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ABSTRACT

In the information-driven and application rich environment of smartphones, power is closer to the user than ever before and it has the potential of helping them become more effective and efficient. Smartphones have become increasingly important for companies to create strategic opportunities and competitive advantage by adding value for its stakeholders and improving efficiency. Technological advances in smartphones have led to increased mobile applications and implications for theory and practice since they create strategic opportunities and competitive advantage by adding value for customers and improving efficiency through the use of mobile technologies.

Understanding the factors that influence the continuance in usage of smartphones in globally distributed teams is extremely helpful because knowledge on how to balance requirements and strategic interests effectively is extremely scarce in existing business model literature. To date, there are no published studies that have investigated the influence of cognitive trust and familiarity on smartphone continuance usage. To fill this gap in the literature, we developed our model based on the Visual Perception Theories as its theoretical foundation. Our model indicates that both familiarity with a smartphone and cognitive trust in integrity of a smartphone have a positive and significant effect on smartphone continuance usage. Also, our study shows factors that influence smartphone continuance usage through cognitive trust. These findings support the Visual Perception Theories.

INTRODUCTION

In today's era of mobile commerce and globally distributed teams, technology is rapidly changing to fit the needs of this fast pace business world and society. Society has become very dependent upon mobile technology in every aspect of life including business, healthcare, education and government among others. Developers are constantly creating networks that have faster connectivity, enhanced performance, capacity and coverage. As the mobile technology industry grows, consumers grow more and more dependent on this industry as it integrates into our daily lives. As the world continues to advance, we can expect technological devices such as the smartphone (e.g., Apple's iPhone, Samsung's Galaxy, (formerly Research in Motion's) BlackBerry) to become smaller, faster, more energy efficient and more mobile.

Smartphones/Mobile devices are not just telephones. They are web browsers, GPS systems, and messaging systems. And there are many uses such as customer service and payment options, inventory management and employee dispatching. Mobility is the portability of technology. Portable technology frees employees from their desks and allows customer flexibility. Since a viable mobile business model should create both customer value and network (i.e., the organizational and financial domains) value, according to de Reuver et al. (2009) findings, addressing organizational design issues (i.e., partner selection, governance and relation management) leads to an acceptable division of roles among actors, while addressing financial design issues (i.e., pricing, division of investments and costs among partners) results in risk levels that are perceived to be acceptable.

The mobile phone has changed the way merchants and farmers do business in rural Africa and Asia. In rural China, many of the farmers cannot read and have never used the Internet, but with the help of younger tech-savvy villagers that use the Internet on their smartphones to sell produce and buy shoes and shampoo (Larson, 2013). In countries such as South Africa, where healthcare systems are overburdened and doctors are scarce, healthcare workers use an experimental smartphone based software program called Cell-Life which is used to manage the treatment of HIV/AIDS. This system combines a comprehensive database that includes a patient's treatment history and lab results with a messaging service that enables counselors, clinical staff and doctors to communicate using SMS (short messaging service). Therapeutic counselors scroll through a series of menus to report on side effects, monitor adherence, and provide detailed social information. These uses of mobile technology are only going to increase (Chief Executive Group, 2011). In today's era of mobile commerce, technology is rapidly changing to fit the needs of this fast pace business world and society. Developers are constantly creating networks that have faster connectivity, enhanced performance, capacity and coverage. Wireless devices (including smartphones) are increasingly popular across the healthcare field enabling caregivers to review patient records and test results, access charge captures, enter diagnosis information during patient visits and consult drug formularies, all without the need for a wired network connection. Patient – Provider communication through the smartphones has been beneficial because office visits are too infrequent and expensive, print mail usually is unread causing a break in continuity of patient care. The smartphone enhances communication with the patient. The use of voice, web access and text messaging helps the patient with reminders such as appointments and medications. The different features and applications on smartphones can also help clinician better track patient behavior and intervene when more intense care is needed (e.g., when asthmatics or diabetics need assistance). This technology has the potential to transform healthcare practices through streamlining operations, optimizing efficiencies, and improving patient outcomes and safety.

To investigate the use and acceptance of smartphones, Park and Chen (2007) argue that many articles have used the technology acceptance model (TAM) and the innovation diffusion theory (IDT) as the theoretical background for their research models. Some researchers have combined both TAM and IDT to develop their models (Cheong & Park, 2005; Mao et al., 2005). Park and Chen (2007) investigate how human motivation affects the adoption decision for smartphone among medical doctors and nurses. Prior studies have been very helpful and these studies focus on behavioral intention to use the smartphone instead of smartphone continuance usage. The
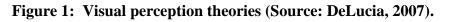
literature review for our study reveals that no studies have investigated the cognitive trusts that influence the smartphone continuance usage as it affects globally distributed teams. To fill the gap in the literature review, we developed our model based on the Visual Perception Theories as its theoretical foundation.
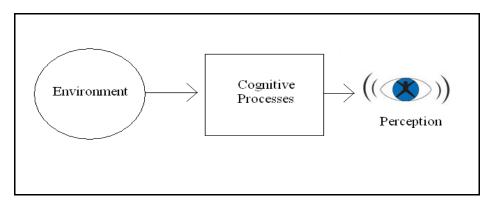
Over the past decades, mobile technology has expanded from the simplest radios and cell phones to PDAs and portable computers. In the traditional computing environment it was necessary to come to the computer to do some work on it and all computers were connected to each other, to networks and servers via wires. Mobile computing was developed in phases. Phase one called for the need to make these devises small enough so they can be easily carried. Phase two called for the need for mobile computing to replace wires with wireless communication media. Phase three was a combination of the first two, namely to use mobile devices in a wireless environment. Referred to as wireless mobile computing, the combination enables real-time connections between mobile devises and other computing environments (Efraim & Leidner, 2006). We are witnessing enormous growth and development in mobile technologies as well as applications and services. Mobile applications include Customer Relationship Management (CRM) systems (e.g., Salesforce.com, Zoho, SugarCRM), customer service (e.g., Olark, Groove, ZenDesk) and, e-mail marketing (e.g., MailChimp, Campaign Monitor). Over three-quarters of potential customers' first impressions of a company are based on web experience – 76 percent do online research before going to a local store (Chief Executive Group, 2011). At the same time our understanding of business models and value creation is not as advanced as necessary to contribute sound modeling of phenomena, deriving theoretical explanations or provide guidance for these developments. To overcome this lack of understanding this study explores new perspectives and offers insight for a better understanding of this phenomenon.

THEORETICAL BACKGROUND AND RESEARCH MODEL

Idemudia (2014) argues that the Visual Perception Theories can provide insights and understanding on factors that improve click-through rates. Data visualization is an interesting field that is becoming very popular because it is the art and science of visually representing n-dimensional data (Kumar & Benbasat, 2004). Data visualization can be used to construct and manipulate graphs to enhance comprehension (Kumar & Benbasat, 2004). The mechanism in visual perception shows "the identity of the scene.s parts and their relationship among them" (Kumar & Benbasat, 2004, p. 257). Visual perception involves the nervous system (Kumar & Benbasat, 2004). During visual perception, raw information and visual array are "converted to memory representations signifying knowledge of what the visual marks of the graphs mean through visual descriptions" (Kumar & Benbasat, 2004, p. 257). Visual perception involves the translation of information from the visual description into conceptual messages forms that are answered through visual descriptions (Kumar & Benbasat, 2004). Also, visual perception involves visual variables such as size, value, texture, color, orientation, and shape (Kumar & Benbasat, 2004). Visualization involves cognitive activities such as knowledge discovery, analytical reasoning, problem solving, sense making, learning, decision making, and planning (Sedig & Parsons, 2013). Cognitive activities involves the performance of simple visual sub-tasks such as identifying or determining the relationships of items (Sedig & Parsons, 2013). Visual attention is a cognitive process (Djamasbi et al., 2012).

Visual perception is a sequential cognitive activity (Faraday, 2000). Visual cues involve cognitive process; and visual cues reduce information overload (Bray, 1996). Visual cues improve decision making performance and information processing relating to complex tasks (McNab et al., 2011). Some examples of cognitive activities are visual perception, memory processing, attention, reasoning, and problem solving (Vessey, 1991). Visual perception involves working memory processing (Figl et al., 2013). The Visual Perception Theories is the theoretical background for our research model. The Visual Perception Theories provide insights, knowledge, and understanding of how people gain information through their senses (i.e., vision) about the environment (DeLucia, 2007; Gordon, 2004). Barry (2002) in his study argues that our eyes are the chief means of knowing the environments, world, and ourselves. Barry (2002) argues that visual perception involves cognitive and mental processes; and he defines perception as "the process by which we utilize external sensory information in combination with other internal conscious and unconscious working of the brain to make sense of the world, [and perception] is itself not even a specific system in the brain through which we can explain visual communication" (pp. 91-92). The cognitive scientist, Flanagan (1984) presents that "the process of visual perception involves several basic parts, including the sensing of information, the use of past experience, [familiarity, association, exposure], both real and genetically acquired, and the processing of information along a dual pathway" (93). Zeki (1999) argues that visual perception involves cognitive and mental processing; that he states that "All visual art is expressed through the brain and must therefore obey the laws of the brain, whether in conception, execution or appreciation, and no theory of aesthetics that is not substantially based on the activity of the brain is ever likely to be complete, let alone profound" (1). One of the founders of the Visual Perception Theories' constructive-inference approach, Von Helmholtz (2005) presents that visual perception is an inferential and associative process that involves familiarity, memory, cognitive, mental, and past experience. Von Helmholtz (2005) argues that the inferential processes are unconscious process; and thus, we are unaware that we are making inference. As illustrated in Figure 1, DeLucia (2007) argues that visual perception is a mediated process that intervenes between stimulation and the environment that involves the disambiguating of the sensory data through cognitive and mental processes.

Figure 1: Visual perception theories (Source: DeLucia, 2007).

RESEARCH MODEL

The theoretical background for our research model as illustrated in Figure 1 is the Visual Perception Theories. The Visual Perception Theories posit that perception involves past

experience, familiarity, association, cognition, memory stored schema, and mental processing (DeLucia, 2007). Hence, our research model as shown in Figure 2 focuses on environment ➔ cognition ➔continuance usage. In our research model, the environments are the perception of a smartphone (i.e. accessibility of smartphone, usefulness of smartphone's Siri feature, usefulness of smartphone's app feature, smartphone reliability, smartphone satisfaction, smartphone functionality, and emotional features for smartphone). To date, to the best of our knowledge, there are no published studies that directly apply the Visual Perception Theories to information systems adoption, acceptance, and continue use. Hence, this study attempts to integrate the Visual Perception Theories to the Smartphone continuance usage.

Figure 2:   Research Model.

SMARTPHONE CONTINUANCE USAGE

The success and long-term viability of an IS depend on its continued use rather than first time or initial use (Bhattacherjee, 2001). Currently, there are some advanced theories and models that provide insights and understanding on factors that motivate users to continue to use an IS (e.g., Bhattacherjee, 2001; Kang et al., 2009; Lin, 2011). It should be noted that in the context of information systems, continuance behavior is different from that of acceptance behavior (Bhattacherjee, 2001). There is a great and substantial difference between initial adoption and

continued use of an IS (Bhattacherjee, 2001). Post-adoption expectations are the most important determinants of satisfaction (Bhattacherjee, 2001). In the Information Systems (IS) and Information Technology (IT) disciplines, most research relating to technology acceptance and usage focused on adoption using the theoretical background such as theory of reasoned action, theory of planned behavior, technology acceptance model, task-technology fit, unified theory of acceptance and use of technology and so forth (Limayem et al. 2007). Our study extends prior studies, models, and theories by using the Visual Perception Theories to investigate the factors that influence the continuance use of smartphone in globally distributed teams. However, prior studies on adoption of a wide range of Information Systems (IS) platforms focused on existing theories that do not incorporate Visual Perceptions and thus make marginal contributions to current study. Realizing this gap in the literature, we conducted our study to investigate how visual perception provides insights to top managements and key decision makers relating the continuance use of smartphone by virtual team members in globally distributed teams. Limayem et al. (2007) defined IS continuous usage as something that "describes behavior patterns reflecting continued use of a particular IS" (p. 707). Limayem et al. (2007) defined continuance as a form of post-adoption behavior. Thus, in our study we define smartphone continuance usage as the continued use of the smartphone (Idemudia et al., 2013). Rogers (1995) argues that post-adoption generally refers to actual behaviors that follow initial acceptance and usage such as assimilation, routinization, adaptation, continuance, and infusion.

COGNITIVE TRUST IN INTEGRITY/COMPETENCE FOR A SMARTPHONE

Komiak and Benbasat (2006) argue that cognition influences a wide range of information systems platforms usage, acceptance, and adoption. Cognition dominates most current IT acceptance models; hence, future research should investigate the influence of cognitive trust on a wide range of information systems usage and acceptance (Komiak & Benbasat, 2006). Most existing theory on IT adoption are cognitive oriented (Venkatesh et al., 2003). Komiak and Benbasat, (2006) define cognitive trust as " a trustor's *rational expectations* that a trustee will have the necessary attributes to be relied upon" (p. 943). To be consistent with prior studies such as Komiak and Benbasat's (2006) model, we indicate that cognitive trust include (1) cognitive trust in integrity and (2) cognitive trust in competence. Komiak and Benbasat (2006) define cognitive trust in competence as "a customer's *rational expectation* that an RA has the capability to provide good product recommendations" (p. 944). Thus, we define cognitive trust in integrity for a smartphone as a user's rational expectation that smartphones have the capability to provide good communication and recommendations. Also, Komiak and Benbasat (2006) define cognitive trust in integrity "a customer's rational expectation that a Recommendation Agents (RA) will provide objective advice" (p. 944). Thus, we define cognitive trust in integrity for a smartphone as users' expectation that a smartphone will provide objective communications and advice relating to daily task. Lewis and Weigert (1985) present in their research works that cognitive trust is established and developed when a trustor identified good and valid reasons to trust. Komiak and Benbasat (2006) present that a high level of cognitive trust in an RA's integrity means that customers and users belief that RA will provide unbiased, truthful, honest, and objective recommendations. Also, Komiak and Benbasat (2006) present that a high level of cognitive trust in a RA's in competence means that customers and users belief that a RA has the

ability and capability to provide good product recommendations. The preceding discussion is summarized by the following hypotheses:

> **Hypothesis 1: Cognitive Trust in competence for a smartphone has a positive effect on smartphone continuance usage**

> **Hypothesis 2: Cognitive Trust in integrity for a smartphone has a positive effect on smartphone continuance usage**

FAMILIARITY WITH A SMARTPHONE

Researchers and scholars in the information systems, marketing, computer science and so forth have used the construct, familiarity to investigate a wide range of information systems adoption, usage, and acceptance; for example, Komiak and Benbasat (2006) use the construct of familiarity to investigate the effects of familiarity on the adoption, usage, and acceptance of recommendation agents (RA). Familiarity with recommendation agents "is acquired through one's prior and direct experiential exchanges with the RA" (Komiak & Benbasat, 2006, p. 946). Komiak and Benbasat (2006) present that familiarity has an indirect positive influence on the intention to adopt recommendation agents. Familiarity is "experience with the what, who, how, and when of what is happening" (Gefen et al., 2003, p. 63). By applying the proceeding discussions to the context of a smartphone continuance usage, familiarity is the understanding and appreciation of how to use most of the features and functions of a smartphone based on prior exposure and experience (Idemudia et al., 2013; 2014). Smartphone contains features, functions, and software applications (apps) that are familiar to users' memory, mental, and cognitive processes. Some of the familiar apps include, clock, calendar, alarm, videos, maps, calculator, GPS, camera, music, photos, games, weather, newsstand, e-mail, Safari, iTunes, YouTube, and so forth.

Proctor and Van Zandt (2011) present in their study that designers should use familiar features and functions to enhance products usage, adoption, and acceptance. Familiarity increases knowledge, understanding, comprehension; and thus, reduces risk (Gefen et al., 2003; Komiak & Benbasat, 2006; Luhmann, 1979). The Visual Perception Theories posit that perception involves familiarity, mental, and cognitive processes (DeLucia 2007). Therefore, we tested the following hypothesis:

> **Hypothesis 3: Familiarity with a smartphone has a positive effect on smartphone continuance age**

EXTERNAL VARIABLES (ENVIRONMENT)

The external variables in our model are the environment in Figure 1.

ACCESSIBILITY OF A SMARTPHONE

Lee et al. (2009) define Access as "the degree of accessibility, responsiveness, and availability of the e-learning systems." Hence, we define Accessibility of a smartphone in our study as the degree of accessibility, responsiveness, and availability of the communication systems among the smartphone's users to perform daily tasks and operations (Idemudia et al., 2013; 2014). Bailey and Pearson (1983) use the construct convenience of access in their study to investigate and develop a tool for measuring and analyzing computer user satisfaction. Lee et al. (2009) argue that access convenience has a positive impact/effect on perceived system quality; thus, enhancing information systems usage, acceptance, and adoption. Islam (2012) investigates the relationship between perceived system quality and access; and his conclusion is that there is a strong relationship between perceived system quality and Access. Accessibility has a positive and significant effect on intentions to continue use of environmentally munificent bypass systems (Marett et al., 2013). Accessibility has a positive and significant effect on system quality (Wixom & Todd, 2005). We summarize the preceding discussion with the following hypotheses:

> **Hypothesis 4a: Accessibility of a smartphone has a positive effect on cognitive trust in competence for a smartphone.**

> **Hypothesis 4b: Accessibility of a smartphone has a positive effect on cognitive trust in integrity for a smartphone**.

USEFULESS OF SMARTPHONE'S SIRI/APPS FEATURE

A lot of studies in the information systems, marketing, computer science, and so forth have shown that Perceived usefulness (PU) has a positive and significant effect on the behavioral intention to accept, use, and adopt a wide range of information technology platforms (Davis 1989; Davis et al., 1989; Idemudia et al.; 2013; 2014). Usefulness has a significant and positive effect on intention (Wixom & Todd, 2005; Xu et al., 2013). Davis et al. (1989) define perceived usefulness as "the prospective user's subjective probability that using a specific application system will increase his or her job performance within an organizational context" (p. 985). Vijayasarathy (2003) defines perceived usefulness in his study in the context of online shopping and ecommerce "as the extent to which a consumer believes that on-line shopping will provide access to useful information, facilitate comparison shopping, and enable quicker shopping" (p. 750). Hence, we define usefulness of a smartphone's Siri and Apps Feature as the degree to which a user believes that using a smartphone's apps and siri features would enhance his or her daily tasks and job productivity relating to communication. Perceived usefulness has a positive and significant impact on the continuing use of IT (Ortiz de Guinea & Markus, 2009). Perceived usefulness is the most powerful beliefs that consistently and significantly influence the temporal stages of the continued use of IT (Bhattacherje, 2001; Ortiz de Guinea & Markus, 2009). Perceived usefulness (PU) influences users' IS continuance intention (intention) (Islam 2012). Some of the most important features ranked by phone users relating to communication, arranging meetings, and killing time while waiting are playing games, camera, calculator, music playing, and videos (Baron, 2008). Idemudia et al. (2013) argue that usefulness of smartphone apps features incentivizes the intention of continuance usage through emotional trust. Therefore, we tested the following hypotheses:

Hypothesis 5a: Usefulness of smartphone Siri's feature has a positive effect on cognitive trust in competence for a smartphone.

Hypothesis 5b: Usefulness of smartphone Siri's feature has a positive effect on cognitive trust in integrity for a smartphone.

Hypothesis 6a: Usefulness of a smartphone apps feature has a positive effect on cognitive trust in competence for a smartphone.

Hypothesis 6b: Usefulness of a smartphone apps feature has a positive effect on cognitive trust in integrity for a smartphone.

SMARTPHONE RELIABILITY

Many studies in the Information Systems have used reliability to measure and operationalize perceived systems quality (Bailey & Pearson, 1983; Islam, 2012; Lee et al., 2009; Seddon, 1997). Islam (2012) argues that reliability is a salient trait that positively and significantly influence the continued usage of an e-learning technology. In the context of variables and measurement items, reliability is generally refer to as the degree to which measurements of variables and indicators are consistent and error free (Peterson, 1994; Rosenthal & Rosnow, 2008). Reliability is "the correlation between the variable as measured and another equivalent measure of the same variable" (Cohen & Cohen, 1983, p. 68). Reliability refers to the dependability of information systems operations (Islam, 2012; Wixom and Todd, 2005). Hence, in our study, we define smartphone reliability as the dependability of smartphones during communication operations. Reliability is among the top three most important factors that positively and significantly influence perceived system quality features in the e-learning context (Islam, 2012). Bailey and Pearson (1983) argue that reliability is the perception that trustees will honor their words and will keep/honor commitments. Butler (1991) presents that trust is perceived in both people and technology to enhance productivity, effectiveness, and efficiency. Reliability has a positive and significant effect on system quality (Wixom & Todd 2005; Xu et al. 2013). Therefore our seventh hypotheses are started as follows:

Hypothesis 7a: Smartphone reliability has a positive effect on cognitive trust in competence for a smartphone.

Hypothesis 7b: Smartphone reliability has a positive effect on cognitive trust in integrity for a smartphone.

SMARTPHONE EMOTIONAL TRUST

Komiak and Benbasat (2006) argue that emotional trust has a positive and significant influence in the adoption of recommendation agents. Emotional trust is feeling (Komiak & Benbasat

(2006). Komiak and Benbasat (2006) define emotional trust as the "extent [/degree] to which one feels secure and comfortable about relying on the trustee" (p. 943). Emotional trust includes the evaluation of emotional reactions to the trustee; and the emotional trust can be rational or irrational (Komiak & Benbasat 2006). Emotion in emotional trust "refers to the trustor's feeling toward the behavior of relying on the trustee" (p. 944). In the context of recommendation agent, Komiak and Benbasat (2006) define emotional trust as "a customer's *feelings* of security and comfort about relying on an RA for the decision on what to buy" (p. 944). Hence, we define smartphone emotional trust as a user's feeling of security and comfort about relying on smartphones for daily communications to perform tasks and operations.

Hypothesis 8a: Smartphone emotional trust has a positive effect on cognitive trust in competence for a smartphone.

Hypothesis 8b: Smartphone emotional trust has a positive effect on cognitive trust in integrity for a smartphone.

SMARTPHONE SATISFACTION

Oliver (1980) argues that there is a positive relationship between customer satisfaction and repeat sales. Customer satisfaction increases profitability for retail businesses (e.g., Ayanso et al., 2011; Kumar & Shah, 2004; Srinivasan et al., 2002). Satisfaction has a positive influence on system usage (Kobler et al., 2011). Satisfaction has a positive influence on repurchase intention and system usage (Kobler et al., 2011). In the information systems discipline, a lot of researchers have used the expectancy-confirmation paradigm to show the positive impact of consumers' satisfaction on repurchase decisions and IS continuance usage (Bhattacherjee, 2001; Churchill & Surprenant, 1982; Oliver, 1980). Islam (2012) argues that customers' level of satisfaction with a product and service has a positive and significant effect on repurchase intention and IS continuance intention. One of the main determinants of e-learning continuance intention is satisfaction (Liao et al., 2009; Sorebo et al., 2009). Satisfaction affects continuance intention (Chiu et al., 2005; Larsen et al., 2009; Lee, 2010; Hung et al., 2011; Liao et al., 2007, 2009; Limayem & Cheung, 2008; Roca et al., 2006). Information and systems satisfaction has a positive and significant effect on usefulness of a system (Wixom & Todd, 2005; Xu et al., 2013). We summarize the preceding discussion with the following hypotheses:

Hypothesis 9a: Smartphone satisfaction has a positive effect on cognitive trust in competence for a smartphone.

Hypothesis 9b: Smartphone satisfaction has a positive effect on cognitive trust in integrity for a smartphone.

SMARTPHONE FUNCTIONALITY

Computer feature such as functionality can be used to explain cognitive state and intention to use (Lyytinen, 2010). Functionality is one of the factors that can be used to evaluate design artifacts (Peffers et al., 2006). System functionality affects the use of distance education (Pituch & Lee 2006). Featherman et al. (2011) argue that functionality increases e-service's perceived benefits. IT functionality are tools and features that are designed to help with a business process (Rai et

al., 2012). Increase in functionality has a positive influence on more use (Howison & Crowston, 2014). Zarmpou et al. (2012) develop the construct known as functionality by borrowing the following concepts from the literature review: transaction speed, connection to the network speed, interface comprehensibility, and infrastructure availability. Thus, we define smartphone functionality as the degree of transaction speed, connection to the network speed, interface comprehensibility, and infrastructure availability that users experience when using a smartphone in their daily communications and activities. Functionality has been operationalized by researchers and scholars in many different ways in the IS literature. For example, Kim and Garrison (2008) apply the technology acceptance model to the mobile wireless technology, and they used the word Perceived Ubiquity to refer to functionality. Also, Kim and Garrison (2008) used the construction Perceived Reachability to refer to functionality; and assuming that the technology has the capability of connecting users all over the world. Kim and Garrison (2008) findings indicate that both perceived ubiquity and perceived reachability have a positive effect on behavioral intention. Technicality has a positive influence on both individual's perceived value of service and adoption intention (Kim et al., 2007; DeLone & McLean 1992). Technicality includes the following concepts: connectivity, efficiency, and response time (Kim et al., 2007; DeLone & McLean, 1992). Response time have a positive effect of consumer acceptance of mobile payments (Chen, 2008). Therefore, we tested the following hypothesis:

Hypothesis 10a: Smartphone functionality has a positive effect on cognitive trust in competence for a smartphone.

Hypothesis 10b: Smartphone functionality has a positive effect on cognitive trust in integrity for a smartphone.

RESEARCH METHODOLOGY

The data for our study was collected from 251 students enrolled in a public university located in the United States of America. A paper-and-pencil survey was used to collect data from active users of smartphones. The participants' characteristics in our study are shown in Table 1. To enhance external validity, we ensure in our study that participants are familiar with the smartphone and they use a smartphone in their daily communication activities. Idemudia et al. (2013, 2014) argue that some of the main reasons why researchers should recruit college students relating to smartphone usage, acceptance, and continue use are: (1) college students use the smartphones in their daily communication activities to perform different tasks (i.e., homework, twitter, email, chat, YouTube, online games, Skype, Facebook, LinkedIn, camera, videos and so forth); (2) college students are addicted and hooked to the smartphone, thus in the near future, college students will be using smartphones in all their daily and work activities; (3) college student experience with smartphones reduces the variance compared to the general population; (4) currently, smartphone manufacturers are targeting college students because they are the upcoming and future market segment; finally, (5) most companies and firms are selling smartphones at a very low price; hence, encouraging college students to use smartphones in their daily communication to perform daily tasks, activities, and operations.

Table 1: Participants' Characteristics.

Have you shopped for smartphone	Yes = 223	No = 28
Have you ever used smartphone (Yes, No)	Yes = 243	No = 8
Have you ever used smartphone in your daily communication such as testing, camera, music, etc. (Yes, No)	Yes = 223	No = 18
On average, how many hours do you spend per week using the smartphone?	Mean = 30.87	
Over the past 12 months, approximately how many times have you shopped for smartphone	Mean = 1.2	
Over the past 12 months, approximately how much is your smartphone bills?	None = 42 $1 to $100 = 93 $101 to $500 = 77 More than $500 = 39	
Age	Mean = 21	
Gender	Female = 107 (42.8%)	Male = 143 (57.2%)
Graduate or Undergraduate	Undergraduate = 251 (100%)	

Note: The sample size is 251

DATA COLLECTION PROCEDURE

A paper-and-pencil survey was used to collect data from active users of smartphones. The time spent by most participants for our study to complete the questionnaire was between 20 and 30 minutes. The procedure for administering the questionnaires was as follows:

(1) The questionnaire with background questions, and consent form was given to each student to complete and sign.
(2) Printed instructions were read aloud to all participants in the computer lab by the instructors that completing the questionnaire and signing the consent form is optional.
(3) Participants for the research in the computer lab were asked by the instructors to read the survey questions very carefully and to answer all questions to the best of their ability and knowledge.
(4) Participants read the information sheet relating to their perceptions of smartphones and were asked to complete the questionnaires. Also, participants completed the background questionnaires and sign a consent form.
(5) The instructors ensured that the questionnaire was completed only once by each participant in this study and that all participants for this study answered all the questions.

OPERATIONALIZATION OF CONSTRUCTS AND MEASUREMENT SCALES

For this study, to be consistent with most studies in the information systems discipline, we used pre-validated measurement items and instruments from prior studies, rewording the content of prior studies' questionnaires to match the constructs, as appropriate. Smartphone continuance usage, smartphone satisfaction, and accessibility of smartphone were each measured using seven point Likert scaled items that were developed and validated by (Islam, 2012). Familiarity of smartphones, smartphone emotional trust, and cognitive trust in integrity/competence for smartphones was adapted from Komiak and Benbasat (2006). Smartphone functionality was measured using the Zarmpou et al. (2012) seven-item Likert scale. Smartphone reliability was measured using the Wixom and Todd (2005) seven-item Likert scale. Usefulness of a smartphone's apps and siri features was adapted using seven point Likert scaled items that were developed and validated by Davis (1989), Davis et al. (1989), and Venkatesh et al. (2003). The constructs and measurement items are shown in Table 2 below:

Table 2: Constructs and Measures.

Construct	Measure
CU: Continuance Usage	(CI1) I will keep on using smartphone in the future.
	(CI2) I intend to continue using smartphone rather than discontinue its use.
	(CI3) My intentions are to continue using smartphone than use any alternative means.
	(CI4) Using a smartphone is worthwhile.
CT: Cognitive Trust in Integrity	(CT1) The smartphone is unbiased.
	(CT2) The smartphone is honest.
CTC: Cognitive Trust in Competence	(CTC1) The smartphone is a real expert in assessing my daily need and want.
	(CTC2) The smartphone has a good knowledge about my daily needs and wants.
F: Familiarity	(FAA1) I am familiar with how to operate smartphone

AC: Accessibility	(A1) Smartphone quickly loads all the text and graphics.
	(A2) Smartphone provides good access.
U: Usefulness of Smartphone's Siri Features	(U1) Using the Siri feature in smartphone is benefit to me.
	(U2) The advantage of the Siri feature in smartphone outweigh the disadvantages
	(U3) Overall, using the Siri feature in smartphone is advantageous.
	(U4) I think using Siri feature in smartphone would increase my effectiveness.
	(U5) I think using Siri feature in smartphone would increase my productivity.
	(U6) I think using Siri feature smartphone would increase my efficiency.
R: Smartphone Reliability	(R1) Smartphone is stable.
	(R2) Smartphone operate reliably.
UA: Usefulness of Smartphone's Apps Features	(UA1) Using the Apps feature in smartphone is benefit to me.
	(UA2) I think using Apps feature in smartphone would increase my effectiveness.
	(UA3) I think using Apps feature in smartphone would increase my productivity.
E: Smartphone Emotional Trust	(E1) I feel secure about relying on smartphone for my decision to communicate.
	(E2) I feel comfortable about relying on my smartphone for my decision to communicate.
	(E3) I feel content about relying on my smartphone for my decision to communicate.
S: Satisfaction	(S1) My overall experience of using smartphone is very satisfied.
	(S2) My overall experience of using smartphone is very pleased.
	(S3) My overall experience of using smartphone is absolutely delighted.
FU: Functionality	(F1) I think the connection speed is high enough for me to use it.
	(F2) I think the transaction speed is high enough for me to use it.
	(F3) I think the interface is comprehensive enough for me to use it.

DATA ANALYSIS

In our study, to assess construct validity (i.e. convergent validity, discriminant validity, etc.), model fit, and to test the hypotheses we implemented the two-step approach recommended by Anderson and Garbing (1988). We prefer and favor this two-step data analysis approach because it is a more complete and robust test for measuring construct validity, model fit, and hypotheses testing compared to the one-step approach (Anderson & Garbing, 1988).

SCALE VALIDATION AND MEASUREMENT MODEL

In our study, we performed construct validity by performing convergent validity and discriminant validity (Barclay et al., 1995; Hu et al., 2004). We used three conditions to assess convergent validity as reported in Tables 3 and 4 (Barclay et al., 1995; Hu et al., 2004). The

three conditions are: (1) the measurement loadings for each measurement items for a construct are significant and exceed 0.70; (2) each construct's composite reliability exceeds 0.80; and (3) each construct average variance extracted estimate (AVE) exceeds 0.50. Hence, our study met all conditions for convergent validity that are recommended by (Barclay et al., 1995; Fornell & Larcker, 1981; Hu et al.,2004).

Table 3: Constructs, Indicators, Reliability, Error Variance, & Variance Extracted.

Construct and Indicators	Loading	Indicator Reliability	Error Variance	Reliability	Variance Extracted Estimate (AVE)
Smartphone continuance usage (FA1)				0.9630 [c]	0.8672
CI1	0.9721	0.9450	0.0550	0.9450	
CI2	0.9643	0.9300	0.0700	0.9300	
CI3	0.9379	0.8800	0.1200	0.8800	
CI4	0.8452	0.7140	0.2860	0.7140	
Cognitive trust in competence for a smartphone (FA2)				0.9439 [c]	0.8939
CTC1	0.9684	0.9378	0.0620	0.9378	
CTC2	0.9219	0.8499	0.1500	0.8499	
Cognitive trust in integrity for a smartphone (FA3)				0.8770 [c]	0.7809
CT1	0.8865	0.7859	0.2140	0.7859	
CT2	0.8809	0.7760	0.2240	0.776	
Accessibility of smartphone (FA4)				0.9184 [c]	0.8491
A1	0.9034	0.8161	0.1844	0.8161	
A2	0.9392	0.8821	0.1180	0.8821	
Usefulness of smartphone Siri's Feature (FA5)				0.9765 [c]	0.9326
U1	0.9486	0.8998	0.1000	0.8998	
U2	0.9810	0.9624	0.0380	0.9624	
U3	0.9672	0.9355	0.0650	0.9355	
Reliability of smartphone (FA6)				0.9490 [c]	0.9030
R1	0.9316	0.8679	0.1320	0.8679	
R2	0.9686	0.9382	0.0620	0.9382	
Usefulness of Smartphone's Apps (FA7)				0.9078 [c]	0.8312
UA1	0.9149	0.8370	0.1630	0.8370	
UA2	0.9085	0.8254	0.1750	0.8254	

Emotional trust for a smartphone (FA8)				0.9671 [c]	0.9073
E1	0.9557	0.9134	0.0870	0.9134	
E2	0.9468	0.8964	0.1040	0.8964	
E3	0.9550	0.9120	0.0880	0.9120	
Smartphone satisfaction (FA9)				0.9649 [c]	0.9017
S1	0.9603	0.9222	0.0780	0.9222	
S2	0.9845	0.9692	0.0310	0.9692	
S3	0.9021	0.8138	0.1860	0.8138	
Smartphone functionality (FA10)				0.9574 [c]	0.8825
F1	0.9674	0.9359	0.0640	0.9359	
F2	0.9688	0.9386	0.0610	0.9386	
F3	0.8793	0.7732	0.2270	0.7732	

Note: [c] Denote composite reliability. All loading in Table 3 are significant at p<0.0001.

Table 4: Construct Reliability and AVE.

Construct	Composite Reliability	AVE
Smartphone Continuance Usage	0.9630	0.8672
Cognitive Trust in competence for a smartphone	0.9439	0.8938
Cognitive Trust in Integrity for a Smartphone	0.8770	0.7809
Accessibility of a Smartphone	0.9184	0.8491
Usefulness of Smartphone Siri's Feature	0.9765	0.9325
Reliability for a Smartphone	0.9490	0.9030
Usefulness of Smartphone's Apps	0.9078	0.8312
Emotional Trust for a Smartphone	0.9671	0.9072
Smartphone Satisfaction	0.9649	0.9017
Smartphone Functionality	0.9574	0.8825

The criterion we used to assess discriminant validity is the recommendation from Fornell and Larcker (1981) that states the square root of AVE for each construct should surpass the correlation of that construct and any other constructs. From Table 5, the highest correlation between a particular construct and any other construct is 0.8229; and this value is lower compared to the lowest square root of average variance extracted estimate (AVE) of all the constructs, which is 0.9117.

Table 5: AVE and Correlations among Latent Constructs.

	CU	CC	CT	F	AC	US	R	UA	E	S	FU
CU	**0.9312**	0.6319	0.6237	0.2567	0.6299	0.2826	0.6088	0.6601	0.6899	0.8216	0.5785
CC		**0.9454**	0.6312	0.1849	0.6363	0.3681	0.5841	0.6795	0.6278	0.6510	0.5081
CT			**0.8837**	0.2064	0.5829	0.3514	0.4736	0.5284	0.5946	0.5974	0.4851
F				1	0.1726	0.1574	0.1948	0.1862	0.1939	0.3060	0.1875
AC					**0.9215**	0.2704	0.8216	0.6551	0.7031	0.7459	0.7523
US						**0. 9657**	0.2792	0.3397	0.2980	0.3316	0.2312
R							**0.9503**	0.6663	0.7417	0.7434	0.6871
UA								**0.9117**	0.7239	0.7268	0.5986
E									**0.9525**	0.8229	0.7273
S										**0.9496**	0.7785
FU											**0.9394**

Note: The diagonal values represent the square root of the average variance extracted (AVE) of the specific construct. Construct legend: CU: Smartphone Continuance Usage; CC: Cognitive Trust in Competence for a Smartphone; CT: Cognitive Trust in Integrity for a Smartphone; F: Familiarity with a Smartphone; AC: Accessibility of a Smartphone; US: Usefulness of a Smartphone Siri's Feature; R: Smartphone Reliability; UA: Usefulness of Smartphone Apps' Feature; E: Smartphone Emotion; S: Smartphone Satisfaction; FU: Smartphone Functionality.

HYPOTHESES TESTING AND STRUCTURAL MODEL

In our study for the hypotheses testing, we used CFA analysis to examine the R-square score of each endogenous variable, significant, and the explanatory power of each path in the model (Figure 3). For data analysis in our study, we used structural equation modeling (SEM) because it can be used to analyze all paths in a model as one analysis (Chin, 1998). Table 6 shows model-fit measures that we used to assess the structural equation modeling's overall goodness of fit for our model based on commonly accepted levels recommended by prior research (Chau & Hu, 2001). Table 6 supports that our SEM demonstrates a good fit of the data.
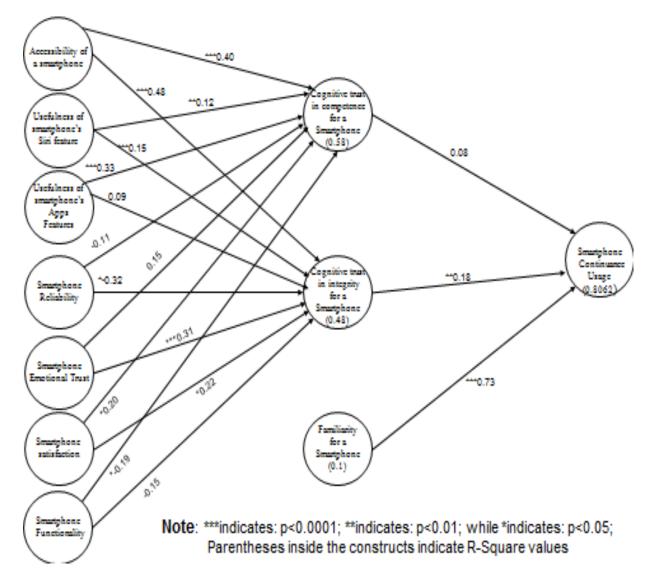
Figure 3:   SEM Analysis with Path Coefficient and R-square.

Table 6:   SEMs Overall Goodness of Fit.

Goodness of Fit	SEMs value	Recommended values
Chi-square / degree of freedom	2.3	≤3.00
Non-Normed Fit Index (NNFI)	0.9471	≥0.90
Normed Fit Index (NFI)	0.9334	≥0.90
Comparative Fit Index (CFI)	0.9598	≥0.90
Root Mean Square of Approximation (RMSEA)	0.0761	≤0.10

DISCUSSION OF KEY FINDINGS

To date, there are no published studies that have applied the Visual Perception Theories to explain the cognitive factors, antecedents, and familiarity that influence smartphone continuance usage. Understanding such factors is extremely helpful because most companies, organizations, and municipalities are encouraging employees to use smartphones for self-advancement, job promotion, job security, performance, effectiveness, productivity, and service quality. Thus, we develop our research model. Our model helps to explain cognitive factors and antecedents that influence the continuance usage of smartphone. SEM analysis, as shown in Figure 3, indicates that familiarity with a smartphone and cognitive trust in integrity for a smartphone explains approximately 80 percent of smartphone continuance usage. Accessibility of smartphone, usefulness of smartphone's Siri features, usefulness of smartphone app's features, smartphone satisfaction, and smartphone functionality explain 58 percent of cognitive trust in competence for a smartphone. Accessibility of smartphone, usefulness of smartphone's Siri features, smartphone reliability, smartphone emotional trust, and smartphone satisfaction explain 48 percent of cognitive trust in integrity for a smartphone. Thus, our study strongly indicates that there are other important factors influencing smartphone continuance usage. Knowing these factors is helpful to organizations and companies that are encouraging Bring Your Own Device (BYOD) to the work environment to improve employees' satisfaction, effectiveness, efficiency, and productivity.

Cognitive trust in integrity for a smartphone (H2) and familiarity with a smartphone (H3) have a positive and significant effect on smartphone continuance usage. These findings strongly support the Visual Perception Theories that visual perception involves familiarity, cognitive, and mental processes. Accessibility of smartphone (H4a & H4b) has a positive and significant effect on both cognitive trust in competent and cognitive trust in integrity for a smart phone. Usefulness of a smartphone Siri's feature (H5a & H5b) has a positive and significant effect on both cognitive trust in competent and cognitive trust in integrity for a smart phone. Usefulness of a smartphone app's feature (H6a) only has a positive and significant effect on cognitive trust in competence for a smartphone. Smartphone reliability (H7b) only has a negative and significant effect on cognitive trust in integrity for a smartphone. Smartphone emotional trust (H8b) only has a positive and significant effect on cognitive trust in integrity for a smartphone. Smartphone functionality (H10b) has a negative and significant effect on cognitive trust in competent for a smart phone. The hypotheses (i.e. H2, H3, H4a, H4b, H5a, H5b, H6a, and H8b) suggest that using smartphones in our daily activities involve familiarity, cognition, and mental process.

IMPLICATIONS FOR THEORY AND PRACTICE

The contributions of this study to the existing body of knowledge are significant. It investigates the influence of cognitive trust, antecedents, and familiarity on smartphone continuance usage and fills a gap in the literature, by developing and applying the theoretical model based on the Visual Perception Theories. The limitations of this study are it is based on a sample collected from one regional area in the USA in lieu of a broader global sample from multiple countries in various continents to see if there are cultural differences that impact the findings in globally distributed teams. The implications for theory and practice are important and interesting. Distributed teams face many challenges of time, location, infrastructure, language, customs, socialization and politics. This is further compounded in globally distributed teams by

cultural issues. Can organizations realistically manage the convergence of technologies such that it does not disrupt their current information technology/systems or business models for globally distributed teams? How can these new technologies be assimilated into existing business/IT processes and culture to allow organizations to be transformed by the benefits of smartphones in globally distributed teams? For example, Kronos before this the hospitals had 6 people dedicated only to this task. Price comparison apps let users see the prices of a product just by taking a picture of it. The immersive and use-oriented nature of mobile applications makes them an intriguing option for advertising opportunities. For example, when 20th Century Fox partnered with the popular game Angry Birds, they got their movie *Rio* not just mentioned, but experienced by millions of gamers (Chief Executive Group, 2011). From a practitioner perspective, it is important for future research to explore how added-value-added mobile applications can enhance loyalty and an organization's relationship with customers; and how mobile technologies can improve an organization's customer relationships, employee engagement, operational efficiency, sales and marketing effectiveness and other key business functions.

Future studies can explore how the enterprise architecture discipline needs to change to address the opportunities provided by BYOD (that includes smartphones) policies, what cultural roadblocks exist, and how they can be overcome in globally distributed teams. Researchers can develop new research models or adapt existing ones based on underlying theories of group dynamics, coordination, communications and decision-making in distributed environments, to create competitive advantage and/or sustained competitive advantage. What operational changes should an organization make accommodations for and what are the opportunities and/or pitfalls?

CONCLUSION

This study has contributed to the existing body of knowledge by investigating the influence of cognitive trust, antecedents, and familiarity on smartphone continuance usage. It filled a gap in the literature, by developing and applying the theoretical model based on the Visual Perception Theories. Our findings support the Visual Perception Theories and suggest that both familiarity with a smartphone and cognitive trust in integrity for a smartphone have a positive and significant effect on smartphone continuance usage. In addition, our study provides insights and understanding on antecedents that indirectly influence smartphone continuance usage through cognitive trust.

The inferences that might be drawn from it are that companies should design smartphones with features and pricing plans that support the tenets of the Visual Perception Theories and allows these companies to stay competitive, differentiate themselves and provide a great customer experience. Companies like Foursquare and Gowalla give businesses the opportunity to market to individuals based on their physical location. By using smartphone GPS and location-awareness technology, opted-in individuals are given discounts, promotions, or other benefits for being at your place of business. to reach consumers on their mobile devices, InMobi and AdMob run campaigns on mobile ad networks (Chief Executive Group, 2011). The focus should be on giving organizations and individuals the ability to be more collaborative, connective and operate in real-time in globally distributed teams. The real-world implications of this study are that we are living through a historic shift that makes technology more important -- in fact, indispensable -- to building close customer ties. The central message that can be applied to theory and practice

today is that the organizational leaders can seize the moment by ruthlessly focusing their organization's strategy and goals on the customer who buys their product/service/s.

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