

# The Adoption of Mobile Internet: Industry and Users Experiences

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**Abstract.** Nowadays Internet and mobile phones are blending into portable devices such as smartphones. At the same time that mobile phones' sales are decreasing worldwide, smartphones, and consequently mobile internet (m-internet), are having an exponential growth. M-internet contributes to the emerging of new practices of mobile social networking and mobile communication, as these devices make it easier to maintain networks of relationships. Resulting from this convergence, contemporary mobile user experience also contributes to the blending of local and global through the permanent dynamic articulation of communication and coordination. This paper deals with the emerging adoption drivers of m-internet and the use patterns that characterize it, highlighting the importance of mobility for online activities and confronting the industry's and users' perspectives on the adoption of this technology, its patterns of use, motivating factors and type of activities performed online. Within a theoretical framework that articulates Maslow's hierarchy of needs theory and the theory of uses and gratification, this paper explores the connection between the nature of social interactions allowed by m-internet and the satisfaction of needs as key adoption drivers. In addition, the paper explores a gap in the expectations of the industry and users regarding m-internet adoption, pointing to social activities as an integrative and relevant part of m-internet service.

**Keywords:** m-internet, mobile phone, mobile user experience, m-activities, m-communication.

## 1 Introduction

The role that m-internet plays in social relationships and users activities is a fruitful field for the exploration of the outcomes that may occur with the adoption of new forms of technology. The present paper deals with the roles that participation and satisfaction play in the adoption of m-internet, the nature of the adoption process of this particular innovation and how it depicts a paradigmatic form of tension between the ones' promoting the technology – hereafter called the “stakeholders” – and those actually adopting it – the “users”. The central research questions we posit examine whether changes in the type of access also change the nature of the users’

experiences, if levels of participation and satisfaction in the online experience vary with the type of access and if such factors are adoption drivers commonly understood by all those involved in the process. Our main research problem is to understand how individual and social variables interact in the adoption process and how different players' expectancy values affect such process.

## 2 State of Art

Technology adoption and appropriation are a dynamic and interactive process between technologies' features and user's actions and creativity.

Roger's diffusion of innovations (1962) is one of the leading initial approaches to adoption models and it analyzes the process of diffusing innovations and practices. Roger argues that innovation intrinsic features perceived by users can explain different levels of adoption, as this perceived advantages contribute to the decision of adopting new technology i.e. expectations about technology's ability of fulfilling needs and/or delivering satisfaction.

Technology acceptance model (TAM) (Davis, 1989) values members' attributes as key adoption drivers by arguing that users develop an intention towards adoption based on their beliefs about technology and their estimated outcomes resulted by that adoption.

According to these theories and considering our research goals, we envision as essential to analyze the concepts of participation, appropriation and satisfaction in order to better understand whether these variables have an impact on the adoption process of m-internet.

Maslow's hierarchy of needs (1970) and some formulations of the uses and gratifications theory (Katz, Haas and Gurevitch, 1973) are relevant theoretical frameworks for exploring concepts of participation and satisfaction as driven for mobile technologies use. Participation is a behavior based on social interaction but can also includes collaboration and the production of something. From participation derives a double-sided sense of belonging i.e. one feels that something belongs to him and also that belongs to a group. Participation however can be thought as a requisite for satisfying the need of esteem. The sense of belonging to a group is essential for feeling esteemed by others and consequently feeling of self-esteem.

Satisfaction is much more complex to conceptualize. Satisfaction is related to the fulfilling needs through participation within a social network in order to enhance well-being and quality of life.

Several theories have tried to understand how individual behavior molds itself in order to seek satisfaction. Uses and gratifications theory explains media consumption patterns and reception as driven by need this need of seeking satisfaction. Katz, Haas and Gurevitch (1973), argued that media consumption address five types of needs: cognitive, affective, personal integrative, social integrative and tension release. Within this theory satisfaction is the result of fulfilling a need of any type and gratification implies that the process of satisfying a specific need is pleasurable. West and Turner (2010) argued that mass media consumption is motivated not only by usefulness in

satisfying specific needs but mostly because the process of satisfying these needs is enjoyable.

More recently, Park, Kerk and Valenzuela (2009) applied uses and gratification theory to new media and have found that using Facebook satisfies different needs as socializing, entertainment, self-seeking and information.

Drawing from these theories, we argued that satisfaction is inherent to participation in the same way that the uses of mass media are associated to obtaining gratification, i.e. to be in online communities, by creating or sharing content, is enjoyable and pleasurable, thus reinforcing the importance and frequency of these activities, which are facilitated by the possibility of accessing internet on-the-go.

The use of m-internet is growing but the concept is still controversial. Some authors agree that m-internet refers to internet used in mobile devices (Gerpott, 2010; Wang & Wang, 2010). Smith (2010) considers m-internet a synonymous of wireless internet that includes going online on a laptop or any mobile device. According to some authors m-internet enables to perform activities on the go (Wellman, Quan-Haase, Boase & Chen, 2002). We understand m-internet as internet access via wireless, 3G or 4G using mobile devices that allow for physical displacement, which means to perform activities on the move.

### **3 Research Design and Method**

The present study is part of a broader longitudinal project that started with a descriptive approach of mobile consumption in Portugal. After this initial stage two complementary studies were developed, one based on qualitative techniques with the intention of understanding stakeholders views of m-internet adoption and dissemination and other based on quantitative techniques that intended to examine user's views of m-internet adoption and usage. After this, the research project will move on to a empirical stage where a mobile platform will be developed and tested regarding adoption patterns, network affects, benefits of using, social interaction and social capital impact.

The qualitative study was performed with the main stakeholders of mobile industry in Portugal and consists in interviews with 18 predetermined questions. The questionnaire was based on previous studies that analyzed the stakeholders' views about technology adoption (Quico, Damásio, Henriques & Veríssimo, 2010; The world internet project, 2012). The interviews were performed face-to-face and were transcribed and analyzed in Nvivo software.

Subsequently a more quantitative approach was developed based on the application of an inquiry, with the main goal of assessing user's perspective of m-internet services and possibilities, characterizing m-internet access in Portugal, identifying the factors that contribute to its growth and the activities performed via m-internet in comparison with fixed access to the internet. The inquiry was developed based on previous measures (Zickuhr, Kathryn, Smith, Aaron, 2011 – Pew Internet & American Life project; Smith, Aaron, 2010 - Pew Internet & American Life Project; Lejnicks, Carly, 2008). A pre-test was performed with a convenience sample of 40 individuals

in order to improve the instrument and ensure that there were no misunderstanding issues. The final version has in total 20 questions.

Within the inquiry, there are two items that we consider more relevant for the current purposes— the first one is focused on participants' online activities, both via mobile and via fixed internet access; the second is based on a measure developed for analysing the levels of satisfaction and participation of m-internet users. These variables refer to satisfaction and participation when using the internet and, specifically, when using social websites or social web platforms whether via mobile or via fixed access.

This measure was previously tested and adjusted via an exploratory and confirmatory factor analysis; the final measure reached a good adjustment for the data (cronbach $\alpha$ =0,897, CR=0,895; VEM=0,594). The quantitative data was analysed with IBM SPSS 20. In order to analyse the research hypothesis questioned, statistical analysis was performed with a level of confidence of 95% ( $\alpha$ =0,05). The values of proximity were calculated based on the answers to this item in the inquiry, using the algorithm Proxcal. The quality of the model was analyzed through the STRESS-I index and DAF index, using the reference values defined in Marôco (2007).

In order to analyse whether the levels of satisfaction and participation with online experience have any influence on the decision of using m-internet we use the Wilcoxon-Mann-Whitney.

## 4 Results

### 4.1 Qualitative Study

The main goal of this study was to search for relevant research questions contributing to the understanding of how the industry faces the changing technological environment in this field and how they perceive m-internet dissemination.

We interviewed stakeholders from mobile manufacturing companies as Sony Ericsson's Key Account Manager, Nokia's Communication Manager and LG's Marketing Manager; from market research companies such as Marktest's Internet Director, GFK's Business Group Director and Netsonda's partner; from mobile marketing companies as TIMWE's product manager; and from mobile network operators as the Optimus' Internet Mobile Multimedia Services Manager, Vodafone's Internet Services Director and ZON's voice product manager.

Interviews show that stakeholders believe that mobile phones' sales are decreasing in Portugal and worldwide but smartphones are having an exponential growth due to the price being so similar to the ordinary mobile phone. As consequence, they point out that m-internet is growing, as smartphones naturally need internet for their features. According to stakeholders' view, the age group between 25-34 years is the one that uses more m-internet in Portugal, from social media and email, to news and meteorology contents.

Vodafone considers that the use of m-internet will soon exceed the use of internet on a PC. Vodafone also argues that m-internet is more utilitarian and frequent along the day but has a shorter duration of access, when compared with a normal internet

access on a computer. They also believe that there is a peak of usage at lunch time, between 6pm and 7pm and a primetime between 10 pm and 11 pm. Friday is believed to be the day with more traffic.

According to all interviews, m-internet users are becoming multiplatform. This means that they can access it everywhere, anytime and through different devices. This mobility allows a better exploitation of the internet and its possibilities and the creation of a more appealing experience.

For the majority of the stakeholders, with exception of those from mobile networks operators, the price plans available are the main obstacle to the expansion of the m-internet, as they still have high prices and limited traffic. Another obstacle listed was the lack of information and literacy of Portuguese people regarding the existent services.

As main motivations to access m-internet, stakeholders considered that social networks represent a very high share of internet traffic through mobile phones. Market research companies highlighted that a high percentage of young people aged 15-17 access social networks on mobile phones and half of this value in the following age groups 18-24 and 25-34.

Mobility is one of the main motives to use m-internet as it gives access to new services and possibilities (e.g. geolocation) and new types of consuming, sharing and communicating. In a near future, it is expected that people will perform the same tasks via m-internet than we do now via fixed internet, like editing documents and store data. Social networks and email access are other important reasons to have m-internet and the main banners in attracting customers to this service. Geo-location is another motivation mentioned by the stakeholders. According to the data collected, on the top of the most popular apps are geo-location services. These apps are based on the convergence between internet and mobility provided by the mobile phone.

Stakeholders referred to an interesting topic about the impact of m-internet on social practices, as they considered that m-internet access makes it easier to communicate and share information in real time. This fact contributes to social closeness and public life involvement. Stakeholders remembered some of the social movements that were initiated via the internet and mobile access e.g. Arab Spring and London riots.

## 4.2 Quantitative Study

In this section, we will present the results achieved in the quantitative study referred to above, performed with a representative sample of the Portuguese population (n=1107). The individuals from this sample are aged between 14 and 64 years (mean age=38,69), 49% being male and 51% being female. The sampling was conducted in a random way in all regions of the country and the inquiry application was performed face-to-face in the individuals' households.

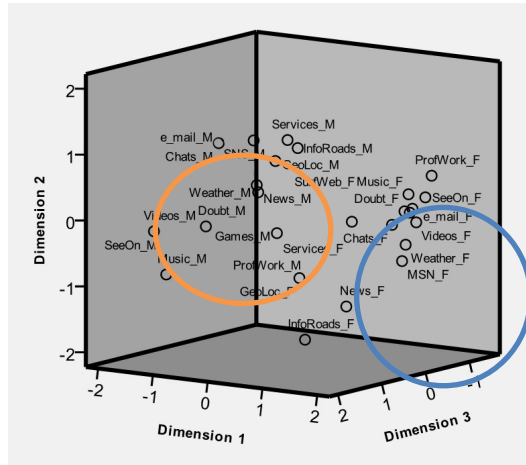
In this paper we will focus only on the data relevant for the objectives of the paper. Therefore, only the questions that are thought to be more relevant both to characterize the sample and examine the research problem raised will be analyzed and discussed.

Some initial items analyzed mobile devices ownership and use, whether participants use m-internet, via which devices, for how long, how, when or where. The data

indicates that almost all participants have a mobile phone device (96,6%), however only 19,1% are smartphones. When questioned whether they use m-internet, either by mobile phone or other mobile devices such as tablets, iPad, or others, only 15,7% answered affirmatively. From those, 23% replied they use it via mobile phone, 7% via tablet devices, 2% via iTouch devices, 4% via iPad devices, and 6% via Psp. Most individuals replied they use this type of access for more than one year (73,1%), 15,4% use it between 6 months to 1 year, and 11,5% use it for less than 6 months. Regarding the frequency of use, most participants (30,5%) use mobile internet two to three times per week, 32,2% use it sometimes per week, 21,3% replied they use it rarely and 16,1% replied they are always on. Referring to the moment during the day in which individuals most use m-internet (graphic 1), participants responded they mostly use m-internet between 12a.m.-4p.m. (43,1%) and between 8p.m.-12p.m. (41,4%).

The inquiry also asked participants about their behaviors in using mobile internet, if they normally use the browser, apps or near filed communication to surf the web in their mobile devices, offering them a scale from 1 to 7 in which 1 meant they never use and 7 they always use it. Most participants answered they use the browser (mean=4,77, sum=830), when compared with apps (mean=3,62; sum=630) or near field communication (mean=1,40; sum=244).

Other relevant and interesting results are related to the analysis of the activities performed online, both via mobile and fixed internet access. The inquiry posted a list of activities performed online (the same online activity was always questioned twice, one regarding the mobile access and one regarding the fixed access to the internet), and asked participants their agreement with the sentences on a scale from 1 to 7, where 1 meant "I never do that" and 7 meant "I always do that". The data collected shows as activities more frequently conducted via mobile the following: to read e-mails (mean=4,17; SD=2,264), to access social networking sites (mean=4,24; SD=2,313), to search information about maps, paths or roads (mean=3,74; SD=2,352), use chats (mean=3,89; SD=2,293), use geo-location applications (mean=3,64; SD=2,333). In order to analyze whether there is any influence of the type of access on the activities performed online, we conducted a multidimensional scaling analysis in order to examine the proximity (similarity/ dissimilarity) between the activities analyzed in the inquiry, intending to examine groups or types of activities that are more frequently done via mobile. The values of proximity were calculated based on the answers to this item in the inquiry (5.1.), using the algorithm Proxcal. According to MDS analysis assumptions, three dimensions were retained in order to reproduce properly the perceived similarities between the activities (STRESS-I=0,129, DAF=0,983). The following figure illustrates the three-dimensional perceptual map.



**Fig. 1.** Online Activities- Three-dimensional perceptual map (Euclidean distance model: STRESS-I=0,129; DAF=0,983)

Regarding the dimension retained we opted to call: dimension1 - interaction; dimension2 – time; dimension 3 - effort. Examining the graphic, two main groups of activities emerge, while the remaining activities are distributed randomly within the graphic space. The two main groups are located at the superior left and at the superior right part of the perceptual map.

The superior left part include the following activities conducted via mobile internet access: using the e-mail, using social network site using geo-location applications, using online services, searching information about maps, paths or roads, using chats. These type of activities are the ones with higher values on mobile access. Regarding the superior right part of the perceptual map, we will find another group of online activities, such as: downloading music, settling a doubt, looking for someone online, performing professional/ work searches online, watching videos online; that present higher scores on the fixed internet access.

The perceptual map points to the distinction of two main groups of activities: one more related to the fixed access and the other one more related to the mobile access. Interpreting this data and considering the dimensions conceptual meaning, one can say that the activities more frequently done via mobile access commonly imply communication and participation, such as using chats, e-mailing, using social network sites, and activities that need to be done on the go. On the other side, the activities more frequently done via fixed access are normally activities that take more time to be performed, imply higher levels of attention or knowledge.

The inquiry also included a scale that analyzed the levels of satisfaction and participation of participant with online experience. This question allowed us to examine whether these variables have any influence on the decision of using m-internet. In order to test this hypothesis used a Wilcoxon-Man-Whitney test, since the assumptions for a parametric test were not fulfilled. According to the data, there

are significant differences for a confidence level of 95% ( $\alpha=0,05$ ) for satisfaction and for participation between the group that use m-internet and that don not use m-internet (satisfaction: Man-Whitney  $U=34285,000$ ;  $p<0,001$ ;  $N=1107$  and participation: Man-Whitney  $U=38243,500$ ;  $p<0,001$ ;  $N=1107$ ). The data shows a statistical significant effect of participation and satisfaction on the choice of using or not using m-internet.

The following table shows the descriptive data for each variable - participation and satisfaction - in each group – use m-internet/ do not use m-internet. As it is possible to observe, the levels of participation and satisfaction are higher for the individuals that use m-internet, which indicates that these individuals are more satisfied and participate more in their online experience.

**Table 1.** Descriptive data for participation and satisfaction

m-Internet access		Mean	Std. Devia- tion	N
NO	Satisfaction	3,42	2,212	933
	Participation	2,90	2,034	933
YES	Satisfaction	5,57	1,112	174
	Participation	4,78	1,334	174
Total	Satisfaction	3,76	2,219	1107
	Participation	3,19	2,058	1107

## 5 Conclusions

Our results show that social factors apply an important influence on people's decision to adopt advance mobile services and they should face as an originator of hypotheses explaining the adoption of m-internet. These social factors do not seem to be determined by industry utilitarian views but are based on values expected that emerge via social interaction, namely communitarian one. Our results show that although satisfaction of needs are one of the main drivers for technological innovation, satisfaction is understood differently by users' and stakeholders with the first group associating it with a social use of the technology and the second with its individualistic function. These opposite views indicate that drivers of adoption are similarly drivers of rejection if a larger socially mediatized frame is considered. Also, indirect external effects of the network shape activities that drive users' behaviors and not expectancy values directly related with the consumption of the technology.

Our conclusions point out that activities performed online are more similar to the activities associated with mobile phone use patterns than with the fixed internet, as they are related to connectivity and coordination. Thus, smartphones and other portable devices, with m-internet access, are more viewed as extensions of the mobile phone than of the fixed computer with internet access. Thus, m-internet is primarily used for satisfying love and esteem needs.



Our research also shows that the concepts of participation and satisfaction are as connected when it comes to m-internet as the concepts of uses and gratifications regarding mass communication media such as television. This notion refers to an approach to satisfaction as inherent to online participation, being therefore intrinsic to social interaction. In the same way that watching television may satisfy, for instance, surveillance needs, in a gratifying way, so does interacting in a social network afford, at the same time, the satisfaction of love and esteem needs as well as satisfaction resulting from performing an enjoyable activity. Mobile access to the internet enhances this participation and satisfaction by facilitating social interaction anytime, anywhere.

Our research reports on participation and satisfaction being not only variables that explain the diversified use of the internet whether the access is fixed or mobile, as m-internet users participate more in online communities and are more satisfied with their use experience, but also as relevant in what concerns m-internet adoption. Such needs are not similarly understood by stakeholders that regard the adoption process more from a determinist fashion that posits that the fruition of services is enough indicator of satisfaction. Thus, users who already have an internet use profile related to connectivity, networking, sociability and sharing – users that an IBM report on internet use classifies as social butterflies (Berman and Kesterson-Townes, 2011) – are more likely to adopt m-internet in order to facilitate the activities that they already perform.

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