FROM ADOPTION TO ADDICTION: 
THE CASE OF MOBILE ADDICTION

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ABSTRACT

Recently, there has been an explosive increase in the use of mobile phones in societies which raises concerns about social and psychological effects of excessive use of mobile phones by individuals. The goal of this study is to investigate whether mobile phone adoption factors (including perceived ease of use, perceived usefulness, perceived enjoyment, and social influence) as well as various mobile applications and services can also lead to mobile addiction. This paper proposes a model of mobile phone addiction based on technology adoption and addiction literature.

Keywords: mobile phone functions, mobile addiction, technology addiction, mobile applications, mobile adoption.

INTRODUCTION

The fast growth of mobile phone use in the past decade has raised concerns about the social, psychological, and health issues resulted from overuse or abuse of mobile technology (Dellorto, 2011; Reid & Reid, 2004). In 2011, more than four out of five American adults owned some type of mobile phone (Smith, 2011). In 2012, the penetration rate of smartphones (which are advanced mobile phones) exceeded 50% in the United States, reaching to more than 125 million (comScore, 2013). Although use of mobile phones proves to be very convenient during its early adoption, it is also a source of many social and behavioral issues including excessive use of mobile phones in public places, using mobile phones in prohibited places, using mobile phones while driving or activities that require full concentration such as studying. Compulsive use is a symptom of mobile phone dependence or even mobile phone addiction (Toda et al., 2008). As mobile phones are becoming more and more sophisticated and multifunctional, mobile phone users are becoming more and more dependent (or even addicted) to these devices (Leung, 2008). Today, mobile phones are no longer devices for one-to-one communication through voice and texting services. They are used as a device for internet surfing, email checking, online chatting, time management, entertainment, playing online/offline games, pictures and videos sharing, self-expression, establishing identity and developing and running various mobile applications. This leads to increasing concerns about pathological use of mobile phones as an instance technology addiction. The bibliographic search for addiction to information and communication technologies (ICT) including internet, online video games, and mobile phones between 1996 to 2008 shows that the number of publications in this area is growing (Carbonell, Guardiola, Beranuy, & Bellés, 2009).

This research is addressing the question whether the factors associated with mobile phone adoption can also lead to mobile phone addiction. The structure of this paper is as follows: First, we conduct an extensive literature review within two main research streams: (1) mobile
technology use and adoption, (2) mobile addiction. We will then propose a research model that integrates both adoption factors and mobile phone addiction.

LITERATURE REVIEW

Over the past few years there has been an explosive growth in the number of mobile phone applications. More people are using Smartphones which are mobile phones with advanced functionalities and diverse connectivity features and capable of running software applications (a.k.a. mobile apps). In this section we will have a look at two major research streams: the first research steam is associated with use and adoption of information technology particularly in the area of information and communication technologies including mobile phones and their applications. The second research stream addresses issues related to dependence on information and communication technologies including mobile phones. Finally, we develop a research model that brings these two research streams together to identify factors that can lead to mobile phone addiction.

Technology Use and Adoption

When examining the adoption and acceptance of an ICT, many researches build their arguments based on technology acceptance model (TAM) (Davis, 1989), diffusion of innovations (DOI) theory (Rogers, 1995) and unified theory of acceptance and use of technology model (UTAUT) (Venkatesh, Morris, Davis, & Davis, 2003). In a study on technology adoption by physicians, Chau and Hu (2001) found that TAM can appropriately explain technology acceptance by professionals. In another study on the behavioral intention to use a mobile phone using TAM, Park and Chen (2007) found perceived usefulness and attitude toward using a mobile phone as drivers for behavioral intention to use the device. They further postulated that perceived usefulness and perceived ease of use positively determine attitudes toward using a mobile phone (Park & Chen, 2007).

Diffusion of Innovations theory posits that individual’s perception and adoption speed of the innovation can be impacted by an array of innovation characteristics which are relative advantage, compatibility, trialability, observability, and complexity (Rogers, 1995). Extending DOI theory to the context of information systems, the following eight factors found to be significant: voluntariness, relative advantage, compatibility, image, ease of use, result demonstrability, visibility, and trialability (Moore & Benbasat, 1991).

The Unified Theory of Acceptance and Use of Technology Model (UTAUT) (Venkatesh et al., 2003) explains behavioral intention to use an information system using performance expectancy, effort expectancy, social influence, and facilitating conditions as direct determinants of intention to use and use behavior (Venkatesh et al., 2003). Previous studies have applied UTAUT in the context of adoption of mobile phone services or features including: user acceptance of the mobile Internet (Lee, Kim, & Chung, 2002), adoption behavior of mobile internet services (Pedersen & Ling, 2003), WAP service adoption on mobile phones among internet users (Teo & Pok, 2003), consumer acceptance of wireless financial services (Kleijnen, Wetzels, & De Ruyter, 2004), mobile phone adoption factors at organizational level (Roberts & Pick, 2004). As part of their findings, these studies indicate the importance of infrastructure factors in mobile phone adoption (Kleijnen et al., 2004).
‘Mobile Phone Technology Adoption Model’ (MOPTAM) (Biljon & Kotzé, 2007) was developed based on TAM, UTAUT and DOI to investigate factors that influence mobile phone adoption. MOPTAM categorizes factors affecting actual system use into two groups: determining factors and mediating factors. The determining factors are: social influence, perceived ease of use, perceived usefulness, facilitating conditions, and behavioral intention. The effects of determining factors are influenced by mediating factors which are: personal, demographic and socio-economic factors. The MOPTAM model introduces the effect of infrastructural and personal factors to the existing literature of mobile phone usage and adoption (Biljon & Kotzé, 2007).

As mobile phones become more advanced and smarter, covering larger range of users’ needs, there will be an increase in their perceived usefulness. Based on propositions of technology acceptance model this can lead to behavioral intention to use the mobile phone, which subsequently derives actual use. However the excessive use of mobile phones may lead to mobile phone addiction which is discussed in the following section.

**Mobile Phone Addiction**

Addiction was traditionally viewed as physical and psychological dependence on a substance (Leung, 2008), which did not include behavioral patterns as addiction. However, recent studies suggest that addiction covers a broader range of behaviors (Lemon, 2002; Orford, 2001; Shaffer, 1996). Technology addiction is a type of behavioral addiction that is viewed as interaction between human and a device (Griffiths, 1996; Leung, 2008). Researchers have found that excessive use of technology can be problematic in nature (Griffiths & Hunt, 1998; Griffiths, 1999; Shotton, 1989). For instance studies have shown that in some cases internet addiction occur in much the same way that addiction to gambling, drugs, or alcohol does (Beard & Wolf, 2001; Beard, 2002; Chak & Leung, 2004; Ling, 2004; Sherer, 1997; Young, 1998, 2009).

The theory of optimal flow (Csikszentmihalyi, 1991) can explain the addictive aspect of information technology. This theory describes a state of mind of intense involvement in which nothing other than a specific activity matters to the person. This experience is so enjoyable for the individual that they will keep doing it even at greater costs just for the sake of doing it (Csikszentmihalyi, 1991). The flow is characterized with concentration and the enjoyment associated with a certain activity. Activities associated with use of IT have both characteristics of the flow (Porter & Kakabadse, 2006). They can deeply involve the users and give them a sense of enjoyment simultaneously. This encourages the users to continuously conduct the activity even at the cost of losing time or money (Porter & Kakabadse, 2006).

Addiction involves individual’s absorption in the activity along with an artificial sense of relief or of simulation. However, addiction is a continuum of degrees (Akers, 1991; Peele, 1985; Walters, 1999). That is why one of the challenges in this area, is the definition addiction or dependence based on the degree to which it can be considered a disorder. The World Health Organization (WHO) has defined addiction in terms of degrees of severity for dependence. Dependence is often used to describe habits without symptoms of addiction. The American Psychiatric Association’s (1994) Diagnostic and Statistical Manual of Mental Disorders (DSM-IV) refers to dependence as negative habitual syndromes (Spitzer, Gibbon, Skodol, Williams, & First, 1994). WHO defines addiction as the continuous use of something for the sake of relief,
comfort, or stimulation that often causes cravings when absent (World Health Organization, 1994). Based on this definition, an addiction involves engaging in a relieving or stimulating activity (often continuous) which if discontinued results in discomfort or unease. Addiction has also been defined as “compulsive use” (or activity in this case) that is not necessary accompanied by some impairment of health or social functioning (World Health Organization, 1994).

Technology addiction has been examined within the context of online sexual addiction (Bingham & Piotrowski, 1996), internet and academic performance (Kubey, Lavin, & Barrows, 2001), and addiction to mobile text messaging (Perry & Lee, 2007). In another study Toda et al. (2008) tried to develop a Mobile Phone Dependence Questionnaire (MPDQ) by which they could measure the level of respondent’s dependency toward mobile phone. In their study they considered certain type of individual behavior particularly the over-use of mobile phones in public places and tendency to using mobile phone in places where mobile phone use was prohibited as indicators for mobile phone addiction. Smartphone dependence, which can be viewed as a proxy for addiction to mobile phones, has also been found to be a significant predictor of smartphone adoption (Negahban, 2012).

So far there has been a paucity of studies considering how using various mobile phone applications and services can increase degree of individuals’ mobile phone dependence. In the following section a model is developed to provide an in-depth view of factors leading to individual’s mobile phone dependence.

**RESEARCH MODEL**

In order to address our research question (i.e. whether mobile phone adoption factors could lead to mobile phone addiction), we proposed the following research model. In our model we incorporate major adoption factors that were identified by previous literature and mobile addiction.

![Figure1: Proposed mobile phone dependence model](image-url)
The definition of the constructs used in our research model is shown in table 1.

<table>
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<tr>
<th>Construct</th>
<th>Definition</th>
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<tr>
<td>Perceived usefulness (of mobile phone)</td>
<td>The degree to which user believes that using a mobile phone is beneficial for him/her.</td>
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<tr>
<td>Perceived enjoyment (of using the mobile phone)</td>
<td>The level of enjoyment performing the task gives to the user.</td>
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<td>Mobile phone addiction</td>
<td>Compulsive use of mobile phone that involves individual’s absorption in using the mobile phone.</td>
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<tr>
<td>Mobile phone applications</td>
<td>Mobile phone services, features and applications made available to the user by using the mobile phone.</td>
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<tr>
<td>Social influence (of mobile phone)</td>
<td>The degree to which it is important for the individual to be thought by others as a mobile phone user.</td>
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<tr>
<td>Frequency of use (of mobile phone)</td>
<td>The number of times mobile phone is used by the user during a specific period of time.</td>
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As mobile phones turn into the personalized devices that are available for use in most contexts and locations, they start to become more and more visible to public. Since individuals care about their image among other people particularly those who are important to them, they start considering the social image that using a mobile phone creates for them. Based on the degree to which their mobile phone helps them establish their desired image, they tend to use their mobile phone more frequently in public. At the same time, they will also find their mobile phone more useful, because individuals find their mobile phone beneficial to attain their goal of creating their desired image among others. Thus, the social influence of mobile phone can be an antecedent of perceived usefulness of mobile phone.

Based on the degree to which an individual finds his mobile phone help him create his/her desired image among others, he/she will find using the mobile phone more enjoyable. Previous research has also found that Social norm is a significant antecedent of perceived enjoyment within the context of Push-To-Talk (Dickinger, Arami, & Meyer, 2008). This can be extended to the context of mobile phone. Thus, we posit the following hypotheses:

*H1a: Social influence of using a mobile phone positively influences perceived enjoyment of using a mobile phone.*

*H1b: Social influence of using a mobile phone positively influences perceived usefulness of using a mobile phone.*
H1c: Social influence of using a mobile phone positively influences frequency of using a mobile phone.

Mobile phones are turning into multifunctional devices that are not only used for communication purposes, but also they are used for calendar, instant messaging, social networking, and even playing games. That is why these devices can have both utilitarian and hedonic uses. Perceived usefulness is more strongly associated with utilitarian nature of a device while perceived enjoyment is more strongly associated with hedonic nature of a device (Heijden, 2004). That is why we believe that due to the variety of hedonic and utilitarian applications that mobile phones provide to their users, they can influence their users’ perceived usefulness and perceived enjoyment. At the same time, as users start using mobile phones for different purposes, their frequency of use will increase. Thus, we posit:

H2a: Mobile phone applications positively influence perceived enjoyment of using a mobile phone.

H2b: Mobile phone applications positively influence perceived usefulness of using a mobile phone.

H2c: Mobile phone applications positively influence frequency of using a mobile phone.

Drawing on TAM, ease of use is a significant antecedent of perceived usefulness and use. Extending this to the context of mobile phones, we can argue that perceived ease of use not only positively influences perceived usefulness of mobile phones, but it also influences frequency of using these devices. We believe that frequency of use can capture the actual use, allowing us to bypass intention to use which has often been used as a proxy for actual use in IS adoption literature. As a result, we posit that perceived usefulness influences frequency of using the device.

As discussed earlier, mobile phones are dual nature systems in terms of being utilitarian and hedonic. However, TAM is a more suitable model for utilitarian systems. To address the hedonic nature of mobile phones, we draw on Heijden (2004) model for acceptance of hedonic information systems. Perceived ease of use influences the perceived enjoyment in a hedonic system context. This can also be extended into the context of mobile phone use which has both hedonic and utilitarian aspects. Thus, we posit the following hypotheses:

H3a: Perceived ease of using mobile phones positively influences perceived enjoyment of using a mobile phone.

H3b: Perceived ease of using mobile phones positively influences perceived usefulness of using a mobile phone.

H3c: Perceived ease of using mobile phones positively influences frequency of using a mobile phone.

H4: Perceived usefulness of using mobile phones positively influences frequency of using a mobile phone.
Previous studies have demonstrated that activities associated with use of information technology can be characterized by such high concentration and the enjoyment that they can involve the users deeply and simultaneously provide the user with a sense of enjoyment which encourages the users to continue the activity at high cost of time or money (Porter & Kakabadse, 2006). The perceived enjoyment of using mobile phones along with their highly personalizable nature that enables these devices to best address hedonic and utilitarian needs of users, can create similar effect of a flow that can absorb the user into using the device even in inappropriate situations. Thus, we posit that:

\[ H5: \text{perceived enjoyment of using a mobile phone positively influences Mobile phone addiction}. \]

The frequency of using a mobile phone is defined as the number of times the mobile phone is used by the user during a specific period of time. At the same time frequency of use can be used as an indicator of use continuity and continuous use. Based on definitions provided by WHO compulsive and over-use can be an indicator addiction. In the context of this study frequency of use includes using any feature, service or application of mobile phone. As a result, we posit that the higher the frequency of using the mobile phone, the higher the likelihood of mobile phone addiction.

\[ H6: \text{Frequency of using the mobile phone positively influences Mobile phone addiction}. \]

**CONCLUSION**

Over the last decade, there has been an explosive growth in the use of mobile phones. As the penetration rate of mobile phones in the societies grow, concerns about social and psychological effects of these devices rise. The goal of this study is to understand how using various mobile phone features, applications or services for different purposes by an individual can result in mobile phone addiction. In this study an integrated model of mobile phone addiction is developed based on factors associated with technology adoption and theory of optimal flow. So far most of the studies have addressed perceived ease of use, perceived usefulness, social influence, perceived enjoyment, and use to investigate technology adoption behavior of individuals. However, there is scarcity of studies which evaluate the effect of these technology adoption factors on degree of individuals’ technology addiction. Studies on the hedonic aspect of information systems are also mainly focused on the relation between hedonic use of technology and technology adoption/continuation of use. To capture the hedonic aspects of information technology, those studies have introduced constructs associated with pleasure, enjoyment, playfulness, etc. However, such constructs are usually considered as antecedents of intention to use and not as mediators for technology addiction.

The author intends to validate this model by developing a survey. In order to do so, we plan to operationalize mobile phone applications by looking into different type of applications and functions that are provided by mobile phones. We also need to develop and validate measurement items for addiction within the context of mobile phones.
REFERENCES


