaining increasing importance. The potential to increase usage of these mobile services (including mobile content) is an important reason for studying their adoption.

Mobile technologies are changing the business environment. These technologies have the potential to create new markets and opportunities as well to change the existing marketing environment available nowadays (Stewart and Pavlou, 2002; Ktoridou, Epaminonda, Kaufmann and Arutusi, 2008). This research contributes to a better understanding of the variables that lead to the adoption of mobile content and how these variables manifest at different stages of the adoption lifecycle. Chapter Two provided an overview of mobile technologies and services, contextualizing the technology used in this research, outlining technological advances in the field for the mobile services under investigation in this dissertation.

Existing literature (Biljon, Kotze and Marsden, 2007) supports the premise that adoption variables and motivational needs are connected and help predict the adoption of innovations. Therefore, based on two different literature fields (adoption and motivational research), this study has identified variables that may allow businesses to reach customer segments empowered with more information, and thus more efficiently and cost effectively meeting consumer Mobile Content Needs (MCN). These variables

are derived from different research fields: adoption of innovations and uses and gratifications approach and motivational research (discussed in Chapter Three). As companies redirect their marketing spending to interactive marketing, focusing on targeted consumer segments, the results obtained in this research serve as basis for businesses to understand better their customers' needs and motivations. By understanding how customers' needs change according to the stage in the adoption lifecycle of an innovation, it is possible to better develop targeting market strategies that are more appealing to all groups of customers. To take an example, consider the need for "ease of use" in mobile content: "Innovators" perceive an innovation's ease of use to be significantly less important in the decision to adopt mobile content than for the "Laggard" category of user. Strategically, therefore, it is important that businesses understand that the perception of ease of use should increase with time, so all groups of adopters are stimulated to purchase a mobile content innovation.

Through the study of aspects of the individual adoption process of mobile content, this research contributed to both the consumer behaviour and adoption literature. The study of innovations in this dissertation is limited to mobile content. This research has studied the adoption behaviour of large samples (621 respondents) of consumers over a relative short time period and found results with strong theoretical support. The next subsections discuss the results obtained for each research question studied and put the results in the context of existing literature to help explain the findings.

Why might people be reluctant to adopt mobile services?

Privacy concerns are a clear obstacle to mobile services. Users may want to delay the adoption of a service until mobile service providers can ensure the privacy of data and

communications. Consequently, providers must demonstrate the objective value and safety of such services (López, Molina and Bouwman, 2008). The marketing strategy of providers should therefore include showing the value and safety of new services. Furthermore, this strategy could target those users who may already fall in the later adopter groups.

5.9.2. Comparison of mobile content needs among categories of adopters

The first research question examined the respondents' rating of importance for each MCN: Functionality, Utility, Reliability, Compatibility, Communication, Popularity, Ease of Use, Status, Value and Fun. The respondents were classified into five groups of adopters: Innovators, Early Adopters, Early Majority, Late Majority and Laggards. This research compared how each group of adopter rated each of MCN and examined the significant differences in ratings across the groups. The results include the following:

- *Innovators and Early Majority* rate differently their needs for functionality, utility, reliability, compatibility, ease of use, value and fun;
- *Innovators and Late Majority* have different perceptions of ease of use and value;
- *Innovators and Laggards* perceive ease of use and value differently
- *Early Adopters and Early Majority* have different perceptions of functionality, utility, reliability, compatibility, communication, ease of use, value and fun;
- *Early Majority and Late Majority* perceive the following MCN differently: communication, ease of use, value and fun;
- *Early Majority and Laggards:* rate ease of use differently from each other;
- *Early Majority and Late Majority*: differ in their perception of functionality, utility and reliability influencing the adoption of mobile content.

It is worth noting that respondents were classed in categories of adopters according to their level of innovativeness: the higher the respondent's levels of innovativeness, the higher they are classified in the adoption groups. Results show that most of the time, respondents with higher level of innovativeness classified MCN as less important than respondents with a lower level of innovativeness. This may be due to the association of high level of innovativeness with less attention to the characteristics of innovations. Respondents with high level of innovativeness do not adopt mobile content because they feel the need to do so. They adopt for the "thrill" they find by being a first adopter (Rogers, 1965), and this thrill seems to evolve into needs as the innovation adoption lifecycle progresses in time.

The results indicate that the main differences in ratings are between Innovators and Early Majority and between Early Adopters and Early Majority. These results validate Moore's hypothesis in "Crossing the Chasm" (Moore, 1991). As discussed in Chapter Three, Moore claimed that there is a "chasm" between the categories of Innovators and Early Adopters. According to Moore, this is because Early Adopters and Innovators have different expectations for innovations when compared to the Early Majority or "mainstream" consumers.

This study aims to broaden the understanding of how differently the categories of adopters rate their needs for mobile content throughout the adoption process. This knowledge would facilitate business to produce better (evolving) mobile content, as well as market it appropriately according to the mobile content adoption phase. Users would benefit from the results of this research once producers and developers seek to better fulfil their different needs throughout the lifecycle of a mobile content.

5.9.3. Are MCN associated with adoption of mobile content?

This research has used elaborate statistical models to inspect a possible relationship between MCN variables and the adoption of mobile content. The results obtained differed among the samples used, but the results of the regression for the total sample suggest a more general result (applicable to all respondents surveyed). Results indicate that the following MCN have significant correlation with the adoption for mobile content within the sampled categories of adopters: utility, status, country, ease of use, value and fun.

Regarding the differences observed between the samples, the variables found to predict actual use of mobile content for the total sample and for sample one are not congruent – sample one does not include the variables country and status. On the other hand, the model created for sample two differs substantially from the other two models. The reasons for the different results obtained for the three samples may include demographic differences between samples, as well as the use of different measurements of innovativeness. The fact that the sampling method was non-random may also contribute to differences between each sample and the combined sample.

It is argued that innovation adoption varies across cultures (Bagchi and Kirs, 2009), demographics (Branca, 2008) and personal preferences (Tan, 1994), and this may be reflected in the results obtained by analysis of three different samples studied (two separate and one combined sample). For the regression using the smallest sample (n=96), which sampled mainly post-graduate students and professors from a third level institution in Dublin, Ireland, gave results which indicated that only two MCN influence the adoption of mobile content: communication and fun. However, for a larger sample

(n=525), with responses from many countries (mainly Ireland and Brazil), the variables obtained identified: utility, status, ease of use, value, and fun as significant in the adoption of mobile content. In this way, different results are obtained from different samples, but they tend to point to the results achieved by the Total Sample (n=621), which are Utility, Status, Country, Ease of Use, Value and Fun. The regression results from the combined Total Sample (n=621) identified Utility, Status, Ease of Use, Value and Fun as significant variables and it is on this sample and result upon which this discussion rests.

Finally, the results based on the combined samples also found that the variable for *Country* has a significant impact on the adoption of mobile content and services. This result is interesting given that the total sample retains all significant MCNs from sample one despite being mixed or less uniform in terms of demographics. It is important to remember here that the countries at stake were Brazil and Ireland, which present at first hand very different demographic markers. Differences are evident, yet the adoption of mobile content and services could not be straightforwardly assumed as biased. It is for this reason that our results are revealing in this respect, as they confirm an initial intuition regarding the weight that different geographical locations, which implicate different cultural frameworks, actually have on the adoption of a universally available innovation, such as the mobile content and services studied here. In short, nationality plays an important role, but further research is necessary to sound out the breadth and depth of culture's impact in this context.

It is worth recapping the conceptual formulation for these MCN variables. Utility has been studied as a variable in adoption by (Dickinger, Arami and Meyer, 2006; Knutsen,

Constantiou and Damsgaard, 2005; Cheong and Park, 2005; Yang, Chatterjee and Chen, 2004; Yu, Liu and Yao, 2003; Pedersen and Ling, 2002). These researchers classed it as "usefulness" or "performance expectancies". Status was found to be connected with adoption of innovations (Dickinger, Arami and Meyer, 2006; Nysveen, Pedersen and Thorbjørnsen, 2005; Kim, Chan and Gupta, 2005; Pedersen and Ling, 2002). Value, also defined by previous researchers as "Relative Advantage" or "Perceived value" has previously been found as a variable that significantly predicts the adoption of innovations (Kim, Chan and Gupta, 2005; Barnes and Huff, 2003). Ease of use, or "Perceived complexity" and "Effort expectancies" was found by previous researchers (Wang, Lin and Luarn, 2006; Kim, Chan and Gupta, 2005; Harris, Rettie and Kwan, 2005; Wu and Wang, 2005; Luarn and Lin, 2005; Haque, 2004; Hung, Ku and Chang, 2003; Julius and Khasawneh, 2002; Julius and Khasawneh, 2002) to be a significant variable in the prediction of adoption of innovations. Also, the MCN Fun, classed as "Enjoyment" or "Playfulness" was previously studied in the context of the adoption of innovations (Dickinger, Arami and Meyer, 2006; Nysveen, Pedersen and Thorbjørnsen, 2005; Kim, Chan and Gupta, 2005; Pedersen and Ling, 2002), and was also found to be a significant variable in the adoption of innovations.

An important contribution of this research therefore is in the finding that these variables (MCN) are significantly correlated to the adoption of mobile content, a modern innovation made possible by mobile networks and technology. This relationship is further explored in the next section.

5.9.4. Cross comparison of MCN and adopter category results

An important discussion of the results hinges on how MCNs differ across adopter categories and it has been possible to statistically analyse these differences. A discussion of these differences is intended as a contribution to a deepened understanding of how a combination of both adoption of innovations and motivational variables leads to mobile content adoption.

Research question one asked whether, by looking at how differently adopter groups rated the need for each MCN, the perception of need for mobile content changed through the adoption lifecycle. Research question two asked whether a set of MCN variables could help predict the adoption of mobile content. The combination of the results obtained determined how the perception of predictive MCN may change throughout the mobile content adoption lifecycle.

A cross comparison of the MCN variables used to answer question one with responses for question two are summarised below.

Table 42: Combined results of questions 1 and 2

Group comparison		Utility	Status	Ease of use	Value	Fun
1st group	**2nd group**					
Innovators	Early Adopters					
Innovators	Early Majority	↓		↓	↓	↓
Innovators	Late Majority			↓	↓	
Innovators	Laggards			↓	↓	
Early Adopters	Early Majority	↓		↓	↓	↑
Early Adopters	Late Majority			↓	↓	↓
Early Adopters	Laggards			↓		
Early Majority	Late Majority	↓				
Early Majority	Laggards					

Late Majority	Laggards					

Table 42 shows how each of the MCN with significant influence in the adoption of mobile content varies between the adopter groups. ↓ indicates that the second group rated the MCN higher than the second and ↑ represents the opposite. The conclusions derived from the combined results include the following:

- *The perceived need for utility* is a significant variable related to the adoption of mobile content and the group that considers utility the most significantly important as a variable in the adoption of mobile content is the Late Majority. This indicates that higher levels of perceived utility when the innovation is being adopted by the Late Majority should increase its adoption rate;
- *Status* is a significant variable related to the adoption of mobile content, and all groups of adopters consider status equally important throughout the adoption cycle. This indicates that high levels of perceived status throughout the mobile content lifecycle should increase adoption rates;
- *Ease of use* is also a significant variable in the adoption of mobile content. It is the MCN which is most differently perceived across the groups of adopters (6 pairs of groups rated ease of use differently from each other). The group that considers ease of use the most significantly important as a variable in the adoption of mobile content is the Laggards. The negative p-value associated with ease of use indicates that for some people, perhaps counter-intuitively, the innovation should give the impression that it is difficult to use. Potential adopters seem to perceive the need to be able to master complex technologies as a motivational variable to use them. This indicates that perception of ease of use affects the adoption of mobile content (affecting Laggards the most) and

marketers of content should treat it carefully, so that some consumer groups perceive they are mastering a complex technology easily;

- *Value* is a significant variable in the prediction of adoption of mobile content. It is also perceived very differently among the categories of adopters. The groups that consider value the most important as a variable in the adoption of mobile content are Laggards and Late Majority. This indicates that high levels of perception of value throughout the life cycle, and especially at the end of the innovation lifecycle, should lead to increased adoption rates;
- *Increased perception of fun* should also increase the adoption rates for mobile content. Early Adopters rated perception of fun the highest as a variable in the adoption of mobile content. This indicates that high levels of perception of fun throughout the adoption lifecycle of a mobile content, especially by Early Adopters, should increase adoption rates.

It is also possible to conclude that the perception of these needs across the groups Early Majority and Laggards and Late Majority and Laggards and Early Adopters and Innovators are equivalent because each group demonstrates a correlation with each of these variables. This indicates that these groups need the same degree of motivation in terms of *utility*, *status*, *ease of use*, *fun* and *value* in order to adopt mobile content.

Therefore, by combining the results obtained through the first and second research questions it is possible to summarize the most important achievements in this research, which shows that MCN affects the adoption of mobile content and changes significantly in perception among the categories of adopters.

5.10. Insights and practical application

Insights from this research include the following points:

1. Mobile services are still not widely adopted. Research is necessary to help understand the variables that lead to content adoption and the variables that motivate users to perceive mobile content to be of importance in their lives;
2. Research on motivational needs and adoption of mobile content can be combined to help predict the adoption of mobile content (Chapter Three);
3. Users belonging to different adoption groups perceived differently their needs to adopt mobile content(Chapter Five);
4. The needs: Utility, Status, Ease of Use Value and Fun were found to be significant aspects in the adoption of mobile content in the samples studied in this research (Chapter Four);
5. All ten MCN proposed in this research have individually different weight as determinant variables of mobile content adoption, however, not all MCN affect the adoption of this type of innovation: only Status, Utility, Ease of Use, Value and Fun do.
6. The combined results of questions one and two show that the MCN status, utility, ease of use, value and fun affect the adoption of mobile content, but have different importance both between groups and throughout the innovation lifecycle:
    a. Utility has more importance to Early Adopters than to Innovators; it also has more importance to Early Majority than to Early Adopters and more importance to Late Majority than to Early Majority;

b. Status has the same importance to all groups of adopters throughout the mobile content lifecycle. This is important because it is the one attribute that is constant throughout the adoption lifecycle, while the other MCN obtained varied between the groups;
c. For ease of use, the later in the life cycle, the more importance it has, from Innovators to Laggards;
d. Value was deemed an important variable for the Late Majority and Laggard adopter groups. This may suggest that the perception of individual value appears once a clear consensus about an adoption already exists within a population.
e. Fun has more importance to Early Adopters than to Innovators, less importance to Early Majority than to Early Adopters and more importance to Late Majority than to Early Majority.

7. The measurement of innovativeness was not found to have a significant relationship with the adoption of mobile content in this research, although it must be noted that different measurements may lead to different models or different variables in the model. Further research is required here to ultimately determine the impact of the measurement of innovativeness in the creation of the model, and to decide which measurement of innovativeness interferes the least with the model.
8. Different samples, using different demographics- age, education, socio economic status, geographical location may lead to different models, showing the importance of these variables in the model in further research;

a. Country, the construct proposed was reported as having a significant impact on the adoption of mobile services and content, suggesting that cultural and demographic particularities can have a significant impact on the diffusion of the innovations at stake.

5.10.1. A scenario for practical application of the research model and findings

A company, part of the high-tech industries, wishes to release a new mobile game to the market; here considered mobile content. Assuming that the company wishes to use the results obtained for the demographics studied in this research as part of the conception, development and marketing plan of their new mobile service. The variables to be taken account of during these phases of the projects are the following:

Product concept and development

At this stage, it is important to plan for development iterations in terms of utility, status, ease of use, fun, value and country associated with the innovation.

a. *Utility:* It is important to pay attention to the utility of a mobile content, since it is one of the variables that influence the adoption of mobile content. Since the first groups to adopt mobile content associate utility with adoption of the innovation in a lower level than later groups, it is important that elements that improve the perception of game utility are introduced in later stages of development. The concept of the game should therefore be associated less with how useful it might be to the adopter. Later in the mobile game's adoption lifecycle, elements that may

increase the perception of game utility can be gradually added, such as the ability to contact other players through the game, how the game can teach them something relevant to their lives, among others.

b. *Status*: when conceptualizing and developing mobile content, businesses should have in mind that high levels of status associated with mobile content increases its chances of being widely adopted. However, status seems to have equivalent levels of perceived importance throughout the adoption lifecycle. Therefore, when considering this aspect, businesses should release mobile content with the highest perception of status possible; and focus the strategy in trying to maintain these levels throughout its lifecycle through development and marketing strategies. This MCN is most in line with Maslow's hierarchy of needs (1943) for it applies with the same intensity to all groups of adopters. In fact, status is described by Maslow's seminal research as a basic need which is sought to be met by all human beings. This dissertation builds on Maslow's research, and suggests that achievement of status is also sought through mobile content adoption.

c. *Ease of use*: for this MCN, the strategy at conception and development is different. Although ease of use is a variable affecting the adoption of mobile content, later stage adopters reported that ease of use associated with mobile content is a variable of greater importance than early stage adopters. This indicates that ease of use should evolve (or be developed) throughout the adoption lifecycle of mobile content. Conceptualization and development of innovative mobile content such as this mobile game

should therefore be designed in a way that increases its perceived ease of use as the innovation progresses through the adoption lifecycle over time, from Innovators to Laggards.

d. *Fun:* the conceptualization and development strategy for the perception of fun also differs from the previous strategies. In general, fun is perceived as more important for the Early Majority than for Innovators and Early Adopters and also more important for Late Majority than for Early Adopters. In this way, profiling and further research on what these groups consider fun may be important to improve adoption rates.

e. *Value:* for this MCN, which also influences significantly in the adoption of mobile content, late adopters perceive it to have the highest adoption impact. From Innovators to Late Majority, the level of importance of value grows significantly. This indicates that conceptualization and development of products may benefit from iterations on the product development, with increments that would increase the perception of value with time.

f. *Country:* for both, developers and marketers, country-specific attitudes and perceptions are valuable insights about the adoption of mobile content. Although this research cannot propose a universal formula that would apply to all countries, its findings do suggest that consumers' habits in each country must be studied separately, but they must also be compared across countries in order to identify the particular markers that can help explain differences in adoption rates.

Another area that can benefit from this research is the marketing of mobile content innovations. Strategies can be used by observing the adopters' behaviour and perceived needs, and adjust marketing strategies over time.

This research shows that it is necessary to maintain the status associated with mobile content throughout its adoption lifecycle. For all groups, status was observed to have the same relative importance in the adoption of mobile content.

In the case of ease of use, it is important to develop marketing strategies that do not explicitly portray the game in question as easy to use, at least in the first stages of introduction. As the innovation reaches the time of adoption for those groups that score ease of use highly, a marketing campaign should try to increase the perception that the game is easy to use.

The same strategy can be used for utility, value and fun. Marketing strategy should attempt to increase the perception of utility, especially for the Late Majority group, which is the group that perceives utility most important in the adoption of mobile content. At the same time, marketing strategy should also try to increase the perception of fun, especially for Early Majority and Late Majority; and value for Late Majority.

Therefore, the knowledge obtained through this research can be applied to potentially increase the adoption of these types of mobile content in practice, such as the mobile game described in this example, by improving procedures of conceptualization, development and marketing of these services. In carrying out these strategies the business might make use of the research questionnaire (available in the appendix) and analysis methodology as detailed in Chapter Three.

5.10.2. Summary of discussion

This chapter has presented a discussion for this dissertation along with literature validation, research insights, contribution, a practical scenario and a review of the research questions. In summary, this research has attempted to deepen the understanding of the variables that influence or predict the adoption of mobile content. These variables derive from both adoption and motivational literature, and demonstrate that these areas can be interlinked and studied in conjunction to better understand what drives the adoption of innovations.

The results reveal that, for the sample studied, there are five motivating variables of particular importance for the adoption of mobile content: utility, status, ease of use, value and fun. However, these variables don't have the same relevance in the adoption process for all groups of adopters. Categories (or groups) of adopters, categorized according to when they decide to adopt an innovation, perceive these variables differently from each other while influences in the adoption of mobile content. In addition, it was possible to determine which group finds each of the MCN most important in the adoption of mobile content. This insight may be an interesting and useful tool for businesses, helping them to understand not only what their customers need in terms of mobile content, but also when they need it the most.

By combining the two findings of this research [1] the five variables or MCN that significantly affect the adoption of mobile content with [2] how MCN is perceived by each of the adoption groups, it is possible to determine how the MCN that significantly affect the adoption of mobile content is perceived throughout the adoption lifecycle. This result can be used for business to determine what aspect in terms of user needs

should be given more development and marketing attention at each point of the adoption lifecycle of mobile content. Here as well the findings on the variable Country can play an important role in understanding the adoption cycle differences, in terms of geographical location.

As described in Chapter Three, needs were found to be influencers in the adoption of mobile content. These are based on Maslow's Hierarchy of Needs (1943), and represent consumer's contextual needs towards the adoption of mobile content. Results show that these mobile contextual needs don't follow a hierarchy per se, but vary in intensity according to the moment in the adoption lifecycle a mobile content is going through. Such needs represent real human needs in addition to consumer needs, as technology evolved to become more than just a commodity, having social and cultural significance.

The results obtained in this research challenge the existing innovation adoption frameworks such as those described in Chapter Three. Results showed that variables predicting the adoption of mobile content are perceived differently for each group of adopters, as groups have different adoption driving needs. Therefore, different models should be formulated for each of them in order to achieve better accuracy when predicting the adoption of mobile content. However, existing innovation adoption models are based on the entire adoption lifecycle of an innovation, rather than on the categories of adopters. This research proposes a re-examination of the existing models of adoption, in order to determine if this is also the case for other technological innovations. The existing frameworks may be too general to be applied by industries that wish to dynamically adjust their adoption strategies as the innovation evolves in its lifecycle, or if they have a category of adopter as a specific target market.

In addition, extending Moore's research (1991) on the gap that exists between innovators and early adopters, this research proposes that there are also gaps between the other categories of adopters, at least for mobile content innovations, based on the significant differences between adopters categories presented in this research. It therefore proposes a new bell curve, which includes gaps between each category of adopters, instead of a continuous bell curve as proposed by Rogers (1986). It also raises the question of the application of this multi-gap bell curve for other technological innovations as well as for mobile content.

5.11. Conclusion

This chapter presented and analysed the data collected for this research. The results are discussed in relation to the two research questions posed at the start of the dissertation.

To answer the research question "What are the differences in the perception of needs for mobile content among the different categories of adopters?", data was collected and processed about how important respondents perceived their mobile content needs are. Respondents were classified into five groups or categories of adoption: Innovators, Early Adopters, Early Majority, Late Majority and Laggards. Individual responses were consolidated and compared amongst the groups. The techniques used to analyse the data included Kruskal-Wallis' and Dunn's test, both corrected for ties, which was found to be an important aspect of the dataset. Regression with added demographic variables made it possible to combine the samples, and the results obtained are sound and trustworthy. Kruskal-Wallis' test on the total sample (sample for questionnaires 1 and 2 together) found that, nine out of ten mobile content needs (MCN) including:

functionality, utility, reliability, compatibility, communication, ease of use, status, value and fun and excluding: popularity, present significant differences in their rankings per group. In other words, for these nine MCN, there were at least two categories of adopters that rank them significantly different. The group differences are summarized in table 30 in this chapter.

The second question addressed by this research and answered in the foregoing chapter is: "Can a theoretical framework incorporating user's innovativeness and needs to acquire mobile content to be used to predict mobile content adoption?"

This question, bear in mind, follows from the first question proposed. Given that the proposed MCN put forward in this research does conform to Roger's theory on adoption of innovation, then it makes sense to ask whether innovative behaviour and MCN can be used to predict adoption or "actual use". The analysis of this second question was achieved following four steps:

1. Preliminary analysis using Spearman's test

Before choosing or running a regression, the linear relationship between our variables MCN and innovativeness, and Actual Use was assessed using a Spearman's test. The test allowed for strong correlations between dependent variables to be identified and, hence, select only those which have a direct relation with the dependent variable Actual Use. The conclusion of this test suggested that the variables country, utility, status, ease of use, value, and fun should be included in the linear regression model for the combined sample; the test on sample 2 alone suggested only the variables communication and fun.

2. Choosing the regression model

A regression model was chosen by plotting the histogram of Actual Use scores against both samples used in this research. The histogram's asymmetry, for both samples as well as the total sum of the two, suggested that the variables could be fitted to a Generalized Linear Model. A quasi-likelihood regression model with variance function $V(\mu)=\mu^2$ is fitted (as suggested by Paula, 2004, 2010; Neter, Kutner, Nachtsheim, and Wasserman, 1996), in order to construct a predictive model for the adoption of mobile content.

3. Results of the quasi-likelihood regression model

For the regression based on the combined sample all variables suggested by the Spearman's rank (Country, Utility, Status, Ease of Use, Value and Fun) were found to be significant at statistical levels no higher than 1%. For the regression made on sample 1 alone the expected variables (Country, Utility, Status, Ease of Use, Value and Fun) were found to be statistically significant at levels no higher than 5%. For the regression made on sample 2 alone again the expected variables (Communication, Fun) were found to statistically significant with 95% confidence. Finally, a last step was the comparison of the results between different samples. The total sample and sample two return virtually the same results, in terms of significant variables. The variable innovativeness was not found significant in any of our regressions, which may be the result of the demographics chosen or an insight regarding the greater weight that, for instance, a variable like Utility has instead. These results as well as the demographics involved are discussed in the following chapter. The answer to the second question raised is that based on the samples gathered our statistics strongly suggest that MCN do play an important role in

the adoption of mobile content within each of the categories of adopters. In detail, specific content needs like utility and fun were both found to be significant, which points in the direction of mobile content that is multifaceted, that is, which is not meant to satisfy practical needs alone. The different results obtained based on sample 2 point decisively to the differences involved in the samples. These differences are discussed as well as part of this research. Furthermore, this research puts forward an innovative way to analyse adoption of innovations. Careful steps were taken throughout this chapter to show the validity of the results leading to the use of a quasi-likelihood model. The final plot analysis shows that the model helped indeed to control for over-dispersion, hence, helping to prove that quasi-likelihood is a valuable tool in the analysis of adoption of mobile content and services, as well as in the field of diffusion and adoption in general.

6. CHAPTER SIX: CONCLUSION

6.1. Introduction

This research aims to improve the understanding of how perceived needs impact the adoption of mobile content, which includes mobile video, such as mobile streaming, mobile YouTube; mobile audio, such as ringtones, mp3 and radio; mobile gaming, such as interactive online and offline games; mobile personalized content; and user generated content, such as personal videos, and photos.

The research was organized in six chapters. Chapter One introduced and outlined the research, presenting the research questions. Chapter Two set the context for the research, discussing how networks, devices and services have enabled the development of mobile content, and whether users' mobile content needs have influenced the rapid and complex evolution of mobile content. Chapter Three analysed the literature on motivation and needs theory and on the adoption and diffusion of innovations, exploring how previous research theories and findings can be incorporated into the methodological framework used in this research. This chapter discussed the relationship between innovativeness and the adoption of mobile content. Chapter Three also introduced the concept of ten Mobile Content Needs (MCN) as influencing variables in mobile content innovation and adoption. Chapter Four described the research design and methodology, as well as the research questions, samples and variables that are used in this study. Chapter Five discussed data analysis techniques in detail and presented research results. The chapter concluded with discussion and reflection on the results obtained and highlighted the academic/intellectual insights and contribution. The

current chapter—Chapter Six—discusses the research conclusions, limitations and puts forward ideas for further research.

6.2. Reflection on the results obtained

The combination of predictive variables identified in motivation literature (Maslow, 1987; Alderfer, 1972; Herzberg, 1959) and adoption research (Venkatesh, 2010; Dickinger, Arami and Meyer, 2006; Nysveen, Pedersen and Thorbjørnsen, 2005) influenced the framework proposed in this research, as some of the concepts on these two fields have similar definitions, including functionality, utility, reliability, compatibility, status, popularity, communication, ease of use, value and fun.

The aim of this research was to better understand which and how these variables affect the adoption of mobile content and how they are perceived differently among groups of adopters in the process of adoption of mobile content. Therefore, the results obtained in this research don't widen the number of variables in the adoption of innovation, as most studies in the field (Abrantes and Gouveia, 2011; Venkatesh, 2010; Van Biljon, 2007), but rather deepen the understanding of the most significant and relevant variables for the mobile content adoption. Furthermore, because the samples contained cross-sections of Rogers' five categories of adopters, this research offers data on the motivations and behaviours of each of those groups.

The research provides insights indicating that significant changes in the perceived importance of some of these variables by each of the adopter groups are an indication of how the market might change with time for a mobile content innovation, and towards which aspects businesses should focus their development and marketing. A reflection on the results obtained for each research question is outlined below.

6.2.1. How mobile content needs are perceived by different adopter groups

The first research question aimed to identify if adopter categories have different needs. In other words, it explores whether potential consumers' perception is driven by different factors as time progresses and the innovation is introduced and steadily adopted by more and more peers.

The theory suggested that the higher an individual scored in terms of innovativeness, the less the importance that is attributed to any MCN when adopting a mobile content innovation. This is because, in the adoption lifecycle, consumers would tend to be more careful to purchase innovations later in the adoption cycle (Rogers, 2003), whereas Innovators and to some extent Early Adopters are more adventurous. This deduction is in accordance with Rogers' profiling of innovation adopters. The results reached in this research, through the statistical analysis based on the two samples gathered, as well as in the total sample, however, do not confirm this theoretical presupposition. The reasons behind this, it must be noted, will not by themselves debunk the theory, given that the specific demographics of the samples gathered has an effect on the results obtained. In this respect, it is perhaps the results obtained in the total sample that may challenge or at least question the weight of innovativeness as a determinant variable. Although innovativeness alone was not reported as a significant variable, the results obtained remain for the most part in line with existing marketing literature, indicating that mobile content adoption agrees with Moore's (1991) suggestion that there is a large gap between innovators and early adopters in terms of the group's expectations towards innovations and therefore their adoption. This sentiment is echoed by Salman and Rahim (2012), who state the digital divide and the absence of digital inclusion is

dependent upon digital literacy. Digital literacy is an output of innovative thinkers and innovative adopters.

This research also adds to Moore's research (1991), which stated that not only innovators and early adopters have different needs, but there are also significant differences in needs between other groups of adopters for the adoption of mobile content. It further proposes that the normal curve (bell curve) of an innovation (Rogers, 1986) should also consider the existing gaps between each category of adopter; not only between innovators and early adopters but also between the other categories of adopters. This suggestion is based on the differences in the perceived needs that lead to adoption of mobile content observed in this research. Tao (2011) proposed that "Expectation confirmation significantly affects perceived usefulness and Expectation confirmation significantly affects user satisfaction" (p. 243). This mirrors the findings in this research and is similar to proposed notions by Moore. The greater the expectation and perceived usefulness, the greater the willingness to adopt the innovation.

Therefore, for the samples studied, it was demonstrated that potential adopters do have different needs according to the stage in the mobile content life cycle they occupy. This indicates that, in order to be effective, marketing strategies for the types of mobile content studied should be flexible and evolving. The mobile content life cycle should be monitored closely, and marketing strategies should be adapted at every stage of the innovation lifecycle to meet different needs for each adopter group, using the guidelines presented in Chapter Five.

6.2.2. Variables affecting adoption of mobile content

For the second research question, the aim was to identify whether MCN and innovativeness are predictive variables for the adoption of mobile content. To do this, a framework was developed to explore the relationship between needs and adoption of mobile content. Results indicate that throughout the mobile content lifecycle (for all groups):

- *The higher the perception of utility, the higher the likelihood of adoption of a mobile content*: this indicates that mobile content that adopters perceive as having some utility in their lives (personal or professional), tends to be more acceptable in the market.
- *The higher the perception of status, the higher the likelihood of adoption of mobile content:* this indicates that mobile content which are associated to high level of status tends to be more sought after in the market, and have more perceived value to potential customers;
- *The higher the perception of ease of use, the lower the likelihood mobile content will be adopted:* in this case, content that is easier to use may have its adoption inhibited, as potential consumers seem to be confident they can handle more complex innovations. Note that the responses for this questionnaire deal with the perception of ease of use, and not ease of use itself, which means, in this case, that potential consumers are attracted by mobile content that few people are able to master (difficult to use), demonstrating to themselves that they have better capabilities than their peers. It is also important to note that, in self-reported questionnaires,

respondents may answer questions according to what they think the best answer is which sometimes differs from their answer in the moment of adoption. This is further discussed in section 6.5.

- *The higher the perception of value, the higher the likelihood mobile content will be adopted:* this indicates that people are more likely to adopt content they find insightful and that adds value to their daily lives;
- *The higher the perception of fun, the higher the likelihood mobile content will be adopted:* indicating that consumers studied tend to adopt mobile content that brings them distraction, enjoyment and a sense of fun and entertainment.

Therefore, the five variables that derive from both motivational and adoption research do help predict the adoption of mobile content within the categories of adopters.

6.2.3. How variables that predict adoption of innovations are perceived by different adopter groups

This research further combined the results obtained for research questions one and two, indicating how the identified predictors of mobile content adoption are relative to an individual's position within the innovation adoption lifecycle. The following suppositions arose from this combination:

1. *Utility*, a significantly predictor of the adoption of mobile content, varies as follows within the mobile content adoption life cycle:
    a. The first 2.5% of the population to adopt an innovation (Innovators) find "utility" to be a less important variable in the adoption of mobile content than the following 13.5% of the population (Early Adopters);

b. These 13.5% (Early Adopters) find "utility" to be a less important variable in the adoption of mobile content than the following group (34% of the population – Early Majority);
c. Early Majority finds "utility" to be a less important variable in the adoption of mobile phone than the next 34% of the population (Late Majority);

Therefore, it is possible to conclude that, as the innovation progresses in the adoption lifecycle, the perception of need for "utility" should increase if it is to stimulate its adoption for the first three adopter's groups (Innovators, Early Adopters and Early Majority), or the first 50% of the innovation adopters.

2. *Status* (or the perception of need for status), a significant predictor of adoption of mobile content, doesn't vary among the categories of adopters. According to the results obtained, status is always perceived as a variable that contributes in the adoption of innovation.
3. *Ease of use*, also a significant predictor in the adoption of mobile content, is perceived differently by the categories of adopters:
    a. Innovators (first 2.5% of the adopters) perceive "ease of use" as less important for the adoption of mobile content than Early Adopters (next 13.5%);
    b. Early Adopters perceive "ease of use" as less important for the adoption of mobile content than Early Majority (next 34% of adopters);
    c. Early Majority perceive "ease of use" as less important for the adoption of mobile content than Late Majority (next 34% of adopters);

d. Late Majority perceive "ease of use" as less important for the adoption of mobile content than Laggards (last group to adopt an innovation, corresponding to 16% of the population of adopters).

Therefore, it is possible to conclude that "ease of use" is a variable that increases in importance as the adoption cycle develops, being more important for later rather than early adopter groups.

4. *Fun* , which is a significant predictor for the adoption of mobile content, is perceived as needed differently among the categories of adopters:
    a. Innovators perceive "fun" as less important in the adoption of mobile content than Early Adopters;
    b. Early Majority perceive "fun" as less important in the adoption of mobile content than Early Adopters;
    c. Early Majority perceive "fun" as less important in the adoption of mobile content than Laggards.

    Therefore, it is possible to conclude that, for these groups of adopters, the perception of need for fun mobile content changes throughout the innovation adoption lifecycle.

5. *Value*, which is a significant predictor for the adoption of mobile content, is also perceived differently among categories of adopters
    a. Early Majority, Late Majority and Laggards perceive it to be more important than Innovators in the adoption of mobile content;
    b. Early Majority, Late Majority and Laggards perceive it to be more important in the adoption of mobile content than Early Adopters.

In summary, this research has unveiled some aspects in terms of status, ease of use, utility, value and fun, of what customers expect (or need) in order for them to adopt mobile content at different times in the innovation lifecycle.

6.2.4. Comparisons between samples

The preceding sections discussed only the total sample, but an analysis of and comparison between the results of sample 1, sample 2 and the total sample can be revealing as well. Most importantly, the samples highlight some potential cultural differences in the prediction of mobile content adoption.

Sample 1, with 525 subjects from both Ireland and Brazil, is a reflection of the results for the total sample. Namely, Utility, Status, Ease of use, Value and Fun are all significant variables in the adoption of mobile content. Sample 2 is both smaller (n=96) and consists of subjects only from Ireland. Interestingly, only Communication and Fun were predictive of mobile content adoption. Perhaps the absence of Status, Ease of use and Value can be explained by the cultural differences present between the two samples. For instance, in a country like Ireland, where ICT (information and communications technology) has heavily penetrated the market, the idea of mobile content, or associated mobile phones conferring Status has fallen by the wayside. To adopt an analogy, running water no longer awards one with Status in most parts of the developed world. A similar argument can be applied to the variable Ease of use. It's reasonable to assume that most technology consumers in Ireland are adept enough to disregard Ease of use, except in cases of extremely poor design. Lastly, economic factors may explain the absence of value. With a relatively healthier economy, and a low price point for most

forms of mobile content, value may only be a marginal concern for technology consumers in Ireland.

6.3. Contributions to knowledge and industry

This research contributes to mobile adoption research by providing a better understanding of how consumers' needs for mobile content change through the adoption lifecycle. The current need for research in this respect finds validation in the ongoing literature that argues in favour of the need for more research on the importance of users' intentions in the adoption of mobile services (Revels, Tojib and Tsarenko, 2010). The speed at which mobile technologies develop makes such research especially important. Businesses have many possibilities open for exploration, but are understandably cautious when knowledge of consumer behaviour is scarce. A recent editorial in The Economist (June 16, 2012) explained the lack of reliability of mobile marketing as a symptom of the still pending research on consumer behaviour.

Contributions to motivational research include the identification of how Mobile Content Needs affect the adoption of innovations. Furthermore, this research seeks to outline how these needs evolve throughout the adoption lifecycle. This knowledge carries enormous potential for businesses to assess how they should release mobile content at particular points within the lifecycle of innovation/adoption.

The expansion of smartphone technology has given businesses a new toolbox for reaching out to consumers (Grant and O'Donohoe, 2007; Roach, 2009; Barutçu, 2007). This set of tools, however, does not come without risk. Unintended consequences may result when there is insufficient understanding of how consumer attitudes change throughout the adoption cycle of new mobile channels of communication (Persaud and

Azhar, 2012). Releasing mobile content for marketing purposes, it is argued, needs in-depth understanding, not only of the motivations of different adopter groups, but of the way these motivations are part of the dynamics of adoption (Persaud and Azhar, 2012). As this research has shown, users may positively and quickly accept mobile content if released at the appropriate time in the adoption cycle. On the other hand, releasing content without detailed, accurate knowledge will have a chilling effect: Consumers will perceive the content as intrusive and annoying (Persaud and Azhar, 2012).

This dissertation contributes to consumer and marketing literature by including information on the evolution of characteristics of potential adopters in the adoption of a technology, as shown in Chapter Five. The finding that the construct of popularity (i.e., subjective norm) has an impact on the adoption of mobile content is crucial for mobile marketers (Yang and Zhou, 2011). Evidence that family members, friends and social peers play a fundamental role in the adoption of mobile content allows those in the industry of digital marketing to target campaigns appropriately. These campaigns benefit from identifying the networks of relationships that are now so visible on the Internet (social media has simplified the recollection of such data enormously). What these authors and this research show is just how valuable it can be for businesses to prioritize such information. Without empirical proof that popularity has an effect on the adoption of mobile content, businesses risk spending useless money on social media campaigns instead of, for instance, offline advertisement.

This research contributes to the body of knowledge in adoption of innovations and also uses and gratifications research, with the validation of a set of variables that contribute

to the adoption of mobile content, based on a sample of 621 respondents in Brazil and in Ireland.

Based on the literature on motivation and adoption of innovation reviewed in Chapter Three, this research elaborates a list of variables in the adoption of technology. Included are ten variables common to both research fields: functionality, utility, reliability, compatibility, popularity, ease of use, status, communication, value and fun. The role that these variables have played, in both past and ongoing research, also helps to validate the purposes of the current research. Revels, Tojib and Tsarenko, among others, have reported that *Utility*, *ease of use*, and *fun* are significant in the adoption of mobile services (2010). They further note that these utilitarian and non-utilitarian variables have been reported as significant when it comes to media use in general (Höflich and Rössler, 2001; Leung and Wei, 2000).

Utility and *popularity* were, moreover, deemed significant for the adoption of "viral marketing", based on a sample of American university students (Yang and Zhou, 2011, p. 85). Results were significant, however, only in the context of messages with an "entertaining" value rather than "useful" messages, where *utility* came out as significant. Given that university students were also an important part of the sample upon which this research is based, these authors' study could definitely hint towards a next stage in which MCN is divided between useful versus leisurely perceived content. One could argue, however, that proposing such a bifurcation may create undue bias. Respondents could perceive that there is a "correct answer". As was shown in the discussion over snowball sampling in Chapter Four, this is a risk which this research made an effort to avoid. A better approach would avoid this division. Further research will clarify the issue, but the results reported here will surely give a head start for new investigations.

It also contributes to an understanding that different samples may have different responses and needs in the process of mobile content adoption. As elaborated in Chapter Five, the research hinged upon two different models for two different samples and questionnaires. A more individualistic society (i.e., Ireland), it has been argued, is less prone to see social status as important when it comes to the adoption of technologies (Revels, Tojib and Tsarenko, 2010), which would be in line with our results. These authors, in addition, argue in favour of checking whether the weight of motivations changes in samples based on less individualistic societies (Revels, Tojib and Tsarenko, 2010), which would again be in line with our compared results for the two samples. Finally, a bias towards the young is also a common occurrence in the samples use in studies of the adoption of mobile services (Persaud and Azhar, 2012).

The research examined the two different measurements of innovativeness in the two datasets and explored the effects that different measurements of innovativeness may have on the MCN model. This research did not compare the two innovativeness scales, but rather identified that the assessment of innovativeness has a direct impact on the final model of MCN influence in the adoption of mobile content.

Understanding the value of *Innovativeness* can also play an important role for mobile marketing campaigns. Campaigns that are perceived as innovative seem to be more relevant for a higher educated population (Persaud and Azhar, 2012). The reason for this depends on relevance. Location-based campaigns are perceived as innovative because of their superior targeting, which is particularly important for this population. The authors argue that educated people are usually uninterested in advertising campaigns, because they perceive them as a waste of time: information that is too

general to be deemed relevant for them and which takes valuable time from people who conduct busy lives (Persaud and Azhar, 2012).

6.4. Application to industry

This research may be of use in industry to help plan and market mobile content in a more efficient way. The industrial benefits of this research are summarised below:

1. *Insights on product development and research*: the results obtained can help the planning of iterations in the release of mobile content release to the market. Releasing mobile content innovations with improved perception of status, fun, utility, value, and ease of use to the market stages may improve adoption rates.
2. *Insights on mobile content marketing:* marketing of mobile content should take into consideration that adopters have different needs as the innovation progresses in the adoption lifecycle. Improved marketing strategies which take into consideration that consumers perceive status, utility, ease of use, value and fun differently overtime, and may lead to increased adoption rates.
3. *Evaluation method:* businesses can use the questionnaire used in this research (provided in the appendix) together with the calculation instructions (Chapter Four) to measure variables and find further information on what their target market considers important in terms of needs for adoption of mobile content.

Ultimately, this research may be used to help industries to work more closely with groups of users to better understand their needs.

In terms of strategic planning for new mobile content innovations, businesses must take the entire product lifecycle into consideration. Whereas at launch the needs and

preferences of innovators may be paramount, as the product ages, other adopter groups must be brought into the fold. It's a fact that many new products fail; recent research has shown that communicating the innovative and unique qualities of a new product, as well as clearly setting the user's expectations, are essential components of a successful launch (Frattini, Dell'Era and Rangone, 2013). Innovators need to see the innovation in action, in other words.

The Mobile Content Needs that figure most prominently in strategic planning for new mobile content innovations are utility, status, ease of use, value and fun. However, the areas of emphasis change as the product evolves. Utility, for instance, becomes increasingly important as the innovation moves through its lifecycle. Innovators and early adopters may simply appreciate newness, but the late majority prizes utility above most everything else. Status, on the other hand, is perceived as equally important by all groups, but that does not mean that the message should be identical for each adopter group. Status will not mean precisely the same thing for an early adopter as for a laggard. Much the same can be said of ease of use.

Over the long haul, loyalty and customer satisfaction are the strings connecting short-term success with sustainable success (Bayraktar, Tatoglu, Turkyilmaz, Delen and Zaim, 2012). Communicating to each adopter group in a meaningful and relevant way is the first step in creating loyalty.

Lastly, the cultural component lies in the background of each of these marketing factors; ignoring the particular conditions of the population in question almost ensures failure. Marketers must discover how and why citizens of a certain county use mobile content before even considering a new product launch.

6.5. Limitations

This section examines the limitations of this research. Limitations of the questionnaire and interview (self-reporting) and the sample (generalization) will be discussed in this section.

Because the questionnaire responses for this research were self-reported, it is important to note that the results might not represent, in reality, what respondents would do in a situation when they have the opportunity to adopt mobile content. The responses, on the other hand, indicate what respondents perceive to be true when it comes to the attributes they believe they find important to the adoption of mobile content. For this reason, in this research, the perceived importance that respondents have when facing a hypothetical situation of adoption of mobile content was measured. This is a common self-reporting limitation (Stone, Bachrach, Jobe, Kurtzman and Virginia, 1999). Behavioural attitude could be different when they are facing a real life opportunity of adoption.

When considering the population sample, another limitation of this research is its applicability to a wider population. Because of the sampling techniques used, respondents were not sampled in a way that they would be representative of the general population. For this reason, the results achieved in this research cannot easily be generalised, and further research is required so that further results can be calculated. However, the results are representative within respective adopter groups, and the use of snowball sampling as a quantitative research tool (when circumstances dictate) has been well documented. In addition, despite the relatively large sample size

used in this research, the results obtained could be different if a larger or different set of respondents were analysed, or if a truly random sample could be obtained.

6.6. Further research

Further research suggested includes the study of alternative needs that might be associated with adoption of mobile content or the use of the MCN to complete other models of adoption of innovation, such as TAM, UTAUT, TPB, among others cited in chapter three. Additional research can be also pursued to identify whether these models would change if the samples considered are grouped in categories of adopters, based on this research's observation that categories of adopters have different needs in terms of mobile content. Moreover, research is required to inspect whether the observed differenced among adopters of other technological innovations are somehow similar to the differences observed in this research, and whether it makes sense to propose a generalized extension of Moore's (1991) research by including gaps between each of the adopters categories within Rogers' (1986) bell curve for technology innovations.

In addition, further research is required to understand how mobile content needs can be fulfilled in practice when producing mobile content throughout the adoption lifecycle. Moreover, other innovativeness scales and categories of adopters can be used to access the differences between the groups of adopters in the adoption of mobile content. Other research might include transnational and cross-demographic studies of the adoption of mobile phones, with comparison of similarities and differences.

Another future area of research may inspect what is the impact of each mobile content need in the adoption of other technologies other than mobile phones and/or content. Yet another possible contribution would be to include the framework produced in this

research in a framework to help predict the adoption of mobile content or other innovations. Moreover, as downloadable mobile software applications are becoming ubiquitous (Rodrigues, Oliveira and Vaidya, 2010) another further research area would be to include the applicability of this study to mobile applications.

Also, this research used two different measurements of innovativeness in two different questionnaires similar results were obtained for each sample. One explanation for this is that innovativeness measures do not influence the model for the adoption of mobile content at all. It could also be the case that different measurements for innovativeness could result in significant results. Further research is required in this area.

Moreover, the results which show that status is perceived as having the same importance throughout the mobile content adoption of mobile content invites further research. This is an important insight for the field, because maintaining the perception of status associated with an innovation at high levels throughout the adoption lifecycle should not be a trivial task, as the perception of status could decrease as the adoption progresses in time, becoming cheaper and more popular. Further research is also required to help understand how to increase, at a practical level, the perception of needs for each of the MCNs.

As observed by Ries (2011), "there are more entrepreneurs operating today than at any previous time in history" (p.16) and a great part of them are focused on the development of innovative technologies. However, there are far too many new businesses failures, which are due to the lack of adoption of these innovations by the market. A better understanding of potential customers' needs is therefore necessary in order to avoid not just economic damage to individuals, companies and investors, but

also to prevent waste of civilization's invaluable resources such as time, passion and skills.

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APPENDIX I

The following pages illustrate the questionnaire one used in this research. It corresponds to the paper version. The electronic version used the same questions.

Mobile content survey

*This questionnaire is **anonymous** and **confidential.***

*It will take approximately **10- 15 minutes** to be completed.*

1. Gender:

- ❑ **Female**
- ❑ **Male**

2. Age:

- ❑ 15 – 19
- ❑ 20 – 24
- ❑ 25 – 29
- ❑ 30 – 34
- ❑ 35 – 39
- ❑ 40 – 44
- ❑ 45 – 49
- ❑ 50 – 54
- ❑ 55 – 59
- ❑ 60+

3. Education

- ❑ Primary School
- ❑ Secondary School
- ❑ Third Level
- ❑ Further Education, e.g. PLC
- ❑ Postgraduate

4. Income (yearly):

- ❑ Less than €25,000
- ❑ €25,000 - €34,999
- ❑ €35,000 - €44,999
- ❑ €45,000 - €59,999
- ❑ 60,000 - €99,999
- ❑ €100,000 - €149,999
- ❑ More than €150,000

5. Employment status:

- ❑ Student
- ❑ Part-time job
- ❑ Full-time job
- ❑ Retired
- ❑ Not currently employed

*Please state your **occupation** or **field of study***

6. Check all that you own:
Check all that apply

- ❑ Mobile phone
- ❑ MP3 player
- ❑ Broadband
- ❑ Photo Camera
- ❑ Personal Computer
- ❑ Laptop/Mac
- ❑ Play station/ Xbox
- ❑ Electronic book reader
- ❑ Other _____

6. What is your mobile provider?

- ❑ Meteor
- ❑ Vodafone
- ❑ O2
- ❑ 3
- ❑ Other _____

7. What type is your mobile phone plan?

- ❑ Pre-paid
- ❑ Monthly paid
- ❑ Other _____

8. How much do you spend on your mobile, per months, in Euros?

- ❑ Less than 20
- ❑ 20-49
- ❑ 50-99
- ❑ 100- 199
- ❑ 200 or more

9. How regularly do you update your phone?

- ❑ Never
- ❑ When it stops working
- ❑ Regular intervals (e.g. 6 months, 1 year)
- ❑ Whenever there is upgrade available
- ❑ Other _____

10. Do you own a 3G phone?

- ❑ Yes
- ❑ No

11. What are the functionalities of your mobile phone? *Check all that apply*

- ❑ Regular calls
- ❑ Text – SMS
- ❑ Camera (regular pictures)
- ❑ Video recording
- ❑ Wi-Fi
- ❑ WAP/Internet
- ❑ Bluetooth
- ❑ Infrared
- ❑ Polyphonic Audio
- ❑ MP3
- ❑ Radio
- ❑ Skype
- ❑ Email
- ❑ None

12. Which of the following content have you ever downloaded for **FREE** to your **mobile phone?**

- ❑ Music
- ❑ Video
- ❑ Games
- ❑ Personalized content : i.e. ringtones, wallpapers
- ❑ Shared content: i.e. a friend's video or photo
- ❑ Other _____
- ❑ None

13. Which of the following have you **PAID FOR** downloading to your **mobile phone?**

- ❑ Music
- ❑ Video
- ❑ Games
- ❑ Personalized content : i.e. ringtones, wallpapers
- ❑ Other _____
- ❑ None

14. Do you use audio on your mobile phone?

- ❑ Ringtones
- ❑ Radio
- ❑ Mp3
- ❑ Other _____

15. How do you use video on your mobile phone?

- ❑ Pictures/Photo
- ❑ MMS
- ❑ Animated presentations
- ❑ Video download
- ❑ Video streaming
- ❑ SWIS – "See what I see"
- ❑ Video telephony
- ❑ Broadcasting (mobile TV and Internet)

❑ None ❑ Other _____

16. How often do you**download**new **mobile content?** *Choose one for each line.*

	Never	Once a month	Once a week	Once a day	More than once a day
Mobile music	❑	❑	❑	❑	❑
Mobile video	❑	❑	❑	❑	❑
Mobile games	❑	❑	❑	❑	❑
Ringtones, wallpapers, etc	❑	❑	❑	❑	❑
Content created by friends	❑	❑	❑	❑	❑

17. How much of **mobile content** do you**use PER WEEK**(approximately)?

	Nothing	1 min to 1 h	1h to 5h	5h to 10h	More than 10h
Mobile music	❑	❑	❑	❑	❑
Mobile video	❑	❑	❑	❑	❑
Mobile games	❑	❑	❑	❑	❑
Ringtones, wallpapers, etc	❑	❑	❑	❑	❑
Content created by friends	❑	❑	❑	❑	❑

18. Rate the **importance** of the following attributes for**mobile content:**
Mark ***1*** *for* ***VERY important - 5*** *for* ***NOT important***

a.	Functional	Very important	1	2	3	4	5 Not important
b.	Useful		1	2	3	4	5
c.	Reliable		1	2	3	4	5
d.	Compatible		1	2	3	4	5
e.	Popular		1	2	3	4	5
f.	Easy to share		1	2	3	4	5
g.	Improve your status/ image		1	2	3	4	5
h.	Impress others		1	2	3	4	5
i.	Valuable		1	2	3	4	5
j.	Enjoyable		1	2	3	4	5

19. Place the attributes **A**, **B**, **C**, **D**, and **E** in **order of importance**:

Attributes of Mobile ContentOrder of Importance

A. Communicative and Easy
B. Reliable and Trustworthy
C. Impressive and Powerful
D. Functional and Informative
E. Interesting and Fun

☐ ☐ ☐ ☐ ☐

Most Important — *Least Important*

20. Rate the following affirmatives about yourself:

	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
I like to purchase mobile content that improve my work	❑	❑	❑	❑	❑
I like to purchase mobile content that improve my **personal life.**	❑	❑	❑	❑	❑
I prefer mobile content that are convenient and makes my life more comfortable.	❑	❑	❑	❑	❑
I tend to purchase mobile content that saves me time.	❑	❑	❑	❑	❑
I prefer mobile technologies that increase my sense of security and safety.	❑	❑	❑	❑	❑
I only buy mobile technologies that are reliable	❑	❑	❑	❑	❑
I always consider if technology is compatible with my phone when purchasing mobile content.	❑	❑	❑	❑	❑
I like to have the same type of mobile content all my friends have.	❑	❑	❑	❑	❑
I am interested in mobile content that I could share with my family and friends.	❑	❑	❑	❑	❑
I enjoy content that would strengthen my relationship with others and/or make new friends.	❑	❑	❑	❑	❑
I like mobile content that impress others.	❑	❑	❑	❑	❑
I like mobile content that distinguishes me from other people.	❑	❑	❑	❑	❑
I am interested in content that that my friends and family still don't have.	❑	❑	❑	❑	❑
I am interested in mobile content that gives me a sense of personal enjoyment.	❑	❑	❑	❑	❑
I like mobile content that provides useful information and adds value and purpose to my life.	❑	❑	❑	❑	❑
I am interested in mobile content that are intelligent, insightful and stimulating.	❑	❑	❑	❑	❑

21. Rate the following affirmatives about yourself:

	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
Compared to my friends, I make little use of mobile content.	❑	❑	❑	❑	❑
In general, I am the last in my circle of friends to know the types , names and ways to access mobile content	❑	❑	❑	❑	❑
In general, I am among the first in my circle of friends to download new mobile content when it appears.	❑	❑	❑	❑	❑
If I heard that a new mobile content was available I would be interested in downloading it.	❑	❑	❑	❑	❑
I would consider downloading a new mobile content, even if I haven't heard of it yet.	❑	❑	❑	❑	❑
I know more about new mobile content that other people do	❑	❑	❑	❑	❑
I download mobile content because of the advantages it brings to my life.	❑	❑	❑	❑	❑
Before downloading a new mobile content, I think about the benefits it will bring me and consider its current estate of affairs	❑	❑	❑	❑	❑
If I heard about a new mobile content was available in an easier way to use I would probably download it	❑	❑	❑	❑	❑
I would download mobile content if the price was convenient	❑	❑	❑	❑	❑

APPENDIX II

The following illustrates the online questionnaire two used in this research (SurveyGizmo interface).

1. Gender *

- ○ Male
- ○ Female

2. Age *

- ○ Less than 15
- ○ 15 to 19
- ○ 20 to 24
- ○ 25 to 29
- ○ 30 to 34
- ○ 35 to 39
- ○ 40 to 44
- ○ 45 to 49
- ○ 50 to 54
- ○ 55 to 59
- ○ More than 60

3. Education

- ○ Primary School
- ○ Secondary School
- ○ Third Level
- ○ Further Education
- ○ Post Graduate

4. Income (yearly):

- ○ Less than 25,000
- ○ 25,000 to 34,999
- ○ 35,000 to 44,999
- ○ 45,000 to 59,999
- ○ 60,000 to 99,999
- ○ 100,000 to 149,999
- ○ More than 150,000

5. Employment status:

- ○ Student
- ○ Part time job
- ○ Full time job
- ○ Retired
- ○ Not currently employed

6. Check all that you own:

- ☐ Mp3 player
- ☐ Broadband
- ☐ Photo Camera
- ☐ Personal Computer
- ☐ Laptop/Mac
- ☐ Playstation/Xbox/similar
- ☐ Electronic book reader
- ☐ Other

7. Do you own a mobile phone?

- ○ Yes
- ○ No

8. What is your mobile provider?

- ○ Meteor
- ○ Vodafone
- ○ O2
- ○ 3
- ○ Other

9. What is your mobile phone plan?

- ○ Pre-paid
- ○ Monthly paid
- ○ Other

10. How much do you spend on your mobile, per month, in Euros?

- ○ Less than 20
- ○ 20 - 49
- ○ 50 - 99
- ○ 100 - 199
- ○ 200 or more

11. How regularly do you update your phone?

- ○ Never
- ○ When it stops working
- ○ Regular intervals (e.g. every 6 months)
- ○ Whenever there is upgrade available
- ○ Other

12. Do you own a 3G phone?

- ○ Yes
- ○ No

13. What are the functionalities of your phone?

- ☐ Regular calls
- ☐ Text - SMS
- ☐ Camera (regular pictures)
- ☐ Video recording
- ☐ WiFi
- ☐ WAP/Internet
- ☐ Bluetooth
- ☐ Infrared
- ☐ Polyphonic Audio
- ☐ MP3
- ☐ Radio
- ☐ Skype
- ☐ Email

14. Which of the following content have you even downloaded for FREE to your mobile phone?

- ☐ Music
- ☐ Video
- ☐ Games
- ☐ Personalized content (i.e. ringtones, wallpapers)
- ☐ Shared content (i.e a friend's video or photo)
- ☐ Other
- ☐ None

15. Which of the following have you ever PAID FOR downloading to your mobile phone?

- ☐ Music
- ☐ Video
- ☐ Games
- ☐ Personalized content (i.e. ringtones, wallpapers)
- ☐ Shared content (i.e a friend's video or photo)
- ☐ Other
- ☐ None

16. Do you use AUDIO on your mobile phones?

- ☐ Ringtones
- ☐ Radio
- ☐ MP3
- ☐ Other
- ☐ None

17. How do you use VIDEO on your mobile phone?

- ☐ Pictures/Photo
- ☐ MMS
- ☐ Animated presentations
- ☐ Video download
- ☐ Video streaming
- ☐ SWIS - "See what I see"
- ☐ Video telephony
- ☐ Broadcasting (mobile TV and internet)
- ☐ None

18. How often fo you download mobile content?

	Never	Once a year	Once a month	Once a week	Once a day
Mobile music	○	○	○	○	○
Mobile video	○	○	○	○	○
Mobile games	○	○	○	○	○
Ringtones, wallpapers	○	○	○	○	○
Content created by friends	○	○	○	○	○

19. How much of mobile content do you USE per week?

	Nothing	1 min to 1h	1h to 5h	5h to 10h	More than 10h
Mobile music	○	○	○	○	○
Mobile video	○	○	○	○	○
Mobile games	○	○	○	○	○
Ringtones, wallpapers	○	○	○	○	○
Content created by friends	○	○	○	○	○

20. Rate the importance of the following attributes for MOBILE CONTENT:

	Not important at all	A bit important	Neutral	Quite important	Very important
Functional	○	○	○	○	○
Useful	○	○	○	○	○
Reliable	○	○	○	○	○
Compatible	○	○	○	○	○
Popular	○	○	○	○	○
Easy to share	○	○	○	○	○
Improves your status / image	○	○	○	○	○
Impress others	○	○	○	○	○
Valuable / Informative	○	○	○	○	○
Enjoyable	○	○	○	○	○

21. Rank theattributes in order of importance - for mobile content

____	Communicative and Easy to Share	↓
____	Reliable and Trustworthy	↓ ↑
____	Impressive and Powerful	↓ ↑
____	Functional and Informative	↓ ↑
____	Interesting and Fun	↑

22. Rate the following affirmatives about yourself:

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
I like to purchase mobile content that improves my work	☐	☐	☐	☐	☐
I like to purchase mobile content that improves my personal life	☐	☐	☐	☐	☐
I prefer mobile content that is convenient and makes my life more comfortable	☐	☐	☐	☐	☐
I tend to purchase mobile content that saves me time	☐	☐	☐	☐	☐
I prefer mobile technologies that are reliable	☐	☐	☐	☐	☐
I always consider if technology is compatible with my phone when purchasing mobile content	☐	☐	☐	☐	☐
I like to have the same type of mobile content that all my friends have	☐	☐	☐	☐	☐
I am interested in mobile content that I couls share with my family and friends	☐	☐	☐	☐	☐
I enjoy content that would strenghten my relationship with others and/or make new friends	☐	☐	☐	☐	☐
I like mobile content that impress others	☐	☐	☐	☐	☐
I like mobile content that distinguishes me from other people	☐	☐	☐	☐	☐
I am interested in content that my friends and family still don't have	☐	☐	☐	☐	☐
I am interested in mobile content that gives me a sense of personal enjoyment	☐	☐	☐	☐	☐
I like mobile content that provides useful information and adds value and purpose to my life	☐	☐	☐	☐	☐
I am interested in mobile content that is intelligent, insightful and stimulating	☐	☐	☐	☐	☐
I prefer mobile technologies that increase my sense of security and safety	☐	☐	☐	☐	☐

23. Rate the following affirmatives about yourself:

	Strongly Agree	Agree	Neutral	Disagree	Stronlgy Disagree
Compared to my friends, I make little use of mobile content	○	○	○	○	○
In general, I am the last in my circle of friends to know the types, names and ways to access mobile content	○	○	○	○	○
In general, I am among the first in my circle of friends to download new mobile content when it appears	○	○	○	○	○
If I heards that a new mobile content was available I would be interested in downloading it	○	○	○	○	○
I would consider downloading a new mobile content, even if I haven't heard of it yet	○	○	○	○	○
I know more about new mobile content that other people do	○	○	○	○	○
I download mobile content because of the advantages it brings to my life	○	○	○	○	○
Before downloading a new mobile content, I think about the benefits it will bring me and consider its current estate of affairs	○	○	○	○	○
If I heard about a new mobile content was available in an easier was to use I would probably download it	○	○	○	○	○
I would download mobile content if the price was convenient	○	○	○	○	○