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An Investigation of the Key Factors that Affect the Adoption of Smartphones in Global Midmarket Professional Service Firms

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by

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A dissertation report submitted in partial fulfillment of the requirements
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We hereby certify that this dissertation, submitted by Mark Kocour, conforms to acceptable standards and is fully adequate in scope and quality to fulfill the dissertation requirements for the degree of Doctor of Philosophy.

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An Abstract of a Dissertation Report Submitted to Nova Southeastern University
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The evolution and proliferation of mobile devices (m-devices) in the workplace have been rapid. In comparison to conventional services provided by mobile phones (m-phones), smartphones feature sophisticated functionality, such as Internet access, video/audio streaming, and business productivity applications. As a consequence of increased demand for smartphones in the workplace, an understanding of the factors that determine the decision to adopt smartphones in business settings is necessary. The goal of this investigation was to identify the key factors that have an impact on the adoption of smartphones.

This dissertation investigation provided an understanding of the key factors that affect the adoption of smartphones for the domain of professional consultants and validated the key constructs of a conceptual map of smartphone adoption through the analysis of data generated from a survey of professional consultants from a global professional services firm, ZS Associates. A total of 130 valid responses from an online survey distributed to 336 ZS Associates professional consultants located in North America, European Union, Japan, China, and India were used in this study.

The results of this investigation indicated that social influence, perceived ease of use (PEU), perceived usefulness (PU)/compatibility in the workplace, job relevance, and technology are the key factors that affect the adoption of a smartphone. Demographics and observability factors such as age and observing others' using smartphones in the workplace were found to have no significant impact on smartphone adoption. The outcomes of this investigation indicated that there were no significant cultural differences between respondents in the North America, EU, and Asia-Pacific regions in regard to the adoption of a smartphone.

The results of this investigation expanded the research on the adoption of smartphones to the domain of professional consultants. The investigation expanded the research of smartphone adoption from a cultural perspective. Further, the research bridged the gap in the information technology (IT) literature on the intention to use a smartphone by incorporating the key constructs from the Technology Acceptance Model (TAM), Unified Theory of Acceptance and Use of Technologies (UTAUT), and the Diffusion of Innovations Theory (DOI) models.

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Chapter 1

Introduction

Background

Smartphones provide individuals with a mobile means to engage in social interactions and business (Chang, Chen, & Zhou, 2009; Zhu, Liu, & Pang Chuan, 2009). To meet increasing demands from consumers for multipurpose devices, smartphone platforms such as the Apple iPhone™, Blackberry®, Android™, and Microsoft® Windows® Mobile integrate technologies and features that go beyond traditional voice and text communications (Barkhuus & Polichar, 2011; Chen, Yen, & Chen, 2009; Kim & Garrison, 2009; Lee, 2014). Smartphones feature touchscreens and/or physical keyboards for entering text and phone numbers (Hoggan, Brewster, & Johnston, 2008; Hopkins, 2012). Smartphones also are distinguished from earlier mobile phone (m-phone) generations by their sophisticated features that support Internet access, video/audio streaming, text messaging, e-mail, Global Positioning System (GPS) navigation, Personal Information Management (PIM), and business productivity applications (Chang et al., 2009; Hopkins, 2012; Lee, 2014). Moreover, smartphones provide the capability to access corporate databases and business intelligence systems (Chang et al., 2009). The use of a smartphone for personal and business purposes is termed the "consumerization of IT" (Thakur, Gormish, & Erol, 2011, p. 1514).

Since 2008, smartphone sales have steadily increased, resulting in a decrease in the use of traditional m-phones (Adhikari, 2010). In 2013, 56% of US adults owned a smartphone (Pew Research Center as cited in Smith, 2013). According to Gartner (as

cited in Gupta et al., 2014), the smartphone share of overall m-phone sales increased from 38.9% in 2012 to 53.6% in 2013.

Individuals use smartphones to exchange information and knowledge in a flexible and rapid manner (Hopkins, 2012). To maintain their competitive advantage and to enhance communications with employees, companies increasingly deploy smartphones in the workplace (Kim & Garrison, 2009). Smartphones provide mobility and flexibility while offering users the ability to effectively communicate, interact, and manage business interactions (Hopkins, 2012). Importantly, smartphones are critically important technological devices that improve business interactions by enhancing decision-making capabilities and reducing response times that provide individuals and businesses with the capacity to make business decisions and to gain a competitive advantage as compared to those companies that do not support smartphone utilization (Hopkins, 2012). According to Barkhuus and Polichar (2011), as a consequence of the increased demand for smartphones in the workplace, the importance of identifying the key factors that determine smartphone adoption is necessary.

In this investigation, the author identified the key factors such as social influence, perceived ease of use (PEU), and job relevance that affect the adoption of smartphones in global midmarket professional service firms. According to Von Nordenflycht (2010), professional service firms (PSFs) such as ZS Associates are distinguished by three important characteristics: knowledge intensity, low capital intensity, and a professionalized workforce. Midmarket firms, as defined by the National Center for the Middle Market (2011), have between 100 and 3,000 employees and yearly revenues between $10 million to $1 billion.

The key factors, which include demographics, social influence, PEU, perceived usefulness (PU), observability, compatibility, job relevance, and technology, were drawn from the Technology Acceptance Model (TAM; Davis, Bagozzi, & Warshaw, 1989), Unified Theory of Acceptance and Use of Technologies (UTAUT; Venkatesh, Morris, Davis, & Davis, 2003), and the Diffusion of Innovations Theory (DOI; Rogers, 2003). This investigation validated the proposed key factors by providing an analysis of data generated from a survey of professional consultants from a global professional services firm.

Problem Statement

According to Adhikari (2010) and Hopkins (2012), smartphones have transformed the way that companies such as healthcare and professional services operate and how business, in general, is conducted, and they represent a rapidly growing share of overall sales of m-devices. In their investigation of smartphone adoption, Chen, Yen, and Chen (2009); Park and Chen (2007); and Putzer and Park (2010, 2012) applied the TAM and DOI models to investigate the adoption of technological innovations in facilitating smartphone adoption. Additionally, Chen et al., as well as López-Nicolás, Molina-Castillo, and Bouwman (2008), developed a theoretical framework for smartphone adoption by combining or expanding other models, constructs, and theories. Although smartphone adoption models, such as those developed by Chung and Chun (2011) and Putzer and Park (2012), are available, smartphone adoption models do not uniformly include key factors that influence adoption of smartphone technology (Aldhaban, 2012). According to Aldhaban, TAM is not a comprehensive model that supports the adoption of technology. TAM lacks sensitivity to human and social factors such as age, gender, and

cultural influences (Aldhaban, 2012; Van Biljon & Kotzé, 2008). Moreover, TAM does not sufficiently support the validity of the relationships among external variables such as technology factors and innovation factors from DOI. As a consequence, technology acceptance studies of smartphone adoption are based on a modified version of TAM (Chua, Balkunje, & Goh 2011; Putzer & Park, 2012; Su & Li, 2010; Thakur et al., 2011; Yun et al., 2011). According to Yun et al., UTAUT is a more comprehensive model than is TAM and includes external variables such as demographics, social influence, and facilitating conditions. The UTAUT model successfully integrates key constructs from eight existing IT models and is able to explain 70% of the variance in intention to use a system, as compared to 40% by TAM (Aldhaban, 2012; Yun et al., 2011).

Researchers such as Putzer and Park (2012) also used DOI theory to determine whether an individual or an organization will adopt an innovation. Further, research on smartphones that is based on Rogers' (2003) DOI theory indicates that smartphones are a relatively recent innovation (Park & Chen, 2007; Putzer & Park, 2010, 2012). According to Zheng (2012), however, current research on smartphone diffusion, as based on the DOI theory is limited.

According to Barkhuus and Polichar (2011) and Putzer and Park (2012), as a consequence of the increased demand for smartphones in the workplace, there is a need to identify the key factors that determine smartphone adoption. Aldhaban (2012), who reviewed the research on smartphone adoption, was unable to find a comprehensive model of smartphone acceptance.

According to Chung and Chun (2011) and Putzer and Park (2012), the need for a smartphone adoption model that includes a comprehensive explanation of the key factors

that influence adoption of smartphones is necessary. To address this requirement, the author investigated the key factors that determine the decision to adopt (Aldhaban, 2012; Chung & Chun, 2011; Putzer & Park, 2012) smartphones in business settings as a consequence of their increased demand in the workplace (Barkhuus & Polichar, 2011).

Dissertation Goal

The goal of this investigation was to identify the key factors that affect the adoption of smartphones in global midmarket professional service firms. The author established the key factors that affect adoption of smartphones by examining research in the field of technology acceptance, including research by Chung and Chun (2011), Davis (1989), Davis et al. (1989), Kim and Garrison (2008), Putzer and Park (2010, 2012), Rogers (2003), Van Biljon and Kotzé (2007), and Venkatesh et al. (2003), and by conducting survey research.

The author validated the key factors that affect the adoption of smartphones by analyzing data generated from a survey of professional consultants at ZS Associates, a global sales and marketing consulting organization with 2,500 employees in offices throughout the United States (U.S.), Canada, the European Union (EU), Japan, China, and India. Approval to conduct this investigation was provided by ZS Associates, specifically, to conduct a survey of individuals who include consultants, managers, associate principals, and principals (Appendix A). The author is an associate principal, responsible for global information technology (IT) for ZS Associates, and has 20 years of technology implementation experience in small to global midmarket professional service firms that provide accounting, legal, and business consulting services. The author also has extensive experience in smartphone deployments in professional service firms. In

addition, the author has managed smartphone implementations in two professional service firms, DLA Piper and ZS Associates.

Research Questions

The research questions (RQs) that guided this investigation are as follows:

1. What are the demographic factors that contribute to intention to use a smartphone? (Putzer & Park, 2010, 2012; Su & Li, 2010; Van Biljon & Kotzé, 2007).
2. What are the social influence factors that contribute to intention to use a smartphone? (Chua et al., 2011; Chung & Chun, 2011; López-Nicolás et al., 2008; Van Biljon & Kotzé, 2008).
3. What are the cultural influence factors that contribute to intention to use a smartphone? (Thakur et al., 2011; Van Biljon & Kotzé, 2008).
4. What are the Perceived Ease of Use (PEU) factors that contribute to intention to use a smartphone? (Chang, 2010; Chen et al., 2009; Chung & Chun, 2011; Kang, Cho, & Lee, 2011; Kim, 2008; Kim & Garrison, 2009; Teng & Lu, 2010).
5. What are the Perceived Usefulness (PU) factors that contribute to intention to use a smartphone? (Chang, 2010; Chen et al., 2009; Chung & Chun, 2011; Kang et al., 2011; Kim, 2008; Kim & Garrison, 2009; Teng & Lu, 2010).
6. What are the observability factors that contribute to intention to use a smartphone? (Putzer & Park, 2010, 2012).
7. What are the compatibility factors that contribute to intention to use a smartphone? (Putzer & Park, 2010, 2012).

8. What are the job relevance factors that contribute to intention to use a smartphone? (Kim, 2008; Kim & Garrison, 2009; Putzer & Park, 2012).
9. What are the technology factors that contribute to intention to use a smartphone? (Aldhaban, 2012; Chua et al., 2011; Kang et al., 2011; Li & McQueen, 2008; Van Biljon & Kotzé, 2007).

Figure 1 shows the researcher-developed proposed conceptual map that was used in this investigation (Aldhaban, 2012; Kim, 2008; López-Nicolás et al., 2008; Putzer & Park, 2012).

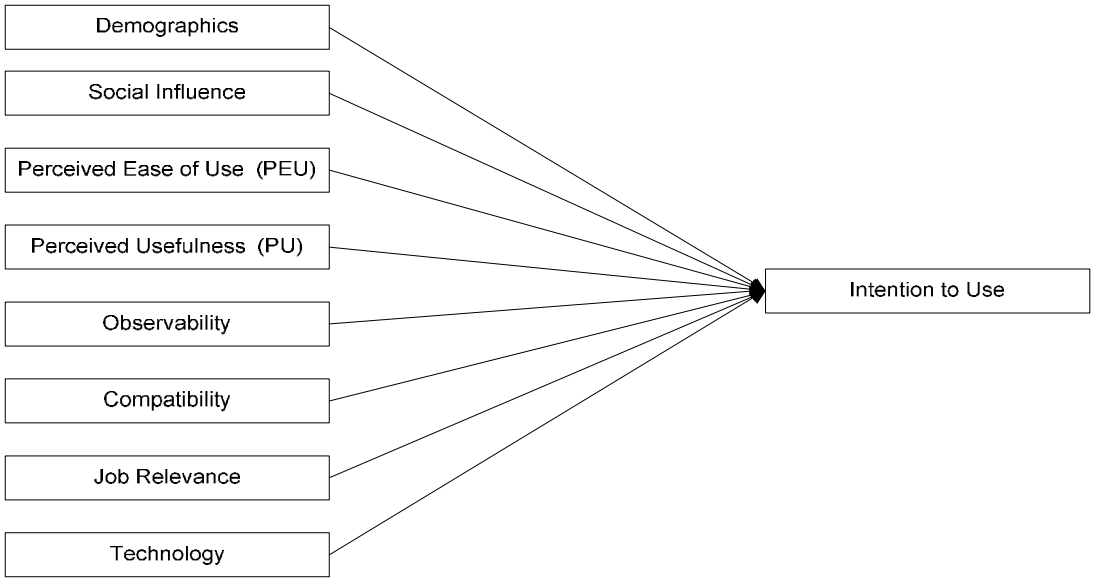


Figure 1. Proposed conceptual map.

The key factors that affect the adoption of smartphones were drawn from the TAM, UTAUT, and DOI models. According to Chung and Chun (2011) and Putzer and Park (2012), the need for a smartphone adoption model that includes a comprehensive explanation of the key factors that influence adoption of smartphone technology is necessary. TAM is a widely applied model for the acceptance and usage of IT (Kang et al., 2011, Kim & Garrison, 2009; Putzer & Park, 2012; Teng & Yu, 2010; Van Biljon &

Kotzé, 2008). The constructs of PEU and PU were incorporated from TAM into this investigation, based on TAM's empirical validity as related to intention to use a smartphone (Putzer &Park, 2012). According to Kang et al., the attitude construct is a weak predictor of intention to use technology and, thus, these authors omitted the attitude construct from TAM in their investigation. As a consequence, the author did not include the attitude construct in this investigation.

The UTAUT model successfully integrates key constructs from existing IT adoption models and is able to explain 70% of the variance in intention to use a system, as compared to 40% by TAM (Aldhaban, 2012; Yun et al., 2011). In this investigation, the author incorporated demographics, social influence, and technology as key factors from the UTAUT model. Demographics are an important aspect of DOI theory (Chen et al., 2009; Putzer & Park, 2012) and, therefore, are incorporated in the UTAUT model as well (Yun et al., 2011). Social influence or subjective norms are direct determinants of intention to use technology (López-Nicolás et al., 2008; Yun et al., 2011). Many investigations have demonstrated that technology or facilitating conditions have a significant impact on intention to use a smartphone (Aldhaban, 2012; Chung & Chun, 2011; Putzer & Park, 2010, 2012; Van Biljon & Kotzé, 2007, 2008). Performance efficiency and effort efficiency are incorporated in this investigation through the PU and PEU constructs (Yun et al., 2011).

Based on smartphones' being considered a recent innovation, smartphone investigations by Park and Chen (2007) and Putzer and Park (2012) employed Rogers' DOI theory. The DOI theory incorporates five characteristics of innovation, specifically, relative advantage, compatibility, complexity, observability, and trialability (Aldhaban,

2012). Trialability is the degree to which an innovation can be tried prior to formal adoption (Rogers, 2003). The constructs from DOI that were incorporated into this investigation included observability, compatibility, and job relevance (Putzer & Park, 2012).

According to DOI theory, observability and compatibility must be present for an individual to choose to adopt technology (Chen et al., 2009). In investigations performed by Kim (2008) and Putzer and Park (2010, 2012), job relevance was found to be a significant factor in an individual's intention to use a smartphone. Job relevance is derived from Roger's DOI (Putzer & Park, 2012). The relative advantage construct is similar to PU, and the complexity construct is similar to PEU; thus, these constructs were not incorporated in the current investigation (Al-Jabri & Sohail, 2012). The trialability construct also was not incorporated into the current investigation based on Putzer and Park's (2012) findings that the construct was eliminated to reduce confusion with the observability construct.

Demographics

Demographics refer to an individual's age and gender as well as factors such as level of education, job status, occupation, and experience with technology (Putzer & Park, 2012; Van Biljon & Kotzé, 2008). Individual characteristics are an important aspect of DOI theory (Chen et al., 2009; Putzer & Park, 2012) and are incorporated into the UTAUT model as well (Yun et al., 2011). This investigation determined whether demographics such as age or gender contributed to intention to use a smartphone by professional consultants.

Social Influence

Social influence refers to the degree to which an individual believes that he or she is expected by significant others to use technology (Yun et al., 2011). López-Nicolás et al. (2008) studied the adoption of advanced mobile service and found that social factors are an important influence on the individual's decision to adopt advanced mobile services. In the UTAUT model, social influence or subjective norms are direct determinant of intention to use technology (López-Nicolás et al., 2008; Yun et al., 2011). This investigation determined whether social factors, such as others' influencing the idea of using a smartphone, contributed to intention to use a smartphone by professional consultants.

Cultural Influence

A limited number of investigations have explored the motivations for the intention to use a smartphone from a cross-cultural perspective (Shin & Choo, 2012). According to Van Biljon and Kotzé (2008), due to the globalization of m-devices, the inclusion of cultural factors when studying smartphone acceptance and usage is necessary. Cultural influences, however, are not explicitly identified in TAM or UTAUT (Van Biljon & Kotzé, 2008). The m-phone adoption and usage model developed by Van Biljon and Kotzé included cultural factors. As a consequence, the author analyzed cultural differences based on the cumulative findings of all investigation constructs by geographic regions. This investigation determined whether cultural differences between North America, EU, and Asia-Pacific regions contributed to intention to use a smartphone by professional consultants.

Perceived Ease of Use (PEU)

PEU reflects the user's expectation of effort required to use an application system and is factor in TAM (Davis et al., 1989). According to Kang et al. (2011), PEU did not directly or significantly affect intention to use a smartphone. Sek, Lau, Teoh, Law, and Parumo (2010) noted that PU had a greater impact on intention to use a smartphone than PEU. In regard to DOI theory, Rogers (2003) indicated that the PEU of innovation has an effect on the adoption decision. This investigation determined whether a smartphone's PEU contributed to intention to use by professional consultants.

Perceived Usefulness (PU)

PU refers to the user's perception that an application system will increase job performance and, therefore, is a factor in TAM (Davis et al., 1989). A number of investigations validated that PU has a significant impact on the intention to use a smartphone (Cho et al., 2010; Kang et al., 2011; Sek et al., 2010). This investigation determined whether a smartphone's PU contributed to intention to use by professional consultants.

Observability

Observability refers to the degree to which the results of adopting or utilizing the IT innovation are observable and are communicated to others (Rogers, 2003). According to the DOI theory, observability is one of the characteristics that must be present if an individual adopts technology (Chen et al., 2009). In the context of this investigation, the observation of others colleagues using a smartphone can increase the adoption rate. Observability is also an important factor in nurses' and doctors' intention to utilize a smartphone (Putzer & Park, 2010, 2012). This investigation determined whether

observing others' use of a smartphone in the workplace contributed to intention to use by professional consultants.

Compatibility

Compatibility refers to the degree to which adopting an IT innovation is consistent with existing values, needs, and past experience of potential adopter (Rogers, 2003). According to DOI theory, compatibility is one of the characteristics that must be present if an individual is to choose to adopt technology (Chen et al., 2009). In this context, compatibility is the alignment of smartphone usage in the work place with an individual's work style and habits (Putzer & Park, 2010, 2012). Compatibility also is an important factor in nurses' and doctors' intention to utilize a smartphone (Putzer & Park, 2010, 2012). This investigation determined whether compatibility, i.e., a smartphone's being compatible with aspects of work, contributed to intention to use a smartphone by professional consultants.

Job Relevance

Job relevance refers to individuals' perceptions of the extent to which technology is applicable to their job responsibilities (Kim & Garrison, 2009). In this context, job relevance involves the use of a smartphone to improve job performance (Putzer & Park, 2012). In investigations performed by Kim (2008) and Putzer and Park (2010, 2012), job relevance was found to be a significant factor in an individual's intention to use a smartphone. Job relevance is derived from Roger's DOI (Putzer & Park, 2012). This investigation determined whether job relevance, i.e., the use of a smartphone as relevant to the job, contributed to intention to use a smartphone by professional consultants.

Technology

Technology or facilitating conditions refer to the technical infrastructure that exists to support the use of the technology (Van Biljon & Kotzé, 2007). For a smartphone, the technology is the mobile infrastructure or the mobile service provider. The UTAUT model incorporates technology or facilitating conditions (Yun et al., 2011). Many investigations have demonstrated that technology or facilitating conditions have a significant impact on the intention to use a smartphone (Aldhaban, 2012; Van Biljon & Kotzé, 2007, 2008). This investigation determined whether technology factors, e.g., not encountering any Internet speed issues, contributed to intention to use a smartphone by professional consultants.

Intention to Use

Intention to use refers to the intention to use a smartphone. The resulting intention-to-use model incorporates concepts and constructs from TAM, UTAUT, and DOI theory. Many investigations have used a theoretical framework developed by combining models or theories (Chen et al., 2009; López-Nicolás et al., 2008). This investigation determined which constructs from the researcher-developed proposed conceptual map (Figure 1) contributed to intention to use a smartphone by professional consultants.

Relevance and Significance

There is a need to identify key factors that influence users' adoption of a smartphone (Aldhaban, 2012). Currently, however, there is no comprehensive model of user acceptance and adoption (Aldhaban, 2012). Current research on smartphone adoption and acceptance focuses on students, consumers, and healthcare professionals (Chen, Park, & Putzer, 2010; Chung & Chun, 2011; Kang et al., 2011; Kim, 2008; Kim & Garrison,

2009; Putzer & Park, 2010, 2012; Teng & Lu, 2010). Further, research on the adoption of mobile devices (m-devices) does not take into account cultural differences (Van Biljon & Kotzé, 2008) and differences in technology such as differences in companies' mobile infrastructure to support voice, data, and video communications (Aldhaban, 2012). Thus, the investigation of the key factors that influence the adoption of smartphone technology, particularly in global midmarket professional service firms is necessary.

This investigation bridged the gap in IT literature on the intention to use by analyzing key constructs from the TAM, UTAUT, and DOI models (Aldhaban, 2012). Research by Putzer and Park (2012), Van Biljon and Kotzé (2007), and Yun et al. (2011) demonstrates the value of adopting the TAM, UTAUT, and DOI constructs to provide an understanding of smartphone acceptance. Chtourou and Souiden (2010) noted that research on the adoption of smartphones focuses primarily on college students. According to Aldhaban, TAM is able to determine approximately 40% of the variance of technology acceptance, while UTAUT is able to determine approximately 70%. TAM, UTAUT, and DOI (Park & Chen, 2007; Putzer & Park, 2010; Van Biljon & Kotzé, 2007) are used to understand adoption among students and members of healthcare communities. This investigation provides an understanding of the key factors that affect the adoption of smartphones by professional consultants.

Barriers and Issues

There are a number of barriers and issues that had the potential to be encountered in the process of completing the proposed investigation. The first barrier to this investigation was the ability to obtain a participation rate of at least 50% for the online survey. According to Fowler (2009), the typical response rate for online surveys ranged

from 30% to 60%. The second barrier was the possibility of not being able to verify that the participants answered questions accurately and honestly (Vuolle et al., 2008). The third barrier was the use of a survey, which introduces self-report biases (Chung & Chun, 2011), and the use of a known group of participants, which resulted in self-selection bias (Groves et al., 2009). Further, according to Groves et al., if the survey questions were poorly worded, the responses from different participants would potentially not be comparable.

Assumptions, Delimitations, and Limitations

Assumptions

Assumptions are aspects of the study that the investigator takes for granted or are assumed to be true (Ellis & Levy, 2009; Nenty, 2009). One assumption in this investigation was that participants would answer the survey questions truthfully. The author included, in the instructions for the questionnaire, a note that the responses to the questions in the survey were anonymous and that only cumulative results would be analyzed. The second assumption was that the questionnaire was valid and reliable. All survey instrument questions used in the study were validated and used successfully in prior studies (Aldhaban, 2012; Kim, 2008; López-Nicolás et al., 2008; Putzer & Park, 2012).

Delimitations

Delimitations are self-imposed limitations that limit the scope of the investigation and that define the boundaries of the investigation (Ellis & Levy, 2009; Nenty, 2009). One delimitation of this investigation was that the population of participants was limited to a

global professional services firm. Thus, the results of this investigation were generalized only to global professional service firms.

Limitations

Limitations are factors that are uncontrollable and, as a consequence, can potentially affect the internal validity of the investigation (Ellis & Levy, 2009; Nenty, 2009). One limitation of this investigation was that the population of the participants was limited to one professional services firm, ZS Associates (Nenty, 2009). The author gathered data from a global group of 336 participants from ZS Associates that included divisions in the U.S., Canada, the EU, Japan, China, and India. The second limitation was that this investigation was conducted at only one point in time (Cho et al., 2010). Specifically, the opinions of the participants on the adoption and diffusion of smartphones were drawn from only one point in time. The third limitation, which related to the second, was that smartphone technology continuously evolved during this investigation. As a consequence, innovations such as new features and functionality of the smartphones' operating systems could have affected participants' opinions (Cho et al., 2010).

Definition of Terms

The key terms utilized in this investigation are defined in this section. A list of acronyms and abbreviations are included in Appendix B.

Behavioral intention. Behavioral intention is the result of the combination of Attitude Toward Using (A) and Perceived Usefulness (PU; Davis et al., 1989).

Compatibility. Compatibility refers to the degree to which an innovation is perceived as being consistent with other ideas (Rogers, 2003).

Complexity. Complexity refers to the degree to which an innovation is perceived as difficult to use (Rogers, 2003).

Cultural influence. Cultural influence refers to patterns of thinking, feeling, and acting that influence the ways individuals communicate and use an m-device (Van Biljon & Kotzé, 2008).

Demographics. Demographic information refers to an individual's age, gender, level of education, job status, occupation, and, for the purpose of this study, experience with technology (Putzer & Park, 2012; Van Biljon & Kotzé, 2008).

Diffusion of Innovations (DOI) theory. DOI refers to the communication of innovation through channels of the social system over time (Rogers, 2003).

Intention to Use. Intention to use refers to the intention to use a smartphone (Chen et al., 2009).

Job relevance. Job relevance refers to individuals' perceptions of the extent to which technology is applicable to their job responsibilities (Kim & Garrison, 2009).

Midmarket firms. Midmarket firms refer to firms that have between 100 and 3,000 employees and yearly revenues between $10 million and $1 billion (National Center for the Middle Market, 2011).

Mobile commerce (m-commerce). M-commerce refers to online purchasing, Internet browsing, mobile banking, and mobile entertainment conducted through a wireless device such as a smartphone (Dai & Palvia, 2009).

Perceived aesthetics. Perceived aesthetics refers to the user's reaction to the design and aesthetics of the smartphone (Shin & Choo, 2012).

Perceived Ease of Use (PEU). PEU refers to a user's expectation of the effort required to use an application system (Davis et al., 1989).

Perceived quality. Perceived quality refers to mobile services' accessibility and reliability, e.g., Internet response times and connectivity (Shin & Choo, 2012).

Perceived usability. Perceived usability refers to perceived usefulness and perceived ease of use, which are constructs from the TAM (Shin & Choo, 2012).

Perceived Usefulness (PU). PU refers to the user's perception that an application will increase job performance (Davis et al., 1989).

Professional Service Firms (PSFs). PSFs are distinguished by three characteristics: knowledge intensity, low capital intensity, and a professionalized workforce (Von Nordenflycht, 2010).

Observability. Observability refers to the visibility of an innovation (Rogers, 2003).

Relative advantage. Relative advantage refers to the degree to which an innovation is perceived as an advantage over an established solution (Rogers, 2003).

Reliability. Reliability refers to the dependability, consistency, and stability of the survey instrument (Salkind, 2009).

Smartphone. A smartphone is a multipurpose device that is distinguished from earlier mobile phones (m-phone) by its sophisticated features and capacities to support Internet access, video/audio streaming, text messaging, e-mail, Global Positioning System (GPS) navigation, Personal Information Management (PIM), and business productivity applications (Chang et al., 2009; Hopkins, 2012).

Social influence or subjective norm. Social influence or subjective norm refers to the degree to which an individual believes that he or she is expected by significant others to use technology (Yun et al., 2011).

Technology Acceptance Model (TAM). TAM is a model developed to explain acceptance of computing technologies based on external variables, user perception, attitudes, and subsequent intentions (Davis et al., 1989).

Technology. Technology or facilitating conditions refer to the technical infrastructure that supports the use of the technology (Van Biljon & Kotzé, 2007).

Trialability. Trialability is the degree to which an innovation can be tried before formal adoption (Rogers, 2003).

Unified Theory of Acceptance and Use of Technologies (UTAUT). UTAUT is a model that explains the determinants of behavioral intention and user behavior of technology systems (Venkatesh et al., 2003).

Validity. Validity refers to whether scores on the survey instrument provide meaningful data (Salkind, 2009).

Summary

Smartphones provide mobility and flexibility while offering users the ability to effectively communicate, interact, and manage business interactions (Hopkins, 2012). The problem that was the focus of this dissertation was the need to identify the key factors that determine the decision to adopt smartphones in business settings as a consequence of the increased demand for smartphones in the workplace (Aldhaban, 2012; Barkhuus & Polichar, 2011; Chung & Chun, 2011; Putzer & Park, 2012). The author specifically identified key factors that impact the adoption of smartphones in global

midmarket professional service firms. Additionally, the author examined key research in the field of technology acceptance, including studies by Chung and Chun (2011), Davis (1989), Davis et al. (1989), Kim and Garrison (2008), Putzer and Park (2010, 2012), Rogers (2003), Van Biljon and Kotzé (2007), and Venkatesh et al. (2003).

The intent of this investigation was to provide an understanding of the key factors the affect the adoption of smartphones by professional consultants. This investigation validated key factors through an analysis of data generated from a survey of professional consultants from a global professional services firm, ZS Associates. The assumptions in this investigation were that participants would answer the survey questions truthfully and that the questionnaire was valid and reliable (Nenty, 2009). The delimitation of this investigation was that the population of participants was limited to a global professional services firm. Thus, one limitation of this investigation was that the results were generalizable only to similar-sized firms. Another limitation was that the study was conducted at only one point in time. Smartphone technology continued to evolve during this investigation, and these innovations could have affected participants' opinions.

Chapter 2

Review of the Literature

Overview

In this investigation, the author analyzed key constructs from TAM (Davis et al., 1989), UTAUT (Venkatesh et al., 2003), and DOI (Rogers, 2003). In addition, this investigation incorporated key constructs from other relevant smartphone adoption models (Cho et al., 2010; Chung & Chun, 2011; Kang et al., 2011; Kim, 2008; Kim & Garrison, 2009; Li & McQueen, 2008; Putzer & Park, 2010, 2012; Shin and Choo (2012); Van Biljon & Kotzé, 2007, 2008). The review of the literature begins with literature on TAM (Davis et al., 1989), followed by UTAUT (Venkatesh et al., 2003), and DOI (Rogers, 2003).

Technology Adoption Models

Technology Acceptance Model (TAM)

According to Davis et al. (1989), TAM was developed to understand acceptance of computing technologies based on external variables, user perception, attitudes, and subsequent intentions. TAM, as an authoritative model, comprises two concepts: PU and PEU, which are influenced by external variables. PU is the user's perception that an application system will increase job performance, while PEU is the user's expected effort. Behavioral Intention (BI) to use is a result of the combination of Attitude Toward Using (A) and PU. Figure 2 presents the TAM model (Davis et al., 1989).

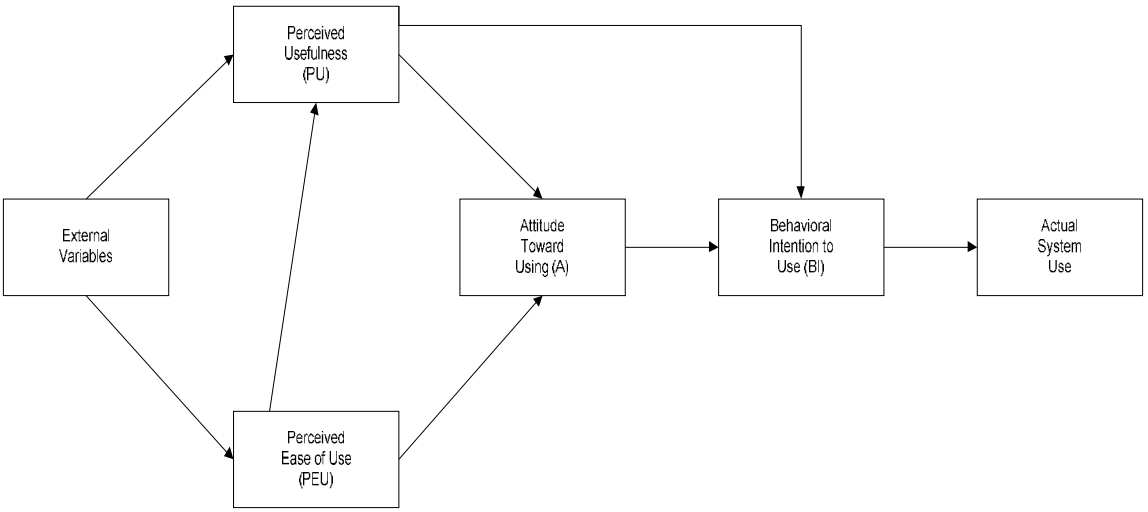


Figure 2. Technology adoption model (TAM). Adapted from "User Acceptance of Computer Technology: A Comparison of Two Theoretical Models," by F. D. Davis, R. P. Bagozzi, and P. R. Warshaw, 1989, *Management Science, 35*(8), p. 985. Copyright © 2003, Regents of the University of Minnesota. Used with Permission (Appendix C).

Putzer and Park (2010) noted that TAM is a popular technology model that depicts user acceptance of and behavior toward technology. More specifically, TAM is a widely applied model for the acceptance and usage of IT (Kang et al., 2011, Kim & Garrison, 2009; Putzer & Park, 2012; Teng & Yu, 2010; Van Biljon & Kotzé, 2008).

According to Aldhaban (2012), TAM is not a comprehensive model of the adoption of technology. TAM lacks sensitivity to human and social factors such as age, gender, and cultural influences (Aldhaban, 2012; Van Biljon & Kotzé, 2008). In addition, TAM does not sufficiently support the validity of the relationships among external variables such as technology factors and innovation factors from DOI.

Unified Theory of Acceptance and Use of Technologies (UTAUT) Theory

The UTAUT model explains the determinants of behavioral intention and use behavior of technology systems. The direct determinants include performance expectancy, effort expectancy, social influence, and facilitating conditions. The key

moderators include gender, age, experience, and voluntariness of use. Figure 3 presents the UTAUT model (Venkatesh et al., 2003).

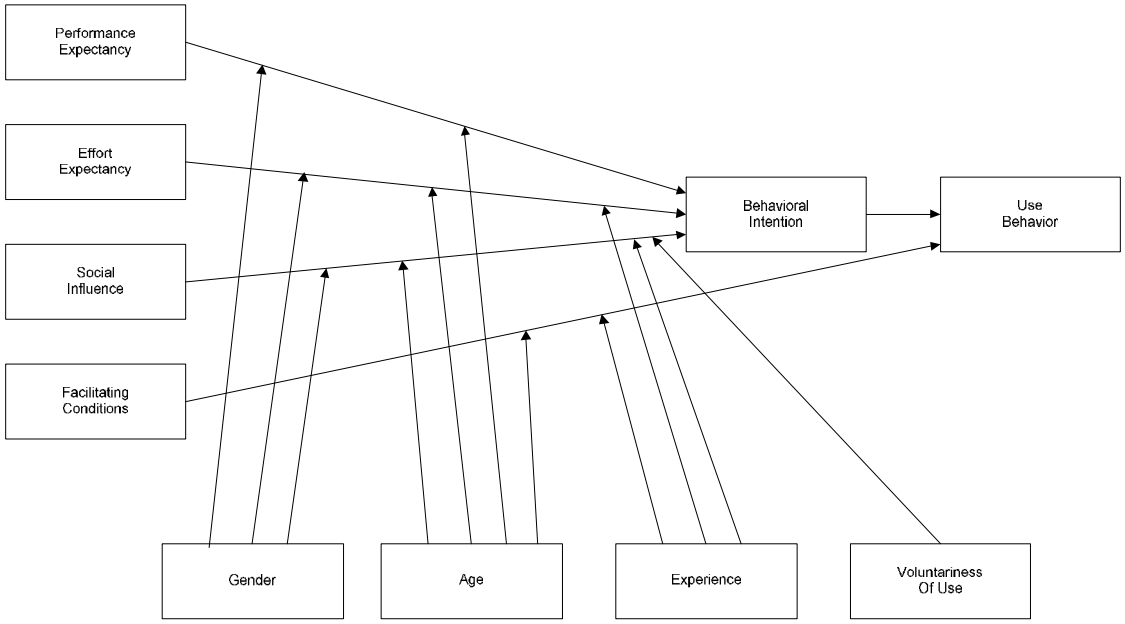


Figure 3. Unified theory of acceptance and use of technologies (UTAUT) theory. Adapted from "User Acceptance of Information Technology," by V. Venkatesh, M. G. Morris, G. B. Davis, and F. D. Davis, 2003, *MIS Quarterly, 27*(3), p. 447. Copyright © 1989, The Institute for Operations Research and the Management Sciences, 5521 Research Park Drive, Suite 200, Catonsville, Maryland 21228 USA. Reprinted by Permission (Appendix C).

The UTAUT paradigm was developed by Venkatesh et al. (2003), based on a review of eight IT acceptance models. The eight models reviewed included Theory of Reasoned Action (TRA), TAM, a motivational model, a theory of planned behavior, a model that combines the TAM and the theory of planned behavior, a model of PC utilization, an innovation theory, and social cognitive theory. UTAUT was empirically tested and cross-validated to provide a TAM that performed better than each of the eight information technology acceptance models noted above. The UTAUT model suggested that performance and effort expectancy, as well as social influence, may be direct determinants of intention to use technology. In addition, facilitating conditions such as

resources and knowledge also influence an individual's decision in regard to whether to use IT systems (Venkatesh et al., 2003).

According to Yun et al. (2011), UTAUT is a more comprehensive model than TAM and includes external variables such as demographics, social influence, and facilitating conditions. Demographic information refers to an individual's age, gender, level of education, job status, occupation, and, for the purpose of this study, experience with technology (Putzer & Park, 2012). Social influence refers to the degree to which an individual believes that he or she is expected by significant others to use technology (Yun et al., 2011). Facilitating conditions refer to the technical infrastructure that supports the use of the technology (Van Biljon & Kotzé, 2007). The UTAUT model successfully integrates key constructs from existing IT adoption models and is able to explain 70% of the variance in intention to use a system, as compared to 40% by TAM (Aldhaban, 2012; Yun et al., 2011).

Additional Investigations that Utilize TAM

This section presents additional relevant literature on other adoption models that incorporated or extended TAM. An analysis of the adoption of m-phones, smartphones, and mobile wireless technology is relevant to the proposed investigation. Technology acceptance studies have incorporated a modified version of TAM (Chua et al., 2011; Putzer & Park, 2012; Su & Li, 2010; Thakur et al., 2011; Yun et al., 2011). The basis for extending TAM (Davis et al., 1989) by adding factors such as demographics, social influence, and culture is supported by Chung and Chun (2011), Kang et al. (2011), Kim (2008), Kim and Garrison (2009), Putzer and Park (2010, 2012), Van Biljon and Kotzé (2007, 2008), and Venkatesh et al. (2003). The inclusion of technology factors such as

smartphone features and network speed is supported by research by Chua et al. (2011), Li and McQueen (2008), and Su and Li (2010). These smartphone adoption models lack various key factors such as demographics, social influence, and technology that affect mobile smartphone adoption in a global midmarket professional service firm.

Park and Chen (2007) developed a smartphone adoption model that incorporates constructs from TAM and DOI, including compatibility, observability, trialability, task, individual characteristics, organization, and environment, which have an impact on an individual's decision to adopt a smartphone.

Park and Chen (2007) conducted survey research to determine the factors that have an impact on the decision of medical doctors and nurses in the Midwest U.S. to adopt a smartphone. They found that the ability of individuals to observe each other using a smartphone as well as company characteristics, such as company size and management support, had a positive influence on an individual's decision to use a smartphone. Other individual factors, including education, job status, and experience, did not influence attitudes toward using a smartphone (Park & Chen, 2007). According to Park and Chen, attitude, PU, and self-efficacy of individuals were predictors of the intention to use a smartphone. The TAM and DOI constructs that informed Park and Chen's study were taken into consideration in the present investigation.

In their Mobile Phone Technology Adoption Model (MOPTAM), Van Biljon and Kotzé (2007) identified the factors that influence m-phone adoption and incorporated existing technology adoption model constructs. In developing MOPTAM, Van Biljon and Kotzé distinguished between determining and mediating factors. The determining factors that influenced m-phone usage included social influence (SI), facilitating

conditions (FC), PU, PEU, and BI. Van Biljon and Kotzé (2007) used survey research to validate MOPTAM with computer science and information system students from a South African university. Their quantitative evaluation included data on demographics, personal factors, and facilitating conditions. Socioeconomic factors were not tested, as participants were from the same socioeconomic group. Demographic factors refer to an individual's experience in the use of technology. Personal factors referred to the technology orientation in which individuals were grouped using Rogers's (2003) categories. Facilitating conditions consisted of the m-phone infrastructure system quality, system service, cost of the service, and cost of the m-phone.

The findings of Van Biljon and Kotzé (2007) supported the validity of omitting the attitude construct, which is consistent with the findings from the UTAUT investigation. The mediating factors included personal factors (PF), demographic factors (DFs), and socioeconomic factors (SFs). Van Biljon and Kotzé (2007) used survey research to validate the developed MOPTAM with computer science and information system students from an unnamed South African university. The results indicated that demographic and personal factors are associated with PEU and facilitating conditions and facilitating conditions are associated with PEU, PU, and actual use. In comparison to other technology adoption models such as TAM and UTAUT, MOPTAM highlights personal factors and facilitating conditions of m-device usage by individuals.

Van Biljon and Kotzé (2008) developed an m-phone adoption and usage model, with both determining and mediating factors. The determining factors that influenced m-phone usage included SI, human-nature influence (HNI), cultural influence (CI), facilitating conditions (FC), PEU, PU, and BI. HNI refers to basic motivational needs of

humans. The mediating factors included PF, DF, and SF. Van Biljon and Kotzé used survey data from undergraduate university students in an unnamed South Africa university. The results indicated that SI had a significant positive correlation with PU and BI and a highly significant positive correlation with FC. The results also indicated that SI and CI are relevant factors in the adoption and use of m-phones (Van Biljon & Kotzé, 2008). The cultural influence, PEU, PU, and facilitating conditions or technology constructs were taken into consideration in the present investigation.

Kim (2008) expanded TAM by adding Perceived Cost Savings (PCSs) and the Company's Willingness to Fund (CWF) to support the intention to use the Mobile Wireless technology (MWT), including smartphones. Job relevance and experience were included in the model as well. To test the MWT model, Kim used an online survey distributed to working adults who used smartphones on a daily basis. The results of the survey indicated that PCS and CWF explained 62.7% of the variance in BI. In addition, the moderating effects of job relevance and experience were significant in an individual's intention to use MWT. This study is relevant in that it extended the TAM and validated that the job relevance and experience constructs positively affect the adoption of smartphones by working individuals.

Kim and Garrison (2009) developed the Mobile Wireless Technology Acceptance Model (MWTAM) to identify key factors that affect the adoption and use of m-devices such as smartphones in a medium-sized Korean company. Two key constructs of TAM, specifically PU and PEU, are incorporated into MWTAM. Kim and Garrison used an online survey to validate MWTAM with participants from a medium-sized Korean company. The results of the survey indicated that PEU and PU are key determinants of

MWT acceptance. Kim and Garrison determined that country and cultural-specific relationships are constructs that could be added to MWTAM in future research. The cultural construct was taken into consideration in the present investigation.

Cho et al. (2010) conducted survey research on smartphone adoption with corporate workers from Korea to test the smartphone intention-to-use model. The independent variables in their study included mobility, interactivity, innovativeness, SI, and job fitness. The results indicated that mobility and interactivity were associated with PU and PEU of a smartphone. PU had a significant relationship with participants' willingness to accept a smartphone, while other results showed that a user's innovativeness did not have significant influence on the usefulness of the smartphone. Additionally, PEU affects PU. This research incorporated TAM in analyzing the factors that affect the use of smartphones in corporations.

Putzer and Park (2010) developed a model that incorporates innovation factors from TAM and DOI, including compatibility, observability, job relevance, personal demographics, personal experience, internal environment, and external environment, that have an impact on an individual's decision to adopt a smartphone. Internal environment refers to support from management to use a smartphone. External environment refers to current trends in smartphone use and competitor pressure.

Using this model, Putzer and Park (2010) conducted survey research to determine the factors that have an impact on the decision of nurses from two community hospitals in the southeastern U.S. to adopt a smartphone. The results indicated that an individual's attitude toward using a smartphone is influenced by compatibility, observability, job relevance, internal environment, and external environment. Overall, the results

demonstrated the positive acceptance of mobile technology by nurses. Importantly, the investigation incorporated factors from TAM and DOI to understand smartphone adoption by professionals; however, cultural factors were not investigated.

Putzer and Park (2012) studied the innovation factors that affect the decision of physicians in community hospitals and academic medical centers to adopt a smartphone. Putzer and Park developed a model of the innovation factors from TAM and DOI, including compatibility, observability, job relevance, personal demographics, personal experience, internal environment, and external environment, that affect an individual's decision to adopt a smartphone. The results showed that a user's attitude toward the use of smartphone is influenced by compatibility, observability, job relevance, personal experience, internal environment, and external environment. Overall, the results showed the acceptance of mobile technology by physicians (Putzer & Park, 2012). Importantly, the investigation incorporated factors from TAM and DOI to understand smartphone adoption by professionals; however, cultural factors were not investigated.

Chung and Chun (2011) developed a smartphone selection model based on Kim's (2008) smartphone adoption model. Chung and Chun's model incorporates the determining factors for smartphone selection, which include PU, PEU, perceived application updates (PAU), perceived available applications (PAA), opinion of social network (SN), and security/privacy (SP). These researchers used an online survey of smartphone users to test their smartphone selection decision model. The results indicated that PU, PEU, PAA, and PAU have a significant impact on new smartphone selection. This investigation extended the TAM model by including technology, social peer group's

opinion, and security/privacy factors that may affect the selection decision of smartphones; however, it did not take into consideration demographic or cultural factors.

Kang et al. (2011) extended TAM by incorporating influential functional attributes of wireless Internet and mobile service technology to understand the factors that affect the adoption of smartphones. These researchers distributed a survey to undergraduate and graduate students in Korea to test their model. The results indicated that the top functional attributes were wireless Internet, design, multimedia, application, and support services. The results also indicated that PU, but not PEU, affected BI directly, as the majority of the participants already used smartphones. This study extended the TAM model by determining functional attributes that affect the adoption of smartphones by students in Korea but did not take into consideration cultural factors.

Diffusion of Innovations (DOI) Theory

Rogers (2003) defined diffusion as the communication of innovation through channels of the social system over time. According to Rogers, the four main components of the DOI theory are innovation, communication channels, time, and the social system. Attributes of innovations that explain the rate of adoption include relative advantage, compatibility, complexity, trialability, and observability. Relative advantage is the degree to which the innovation is perceived as an advantage over an established solution; compatibility is the degree to which an innovation is perceived as being consistent with other ideas; complexity is the degree to which an innovation is perceived as hard to use; trialability is the degree to which an innovation can be tried before formal adoption; and observability refers to the visibility of an innovation (Rogers, 2003). This research

incorporated compatibility and observability in its analysis of smartphone adoption and use in corporations.

According to Rogers (2003), the m-phone closely followed the attributes of innovation, such as relative advantage, compatibility, complexity, trialability, and observability, that lead to high rates of adoption. The attributes of innovation are communicated through several channels that provide a medium to exchange information with other people about innovations. The communications channels used include mass media, interpersonal communications, and interactive communication. Through these channels, the innovation decision process begins. The process involves knowledge, persuasion, implementation, and confirmation, and the end result of the process is either adoption or rejection (Rogers, 2003).

Researchers also use DOI theory to understand whether an individual or an organization will adopt innovations (Putzer & Park, 2012). Smartphone investigations have employed Rogers' DOI theory based on a smartphone's being considered a recent innovation (Park & Chen, 2007; Putzer & Park, 2010, 2012). According to DOI theory, observability and compatibility must be present for an individual to choose to adopt technology (Chen et al., 2009). In investigations performed by Kim (2008) and Putzer and Park (2010, 2012), job relevance was found to be a significant factor in an individual's intention to use a smartphone. Job relevance is derived from Roger's DOI (Putzer & Park, 2012). The constructs from DOI that were incorporated into this investigation are observability, compatibility, and job relevance (Putzer & Park, 2012). According to Zheng (2012), however, current research on smartphone diffusion is limited.

Other Smartphone Investigations

Dai and Palvia (2009) developed a model that incorporates perceived value-added, innovativeness, security perceptions, privacy perceptions, perceived usefulness, perceived ease of use, perceived cost, compatibility, perceived enjoyment, and subjective norms and that determines individuals' intention to use mobile commerce (m-commerce). Their cross-cultural survey research included individuals in the US and China. In the US, innovativeness, privacy, perceived usefulness, compatibility, and perceived enjoyment were found to be positively associated with an individual's intention to use m-commerce. In China, innovativeness, perceived usefulness, perceived ease of use, perceived cost, and subjective norm are positively associated with the intention to use m-commerce. The results showed no significant differences in the intention to use m-commerce in terms of perceived value, innovativeness, privacy, perceived usefulness, perceived ease of use, and compatibility constructs. According to Dai and Palvia, the differences in intentions to use m-commerce by individuals in the US and China can be attributed to differences in cultural and economic factors. This research incorporated a cross-cultural perspective of the intention to use smartphones for m-commerce.

Shin and Choo (2012) developed a model that incorporates perceived usability, perceived quality, perceived aesthetics, perceived enjoyment, and subjective norms and that determines individuals' perceived value of smartphones. Their cross-cultural survey research included students, professionals, homemakers, and retired individuals from the US and South Korea. The results indicated that usability, aesthetic, quality, and subjective norms are significant determinants of intention to use a smartphone in both the US and South Korea. The results showed the South Korea smartphone users are more

influenced by aesthetics and quality of the smartphone, whereas US smartphone users are more influenced by the utilitarian usefulness and functional capability of the smartphone. The research incorporated a cross-cultural perspective to determine individuals' perceived value of smartphones.

Arpaci, Yardimci, and Turetken (2013) conducted survey research to determine the effects of cultural differences on smartphone adoption by private sector organizations in Canada and Turkey. In this regard, they analyzed the constructs of competitive pressure, partner expectations, customer expectations, innovativeness, and top management support. The results indicated that competitive pressure, partner expectations, and customer expectations had a stronger impact on smartphone adoption in Turkey, while innovativeness and top management support had a stronger impact in Canada. Thus, Arpaci et al. concluded that cultural differences have a significant impact on the adoption of smartphones.

Hopkins (2012) conducted survey research with business professionals and mobile industry experts to study the values that smartphones bring to business adopters in Australia. The results of their study indicated the most valued features of smartphones to business adopters are e-mail, calendar synchronization, Internet access, and GPS/mapping. Additionally, in regard to working behavior, the results showed that mobility provides business users with greater responsiveness and allows for more tasks to be performed remotely. The majority of participants felt that a smartphone would have a high impact on their ability to conduct business. According to Hopkins, smartphones can provide business professionals with the ability to increase the amount of information that can be consumed and distributed, which, in turn, can improve how professional interact

and how companies can do business. This research incorporated perceived impact value of smartphones by business adopters.

Gartner (as cited in Dulaney, Willis, & Keltz, 2013) conducted survey research on the current and future states of smartphone platforms. Multiple industries, e.g., as manufacturing, banking, consulting services, and healthcare, were included in the study. The results indicated that 38% of the participants resided in North America, 37% resided in the EU region, 14% resided in the Asia-Pacific, and 7% resided in Latin America. The results showed that the most prevalent smartphones in use by business users are the Apple iPhone™, Blackberry®, and Android™. In addition, respondents indicated that productivity and opportunity are the top two business concepts related to the use of smartphones. This research incorporated the prevalent smartphone platforms and the major business concepts related to smartphone use in global industries.

Summary

The author reviewed the literature specific to the adoption of smartphones, and the literature review pertained to the adoption models of TAM, UTAUT, and DOI. According to López-Nicolás et al. (2008), TAM lacks the appropriateness and comprehensiveness needed for a technology adoption model. TAM does not sufficiently address external variables in relation to core model constructs such as PU and PEU; thus, technology acceptance studies have incorporated a modified version of TAM (Yun et al., 2011). According to Yun et al., UTAUT is a more comprehensive model and explains the variance of intention to use technology by integrating key constructs from eight existing IT models (Aldhaban, 2012; Yun et al., 2011). In regard to DOI theory, Van Biljon and Kotzé (2008) noted that the problem with Roger's (2003) model is that it

includes the adoption of the innovation but does not take into account m-phone usage. Dai and Palvia (2009), Shin and Choo (2012), and Arpaci et al. (2013) conducted survey research that incorporated a cross-cultural perspective of smartphone adoption. Their research, however, was limited to two countries and, as such, did not incorporate a more global perspective.

Aldhaban (2012) and Yun et al. (2011) determined that a comprehensive smartphone adoption and diffusion model is necessary. Based on the research of Chen et al. (2009) and Putzer and Park (2012), the author incorporated the key constructs of TAM, UTAUT, and DOI in the investigation of the key factors that affect the adoption of smartphones in a global midmarket professional service firm.

Chapter 3

Methodology

Introduction

The approach to investigating the key factors that have an impact on the adoption of smartphones included conducting research on technology adoption models by developing and administering an online survey questionnaire. This investigation bridged the gap in IT literature on the intention to use by analyzing key constructs from the TAM, UTAUT, and DOI models (Aldhaban, 2012). Research by Putzer and Park (2012), Van Biljon and Kotzé (2007), and Yun et al. (2011) shows the value of adopting the TAM, UTAUT, and DOI constructs to provide an understanding of smartphone acceptance. The author investigated the key factors that affect the adoption of smartphones by professional consultants and validated the key constructs of a conceptual map of smartphone adoption through an analysis of data generated from a survey of professional consultants from a global professional services firm, ZS Associates. The quantitative data gathered from the survey questionnaire were analyzed using descriptive and inferential statistics to determine the key factors that have an impact of the adoption of smartphones. In addition, the quantitative data were used to interpret the differences in technology adoption from a cross-cultural perspective.

Research Methodology

Survey Design and Distribution

According to Creswell (2009), survey research can be used to determine trends, attitudes, or opinions of a sample population. Shneiderman and Plaisant (2010) stated that surveys should be distributed to a small sample of participants to pilot test before

distribution to a larger sample. In this investigation, an online survey questionnaire was used. According to Evans and Mathur (2005), online surveys have a number of strengths, including global reach, flexibility, low cost, ease of data entry, and timeliness for data collection and analysis. The survey questions relevant to the key factors that have an impact on the adoption of smartphones were directly adapted from the research of Aldhaban (2012); Kim (2008); López-Nicolás et al. (2008); and Putzer and Park (2012). The survey was distributed through SurveyMonkey™. According to Creswell, SurveyMonkey™ enables the development of an online survey and provides the ability to generate descriptive statistics that can be downloaded for further analysis.

The questionnaire for the online survey was developed as a means to determine the key factors that have an impact on the adoption of smartphones in global midmarket professional service firms. The instrument consisted of two sections. The first section contained items related to the demographics of the participant. The second section contained items that concerned the independent variable and dependent variable assumed to affect intention to use a smartphone. The questionnaire items were adapted from the research of Aldhaban (2012); Kim (2008); López-Nicolás et al. (2008); and Putzer and Park (2012). The responses to the items in the questionnaire were anonymous, and only cumulative results were analyzed and included in this investigation. The questionnaire was designed to take no longer than 10 minutes to complete.

The first section of the questionnaire contained items related to the demographics of the participants, e.g., age, gender, education, and technology experience/usage. It should be noted that demographic variables in quantitative studies are intervening variables

rather than independent variables (Creswell, 2009). Table 1 presents the demographic data that was requested from the survey participants.

Table 1. Demographic Data Questions

Section 1: Demographics Personal Information (age, gender, education, and technology experience/usage)
What is your age? 21–30, 31–40, 41–50, 50+
What is your gender? Female, Male
What is your level of education? Bachelor's degree, Master's degree, Doctorate
How many years have you worked for your current employer? 0–less than 1 year, 1–5 years, 6–10 years, 11–15 years, 16–20 years, 21–25 years, 26+ years
What is the location of your home office (country)? United States, Canada, European Union, Japan, China, India
What is your job level? Consultant, Manager, Associate Principal, Principal
The smartphone used in your current job is provided by? ZS Associates, Personal
What type of smartphone do you use? Apple iPhone™, Blackberry®, or a Samsung - Android™
How many years have you used a smartphone? 0–less than 1 year, 1–5 years, 6–10 years
What is your level of experience using a smartphone? Beginner, Intermediate, Experienced
How often do you use a smartphone? Less than once a week, Once a week, More than once a day, More than 5 times a day, More than 10 times a day

Adapted from "Are physicians likely to adopt emerging mobile technologies? Attitudes and innovation factors affecting smartphone use in the Southeastern United States," by G. J. Putzer and Y. Park, 2012, ***Perspectives in Health Information Management.*** Retrieved from http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3329206/. Reprinted by permission (Appendix C).

The second section of the questionnaire contained items that concern the independent variables and dependent variable assumed to affect intention to use a smartphone (Appendix D). In this section, respondents were requested to answer each question on a 5-point scale, as follows: 5 = strongly agree (SA), 4 = agree (A), 3 = undecided (U), 2 = disagree (D), and 1 = strongly disagree (SD). According to Salkind (2009), the Likert scale is the most widely used attitude assessment scale.

The second section of the questionnaire incorporated questions for each construct in a conceptual map of smartphone adoption. The investigation analyzed key constructs that were drawn from the TAM (Davis et al., 1989), UTAUT (Venkatesh et al., 2003), and DOI (Rogers, 2003) models. Demographics, observability, compatibility, and behavioral intention constructs were assessed by items adapted from the research of Putzer and Park (2012); the social influence construct used items adapted from López-Nicolás et al. (2008); the PEU, PU, and job relevance constructs were determined by items adapted from Kim (2008); and the technology construct used items adapted from Aldhaban (2012). Table 2 presents the constructs with mapping to adoption models.

Table 2. Constructs that are Mapped to Adoption Models

Proposed Construct	Adoption Model
Demographics	DOI, UTAUT
Social Influence	UTAUT
Perceived Ease of Use (PEU)	TAM
Perceived Usefulness (PU)	TAM
Observability	DOI
Compatibility	DOI
Job Relevance	DOI
Technology Factors	UTAUT
Behavioral Intention	TAM, UTAUT, DOI

Adapted from Aldhaban, 2012; Davis et al., 1989; Kim, 2008; López-Nicolás et al., 2008; Putzer & Park, 2012; Rogers, 2003; Venkatesh et al., 2003.

The pilot online survey was distributed to 20 participants from ZS Associates who were not part of the actual study group. This pilot survey included constructs that pertained to demographics, social influence, PEU, PU, observability, compatibility, job relevance, and technology. Each construct had its own subscale. The survey questions

consisted of three types: fill-in-the-blank, selection from a list, and Likert-scaled selections.

The pilot online survey questionnaire included a fill-in-the-blank section for respondents to comment on various aspects of the survey to improve the quality. The results of the pilot online survey were analyzed to determine whether there were any functional issues and tested for validity and reliability. Following the evaluation of the results from the pilot survey, the author refined the survey and distributed the survey to 336 employees from ZS Associates. Approval was provided by ZS Associates to conduct the survey with consultants, managers, associate principals, and principals (Appendix A). ZS professional consultants participated in the pilot and the formal survey.

Survey Population

Permission to conduct the study was obtained from the Institutional Review Board (IRB) of Nova Southeastern University (Appendix E). According to Creswell (2009), IRBs are created to uphold federal regulations that protect the rights of research participants, including informed consent.

Participants were drawn from ZS Associates, a company with offices in the U.S., Canada, the EU, Japan, China, and India. According to Salkind (2009), 30 participants is the appropriate number of participants from each group. In this study, 30 to 215 employees from each region (U.S., EU, and Asia-Pacific) or group (consultants, managers, associate principals, and principals) were selected. The study sample was divided into three regions, with 215 participants from the North America region, 34 participants from the EU region, and 87 participants from the Asia-Pacific regions. All participants used an Apple iPhone™, Blackberry®, or a Samsung-Android™ smartphone

and utilized a service provider at their respective geographic locations. Smartphones are offered to ZS employees, but employees are not required to take or use smartphones. All expenses, including the smartphone and voice and data services, were paid for by ZS Associates. Participants were selected by region, using stratified sampling, with each personnel title serving as the stratum to ensure that the population is fairly represented in the sample (Salkind, 2009). The personnel groups at ZS Associates that are provided smartphones included consultants, managers, associate principals, and principals. Individuals within each personnel group had equal probability of being selected.

Data Collection

Each participant was sent an e-mail that contained a detailed description of the study procedures and a link to the online survey. The author requested and obtained approval to waive the signed informed consent form (Appendix E). The research involved no more than minimal risk to the participants and did not adversely affect their rights or welfare. The research entailed only conducting anonymous surveys that were not intrusive. Participants used SurveyMonkey™, which did not collect any identifiable information, to complete the survey. Survey results were accessed through SurveyMonkey™ and were downloaded to both Microsoft® Excel® and the Statistical Package for the Social Sciences (SPSS)™ to generate descriptive and inferential statistics.

Data Analysis

According to Creswell (2009), the data analysis plan should include descriptive and inferential statistics. Descriptive statistics include means, standard deviations, and ranges (Creswell, 2009). The inferential statistics include multiple regressions related to various

smartphone adoption factors. The independent variables in the conceptual map for smartphone adoption include demographics, social influence, PEU, PU, observability, compatibility, job relevance, and technology. The dependent variable in the conceptual map for smartphone adoption is intention to use the smartphone. In addition, the quantitative data were used to analyze the differences in technology adoption and diffusion from a cross-cultural perspective.

The participants who completed the survey were analyzed by region and all regions combined, using frequencies and percentages for each region. The validity of the online survey was tested using factor analysis to determine whether individual questions in the survey or variables represent a particular construct (Salkind, 2009). The type of validity that is relevant is construct validity, which refers to whether the test reflects the underlying construct (Salkind, 2009). Validity was determined through exploratory factor analysis (EFA) using principal component analysis (PCA) with Varimax rotation (Rovai, Baker, & Ponton, 2013). PCA is a variable reduction method that analyzes interrelationships with a large number of variables and reduces the variables to a small number of factors (Rovai et al., 2013). Varimax rotation is an orthogonal rotation that statistically provides a method to identify each variable with a single factor (Rovai et al., 2013). The reliability of the online survey was tested using Cronbach's alpha coefficient for each subscale. Reliability refers to the consistency of each item's measurement of the underlying construct (Salkind, 2009).

According to Rovai et al. (2013), multiple regression determines the relationship between a single dependent variable and multiple independent variables. The independent variables in the conceptual map for smartphone adoption are demographics,

social influence, PEU, PU, observability, compatibility, job relevance, and technology, while the dependent variable is intention to use the smartphone. Multiple regression analysis provides the ability to statistically predict the effect of the independent variables on the dependent variable, both separately and combined (Creswell, 2011). Multiple regression analysis was performed to identify the relationship between the independent variables and the dependent variable (Rovai et al., 2013). According to Rovai et al. (2013), one-way analysis of variance (ANOVA) is a parametric procedure to assess the means of three or more independent groups. A one-way ANOVA was performed to determine whether there were any cultural differences among participants in the North America, EU, and Asia-Pacific regions.

Instrument Development

As noted, the survey questions relevant to key factors that have an impact on the adoption of smartphones were adapted from the work by Aldhaban (2012), Kim (2008), López-Nicolás et al. (2008), and Putzer and Park (2012). The instrument included the background of the investigation and instructions to complete the questionnaire. The first section of the instrument contained items related to the demographics of the respondent. The second section of the instrument contained items that concerned the independent variables and dependent variable assumed to affect intention to use a smartphone. The survey questionnaire is found in Appendix D.

Validity and Reliability

This investigator used a survey instrument that consisted of questions drawn from valid and reliable instruments tested in previous research (Aldhaban, 2012; Kim, 2008;

López-Nicolás et al., 2008; Putzer & Park, 2012). The survey questions for the constructs and their sources are presented in Appendix F.

Internal Validity

According to Salkind (2009), validity concerns whether scores on the survey instrument provide meaningful data. The validity of the online survey was tested using factor analysis. The type of validity that is of concern is construct validity, which, according to Salkind, refers to whether the test items reflect the underlying construct.

External Validity

According to Creswell (2009), external validity threats occur when an investigator makes incorrect inferences or generalizations, based on the data, to participants, settings, or situations outside the focus of the initial investigation. The focus in this investigation is key factors that have an impact on the adoption and diffusion of smartphones in a global midmarket professional service firm. Consequently, the results of the investigation were generalized only to global midmarket professional service firms.

Reliability

According to Salkind (2009), reliability refers to the consistency of each item's measurement of the underlying construct and to the dependability, consistency, and stability of the survey instrument. As noted, the reliability of the online survey was tested using Cronbach's alpha coefficient for each subscale.

Format for Presenting Results

The results from the online survey were exported into a format that could be used with SPSS™. The results are presented in American Psychological Association (APA)-formatted tables. The tables present (a) demographic characteristics of the participants

by region; (b) validity statistics, as determined through PCA; (c) reliability, as determined through Cronbach's alpha; (d) multiple regression analysis by region; and (e) one-way ANOVA analysis by regions.

Resource Requirements

The resources required for the investigation included participants for the online survey and computer hardware and software. The computer resources needed included a laptop with Internet access, an online survey tool, and statistical analysis software. Internet access was required to access the Nova Southeastern University Alvin Sherman Online Library. The online survey was administered through SurveyMonkey™. The statistical analysis software used was Microsoft® Excel® and SPSS™. The participants utilized the Internet to access the survey.

Participants included professional consultants from a global midmarket professional service firm, ZS Associates, a company that specializes in sales and marketing strategy, operations, and execution. As noted, ZS Associates has 2,500 employees in offices throughout the U.S., Canada, the EU, Japan, China, and India.

Summary

The methodology that was used to conduct the investigation was presented. The author developed an online survey based on the research by Aldhaban (2012), Kim (2008), López-Nicolás et al. (2008), and Putzer and Park (2012). The online survey was distributed to employees from ZS Associates through SurveyMonkey™.
The data analysis was presented as well and included the demographics of the participants by region and the validity and reliability of the online survey.

Chapter 4

Results

Introduction

This chapter presents the results of the analysis of the data from the survey instrument. This instrument was adapted from the research of Aldhaban (2012), Kim (2008), López-Nicolás et al. (2008), and Putzer and Park (2012) and distributed online through SurveyMonkey™. The quantitative data were analyzed to determine the key factors that have an impact of the adoption of smartphones and to determine whether there were cultural differences in technology adoption.

Pilot Survey Data Analysis

The pilot online survey questionnaire included a fill-in-the-blank section for respondents to comment on various aspects of the survey as a means to improve its quality. The survey questionnaire was analyzed for functional issues, such as the inability to select a response to a survey question, and tested for validity and reliability. The pilot survey questionnaire was distributed to 20 participants from ZS Associates who were not part of the actual study group. The author sent out an e-mail invitation that contained a description of the investigation and a link to the SurveyMonkey™ online survey (Appendix G). The pilot online survey invitation was sent on April 23, 2014, and responses were collected until April 27, 2014. A total of 15 ZS Associates participants responded. The response rate for the online survey was 75% (15), with 100% (15) of the participants' providing valid responses. There were no functional issues reported by the participants.

Pilot Survey Factor Analysis

The validity of the pilot survey was not performed based on the number of participants were less than the number of construct survey questions.

Pilot Survey Reliability Analysis

The reliability for each construct was determined using Cronbach's alpha coefficient. The construct reliability analysis showed a Cronbach's alpha that ranged from .510, or moderate reliability, to .998, or very high reliability. According to Rovai et al. (2013), a Cronbach's alpha of at least .90 indicates very high reliability, .70 to less than .90 indicates high reliability, and .50 to less than .70 indicates moderate reliability.

Survey Data Analysis

Following the evaluation of the pilot, the author refined the survey questionnaire and distributed it to 336 employees from ZS Associates. The study sample was divided into three regions, with 215 participants from the North America region, 34 participants from the EU region, and 87 participants from the Asia-Pacific regions. Participants were selected by region, using stratified sampling, with each personnel title's serving as the stratum to ensure that the population was fairly represented in the sample (Salkind, 2009). The personnel groups at ZS Associates that are provided with smartphones are consultants, managers, associate principals, and principals. Individuals within each personnel title group had equal probability of being selected (Creswell, 2009).

The online survey invitation (Appendix G) was sent on April 28, 2014, and responses were collected until May 9, 2014. There were 134 completed responses to the online survey, of which 130 provided valid responses. A total of 134 ZS Associates participants

responded to the online survey questionnaire. The response rate for the online survey was 40% (134), with 39% (130) of the participants' providing valid responses.

Participant Demographics

An analysis of the demographic variables of age, gender, and level of education was performed using SPSS™ (Table 3). Of the participants, 41% were between 31 and 40 years old, 38% were between 21 and 30 years old, and the remaining 20% were at least 41 years old. The majority (75%) of the participants were male. Of the participants, 63% held a master's degree, 32% possessed a bachelor's degree, and 5% held a doctorate.

Table 3. Participant Demographics by Region and Overall

Variable		North America		EU		Asia-Pacific		Total	
		F	%	*f*	%	*f*	%	*f*	%
Age	21–30	35	40%	3	30%	11	34%	49	38%
	31–40	30	34%	7	70%	16	50%	53	41%
	41–50	17	19%	0	0%	5	16%	22	17%
	50+	6	7%	0	0%	0	0%	6	5%
Gender	Female	24	27%	3	30%	5	16%	32	25%
	Male	64	73%	7	70%	27	84%	98	75%
Education	Bachelor's	26	30%	2	20%	13	41%	41	32%
	Master's	56	64%	8	80%	18	56%	82	63%
	Doctorate	6	7%	0	0%	1	3%	7	5%

Professional Services Demographic

Of the participants, 40% had been with ZS Associates 1–5 years, 32% had been with ZS Associates 6–10 years, and 12% had been with ZS Associates for 11–15 years. For region, 68% of the participants resided in North America, 26% resided in the Asia-Pacific region, and 8% resided in the EU. In regard to job level, 46% of the participants

held the title of consultant, 25% held the title of manager, 21% were principals, and 8% were associate principals (Table 4).

Table 4. Professional Services Demographic Data by Region and Overall

Variable		North America		EU		Asia-Pacific		Total	
		f	%	*f*	%	*f*	%	*f*	%
Years at ZS	< 1 yr	8	9%	0	0%	4	13%	12	9%
	1–5 yrs	32	36%	4	40%	16	50%	52	40%
	6–10 yrs	28	32%	4	40%	9	28%	41	32%
	11–15 yrs	11	13%	2	20%	2	6%	15	12%
	16–20 yrs	5	6%	0	0%	1	3%	6	5%
	21–25 yrs	3	3%	0	0%	0	0%	3	2%
	26+ yrs	1	1%	0	0%	0	0%	1	1%
Location of Home Office	United States	83	94%	0	0%	0	0%	83	64%
	Canada	5	6%	0	0%	0	0%	5	4%
	European Union	0	0%	10	100%	0	0%	10	8%
	Japan	0	0%	0	0%	2	6%	2	2%
	China	0	0%	0	0%	2	6%	2	2%
	India	0	0%	0	0%	28	88%	28	22%
Job Level	Consultant	39	44%	5	50%	16	50%	60	46%
	Manager	19	22%	4	40%	10	31%	33	25%
	Associate Principal	6	7%	0	0%	4	13%	10	8%
	Principal	24	27%	1	10%	2	6%	27	21%

Smartphone Usage Demographics

Smartphone usage demographics included smartphone provider, type of smartphone used, years using a smartphone, experience using a smartphone, and the amount of use of a smartphone. Nearly all (98%) of the smartphones used by respondents in their current job were provided by their current employer, ZS Associates, while the remaining used their personal smartphones. Of the participants, 82% used an Apple iPhone™, while 15% used a Samsung Android™, and 4% used a Blackberry® smartphone. Additionally,

57% of the participants used a smartphone 1 to 5 years, 42% used a smartphones between 6 and 10 years, and 2% used a smartphone for less than one year. Further, 63% of the participants were experienced smartphone users, 34% had intermediate experience, and 3% had beginner experience using a smartphone. Of the participants, 93% used their smartphone more than 10 times a day, while 5% used their smartphone more than 5 times per day (Table 5).

Table 5. Smartphone Usage Demographic Data by Region and Overall

		North America		EU		Asia-Pacific		Total	
Variable		*f*	%	*f*	%	*f*	%	*f*	%
Provider	ZS Associates	86	98%	10	100%	31	97%	127	98%
	Personal	2	2%	0	0%	1	3%	3	2%
Type	Apple iPhone™	70	80%	8	80%	28	88%	106	82%
	Samsung-Android™	15	17%	0	0%	4	13%	19	15%
	Blackberry®	3	3%	2	20%	0	0%	5	4%
Years of Use	<1 year	1	1%	0	0%	1	3%	2	2%
	1–5 years	45	51%	7	70%	22	69%	74	57%
	6–10 years	42	48%	3	30%	9	28%	54	42%
Experience	Beginner	3	3%	0	0%	1	3%	4	3%
	Intermediate	25	28%	5	50%	14	44%	44	34%
	Experienced	60	68%	5	50%	17	53%	82	63%
Frequency of Use	< Once a week	0	0%	0	0%	0	0%	0	0%
	Once a week	0	0%	0	0%	0	0%	0	0%
	> Once a day	1	1%	0	0%	2	6%	3	2%
	> 5 times a day	4	5%	1	10%	1	3%	6	5%
	> 10 times a day	83	94%	9	90%	29	91%	121	93%

Factor Analysis

Construct validity, refers to whether a test reflects the underlying construct (Salkind, 2009). In this investigation, the author determined, through exploratory factor analysis (EFA) using Principal Component Analysis (PCA) with Varimax rotation, the validity of the model (Rovai et al., 2013). PCA is a variable reduction method that analyzes interrelationships with a large number of variables and reduces the variables to a small number of factors (Rovai et al., 2013). Varimax rotation is an orthogonal rotation that statistically provides a method to identify each variable with a single factor (Rovai et al., 2013).

PCA with Varimax rotation was performed in SPSS™ to assess the interrelationships among the survey questions. PCA was used to reduce the number of factors and associate each survey question with a relevant single factor. PCA was performed on the survey results using eight and seven components. According to Rovai et al. (2013), factor loadings above .6 are considered high, while factor loadings below .4 are low. All factor loadings in the final solution were above .6.

PCA with Varimax rotation was first performed on the survey results, using eight components, to access the underlying structure of the 16 items of the questionnaire. Table 6 presents the results of the factor analysis. The factor loadings above .6 are in bold. The PCA yielded eight components, with the exception of PU, with high factor loadings. The total initial eigenvalue of Component 8 is .576. Factor analysis of the eight components yielded a split in the demographic questions into one component for age and another for gender. The factor analysis also resulted in a medium factor loading (above .4 but below .6) for one question related to the PU construct.

Table 6. Factor Analysis of the Survey Questionnaire (8 Components)

Constructs		Component							
		1	2	3	4	5	6	7	8
Demographics	Age	-.070	.011	.111	-.130	-.101	.044	**.905**	.213
	Gender	.013	-.093	-.005	-.161	-.055	-.084	.215	**.939**
Social Influence	Good idea	.231	.157	.012	.055	.006	**.835**	.150	-.166
	Encouragement	.101	-.046	.266	-.032	.100	**.864**	-.103	.061
Perceived Ease of Use (PEU)	Easy	.066	.199	.033	.110	**.917**	.067	-.078	-.046
	Clear/ Understandable	.444	.034	.194	-.007	**.785**	.043	-.044	-.023
Perceived Usefulness (PU)	Productivity	**.818**	.280	.169	.027	.044	.168	-.126	.029
	Usefulness	.551	.538	.155	-.036	.019	.170	-.288	-.031
Observability	Observe at workplace	-.066	.215	-.007	**.898**	.074	.077	-.117	-.078
	Observe outside of workplace	.370	-.039	.039	**.860**	.039	-.067	-.026	-.114
Compatibility	Compatible with work	**.837**	.243	.034	.129	.170	.089	.065	-.028
	Fits into work style	**.869**	.147	.063	.148	.237	.126	.005	.011
Job Relevance	Frequent use	.250	**.866**	-.020	.092	.133	-.069	.006	-.081
	Relevant	.257	**.827**	-.008	.113	.113	.131	.058	-.025
Technology	No voice quality problems	.065	.056	**.883**	.074	.055	.129	.036	.065
	No Internet speed issues	.143	-.039	**.863**	-.049	.101	.102	.064	-.070

PCA with Varimax rotation was then performed on the survey results, using seven components based on medium factor loadings and on the low total initial eigenvalue for Component 8 of .576. Table 7 presents the results of factor analysis. The factor loadings above .6 are in bold. In the PCA performed on the seven components, the eight constructs loaded into seven components with high factor loadings. The total initial eigenvalue of Component 7 is .939.

Table 7. Factor Analysis of the Survey Questionnaire (7 Components)

Constructs		Component 1	2	3	4	5	6	7
Demographics	Age	-.159	.087	.123	-.059	-.101	.117	**.833**
	Gender	.098	-.174	-.035	-.213	-.032	-.168	**.774**
Social Influence	Good idea	.206	.172	.020	.074	.004	**.862**	.003
	Encouragement	.134	-.081	.261	-.059	.104	**.835**	-.044
Perceived Ease of Use (PEU)	Easy	.068	.198	.034	.104	**.916**	.064	-.104
	Clear/understandable	.433	.029	.194	.002	**.788**	.047	-.047
Perceived Usefulness (PU)	Productivity	**.840**	.243	.162	.026	.052	.157	-.064
	Usefulness	**.605**	.490	.147	-.059	.023	.143	-.235
Observability	Observe at workplace	-.050	.204	-.007	**.878**	.072	.064	-.168
	Observe outside of workplace	.348	-.036	.041	**.871**	.041	-.055	-.105
Compatibility	Compatible with work	**.819**	.236	.033	.154	.176	.108	.042
	Fits into work style	**.860**	.130	.060	.165	.245	.135	.021
Job Relevance	Frequent use	.270	**.862**	-.018	.093	.129	-.061	-.056
	Relevant	.279	**.820**	-.007	.111	.112	.135	.018
Technology	No voice quality problems	.081	.043	**.880**	.067	.056	.118	.072
	No Internet speed issues	.131	-.032	**.866**	-.037	.100	.113	.013

The factor loadings of the seen components ranged from .605–.916. The demographics factors had high loadings (.774–.833), as did social influence (.835–.862), perceived ease of use (PEU; .788–.916), perceived usefulness (PU; .605–.840), observability (.871–.878), compatibility (.819–.860), job relevance (.820–.862), and technology (.866–.880).

The researcher developed the proposed conceptual map. This map included eight factors that affected the adoption of smartphones in global midmarket professional service firms. Based on the PCA and total initial eigenvalues, the factors were reduced to

seven, as perceived usefulness (PU) had a high loading into the same component as did compatibility.

Reliability Analysis

The reliability (Cronbach's alpha) of each construct (Table 9) was determined through the use of SPSS™. Reliability is the consistency of each item's measurement of the underlying construct (Salkind, 2009). According to Rovai et al. (2013), a Cronbach's alpha of at least .90 indicates very high reliability, .70 to less than .90 indicates high reliability, and .50 to less than .70 indicates moderate reliability.

Reliability analysis, using Cronbach's alpha, was performed on constructs of the survey (Table 8). Based on the factor analysis performed on survey results, perceived usefulness (PU) was combined with compatibility. The construct reliability analysis showed a Cronbach's alpha that ranged from .651, or moderate reliability, to .889, or high reliability. Table 8 presents the construct reliability analysis.

Table 8. Construct Reliability Analysis

Construct	No. of Items	Cronbach's Alpha
Social Influence	2	.708
Perceived Ease of Use (PEU)	2	.791
Perceived Usefulness (PU)/Compatibility	4	.889
Observability	2	.777
Job Relevance	2	.811
Technology	2	.757
Behavioral Intention	2	.651

Multiple Regression Analysis

According to Rovai et al. (2013), multiple regression determines the relationship between a single dependent variable and multiple independent variables. The independent variables in the conceptual map for smartphone adoption are demographics, social influence, PEU, PU/compatibility, observability, job relevance, and technology, and the dependent variable is intention to use the smartphone. Multiple regression analysis provides the ability to statistically predict the effect of the independent variables on the dependent variable, both separately and combined (Creswell, 2011).

Multiple regression analysis was performed in SPSS™ to determine the best linear combination of demographics, social influence, PEU, PU/compatibility, observability, job relevance, and technology for predicting the intention to use a smartphone. The overall model had an adjusted R^2 value of .343, which means that 34.3% of the variance in the intention to use a smartphone was explained by the multiple regression model.

The multiple regression model indicates that social influence, PEU, PU/compatibility, job relevance, and technology have a positive significant effect on the intention to use a smartphone. Demographics and observability were found to have no significant effect on the intention to use a smartphone. Table 9 presents the multiple regression model of intention to use a smartphone.

Table 9. Multiple Regression Model of Intention to Use a Smartphone

	Unstandardized Coefficients		Standardized Coefficients			Collinearity Statistics	
Constructs	*B*	*SE*	*Beta*	*t*	*p*	Tolerance	VIF
Demographics	-.083	.068	-.087	-1.219	.225	1.000	1.000
Social Influence	.180	.068	.189	2.644	.009	1.000	1.000
Perceived Ease of Use (PEU)	.195	.068	.205	2.870	.005	1.000	1.000
Perceived Usefulness (PU)/Compatibility	.382	.068	.401	5.623	.000	1.000	1.000
Observability	-.043	.068	-.045	-.628	.531	1.000	1.000
Job Relevance	.312	.068	.327	4.586	.000	1.000	1.000
Technology	.145	.068	.152	2.133	.035	1.000	1.000

One-way ANOVA

According to Rovai et al. (2013), a one-way ANOVA is a parametric procedure to assess the means of three or more independent groups. A one-way ANOVA was performed to determine whether there were any cultural differences among participants in the North America, EU, and Asia-Pacific regions. For the majority of the constructs, there were no statistically significant cultural differences in the intention to use a smartphone (Table 10). There was, however, a statistically significant difference for demographics and PU among the regions.

Table 10. One-way ANOVA among Regions

	Survey Item	Sum of Squares	*df*	Mean Square	*F*	*p*
Demographics	Age	.660	2	.330	.239	.787
	Gender	7.641	2	3.820	5.709	.004
Social Influence	Good idea	.269	2	.134	.249	.780
	Encouragement	1.436	2	.718	.792	.455
Perceived Ease of Use (PEU)	Easy	.206	2	.103	.270	.763
	Clear/understandable	.375	2	.187	.335	.716
Perceived Usefulness (PU)	Productivity	1.834	2	.917	1.703	.186
	Usefulness	2.958	2	1.479	4.938	.009
Observability	Observe at workplace	.553	2	.277	1.150	.320
	Observe outside of workplace	1.895	2	.947	2.455	.090
Compatibility	Compatible with work	.759	2	.380	.841	.434
	Fits into work style	1.276	2	.638	1.324	.270
Job Relevance	Frequent use	1.244	2	.622	1.674	.192
	Relevant	.340	2	.170	.509	.602
Technology	No voice quality problems	3.588	2	1.794	1.420	.246
	No Internet speed issues	1.266	2	.633	.434	.649
Intention to Use	Intend to use on the job	1.158	2	.579	.635	.532
	Intend to use in the future	1.586	2	.793	.678	.510

The differences between regions for the demographic and PU constructs were analyzed through post-hoc tests (Table 11). The respondents in the Asia-Pacific region indicated that using a smartphone is dependent on the gender of the individual, a result that was not found for respondents in the North America and EU regions and that was statistically significant. There also was a significantly significant difference, in terms of regions, in regard to whether use of a smartphone is useful in one's job. Respondents in the North America region indicated that a smartphone is useful in their jobs, which was not found for respondents in the Asia-Pacific region.

Table 11. Multiple Comparisons: Post-Hoc Tests

Dependent Variable	(I) Region	(J) Region	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
						Lower Bound	Upper Bound
Demographics: Use of a smartphone is dependent on the gender of the individual.	North America	EU	.23636	.27298	.688	-.4398	.9125
		Asia-Pacific	-.51989*	.16886	.010	-.9381	-.1016
	EU	North America	-.23636	.27298	.688	-.9125	.4398
		Asia-Pacific	-.75625*	.29635	.042	-1.4903	-.0222
	Asia-Pacific	North America	.51989*	.16886	.010	.1016	.9381
		EU	.75625*	.29635	.042	.0222	1.4903
Perceived Usefulness (PU): Use of a smartphone is useful in one's job.	North America	EU	-.00682	.18262	.999	-.4592	.4455
		Asia-Pacific	.34943*	.11297	.010	.0696	.6292
	EU	North America	.00682	.18262	.999	-.4455	.4592
		Asia-Pacific	.35625	.19826	.203	-.1348	.8473
	Asia-Pacific	North America	-.34943*	.11297	.010	-.6292	-.0696
		EU	-.35625	.19826	.203	-.8473	.1348

* $p < .05$.

Findings as Related to the Conceptual Map

PCA with Varimax rotation was performed to assess the interrelationships among survey questions, reduce the number of factors, and statistically associate each survey item with a relevant single factor. The results indicated that seven components produced the highest correlation among the factor loadings. Based on the PCA and total initial eigenvalues, the factors were reduced to seven, as perceived usefulness (PU) had a high loading onto the same component as did compatibility.

The reliability of the survey was tested using Cronbach's alpha for each subscale. The construct reliability analysis showed a Cronbach's alpha that ranged from .651, or moderate reliability, to .889, or high reliability. Multiple regression analysis was

performed to determine the best linear combination of demographics, social influence, PEU, PU/compatibility, observability, job relevance, and technology for predicting the intention to use a smartphone. The overall model had an adjusted R^2 value of .343, that is, 34.3% of the variance in the intention to use a smartphone was explained by the model. The multiple regression model shows that social influence, PEU, PU/compatibility, job relevance, and technology have a positive significant effect on the intention to use a smartphone, while demographics and observability were found to have no significant effect on the intention to use a smartphone. The results of the one-way ANOVA indicated that the majority of the constructs were found to have no statistical cultural differences between regions in the intention to use a smartphone. Figure 4 presents the resulting conceptual map.

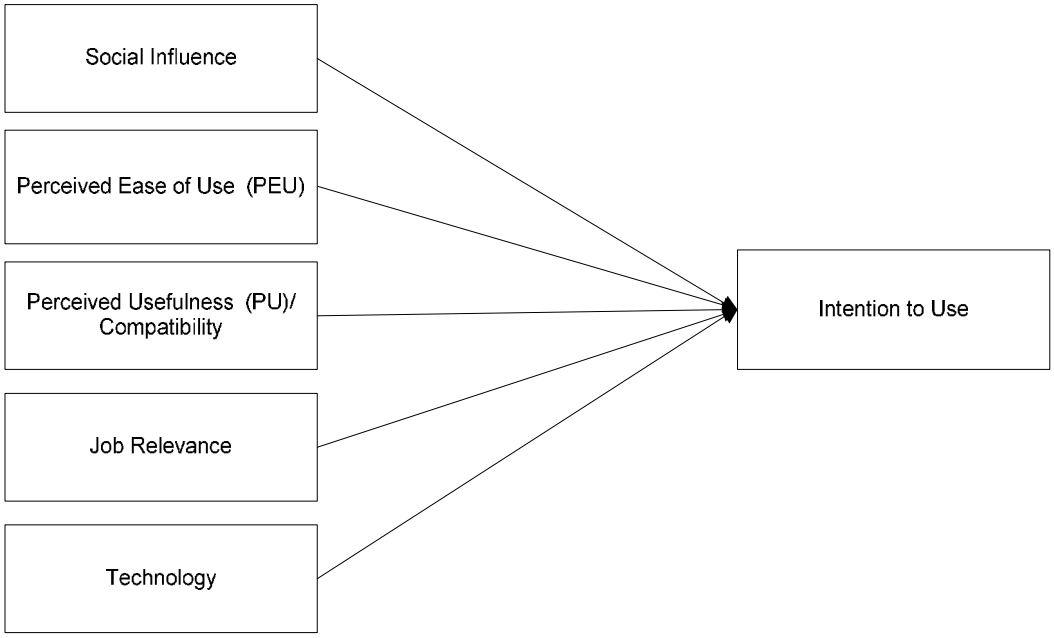


Figure 4. Conceptual map.

Summary

In this chapter, the author presented the data collection and analysis process. The quantitative data gathered from the survey questionnaire were analyzed to determine the key factors that have an impact on the adoption of smartphones and to determine whether there were any cultural differences in terms of adoption. The results of the multiple regression model show that social influence, PEU, PU/compatibility, job relevance, and technology have a positive significant effect on the intention to use a smartphone, while demographics and observability were found to have no significant effect on the intention to use a smartphone. The majority of the constructs related to intention to use a smartphone were found to have no statistically significant differences among the regions.

Chapter 5

Conclusions, Implications, Recommendations, and Summary

Conclusions

The goal of this research was to identify the key factors that have an impact on the adoption of smartphones for the domain of professional consultants as well as to validate the key constructs of the conceptual map of smartphone adoption. The survey instrument used was adapted from the work by Aldhaban (2012), Kim (2008), López-Nicolás et al. (2008), and Putzer and Park (2012). The online survey was distributed to ZS Associates professional consultants throughout the U.S., Canada, the EU, Japan, China, and India, and a total of 134 ZS Associates participants responded to the online survey. The conclusions, based on the data analysis, are organized by each RQ.

RQ1: What are the demographic factors that contribute to intention to use a smartphone? (Putzer & Park, 2010, 2012; Su & Li, 2010; Van Biljon & Kotzé, 2007). The demographics factors included age and gender. The results demonstrated that demographics had no significant effect on the intention to use a smartphone. This is consistent with prior research that has shown that demographics do not have a significant effect on the intention to use a smartphone (Putzer & Park, 2010, 2012). One explanation for this finding is that consultants in a professional environment view a smartphone as an extension to other productivity tools such as a laptop computer, which is a more important factor than is age or gender.

RQ2: What are the social influence factors that contribute to intention to use a smartphone? (Chua et al., 2011; Chung & Chun, 2011; López-Nicolás et al., 2008; Van Biljon & Kotzé, 2008). The social influence factors included others' influencing the idea

to use a smartphone and being encouraged to use a smartphone. The results demonstrated that social influence had a positive significant effect on the intention to use a smartphone. This finding is consistent with an existing technology adoption model, UTAUT (Venkatesh et al. 2003), and with prior research that has shown that social influence contributes to the intention to use a smartphone (López-Nicolás et al., 2008; Van Biljon & Kotzé, 2008). One explanation for this finding is that professional consultants in this investigation work with professionals in other industries, such as pharmaceuticals, medical device manufacturing, and technology manufacturing, who utilize smartphones.

RQ3: What are the cultural influence factors that contribute to intention to use a smartphone? (Thakur et al., 2011; Van Biljon & Kotzé, 2008). An analysis was performed for the results of the participants of the North America, EU, and Asia-Pacific regions to determine whether there were any cultural differences. The results demonstrated for the majority of the constructs, there were no statistically significant cultural differences in the intention to use a smartphone. Notably, this finding is not consistent with the literature. Dai and Palvia (2009), Shin and Choo (2012), and Arpaci et al. (2013) conducted survey research that incorporated a cross-cultural perspective of smartphone adoption. Their research, however, was limited to two countries and, as such, did not incorporate a global perspective. There was, however, a statistically significant difference for demographics and PU among the regions. The respondents in the Asia-Pacific region indicated that using a smartphone is dependent on the gender of the individual, a result that was not found for respondents in the North America and EU regions and that was statistically significant. There also was a significantly significant

difference, in terms of regions, in regard to whether use of a smartphone is useful in one's job. Respondents in the North America region indicated that a smartphone is useful in their jobs, which was not found for respondents in the Asia-Pacific region. One explanation for this finding is that majority of the professional consultants in the Asia-Pacific region work in the office compared to professional consultants in the North America region that work remotely at client sites. Additional research is needed to determine whether cultural factors affect the adoption of smartphones.

RQ4: What are the PEU factors that contribute to intention to use a smartphone? (Chang, 2010; Chen et al., 2009; Chung & Chun, 2011; Kang, Cho, & Lee, 2011; Kim, 2008; Kim & Garrison, 2009; Teng & Lu, 2010). The PEU factors included ease of operating a smartphone. The results demonstrated that PEU had a positive significant effect on the intention to use a smartphone. This finding is consistent with an existing technology adoption model, TAM (Davis et al., 1989), and with prior research that indicates that PEU contributes to the intention to use a smartphone (Chang, 2010; Chen et al., 2009; Chung & Chun, 2011; Kang et al., 2011; Kim, 2008; Kim & Garrison, 2009; Teng & Lu, 2010). One explanation for this finding is that the professional consultants in this investigation view operating a smartphone as easy in business, based on their experience with a smartphone from a consumer's perspective. In 2013, 56% of US adults owned a smartphone (Pew Research Center, as cited in Smith, 2013). According to Gartner (as cited in Gupta et al., 2014), the smartphone share of overall m-phone sales increased from 38.9% in 2012 to 53.6% in 2013.

RQ5: What are the PU factors that contribute to intention to use a smartphone? (Chang, 2010; Chen et al., 2009; Chung & Chun, 2011; Kang et al., 2011; Kim, 2008;

Kim & Garrison, 2009; Teng & Lu, 2010). The PU factors included use of a smartphone as increasing and as useful to one's job. The results demonstrated that PU had a positive significant effect on the intention to use a smartphone. This finding is consistent with an existing technology adoption model, TAM (Davis et al. 1989), as well as with prior research that shows that PU contributes to the intention to use a smartphone (Chang, 2010; Chen et al., 2009; Chung & Chun, 2011; Kang et al., 2011; Kim, 2008; Kim & Garrison, 2009; Teng & Lu, 2010). One explanation for this finding is that the professional consultants in this investigation view a smartphone as a productivity tool in which they have the ability to access e-mail as well as documents and presentations, which also can be edited via their smartphones.

RQ6: What are the observability factors that contribute to intention to use a smartphone? (Putzer & Park, 2010, 2012). The observability factors included the participant's observing others' using smartphones in the workplace and the participant's observing others' using smartphones outside the workplace. The results demonstrated that observability had no significant effect on the intention to use a smartphone, which is not consistent with the literature (Putzer & Park, 2010, 2012). Smartphone investigations by Putzer and Park (2010, 2012) focused on physicians and nurses in a hospital environment in which individuals are mobile and observe others using their smartphones. ZS Associates is an office environment in which desk phones are utilized when a professional consultant is in the office and smartphones outside the office.

RQ7: What are the compatibility factors that contribute to intention to use a smartphone? (Putzer & Park, 2010, 2012). The compatibility factors included smartphone use as compatible with aspects of work and as fitting into one's work style.

The results indicated that compatibility had a positive significant effect on the intention to use a smartphone, which is consistent with prior research that has shown that compatibility contributed to the intention to use a smartphone (Putzer & Park, 2010, 2012). One explanation for this finding is that the professional consultants in this investigation view a smartphone as an extension of their other productivity tools, such as a laptop computer, as the smartphone provides the ability to exchange information and knowledge in a rapid manner via a mobile and flexible device.

RQ8: What are the job relevance factors that contribute to intention to use a smartphone? (Kim, 2008; Kim & Garrison, 2009; Putzer & Park, 2012). The job relevance factors that were analyzed include participants' frequent use of a smartphone and a smartphone as relevant to their job. The results demonstrated that job relevance had a positive significant effect on the intention to use a smartphone. This is consistent with prior research that has shown that job relevance contributes to the intention to use a smartphone (Kim, 2008; Kim & Garrison, 2009; Putzer & Park, 2012). In this investigation, 93% of the professional consultants used their smartphones over 10 times per day. One explanation for this finding is that the professional consultants in this investigation view a smartphone as a productivity and collaborative tool for use when interacting with both internal and external client teams.

RQ9: What are the technology factors that contribute to intention to use a smartphone? (Aldhaban, 2012; Chua et al., 2011; Kang et al., 2011; Li & McQueen, 2008; Van Biljon & Kotzé, 2007). The technology factors included participants' not encountering any voice quality or Internet speed issues when using a smartphone in their job. The results demonstrated that technology factors had a positive significant effect on

the intention to use a smartphone, which is consistent with an existing technology adoption model, UTAUT (Venkatesh et al., 2003), and with prior research that has shown that technology factors contribute to the intention to use a smartphone (Kang et al., 2011; Pitchayadejanant, 2011; Van Biljon & Kotzé, 2007). One explanation for this finding is that the professional consultants in this investigation work in regions that are in established cities with mobile infrastructures that support consumer and business demands. However, the author has found, based on his experience with managing a smartphone deployment, that voice quality and Internet speed can vary within a region and may result in an unsatisfied smartphone user.

Limitations

There were three limitations of this research. The first limitation was the response rate for participants in the EU and Asia-Pacific regions. The response rate of EU was 8%, and, of Asia-Pacific, was 26%, both of which were substantially lower than that of North America, at 68%. The overall response rate for the online survey was 39%, which is in keeping with the response rate of 30% to 60% for online surveys (Fowler, 2009). That the EU and Asia-Pacific regions had a lower response rate may have affected the analysis of cultural differences in the intention to use a smartphone.

The second limitation was that the research was limited to ZS Associates professional consultants. This limits the generalizability of the results to professional services firms (Nenty, 2009).

The third limitation was that 93% of the research participants used their smartphones over 10 times per day. According to Oulasvirta, Rattenbury, Ma, and Raita (2012), smartphone users check their smartphone an average of 34 times per day. This limits the

generalization of the results those who use their smartphone more than 10 times per day (Nenty, 2009). Future research should incorporate an understanding of how respondents use their smartphones e.g., checking e-mail and text messages, particularly business productivity applications.

Implications

The research provides valuable insight into the adoption of smartphones and has at least four implications. The first implication concerns the value of expansion of research on the adoption of smartphones to the domain of professional consultants. Prior research on smartphone adoption and acceptance focused on students, consumers, and healthcare professionals (Chen, Park, & Putzer, 2010; Chung & Chun, 2011; Kang et al., 2011; Kim, 2008; Kim & Garrison, 2009; Putzer & Park, 2010, 2012; Teng & Lu, 2010).

The second implication concerns the value of the expansion of research on the adoption of smartphones to include cultural perspectives. Prior research on the adoption of mobile devices (m-devices) did not take into account cultural differences (Van Biljon & Kotzé, 2008) or differences in technology, such as the mobile infrastructure (Aldhaban, 2012). This investigation did not find significant cultural differences between regions in the intention to use a smartphone. Thus, including this concept in research is worthwhile.

The third implication concerns the value of bridging the gap in the IT literature on the intention to use through an analysis of key constructs from the TAM, UTAUT, and DOI models (Aldhaban, 2012). Research by Putzer and Park (2010, 2012), Van Biljon and Kotzé (2007), and Yun et al. (2011) demonstrated the value of adopting the TAM, UTAUT, and DOI constructs to provide an understanding of smartphone acceptance.

Based on the research by Chen et al. (2009) and Putzer and Park (2010, 2012), the author incorporated the key constructs of TAM, UTAUT, and DOI into the current research. The constructs that were validated from TAM include PEU and PU; the UTAUT constructs included social influence and technology; and the DOI constructs included compatibility and job relevance.

The fourth implication concerns the value of understanding how smartphone adoption factors can further be utilized to determine the impact of business productivity for frequent users of smartphones in the workplace. Research by Carayannis and Clark (2011), Hopkins (2012), and Carayannis, Clark, Valvi, Stone, and Sharifrazi (2013) demonstrated the value of studying the smartphone adoption factors of business users to determine how leveraging smartphone technology can affect business productivity.

Recommendations

Additional research is recommended on the impact of smartphones in global midmarket professional service firms. Future research should include additional professional consulting organizations to obtain a broader understanding of smartphone adoption among professional consulting firms. Future research should focus on the factors that affect smartphone adoption as a means to understand how frequent users of smartphones can leverage the technology to increase business productivity. In addition, future research should incorporate an understanding of how respondents use their smartphone such as checking e-mail and text messages and the use of business productivity applications. Additional research also is needed to determine whether cultural factors affect the adoption of smartphones.

Summary

In this dissertation investigation, the author identified the key factors that affect the decision to adopt smartphones in global midmarket professional service firms. Specifically, through an analysis of data generated from a survey of professional consultants from a global professional services firm, ZS Associates, this investigation provided an understanding of the key factors that affect the adoption of smartphones by professional consultants and validated the key constructs of the conceptual map of smartphone adoption.

The RQs investigated in this dissertation investigation were as follows:

1. What are the demographic factors that contribute to intention to use a smartphone? (Putzer & Park, 2010, 2012; Su & Li, 2010; Van Biljon & Kotzé, 2007).
2. What are the social influence factors that contribute to intention to use a smartphone? (Chua et al., 2011; Chung & Chun, 2011; López-Nicolás et al., 2008; Van Biljon & Kotzé, 2008).
3. What are the cultural influence factors that contribute to intention to use a smartphone? (Thakur et al., 2011; Van Biljon & Kotzé, 2008).
4. What are the Perceived Ease of Use (PEU) factors that contribute to intention to use a smartphone? (Chang, 2010; Chen et al., 2009; Chung & Chun, 2011; Kang, Cho, & Lee, 2011; Kim, 2008; Kim & Garrison, 2009; Teng & Lu, 2010).
5. What are the Perceived Usefulness (PU) factors that contribute to intention to use a smartphone? (Chang, 2010; Chen et al., 2009; Chung & Chun, 2011; Kang et al., 2011; Kim, 2008; Kim & Garrison, 2009; Teng & Lu, 2010).

6. What are the observability factors that contribute to intention to use a smartphone? (Putzer & Park, 2010, 2012).
7. What are the compatibility factors that contribute to intention to use a smartphone? (Putzer & Park, 2010, 2012).
8. What are the job relevance factors that contribute to intention to use a smartphone? (Kim, 2008; Kim & Garrison, 2009; Putzer & Park, 2012).
9. What are the technology factors that contribute to intention to use a smartphone? (Aldhaban, 2012; Chua et al., 2011; Kang et al., 2011; Li & McQueen, 2008; Van Biljon & Kotzé, 2007).

The data collected in this dissertation investigation were drawn from responses to an online survey questionnaire distributed to 336 ZS Associates professional consultants, with offices in the U.S., Canada, the EU, Japan, China, and India. A total of 134 ZS Associates participants responded to the online survey questionnaire. The survey instrument was adapted from research by Aldhaban (2012), Kim (2008), López-Nicolás et al. (2008), and Putzer and Park (2012).

A pilot online survey questionnaire was distributed to 20 participants from ZS Associates who were not part of the actual study group. The author sent out an e-mail invitation that contained a description of the investigation and a link to SurveyMonkey™, which was used to present the online survey questionnaire. A total of 15 ZS Associates participated in the pilot study. As a means to improve the quality of the online survey questionnaire, the pilot questionnaire included a fill-in-the-blank section for respondents to comment on various aspects of the survey. The response rate was 75% (15), with 100% of the participants' providing valid responses. The responses were analyzed to

determine whether there are any functional issues, and the questionnaire was tested for validity and reliability. No functional issues were reported by the participants. The validity of the pilot survey was not performed based on the number of participants were less than the number of construct survey questions. The reliability for each construct was determined using Cronbach's alpha coefficient. The construct reliability analysis showed a Cronbach's alpha that ranged from .510, or moderate reliability, to .998, or very high reliability.

Following the pilot study, the author refined the survey questionnaire and distributed it to 336 employees from ZS Associates. The study sample was divided into three regions, with 215 participants from the North America region, 34 from the EU region, and 87 from the Asia-Pacific regions. A total of 134 ZS Associates participants responded. The response rate for the online survey questionnaire was 40% (134), with 39% (130) of the participants' providing valid responses.

To assess the interrelationships among survey questions, reduce the number of factors, and associate each survey question with a relevant single factor, PCA with Varimax rotation was performed on the survey results using seven and eight components. The results of the PCA for the seven components resulted in eight constructs loaded onto seven components with high factor loadings. Based on the PCA and total initial eigenvalues, the factors were reduced to seven, as perceived usefulness (PU) had a high loading onto the same component as did compatibility.

The reliability for each construct was determined using Cronbach's alpha coefficient. The construct reliability analysis showed a Cronbach's alpha that ranged from .651, or moderate reliability, to .889, or high reliability. Multiple regression analysis was

performed to determine the best linear combination of demographics, social influence, PEU, PU/compatibility, observability, job relevance, and technology for predicting the intention to use a smartphone. The overall model had an adjusted R^2 value of .343, that is, 34.3% of the variance in the intention to use a smartphone was explained by the multiple regression model.

The results of the multiple regression model showed that social influence, PEU, PU/compatibility, job relevance, and technology have a positive significant effect on the intention to use a smartphone. Demographics and observability were found to have no significant effect on the intention to use a smartphone. A one-way ANOVA indicated that majority of the constructs related to intention to use a smartphone were found to have no statistically significant differences in the North America, EU, and Asia-Pacific regions in the intention to use a smartphone.

There were three limitations of this research. The first limitation was the response rate for participants in the EU and Asia-Pacific regions. The response rate of EU was 8%, and, of Asia-Pacific, was 26%, both of which were low compared to that of North America, at 68%. The second limitation was that only ZS Associates professional consultants received an invitation to participate in this dissertation investigation. The third limitation was that 93% of the participants used their smartphones over 10 times per day.

The research provided valuable insight into the adoption of smartphones and had at least four implications. The first implication concerned the value of expansion of research on the adoption of smartphones to the domain of professional consultants. The second implication concerned the value of the expansion of research on the adoption of

smartphones to include cultural perspectives. Although the author did not find significant cultural differences, according to Thakur et al. (2011), this concept remains of value for future research. The third implication concerned the value of bridging the gap in the IT literature on the intention to use through an analysis of key constructs from the TAM, UTAUT, and DOI models. The fourth implication concerns the value of understanding how smartphone adoption factors can further be utilized to determine how the technology can be used to affect business productivity by frequent users of smartphones in the workplace.

Additional research is recommended on the impact of smartphones in global midmarket professional service firms. Future research should include additional professional consulting organizations to obtain a broader understanding of smartphone adoption among professional consulting firms. Future research should focus on the factors that affect smartphone adoption as a means to understand how frequent users of smartphones can leverage the technology to increase business productivity. In addition, future research should incorporate an understanding of how respondents use their smartphones e.g., checking e-mail and text messages, particularly business productivity applications. Additional research also is needed to determine whether cultural factors affect the adoption of smartphones.

Based on the analysis, the results and conclusions were presented, and the results were compared with those of prior research. Then the limitations were presented, followed by the implications and recommendations for the future research.

Appendix A

Permission to Distribute Survey

March 25, 2014

Chris Wright
CEO
ZS Associates, Inc.
1800 Sherman Ave. Suite 700
Evanston, IL 60201

Dear Mr. Wright:

I am currently working on my dissertation for a Ph.D. in Information Technology at Nova Southeastern University. The title of my dissertation is "An Investigation of the Key Factors that Affect the Adoption and Diffusion of Smartphones on Global Midmarket Professional Service Firms."

The goal of the investigation is to identify the key factors that have an impact on the global adoption and diffusion of smartphones. The key factors that will be analyzed include demographics, social influence, perceived ease of use, perceived usefulness, observability, compatibility, job relevance, technology factors, and behavioral intention.

Over the next couple of months, I plan to administer an online survey to a cross-section of consultants, managers, associate principals, and principals at ZS Associates. The online survey will be approved by Nova Southeastern University's Institutional Review Board (IRB). The responses to the questions in the survey are anonymous, and only cumulative results will be analyzed and included in my dissertation report.

ZS Associates would be named in the dissertation. I need to obtain formal approval from ZS Associates to distribute the online survey and to include the results in my dissertation.

Regards,

Mark Kocour

Mark Kocour

March 25, 2014

Mr. Mark Kocour
ZS Associates
1800 Sherman Avenue
Evanston, IL 60201

Dear Mark:

RE: Consent to Conduct Research and Distribute On line Survey at ZS Associates

On behalf of ZS Associates, I approve research to be conducted and an online survey distributed at ZS Associates. This research is being conducted and distribution of on an online survey by a Ph. D. candidate, Mark Kocour, for a dissertation entitled "An Investigation of the key factors that affect the adoption and diffusion of Smartphones in Global Midmarket Professional Service Firms".

Regards,

Chris Wright
CEO

ZS

Barcelona • Boston • Chicago • Evanston • Frankfurt • London • Los Angeles • Milan • New Delhi
New York • Paris • Philadelphia • Princeton • Pune • San Diego • San Francisco • Shanghai • Tokyo • Toronto • Zurich

ZS Associates
1800 Sherman Avenue
Evanston, IL 60201 USA
847.492.3600 Tel
847.864.6280 Fax
www.zsassociates.com

Appendix B

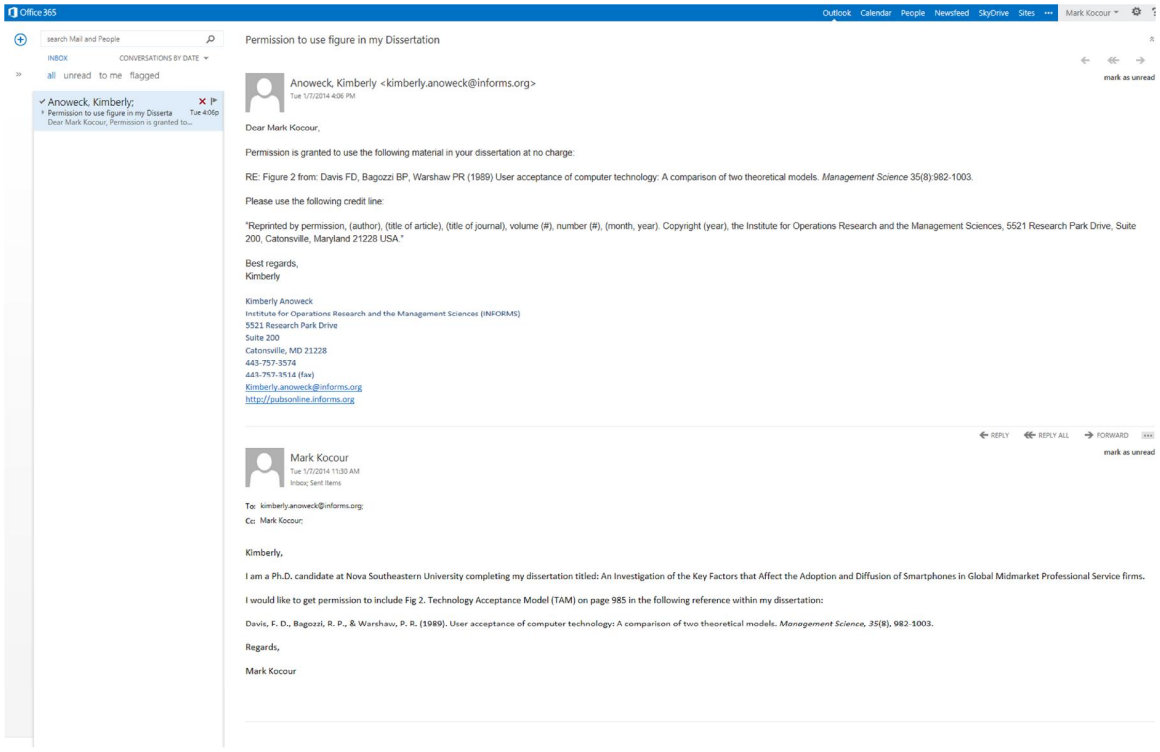
List of Acronyms and Abbreviations

A	Attitude Toward Using
BI	Behavioral Intention
CI	Cultural Influence
CWF	Company's Willingness to Fund
DF	Demographic Factors
DOI	Diffusion of Innovations
EFA	Exploratory Factor Analysis
FC	Facilitating Conditions
GPS	Global Positioning System
HNI	Human-Nature Influence
IT	Information Technology
M-Commerce	Mobile Commerce
M-Devices	Mobile Devices
MOPTAM	Mobile Phone Technology Adoption Model
M-Phone	Mobile Phone
MWT	Mobile Wireless Technology
MWTAM	Mobile Wireless Technology Model
PAA	Perceived Available Applications
PAU	Perceived Application Updates
PCA	Principal Component Analysis
PCS	Perceived Cost Savings

PF	Personal Factors
PEU	Perceived Ease of Use
PIM	Personal Information Management
PSF	Professional Service Firm
PU	Perceived Usefulness
SF	Socioeconomic Factors
SI	Social Influence
SN	Social Network
S/P	Security/Privacy
SPSS	Statistical Package for the Social Sciences
TRA	Theory of Reasoned Action
UTAUT	Unified Theory of Acceptance and Use of Technologies

Appendix C

Permissions



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Best regards,
Kimberly

Kimberly Anoweck
Institute for Operations Research and the Management Sciences (INFORMS)
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Mark Kocour
Tue 1/7/2014 11:30 AM
Inbox; Sent Items

To: kimberly.anoweck@informs.org;
Cc: Mark Kocour;

Kimberly,

I am a Ph.D. candidate at Nova Southeastern University completing my dissertation titled: An Investigation of the Key Factors that Affect the Adoption and Diffusion of Smartphones in Global Midmarket Professional Service firms.

I would like to get permission to include Fig 2. Technology Acceptance Model (TAM) on page 985 in the following reference within my dissertation:

Davis, F. D., Bagozzi, R. P., & Warshaw, P. R. (1989). User acceptance of computer technology: A comparison of two theoretical models. *Management Science, 35*(8), 982-1003.

Regards,

Mark Kocour

MIS Quarterly
Carlson School of Management
University of Minnesota
Suite 4-339 CSOM
321 19th Avenue South
Minneapolis, MN 55455

January 9, 2014

Mark Kocour
Nova Southeastern University

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Permission is hereby granted for Mark Kocour to use material from "User Acceptance of Information Technology: Toward a Unified View," V. Venkatesh, M. G. Morris, G. B. Davis, and F. D. Davis, *MIS Quarterly* (27:3), September 2003, pp. 424-478, specifically, Figure 3, the research model, on page 447, and related materials as necessary, in his doctoral dissertation at Nova Southeastern University.

In addition to the citation information for the work, the legend should include

Janice DeGross

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DN: cn=Janice DeGross, o=MIS Quarterly, ou, email=degro003@umn.edu, c=US
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Janice I. DeGross
Manager

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Survey questions from the study “Are physicians likely to adopt emerging mobile technologies?” as published in Perspectives in HIM.

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Anne Zender
Senior Director, Periodicals

Appendix D

Questionnaire

Employee Questionnaire

Instructions: To assist in determining the key factors that have an impact on the adoption of smartphones in global midmarket professional service firms, you are asked to complete the following questionnaire. The first section includes demographic items, and the second section includes items on the factors that contribute to the intention to use a smartphone. The responses to the questions in this survey are anonymous, and only cumulative results will be analyzed and included in my dissertation report. This questionnaire should not take any longer than 10 minutes to complete.

Section 1: Demographics

Personal Information (age, gender, education, and technology experience/usage)

1. What is your age?
21-30
31-40
41-50
50+

2. What is your gender?
Female
Male

3. What is your level of education?
Bachelor's degree
Master's degree
Doctorate

4. How many years have you worked for your current employer?
0-less than 1 year
1-5 years
6-10 years
11-15 years
16-20 years
21-25 years
26+ years

5. What is the location of your home office (country)?
United States
Canada
European Union
Japan
China
India

6. What is your job level?
Consultant
Manager
Associate Principal
Principal

7. The smartphone used in your current job is provided by?
ZS Associates
Personal

8. What type of smartphone do you use?
Apple iPhone™
Samsung - Android™
Blackberry®

9. How many years have you used a smartphone?
0-less than 1 year
1-5 years
6-10 years

10. What is your level of experience using a smartphone?
Beginner
Intermediate
Experienced

11. How often do you use a smartphone?
Less than once a week
Once a week
More than once a day
More than 5 times a day
More than 10 times a day

Section 2: Adoption of Smartphones – Please make a selection based on the extent you agree or disagree with the statement.

Demographics

	Strongly Disagree (1)	Disagree (2)	Un-decided (3)	Agree (4)	Strongly Agree (5)
Using a smartphone is dependent on the age of the individual.					
Using a smartphone is dependent on the gender of the individual.					

Social Influence

	Strongly Disagree (1)	Disagree (2)	Un-decided (3)	Agree (4)	Strongly Agree (5)
People around me think that it is a good idea for me to use a smartphone.					
People around me have encouraged me to use a smartphone.					

Perceived Ease of Use (PEU)

	Strongly Disagree (1)	Disagree (2)	Un-decided (3)	Agree (4)	Strongly Agree (5)
Learning to operate a smartphone is easy for me.					
My interaction with a smartphone is clear and understandable.					

Perceived Usefulness (PU)

	Strongly Disagree (1)	Disagree (2)	Un-decided (3)	Agree (4)	Strongly Agree (5)
Using a smartphone in my job increases my productivity.					
I find a smartphone useful in my job.					

Observability

	Strongly Disagree (1)	Disagree (2)	Un-decided (3)	Agree (4)	Strongly Agree (5)
I observe others' using a smartphone in my workplace.					
I observe others' using a smartphone outside the workplace.					

Compatibility

	Strongly Disagree (1)	Disagree (2)	Un-decided (3)	Agree (4)	Strongly Agree (5)
Using a smartphone is compatible with aspects of my work.					
Using a smartphone fits into my work style.					

Job Relevance

	Strongly Disagree (1)	Disagree (2)	Un-decided (3)	Agree (4)	Strongly Agree (5)
In my job, usage of a smartphone is frequent.					
In my job, usage of a smartphone is relevant.					

Technology Factors

	Strongly Disagree (1)	Disagree (2)	Un-decided (3)	Agree (4)	Strongly Agree (5)
Using a smartphone in my job, I do not encounter any voice quality issues.					
Using a smartphone in my job, I do not encounter any Internet speed issues.					

Behavioral Intention

	Strongly Disagree (1)	Disagree (2)	Un-decided (3)	Agree (4)	Strongly Agree (5)
Whenever possible, I intend to use a smartphone in my job.					
I intend to increase the use of a smartphone in the future.					

Included only in the pilot questionnaire:

Please provide comments on the questionnaire (length, clarity of the questions asked, and any technical issues):

Appendix E

IRB Approval

NOVA SOUTHEASTERN UNIVERSITY
Office of Grants and Contracts
Institutional Review Board

MEMORANDUM

To: Mark Kocour

From: Ling Wang, Ph.D.
Institutional Review Board

Date: April 17, 2014

Re: *An Investigation of the Key Factors that Affect the Adoption and Diffusion of Smartphones in Global Midmarket Professional Service Firms*

IRB Approval Number: wang03151402

I have reviewed the above-referenced research protocol at the center level. Based on the information provided, I have determined that this study is exempt from further IRB review. You may proceed with your study as described to the IRB. As principal investigator, you must adhere to the following requirements:

1) CONSENT: If recruitment procedures include consent forms these must be obtained in such a manner that they are clearly understood by the subjects and the process affords subjects the opportunity to ask questions, obtain detailed answers from those directly involved in the research, and have sufficient time to consider their participation after they have been provided this information. The subjects must be given a copy of the signed consent document, and a copy must be placed in a secure file separate from de-identified participant information. Record of informed consent must be retained for a minimum of three years from the conclusion of the study.

2) ADVERSE REACTIONS: The principal investigator is required to notify the IRB chair and me (954-262-5369 and 954-262-2020 respectively) of any adverse reactions or unanticipated events that may develop as a result of this study. Reactions or events may include, but are not limited to, injury, depression as a result of participation in the study, life-threatening situation, death, or loss of confidentiality/anonymity of subject. Approval may be withdrawn if the problem is serious.

3) AMENDMENTS: Any changes in the study (e.g., procedures, number or types of subjects, consent forms, investigators, etc.) must be approved by the IRB prior to implementation. Please be advised that changes in a study may require further review depending on the nature of the change. Please contact me with any questions regarding amendments or changes to your study.

The NSU IRB is in compliance with the requirements for the protection of human subjects prescribed in Part 46 of Title 45 of the Code of Federal Regulations (45 CFR 46) revised June 18, 1991.

Cc: Protocol File

03301 College Avenue • Fort Lauderdale, FL 33314-7796 • (954) 262-5369
Fax: (954) 262-3977 • Email: *irga@nsu.nova.edu* • Web site: www.nova.edu/cwis/ogc

Appendix F

Survey Questions and Constructs

Survey Question	Reference
Demographics	
Using a smartphone is dependent on the age of the individual.	Putzer & Park (2012)
Using a smartphone is dependent on the gender of the individual.	Putzer & Park(2012)
Social Influence	
People around me think that it is a good idea for me to use a smartphone.	López-Nicolás et al. (2008)
People around me have encouraged me to use a smartphone.	López-Nicolás et al. (2008)
Perceived Ease of Use (PEU)	
Learning to operate a smartphone is easy for me.	Kim (2008)
My interaction with a smartphone is clear and understandable.	Kim (2008)
Perceived Usefulness (PU)	
Using a smartphone in my job increases my productivity.	Kim (2008)
Using a smartphone is useful in my job.	Kim (2008)
Observability	
I observe others' using a smartphone in my workplace.	Putzer & Park (2012)
I observe others' using a smartphone outside of the workplace.	Putzer & Park (2012)
Compatibility	
Using a smartphone is compatible with aspects of my work.	Putzer & Park (2012)
Using a smartphone fits into my work style.	Putzer & Park (2012)
Job Relevance	
In my job, usage of a smartphone is frequent.	Kim (2008)
In my job, usage of a smartphone is relevant.	Kim (2008)
Technology Factors	
Using a smartphone in my job, I do not encounter any voice quality issues.	Aldhaban (2012)
Using a smartphone in my job, I do not encounter any Internet speed issues.	Aldhaban (2012)
Behavioral Intention	
Whenever possible, I intend to use a smartphone in my job.	Putzer & Park (2012)
I intend to increase the use of a smartphone in the future.	Putzer & Park (2012)

Appendix G

E-Mail to ZS Associates Professional Consultants

To: ZS Professional Consultants

From: Mark Kocour

Subject: Request for Participation in a Smartphone Survey (Doctoral Dissertation Research)

I am currently a Ph.D. student in Information Systems at Nova Southeastern University and am working my doctoral dissertation, "An Investigation of the Key Factors that Affect the Adoption of Smartphones in Global Midmarket Professional Service Firms." As part of my dissertation research, I would like your assistance in completing a questionnaire that will enable me to determine the key factors that have an impact on the adoption of smartphones in global midmarket professional service firms.

The questionnaire consists of two sections. The first section includes demographic items, and the second section includes items on the factors that contribute to the intention to use a smartphone. The responses to the questions in this survey are anonymous, and only cumulative results will be analyzed and included in my dissertation report. This questionnaire should not take any longer than 10 minutes to complete. Completing the survey indicates your voluntary participation in the study.

To participate in this survey please click on the following link:

https://www.surveymonkey.com/s/smartphone_adoption

Thank you in advance for your participation.

Regards,

Mark Kocour

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