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Identifying factors influencing consumers' intent to install mobile applications

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ABSTRACT

The purpose of this research is to explore the factors that influence a consumer before installing a mobile application. A research model is created based on perceived risk, trust, perceived benefit, and intent to install. Seven antecedents of trust and risk include perceived security, perceived reputation, application characteristics, familiarity, desensitization, consumer disposition to trust, and consumer disposition to risk. Partial least squares (PLS) is used to test the research model. Only significant antecedents are retained and a new research model is created, which includes the antecedents of perceived security and familiarity. Results show that consumers that perceive more security have greater trust and reduced perceived risk. Furthermore, consumers that feel more familiar with finding, purchasing, downloading, and installing applications have greater trust and reduced perceived risk. More than half (R^2=.505) of the variability in the intention to install an app is explained.

1. Introduction

As of May 2015, Google's Google Play Market contained 1.5 million apps and Apple's App Market contained 1.4 million (Statista, 2015a). Consumers are downloading apps at a staggering rate. As of June 2015, Apple has had 100 billion total downloads from its market since its inception in 2008 (Statista, 2015b). In the first quarter of 2015 alone, Google had an estimated 160 million downloads and Apple had 100 million downloads (Android Authority, 2015). As mobile app availability and downloads have been rapidly increasing, so has the risk to consumer privacy and security. New mobile malware for the first quarter of 2015 has reached 1.1 million variants and total mobile malware is now near 7 million variants (McAfee, 2015). Beyond malware are privacy concerns, many apps request access to consumer data that is not necessary for the apps' functionality. Developer access to this consumer data comes in the form of permission requests, which must be granted by the consumer. While many legitimate developers then use this customer data to earn revenue, one study revealed that many app developers earn their money not from the app purchase price, but from selling consumer data to third parties (SC Magazine, 2015).

With so many apps to choose from and so many of them having security or privacy concerns, it is important to determine the factors that influence a consumer before installing an app. From the developer and market owner's perspectives, it is important to know these factors in order to maximize revenue. For example, if consumers are desensitized to in-app permission requests and simply ignore them, then more consumer data can potentially be collected without losing customers. From a consumer protection perspective, it is important to know the factors influencing consumers in order to determine if consumers are making judicious decisions to maximize their safety. Therefore, the purpose of this paper is to determine the factors that influence consumers before installing mobile apps. The trust-based consumer decision-making model, which is employed in this paper, is adapted from Kim, Ferrin, and Roa (2008) and is extended to investigate these factors.

Only a few previous studies have investigated factors influencing the use of or adoption of mobile apps, and no previous study was found that employed our basic theoretical model or many of its antecedents. No previous studies were found that investigated security as potentially influencing a consumer's decision to install and app. However, previous mobile device studies have shown that users are concerned about security (Harris, Furnell, & Patten, 2014; Jones and Chin, 2016), and this study adds to previous mobile app research by investigating security as one of the seven antecedents of trust and risk. Earlier mobile device studies have also shown that consumers often read app reviews and consider star ratings

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before installing apps (Harris, Brookshire, Patten, & Regan, 2015; Shen, 2015), and therefore, an application characteristic antecedent is included in our model. In addition, this study introduces two new antecedents for familiarity with getting apps from the market and the potential desensitization to permission requests. Given the plethora of permission requests embedded in apps, particularly with Android apps, it is imperative to determine if users simply ignore these requests when installing an app. The integration of these new antecedents, along with the additional antecedents described below, strengthen our model and make significant contributions to existing mobile installation and usage research.

The following section reviews previous mobile app usage and adoption research. Section three describes our research model and seven antecedents while section four specifies the details of our research methodology. Our results are presented in section five. Finally, our conclusions and suggestions for future research appear in Section 6.

2. Background

There have been many recent studies that have investigated the factors involved in a consumer's adoption of various mobile device services, such as mobile banking (Chen, 2013), mobile payments (Lu, Yang, Chau, & Cao, 2011; Zhou, 2013), financial services (Chemingui & Ben lallouna, 2013), health services (Deng, Mo, & Liu, 2014), mobile data services (Al-Debei & Al-Lozi, 2014), mobile games (Jiang, Peng, & Liu, 2015), and mobile learning (Callum, Jeffrey, & Kinshuk, 2014). However, there have not been many studies that have investigated the factors that influence the installation of mobile apps on mobile devices.

One study by Yang (2013) did not specify the installation of mobile apps, but instead investigated the use of mobile apps, which implies installation. The author used a model developed from the Theory of Planned Behavior (TPB), Technology Acceptance Model (TAM), and Uses and Gratification Theory to investigate young Americans' intention to use mobile apps. The model included seven constructs for investigating the intention to use mobile apps, including behavioral control, subjective norm, mobile apps attitudes, perceived usefulness, ease of use, perceived expressiveness, and perceived enjoyment. The researcher concluded that perceived behavioral control, usefulness, and mobile Internet use are predictors of young Americans' intention to use mobile apps.

A study by Kim and Yoon (2013) also utilized TAM in investigating antecedents affecting app usage. Constructs used in this model included perceived informative usefulness, perceived entertaining usefulness, perceived social usefulness, perceived ease of use, attitude toward app usage, user review, and perceived cost-effectiveness. The study concluded that perceived information usefulness, perceived entertaining usefulness, and perceived ease of use all had significant influences on attitude toward app usage, which in turn had a significant influence on behavioral intention to use apps. User reviews also significantly influenced app usage, but cost-effectiveness had no influence on app usage.

Another study by Hew and Lee (2015) also investigated the behavioral intention to use mobile apps, but used a different theoretical background in utilizing the Unified Theory of Acceptance and Use of Technology 2 (UTAUT2). The constructs were performance expectancy, effort expectancy, price value, facilitating conditions, habit, social influence, and hedonic motivation. Moderating variables were gender and education level. The authors concluded that all of the constructs except price value and social influence were significantly related to behavioral intention to use mobile apps. Habit had the strongest influence and gender and educational level were not significant.

A study by Shen (2015) investigated user adoption of mobile apps using a framework based on TAM, Signaling Theory, and Regulatory Focus Theory. The author's framework included reputation source (app rating scores), perceived usefulness, app type (utilitarian or hedonic app), attitude, mood, regulatory focus framing (prevention or promotion focus), and perceived risk. Results indicate that app type and perceived risk moderate reputation source's influence on user's attitude toward using apps.

Network Theory was used in another study by Taylor, Voelker, and Pentina (2011) to investigate mobile app adoption and usage by young adults. The authors collected and analyzed survey data, but did not apply it to a developed theoretical model. The results indicate that the likelihood of app adoption and usage increases with app use by the consumer's strongest relationship partner. However, there was only marginal support for adoption and usage being influenced more by friends than by family members.

In summary, there were no studies found that investigated the installation of mobile apps, but a few studies were found that investigated the adoption or usage of mobile apps. The present study assumes that in order to adopt or use a mobile app, the app must be installed. While the act of installing an app does not necessarily mean that the app will be used, this is a likely scenario. Therefore, we perceive adoption, usage, and installation as similar, and therefore, group these studies together. Of the related studies found and reviewed, TAM, TPB, UTAUT2, Uses and Gratification Theory, and Network Theory, Signaling Theory, and Regulatory Focus Theory were utilized. However, none of these studies investigated the basic theoretical model nor the antecedents found in our model, particularly security. Only one study, Shen (2015), investigated perceived risk. Therefore, our theoretical model and related study uniquely contributes to the known body of work.

3. Research model

The theoretical model presented in Fig. 1 is a trust-based consumer decision-making model adapted from Kim et al. (2008), where the authors investigated factors that influence consumers before making a purchase from a website. The basic model's constructs are intention to install an app, trust, perceived risk, and perceived benefit. The model is based on a valence framework that uses perceived benefit and risk from Peter and Tarpey (1975), which assumes consumers use both positive and negative attributes when making decisions (Kim et al., 2008). The antecedents familiarity, perceived security, perceived reputation, and consumer disposition to trust are adapted from Kim et al. (2008). As an extension to their model, we introduce the antecedents application characteristics, desensitization, and consumer disposition to risk.

3.1. Intention to install

Using the Technology Acceptance Model (Davis, 1989), the Theory of Planned Behavior (Ajzen, 1991), and the Theory of Reasoned Action (Fishbein and Ajzen, 1975), previous studies have demonstrated that a consumer's intentions are significant predictors of a consumer's actual behavior (Kim et al., 2008; Pavlou, 2003; Shin, 2009; Taylor & Todd, 1995; Yang, 2013; Venkatesh, Morris, Davis, & Davis, 2003). In this research, a consumer's intention to install an application is seen as a significant predictor of actually installing the application.

3.2. Perceived risk

A consumer's perceived risk can be influential in the decision to install an app. In this study, perceived risk is defined as *a consumer's subjective expectation of suffering a loss in pursuit of a desired outcome* (Warkentin, Gefen, Pavlou, & Rose, 2002). There have been