2012

Continuance of mHealth services at the bottom of the pyramid: the roles of service quality and trust

Shahriar Akter
University of Wollongong, sakter@uow.edu.au

Pradeep Ray
University Of New South Wales, p.ray@unsw.edu.au

John D'Ambra
University Of New South Wales

Publication Details

Akter, S., Ray, P. & D'Ambra, J. (2012). Continuance of mHealth services at the bottom of the pyramid: the roles of service quality and trust. Electronic Markets, 23 (1), 29-47.

Continuance of mHealth services at the bottom of the pyramid: the roles of service quality and trust

Abstract
Continued usage of information systems (or, IS continuance) has proven to be a critical success parameter for ICT implementation at the top of the global economic pyramid. However, there are few studies which have explored continued IS usage at the bottom of the economic pyramid (BOP) though it represents the majority of the world's population. To fill this knowledge gap, this study develops an mHealth continuance model at the BOP framing the impact of two post adoption expectation beliefs (i.e., perceived service quality and perceived trust). This study extends ECM (expectation confirmation model) perspective synthesizing the extant literature on continued IS usage, service quality and consumer trust. The proposed model was empirically tested within the context of mHealth (mobile health) services at the BOP, applying PLS (partial least squares) under a cross sectional study. The findings confirm that both perceived service quality and perceived trust have significant explanatory power under an integrated ECM providing superior prediction of continuance intentions. The study concludes by discussing conceptual contributions, practical implications, limitations and future research directions.

Keywords
services, trust, quality, bottom, service, pyramid, roles, continuance, mhealth

Disciplines
Business | Social and Behavioral Sciences

Publication Details
Akter, S., Ray, P. & D'Ambra, J. (2012). Continuance of mHealth services at the bottom of the pyramid: the roles of service quality and trust. Electronic Markets, 23 (1), 29-47.

Continuance of mHealth services at the Bottom of the Pyramid: the Roles of Service Quality and Trust

Shahriar Akter*
School of Management & Marketing
University of Wollongong
Tel: +61 2 42213377, Fax: +61 2 96624061
NSW-2522, Australia
Email: skater@uow.edu.au
*corresponding author

Pradeep Ray
Australian School of Business
University of New South Wales
Tel: +61 2 93855890, Fax: + 61 2 96624061
NSW-2052, Sydney, Australia
Email: p.ray@unsw.edu.au

John D'Ambra
Australian School of Business
University of New South Wales
Tel: +61 2 93855890, Fax: + 61 2 96624061
NSW-2052, Sydney, Australia
Email: j.dambra@unsw.edu.au

Abstract

Continued usage of information systems (or, IS continuance) has proven to be a critical success parameter for ICT implementation at the top of the global economic pyramid. However, there are few studies which have explored continued IS usage at the bottom of the economic pyramid (BOP) though it represents the majority of the world's population. To fill this knowledge gap, this study develops an mHealth continuance model the BOP by exploring the impact of two post adoption expectation beliefs (perceived service quality and perceived trust). This study extends ECM (expectation confirmation model) perspective by synthesizing the extant literature on continued IS usage, service quality and consumer trust. The model was empirically tested within the context of mHealth (mobile health) services at the BOP setting, applying PLS (partial least squares) under a cross sectional study. Our findings confirm that both perceived service quality and perceived trust have good explanatory power under an integrated ECM providing a better prediction of continuance intentions. The study concludes by discussing conceptual contributions, practical implications, limitations and future research directions.

Introduction

While initial acceptance of IT (Information Technology) services draws enough attention toward realizing IS (Information Systems) success, long-term sustainability of an IS depends on its continued use rather than first-time use (Bhattachergee 2001b). At the individual level, IS continuance has proven to be instrumental for the success of IT (Information Technology) ventures at the high income electronic markets of the developed world, such as, internet service providers (ISPs), online banks, online retailers, online brokerages, online travel agencies etc. (Bhattachergee 2001). Similarly, individual IS continuance is crucial for the survival of ICT (Information and Communication Technology) platforms at the low income electronic markets of developing countries. Basically, these low income markets are known as BOP markets, which represent more than 4 billion consumers around the world who live on less than $ 2 per day (Prahalad 2004). Over the past several years, the concept of designing economically viable ICT platforms to serve this majority of the world's population has gained an increased attention (Prahalad and Hart 2002; Prahalad & Hammond 2002; Prahalad 2004; London et al. 2009). A good number of authors across a variety of disciplines are addressing this topic (Rangan et al. 2007; Rosa and Viswanathan, 2007; Kandachar and Halme 2008; Viswanathan et al. 2008; London 2009). However, there are few studies in IS which have designed models to serve this majority world (Walsham et al. 2007). Thus, focusing on the BOP markets of the developing countries, this study aims to develop an IS continuance model for mHealth services.

mHealth, a new paradigm of an emerging information technology (IT) artifact, is transforming healthcare delivery at the BOP by making it more affordable, available and accessible (Mechael 2009, Ivatury et. al 2009, UN foundation & Vodafone foundation 2009). This study defines mHealth as a personalized and interactive platform whose main goal is to provide ubiquitous and universal access to medical advice and information to any customers over mobile device. Though mHealth is transforming healthcare in low income markets; however, there are growing concerns about the 'continuance' of such services at the BOP. Specifically, how to promote continued mHealth service usage or, alternately how to prevent discontinuance is a critical issue for mHealth service providers at the BOP (Parthasarathy & Bhattacherjee, 1998). Here, *usage behavior* or *continuance* refers to the behavioral patterns reflecting continued use of mHelath services (Limayem et al. 2007), which is also known as *post-implementation* (Saga and Zmud 1994) or *post-adoption* (Jasperson et al. 2005). In order to explore 'continuance' of mHealth services, this study adopts ECM (Expectation-Confirmation Model) proposed

by Bhattacherjee (2001b) which focuses on a user's psychological motivations that emerge after initial adoption of IS. This theory has proven to be successful across different digital service contexts because of its solid theoretical foundation (Bhattacherjee, 2001a; Liao et al., 2007; Lin 2005; Limayem et al., 2007; Kang et al 2009). It assumes that *'continuance'* depends on three variables: *satisfaction*, *confirmation* of expectation and *perceived usefulness* as post adoption expectation belief. In addition, we argue that two additional post adoption expectation beliefs, that is, *perceived service quality* and *perceived trust* play an instrumental role in promoting continuance of mHealth services at the BOP market. The growing recognition of the importance of these constructs has been driven by the fact that high service quality and strong consumer trust result in positive behavioral intentions, greater market share and profitability (Dagger et al. 2007; Rust and Zahorik 1993; Zeithaml 2000; Gefen & Straub 2004; Flavian 2006; Singh and Sirdeshmukh 2000; Gwinner et al. 1998; Chiou & Droge 2006).

We define 'service quality' in mobile health services (mHealth) as the user's judgment about the overall excellence or superiority of the mHealth service platform (Zeithaml 1987) and 'consumer trust' as confirmation of a set of trusting beliefs that lead to behavioral intentions to continue using mHealth services (Deutsch 1956; Gefen & Straub 2004). In B2C mHealth services of developing countries, expanding access or lowering costs is not enough if one's confidence in the quality of health care services is low (Andaleeb 2001). Perceptions of poor quality of care may dissuade patients from using the available services because health concerns are among the most salient of human concerns (Kaplan & Litwka 2008; Dagger et al. 2006, 2007). Also, if the system cannot be trusted to guarantee a threshold level of quality, it will remain underutilized, be bypassed, or used as a measure of last resort (Dagger et al. 2007; Andaleeb 2001). Overall, the importance of quality perceptions and consumer trust has been implied in numerous health studies because of their strong effects on user satisfaction and continuance intentions (Kaplan & Litwka 2008; Ahuwalia & Varshney 2009; Varshney 2005, Norris et al. 2007; Mechael 2009;UN foundation & Vodafone foundation 2009). Despite the profound impact of perceived quality and perceived trust on the intention to continue using mHealth services, there is a paucity of research which have developed metrics to analyze this relationship. A review of the literature reveals that it has been under-researched and still most of the literature remains largely fragmented and anecdotal in this context (Chatterjee et al. 2009). Thus, the main objective of this study is to investigate the impact of service quality and consumer trust on continued mHealth services usage behaviour at the BOP market under ECM framework.

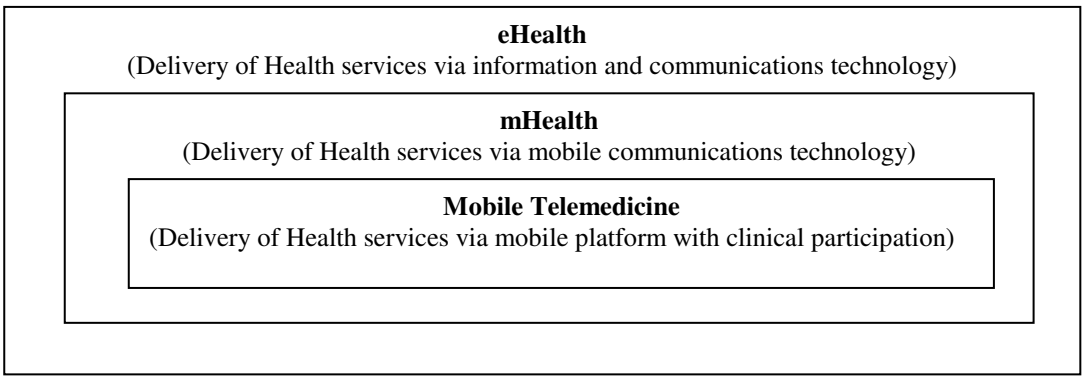
The organization of this paper is as follows: Next section focuses on the literature review & the theoretical background for our study. Then, we conceptualize the research model and propose our hypotheses. The subsequent section describes our research methodology and empirical findings. Finally, we discuss the implications of our research in terms of theoretical and practical contributions, and provide the concluding remarks.

Literature Review

mHealth

Electronic health (eHealth) is defined the embryonic convergence of wide-reaching technologies like the Internet, computer telephony/interactive voice response, wireless communications, and direct access to healthcare providers, care management, education, and wellness (DeLuca & Enmark 2000). It is also defined as the use of information and communications technologies (ICTs) to provide and support health care wherever the participants are located (Brommey 2003).On the other hand, mHealth is defined as a subset of eHealth which uses mobile devices to deliver health services to the customers (Mechael 2009). mHealth typically refers to the use of portable devices with the capability to create, store, retrieve, and transmit data in real time between end users for the purpose of improving patient safety and quality of care (UN foundation & Vodafone foundation 2008) . It is also defined as the application of mobile telecommunication and multimedia technologies in mobile and wireless health care delivery systems.

Figure 1: An interrelationship among eHealth, mHealth and mobile telemedicine



In broad, mHealth involves using wireless technologies to transmit and enable various data contents and services which are easily accessible by health workers through mobile devices such as mobile phones, smart phones, PDAs, laptops and Tablet PCs (UN foundation & Vodafone foundation 2009). However, this definition has targeted only health workers as the sole users of mobile health services, but there are some popular mHealth

services around the world in which users include both patients and health workers, such as, mobile telemedicine services India (HMRI), Mexico (MedicallHome), Pakistan (Teledoctor) & Bangladesh (Healthline) (Ivatury et al. 2009). This study is based on such mobile telemedicine services, which can be defined as a personalized and interactive health service whose main goal is to provide ubiquitous and universal access to medical advice and information to any users at any time over mobile phone.

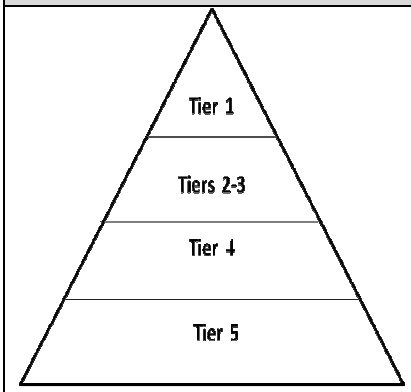
Though the extant literature has predominantly defined mHelath as a subset of eHealth, some scholars have identified mHealth as a separate development. They suggest that mobile platform is the newest mass media based on some unique attributes (e.g., ubiquity, instant connectivity, convenience, personalization and timeliness) which can be leveraged to empower patients and healthcare service delivery. Some also refer it as a pervasive healthcare paradigm to provide right time health services to anyone by removing locational, time and other restraints while increasing both the coverage and quality of healthcare (Varshney 2005).Overall, the development of this ubiquitous healthcare platform is largely considered as a paradigm shift to improve healthcare around the world. It is widely believed that mHealth alone has all the potentials to automate and speed up the healthcare delivery processes, reduce costs, facilitate service delivery, relate more closely to their patients and offer them more convenience and appeal to this new service.

mHealth Services at the BOP

In terms of wealth distribution and income generation, we can frame the world in the form of an economic pyramid, in which the top represents 2 billion people with high levels of income and the bottom of the pyramid represents more than 4 billion people who live on less than $ 2 per day (see Table 1) (Prahalad & Hammond 2002; Prahalad & Hart 2002; Prahalad 2004). A recent study shows that the total BOP spending on healthcare and ICT are $158.4 billion and $ 51.4 billion respectively (Hammond et al. 2007). Thus, serving this huge market at the BOP with digital health services and recognizing these people as value conscious consumers has created a whole new world of opportunity (Prahalad 2004). To capitalize this untapped opportunity at the BOP, ICT driven innovation has taken place to pursue sustainable growth while playing a catalytic role in serving the healthcare needs of the world's poorest populations. Consequently, B2C mHealth has emerged as a viable solution to serve the pressing healthcare needs through its high reach and low cost mechanism. It has made health care more accessible, affordable and effective across the developing world (UN foundation 2008). In recent years, it has become very popular in low income countries (e.g., India, Bangladesh, Mexico, South Africa etc.)

and serving millions by delivering right time medical information services at an affordable price (Ivatury et al. 2009).

Table 1: key facts about the BOP market

Global Economic Pyramid	Purchasing power ($)	Population (million)	Nature of Electronic Markets	Mobile Phone penetration (million)	Healthcare (per 10000)
	> 20000	75- 100	High Income Markets	2000	Hospital beds =35, Health workers = 100 (approx.)
	1500 > 20000	1500- 1750			
	1500	> 4000	Low Income Markets or, BOP markets	3000 >	Hospital beds =7, Health workers = 15 (approx.)
	<1500				

Health services are often inadequate at the BOP market because they are neither accessible nor affordable and when they are accessible, they are often dysfunctional, low in quality, and unresponsive to the needs of clients (World Bank, 2004). UN report (2008) on MDGs (Millennium Development Goals) represents a formidable picture showing that an estimated 2.5 million newly infected HIV users in 2007 and communicable diseases (Tuberculosis, Malaria etc.) continue to claim lives due to lack of knowledge or access to medication. According to WHO (2006), *'57 countries have critical shortages in health care workers, with a total deficit of 2.4 million health professionals worldwide.'* In this context, mHealth is seen as an enabler of change to serve the unserved markets at the BOP. The dramatic penetration of mobile phones at the BOP markets over the last decade has increased the potential of mHealth services around the world (Mechael 2008; Prahalad 2004). There are now more than five billion mobile subscribers in the world and the majority of them are coming from the BOP world. This "majority world" is becoming increasingly interconnected and can easily be served by the current and emerging mHealth services. It is widely agreed that such services can *"reduce the widening gap between haves and have-nots, decrease the potential for further isolation, desperation and instability in countries and groups of our population that deserve a better fate"* (Barrett 2008).

Table 2: mHealth at the Bottom of the Pyramid*				
Type	**Project Name**	**Service**	**Solution areas**	**Countries**
Remote Data Collection	Episurveyor	Health survey	HIV/AIDS	Kenya, Uganda, Zambia (+ 20 countries in sub sahahran Africa)
	Epihandy	Health survey	HIV/AIDS	Uganda, Zambia
	Cell preven	SMS/ Voice	Primary healthcare	Peru
	CHITs	SMS	Primary healthcare	Philippines
	The Dokoza system	SMS	HIV/AIDS, TB	South Africa
	IHISM	SMS	HIV/AIDS	Botswana
	Phones for Health	Health survey	HIV/AIDS	Rwanda
	Nokia data gathering	Health survey	Disease incidence data	Brazil
Remote Monitoring & Medication compliance	The Cell life project	SMS	HIV/AIDS	South Africa
	Medinet	SMS/Voice	Diabetes, Heart disease	Trinidad & Tobago
	MCST	Access to data	HIV/AIDS	India
	Phoned pill reminder	Voice	TB	Thailand
	SIMpill	SMS/Voice	TB	Thailand
	Virtual Health pet	SMS	HIV/AIDS	Brazil
	Mashavu	Health survey	Primary healthcare	Tanzania
Diagnostic & Treatment Support	Grameen Healthline	Voice	Primary healthcare	Bangladesh
	HMRI	Voice	Primary healthcare	India
	Teledoctor	Voice	Primary healthcare	Pakistan
	RICE	Voice	Primary healthcare	Vietnam
	M-DOK	SMS	Primary healthcare	Philippines
	MedicallHome	Voice	Primary healthcare	Mexico
Disease & epidemic outbreak tracking	Frontline SMS	SMS	Any outbreak tracking	Worldwide
	UHIN	Health survey	HIV/AIDS	Uganda
	AESSIMS	SMS/Voice	Japanese Encephalitis	India
	Alerta DISAMAR	SMS/Voice	Disease incidence data	Peru
	Helath Watch	Health survey	Disease incidence data	India
	GATHER	Health survey	HIV/AIDS	Uganda
Education & awareness	Freedom HIV/AIDS	Mobile games	HIV/AIDS	India
	Learning about Living	Interactive e-learning	HIV/AIDS	Nigeria
	Project Masiluleke	SMS & Voice	HIV/AIDS	South Africa
	Text to change	SMS	HI/AIDS	Uganda
Communication & Training	ENACQKT	Mobile instruction	Professional development of nurses	The Caribbean
	Mobile HIV support	Access to data	Information support to health workers	Uganda
	Nursing promotion	Mobile instruction	Virtual nursing program	Guatemala
	UHIN	Access to data	Healthcare planning, resource allocation.	Uganda

* Table constructed using information from Ivatury et al. (2009), UN foundation & Vodafone foundation (2009)

Continuance is the Challenge

A growing number of BOP markets in the developing countries are using mobile technology to address healthcare needs (see Table 2). In these markets, this ubiquitous platform is being used to provide versatile health care solutions, such as, education & awareness, remote data collection, remote monitoring, communication& training, disease & outbreak tracking, diagnostic and treatment support (UN foundation & Vodafone foundation 2009). The adoption rate of such services is quite high in the BOP markets because moving to mHealth from nothing is easier than moving to mHealth from a strong tradition of efficient & ubiquitous healthcare system (Prahalad 2004). A recent study shows that there are fifty-one mHealth programs that are being operated at 26 BOP markets around the world. Although these programs are experiencing higher adoption of its widespread access and cost effective solutions to the basic health care needs, they require immediate assessment to ensure its viability in terms of continued usage (Kaplan & Litwka 2008; Angst & Agarwal 2009, Ahuwalia & Vershney 2009; Varshney 2005; Norris et al. 2008; Mechael 2009; Ivatury et al 2009;UN foundation & Vodafone foundation 2009). Continuance is one of the critical challenges to identify and replicate the best practices around the world. Besides, continuance can ensure acceptable economic returns to mHealth service platforms and provide valued societal returns to the local community in which they operate (Hart and Milstein, 2003; London and Hart, 2004; London, 2008). Furthermore, research on 'continuance' will facilitate its critical impact evaluation in order to move beyond discussions of the potential impact that they might have and anecdotal examples of how they are already being used (Mechael 2009). Bhattacherjee (2001b, pp. 351-352) highlights the importance of 'continuance' by saying that *"long-term viability of an IS and its eventual success depend on its continued use rather than [its] first-time use."* Limayem et al. (2007) support this view by suggesting to consider ICT implementation as a success when a significant number of users have moved beyond the initial adoption stage and using ICT on a continued basis.Therefore, it is necessary to explore the theories on 'continuance behavior' in order to develop a comprehensive continuance model for mHealth services.

Theoretical Background: The Expectation–Confirmation Modeling Perspective

Continuance has become a dominant theoretical framework in IS in order to ensure its sustainability (Bhattacherjee 2001b). Some IS researchers (e.g., Saga and Zmud 1994) treat it as *post-implementation*, whereas others recognize it as *post-adoption* (Jasperson et al. 2005) behavior, which draw equal attention like first time adoption to ensure information technology implementation (Limayem et al. 2007). In this context, the frequently used paradigm is expectancy-confirmation theory which has proven to be successful in consumer behaviour and services marketing literature to study consumer satisfaction and post-purchase behavior (Anderson and Sullivan 1993; Dabholkar et al. 2000; Oliver 1980, 1993; Patterson et al. 1997). Thus, this study is based on Expectation Confirmation Model (ECM) proposed by Bhattacherjee (2001b) in IS context which is, in fact, based on Oliver's (1980) Expectation Confirmation Theory (ECT). We have adopted ECM to frame our own research because this model has successfully been integrated into IS to predict continuance behavior. Based on an individual's psychological motives during post-adoption, this model predicts continuance using perceived usefulness, satisfaction and confirmation as the main drivers of continuance behavior (Limayem et al. 2007).

Like ECT, the core objective of ECM is to explain the intention to continue using a particular IS product (or, service) which follows an initial adoption phase. The ECM posits that confirmation of perceived usefulness leads to satisfaction and satisfaction leads to continuance intentions. Embracing the utilitarian value of technology, this model adopted *'perceived usefulness'* as an antecedent, which has been widely accepted as powerful predictor of IS usage (Davis 1989; Karahanna et al 1999; Venkatesh and Morris 2000; Venkatesh et al. 2002). In addition, it also adopted *'satisfaction'* which is considered an important determinant to reinforce a user's intention to continue using the system (Limayem et al. 2007). Satisfactory experiences with a behavior are a key condition to continuance as they increase one's tendency to repeat the same course of action again and again (Limayem et al. 1997). In the IS context, electronic service consumption offers a good illustration of the close relationship between satisfaction and continuance (Bhattacherjee 2002).Overall, the model establishes an association between satisfaction and perceived usefulness through confirmation of expectation to determine the degree of continuance intention. Though confirmation and disconfirmation are used interchangeably in marketing; however, we will use confirmation throughout the paper which is defined as users' evaluative response to determine their level of satisfaction (Bhattacherjee 2001b).

The extant research suggests that the continued usage behavior is determined by different sets of antecedents, depending on the unique characteristics of the system or contexts of IS application (Kang et al. 2009; Limayem et al. 2007) (Table 3). As such, depending on its application, ECM has added different constructs (*perceived ease of use*, *perceived enjoyment/playfulness, experience)* in different settings which range from B2C online to advanced mobile services (Hong et al. 2006; Kang et al. 2009; Liao et al. 2007; Lin et al. 2005; Thong et al. 2006). These newly added dimensions have proven to be appropriate for specific services like social networking sites, online banking or mobile internet services (Kang et al. 2009). Thus, to improve the explanatory power of the proposed model in the context of mHealth services at the BOP, we feel it needs to be extended by modeling the impact of *perceived service quality and perceived trust*. Despite the profound influence of these two post adoption expectation beliefs on continuance behavior, there are few studies which have developed metrics to analyze this relationship.

Table 3: A review of ECM in IS

Study	Application in IS	New dimensions in different studies
Bhattacherjee (2001b)	Online banking	-
Bhattacherjee (2001a)	Online brokerage	-
Au, Ngai and Cheng (2002)	Conceptual model to measure IS satisfaction	Equity and needs theory
Bhattacherjee and Premkumar (2004)	Computer based training and System development	User beliefs and attitudes
Premkumar & Bhattacherjee (2005)	Online computer learning	An integration of TAM & ECT
Lin, Wu, and Tsai (2005)	Web portal	Perceived enjoyment/playfulness, perceived ease of use
Thong, Hong, and Tam (2006)	Mobile internet service	Perceived enjoyment/playfulness, perceived ease of use
Hong, Thong, and Tam (2006)	Mobile internet service	Perceived ease of use
Liao, Chen, and Yen (2007)	e-Learning service	Perceived ease of use
Lin & Bhattacherjee (2007)	Online video games	Technical quality, interaction quality, perceived enjoyment, social image
Limayem, Hirt, & Cheung (2007)	World Wide Web	Habit
Lin & Bhattacherjee (2009)	Instant messaging (IM)	Self efficacy, social support
Kang, Hong and Lee (2009)	Social network service	Regret, self image congruity
Chou and Chen (2009)	ERP	Innovativeness, anxiety, self efficacy

Two Additional Constructs: Perceived Service Quality and Perceived Trust

The extant literature on ECM perspective has predominantly focused on *perceived usefulness* as the only post adoption expectation belief. Inclusion of other beliefs with perceived usefulness, in most cases, is driven by the nature of a particular system in a particular context to improve the explanatory power of the model. Following this tradition, to meet up the research call for continuance in mHealth services, this study adopts *perceived service quality* as an important post adoption expectation belief because a strong conceptual linkage has been

evidenced between *service quality and satisfaction*, as well as the interrelationship of these constructs with *usage* intentions (Chiou & Drog 2006; Cronin et al. 2000; Cronin and Taylor 1992). Likewise, this study also adopts *perceived trust,* which has been linked to satisfaction in a relationship that has an enormous impact on continuance intention (Jhonson & Grayson 2005; Bauer et al. 2002; Flavian 2006). Evidence to support the importance of these two additional beliefs (i.e., *perceived service quality & perceived trust*) on usage intentions appears in consumer behavior (Churchill & Surprenant 1982; Flavian 2006; Kim et al. 2008), services marketing (Chiou & Drog 2006; Dagger et al. 2007; Parasuraman et al. 2005; Eisingerich & Bell 2008), corporate strategy (Prahalad 2004) and IS literature (Gefen & Straub 2004; Teo et al. 2007). Though these relationships have not explicitly been modelled; however, the link among service quality, perceived trust, satisfaction and continuance is clearly implied. Thus, this study believes that it will be of value to explore the roles of these additional constructs predict continuance of mHealth services at the BOP.

Perceived Service Quality

The concept of service quality can be traced back to Grönroos's study (1982, 1984), who was probably the first to point out the importance of service quality in confirming our expectations. While service quality has found little attention in the IS literature, over the years it has been extensively studied in other disciplines (DeLone & McLean 2003). Major work has been conducted in marketing (Gronroos 1982, 1984; Parasuraman et al. 1988 Brady & Cronin 2001; Parasuraman et al. 2005), health services (Donabedian 1966, 1980, 1992; Andaleeb 2000, 2001, 2008; Bendapudi et al. 2006) and consumer behavior (Headley et al. 1993; Cronin et al. 2000). Across disciplines, service quality is commonly understood as users' judgment about the overall excellence or superiority of any service (Zeithaml 1987). The extant research has found both a direct relationship between service quality and satisfaction and an indirect relationship between service quality and continuance intention through satisfaction (Mahmood et al. 2000; Zviran & Erlich 2003; Cronin and Taylor 1992; Dabholkar et al. 2000; Gotlieb et al. 1994,). Rai et al. (2002) highlighted that IS user satisfaction impacts IS use and a higher level of satisfaction creates greater user dependence on the system. DeLone & McLean (2003) confirmed that service quality leads to user satisfaction and increased user satisfaction leads to continuance.

In health services, service quality and satisfaction are generally viewed as more closely aligned with behavioral intentions (Andaleeb 2001; Dagger et al. 2007). Satisfaction is typically modeled as mediating the relationship between service quality and behavioral intentions (Anderson and Sullivan 1993; Brady and Robertson 2001;

Cronin and Taylor 1992; Gotlieb et al. 1994). In a study on health service quality, Gotlieb et al. (1994) found that customer satisfaction mediates the effect of service quality on behavioral intentions. However, some researchers found that service quality serve as a better predictor of continuance intentions than satisfaction (e.g., Dabholkar et al. 2000). Overall, in exploring the consequence of service quality, researchers confirmed that service quality, satisfaction and usage intentions have strong positive interrelationships (e.g., Boulding et al., 1993; Cronin and Taylor, 1992; Taylor & Baker 1994; Zeithaml et al. 1996).

Perceived Trust

Trust is a key concern for high involvement IT services, such as, mHealth. It is recognized as a central element in many electronic markets, *"especially when the trusting party depends on, yet lacks control over the trusted party"* (Gefen & Straub 2004). The extant research has confirmed the importance of perceived trust and its implications for the continued usage of high involvement services (Garbarino and Johnson 1999; Morgan and Hunt 1999; Chiou & Drog 2006; Eisingerich & Bell 2008). Simply, it is defined as confidence in the honesty and integrity of the other party (Crosby et al. 1990). Broadly, it is defined as the users' confidence in a service provider's reliability and integrity (Morgan and Hunt 1994) and the expectation that it can be relied upon to deliver its promises (Sirdeshmukh 2002; Eisingerich & Bell 2008). In the context of professional & high-credence services, like healthcare, trust is especially important because customers face uncertainty in terms of both the quality and consistency (Bowen and Jones 1986; Chiou & Drog 2006). Some researchers emphasized the psychological benefit of perceived trust in long term relationships with service firms (Gwinner et al. 1998). Overall, it is seen as a dimension of considerable importance in the process of building and maintaining relationships (Bejou et al. 1998). In the context of electronic services, Kim et al. linked perceived trust (criterion variable) with perceived quality (predictor) and modeled their impact on transaction volume, or service outcomes. Gefen (2002) confirmed the importance of perceived trust in online services in predicting customer loyalty. Thus, in an effort to explore ways in which firms can build stable and trusting relationships with users, studies have frequently emphasized the importance of service quality (Grönroos 1983; Parasuraman et al.1988; Rust et al. 2002; Rust and Oliver 1994; Zeithaml et al. 1996). In healthcare context, interpersonal care and attention in the form of service quality have been evidenced successful to enhance trust perception, increase satisfaction (Flavian 2006) and improve continuance intentions (Bendapudi and Berry 1997; Morgan and Hunt 1994). Thus, it is clear that there is a strong linkage among quality, trust and continuance intentions (Flavian 2006; Chiou and Droge 2006; Eisingerich & Bell 2008; Sharma and Patterson 1999).

Research Model and Hypotheses Development

In conceptualizing a continuance model for mHealth services at the BOP, we propose that *perceived service quality* and *perceived trust* play crucial roles to predict satisfaction and continuance intention. As demonstrated in Figure 2, our research model is based on the synthesis of existing literature on perceived service quality, perceived trust and continued IS use. It is noteworthy that our study did not include perceived ease of use because it has proven to be insignificant in the post-acceptance stage (Karahanna 1999; Kang et al. 2009). Likewise, it did not include perceived enjoyment/playfulness because it is inappropriate for healthcare situation, and more significant for hedonic online services in which fun plays a major role (Van der Heijden 2004).

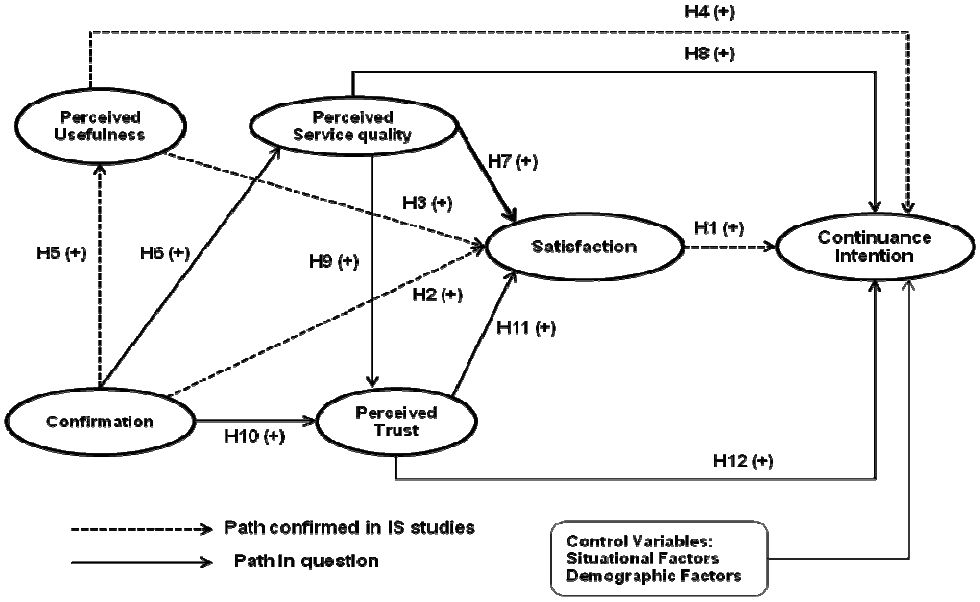


Figure 2: Research Model

Hypotheses based on the original ECM

The original ECM Paradigm (Bhattacherjee 2001b) posits that users' satisfaction with an IS is the primary motivation for its continuance (Limayem et al. 2007; Oliver, 1980). And this satisfaction is positively associated with users' confirmation of expectations and perceived usefulness. When a user compares the perceived performance of mHealth service with his/her expectations, any resulting confirmation is more likely to have a positive impact on satisfaction and post adoption expectation beliefs, such as, perceived usefulness (Bhattacherjee, 2001b; Limayem et al., 2007; Lin et al., 2005; Thong et al. 2006).Confirmation has a positive influence on users' satisfaction in mHealth services because it is based on the realization of the expected benefits of using such services (Kang et al. 2009). Likewise, confirmation positively influences users' perceived usefulness by minimizing any dissonance or, to be more consistent with reality (Bhattacherjee 2001b). On the other hand, perceived usefulness captures the instrumentality of IS use, and has positive impact on satisfaction.

Thus, we assume the following hypotheses based on the original ECM:

H1: Satisfaction is positively associated with continuance intention of mHealth services
H2: Confirmation of expectation is positively associated with satisfaction of mHealth services.
H3: Perceived usefulness is positively associated with satisfaction of mHealth services.
H4: Perceived usefulness is positively associated continuance intention of mHealth services.
H5: Confirmation of expectation is positively associated with perceived usefulness of mHealth services.

The Role of Perceived Service Quality in the ECM:

Service quality perceptions are generally defined as a consumer's judgment of, or impression about, an entity's overall excellence or superiority (Bitner and Hubbert 1994; Boulding et al. 1993; Cronin and Taylor 1992; Parasuraman, Zeithaml, and Berry 1985, 1988). Thus, in this study, we refer service quality as user's perceptions of overall excellence of mHealth services at the BOP. Original service quality theories in marketing (e.g., Gronroos et al. 1982; 1984) suggest that quality results from a comparison of perceived with expected performance. Subsequent researchers supported this view and confirmed a positive association between confirmation and perceived service quality (Cronin and Taylor 1992; DeSarbo et al. 1994; Brady & Cronin 2001; Dabholkar et al. 2001; Dagger et al. 2007), though such association is yet to be examined empirically in IS use research. There is also evidence that service quality, as a cognitive evaluation, precedes the emotive satisfaction construct (e.g., Brady and Robertson 2001; Cronin and Taylor 1992; Gotlieb et al.1994). Studies have found that there is an indirect relationship between service quality and continuance through satisfaction (Cronin and Taylor 1992; Dabholkar et al. 2000; Gotlieb et al. 1994) as well as a direct relationship between these constructs (Cronin, Brady, and Hult 2000). Thus, we expect that service quality will have both a direct effect on intentions as well as an indirect effect through user satisfaction. Recent studies found that in the context of professional, high-credence services (e.g., electronic healthcare), customers' uncertainty can be minimized by ensuring consistent quality of services, which will ultimately lead to trusting relationships (Eisingerich & Bell 2008). This relationship between service quality and customer trust is consistent with expectation paradigm and previous research (Chiou and Droge 2006; Sharma and Patterson 1999). According to Prahalad (2004, P. 21), *"Through persistent effort and the provision of world class quality, private sector businesses can create mutual trust."* Thus, articulating all the impacts of service quality in ECM, we posit that:

H6: Confirmation of expectation is positively associated with perceived service quality of mHealth services.
H7: perceived service quality is positively associated with satisfaction of mHealth services.
H8: perceived service quality is positively associated with continuance intention of mHealth services.
H9: perceived service quality is positively associated with perceived trust of mHealth services.

The Role of Perceived Trust in the ECM:

Perceived trust is defined as users' confidence in a service provider's reliability and integrity (Morgan and Hunt 1994) and the expectation that it can be relied upon to deliver its promises (Sirdeshmukh 2002; Eisingerich & Bell 2008). Johnson and Grayson (2005) opined that confirmation of expectation has association with fulfillment of certain service standards guided by trusting beliefs. Trust is increased when the trusted party shows behavior or other indicators in accordance with the trusting party's expectations (Blau1964; Gefen & Straub 2004). For example, a patient who has been consuming mHealth service for sometime and is pleased with the results is inclined to trust that service Provider (Kassim & Abdullah 2008). Consequently, upon fulfillment of the required level of honesty and benevolence, the consumer will feel satisfied with the mHealth service provider (Flavian 2006). In addition to satisfaction, researchers also found that the degree of trust has direct association with the degree of continuance intentions (Quelch and Klein 1996; Jarvenpaa et al. 2000; Flavian 2006). Prahalad (2004) also recognized that perceived trust is a key factor to establish long term relationship with customers at the BOP market, because it has all the potential impact on customers' continued usage behavior. Thus, abundant evidence suggests that satisfaction, trust and continuance intention are related constructs. Depending on such relationship, we postulate that:

H10: Confirmation of expectation is positively associated with perceived trust of mHealth services.
H11: perceived trust is positively associated with satisfaction of mHealth services.
H12: perceived trust is positively associated with continuance intention of mHealth services.

Overall our proposed model was tested with two control variables, demographic factors and situational factors. In this study, demographic factors consist of age, gender and income which are specific to the consumer (or patient), whereas situational factors include cost and experiences which are specific to the research context. Abundant evidence suggests that both these variables might have an influence on the level of continuance intentions (Morris and Venkatesh 2000; Venkatesh and Morris 2000; Venkatesh et al. 2003; Prahalad 2004; Lin & Bhattacherjee 2007).Thus we explicitly control the direct effects of these variables on continued mHealth usage intentions to capture the essence of the proposed model.

Research Methodology

Research Paradigm

The theory proposed in this study is conforming Gregor's (2006) *'explaining & predicting'* paradigm which is in line with positivistic mindset. Our theory explains something that is new and interesting, and will allow adequate prediction of the model (Gregor 2006). Orlikowski and Iacono (2001) confirm such IT research as "proxy view" to capture the critical aspects of information technology through some surrogates measures (e.g., quantitative variables). As a research method, this study adopted cross sectional survey to measure a causal network of relations under ECM framework.

Research Setting

This study focuses on a popular B2C mHealth setting which is well known as *mobile telemedicine* or, *mobile health (hotline) services* at the BOP markets of developing countries (e.g., MedicallHome in Mexico; HMRI in India and Healthline in Bangladesh). We define mobile telemedicine as a personalized and interactive service over mobile phone in order to provide ubiquitous and universal access to medical advice and information to any users in a particular region. In recent years, it has become very popular at the BOP markets of low and middle income countries (e.g., India, Bangladesh, Mexico, South Africa etc.) and serving millions by delivering right time medical services at an affordable price (Ivatury et al. 2009). Under this platform, a user can easily access this service both in a non-emergency (headache, cold, cough, etc.) and an emergency situation (accident, burn, severe stomach pain, etc.) by simply dialing some unique digits (e.g. 789 in Bangladesh) from his or her mobile phone and can receive medical information, consultation, treatment, triage, diagnosis, referral and counselling from health professionals (registered physicians, nurses and paramedics) (Ivatury et al. 2009).

Sampling

Data was collected from Bangladesh, one of the leading mHealth service providing developing nations, under a global mHealth assessment project supported by WHO from January 07 to March 17, 2010. Currently, more than 44 million people in this country have access to mobile telemedicine services provided by the two major mobile operators (i.e., Healthline service of *Grameen Phone* & Healthlink service of *Banglalink*) (Ivatury et al. 2009). About one third of the population in Bangladesh can use this service at anytime from anywhere by dialing '789' from their mobile phone. In addition, people who do not have their own mobile phones can use this service from local mobile phone kiosks which are widely available in every corner of the country. Initially, 350 interviewers

were planned from urban, semi urban and rural areas using area wise cluster sampling. Areas were selected in a manner such that different socioeconomic groups were represented. In order to obtain a probability sample, systematic random sampling was applied so that each sample unit/element had an equal chance of being selected. The population was defined as the patients who had experience of mobile telemedicine services in the past 12 months. A total of 365 respondents were finally approached, of which 225 (62%) surveys were ultimately completed. All respondents completed their questionnaires, however, nine were considered problematic because of excessive missing data, 'don't know' answers, or N/A answers, and response biases. We did not include these questionnaires in the data set. Finally, 216 surveys were analyzed.

Table 4: Demographic profile of respondents

Items	Categories	%	Items	Categories	%
Gender	Male Female	57.9 42.1	**Age**	18-25 26-33 34-41 42-49 50+	25.3 31.5 21.2 16.9 5.1
Location	Urban Semi urban Rural	44.5 29.3 26.2			
Income (per month in US $)	< $ 60 $ 61- $120 $ 121 - $180 $ 181 +	50 18.5 12.5 19	**Occupation**	Working full time Working part time Housewife Others	38.4 34.3 15.7 11.6

Of the respondents, 50 percent had income less than $ 60 per month; 57.9 percent were male; 25.3 percent were between 18 and 25 years, 31.5 percent were between 26 and 33 years, 21.2 percent were between 34 and 41 years and remaining 22 percent were older than 42 years. Of the total number of respondents, 38.4 percent considered themselves as full time employees, 34.3 percent were part time employees, 15.7 percent were housewives and remaining 11.6 percent were unemployed.

Measurement Instruments

The questionnaire consisted of previously published multi-item scales with favorable psychometric properties based on the studies of Bhattacherjee (2001b), Spreng et al. (1996), Davis et al. (1989), Brady & Cronin (2001), Teo et al. (2007). We developed the primary version of the questionnaire in English, and then translated the measures into the local language (Bangla). The local version was retranslated until a panel of experts agreed that the two versions were reasonably comparable (Andaleeb 2001). All of the constructs, except control variables, were measured in a structured format on a seven-point Likert-type scale, ranging from "strongly disagree" to "strongly agree." The control variables were assessed using categorical measures. For example, demographic

factors were measured using three items representing age, gender and income and situational factors were measured using two items representing past use experience and cost of services. Before the final study, we conducted a pretest over 10 samples to ensure that the question content, wording, sequence, format and layout, question difficulty, instructions and the range of the scales were appropriate. Upon response from the pretest, we made minor adjustments to refine the final version of the questionnaire.

Table: 5: Operationalization of constructs

Constructs	Operational Definitions	Measures
Continuance intention	Users' intention to continue using mHealth services.	Adapted from Bhattacherjee (2001b)
Satisfaction	Users' affect with (or, feelings) about prior mHealth services use.	Adapted from Spreng et al.'s (1996) overall satisfaction scale.
Perceived usefulness	Users' perception of the expected benefits of mHealth use.	Adapted from Davis et al.'s (1989) perceived usefulness scale.
Perceived service quality	Users' perception of the expected excellence or superiority of the mHealth services.	Adapted from Brady and Cronin's (2001) overall perceived service quality scale.
Perceived trust	Users' perception about the expected reliability and integrity of mHelth service platform.	Adapted from Teo et al.'s (2007) overall perceived trust scale.
confirmation	Users' perception of the congruence between expectation of mHealth service use and its actual performance.	Adapted from Bhattacherjee (2001b)

Data Analysis Strategy

This study identifies that the research paradigm of this study is 'quantitative positivist research' (Straub et al. 2004) and the research objective is 'explaining and predicting' which require that 'rigor' needs to be established in statistical design and methods (Gregor 2006). As such, this study has decided to use Component based SEM (PLS) in order to avoid the limitations of covariance based SEM with regard to *distributional properties, measurement level, sample size, model complexity, identification and factor indeterminacy* (Chin 2010; Fornell and Bookstein 1982, Wetzels et al. 2009). In fact, PLS is more suitable for this study because theoretical objective is 'explaining and prediction', the sample size is small, the model is relatively complex and the phenomenon under study is new or changing and (Chin & Newsted 1999). Most importantly, it is a better technique to robustly validate an incremental model with new conjectures maintaining the nomological validity of the baseline model (i.e., ECM) (Chin 2010, p. 660).

Findings

Assessment of the Measurement Model

In order to assess the research model, we used PLS Graph 3.0 (Chin 2001) to estimate the parameters of the outer and inner model. In this case, we applied PLS path modeling with a path weighting scheme for the inside approximation (Chin 1998; Tenenhaus et al. 2005). Then we applied nonparametric bootstrapping (Chin 1998; Efron and Tibshirani 1993; Tenenhaus et al. 2005; Wetzels et al. 2010) with 500 replications to obtain the standard errors of the estimates.

Table 6: Psychometric Properties for Latent Variables

Latent Variables	Reflective Items	Loadings	CR	AVE
Confirmation	CO1: My experience with using mHealth service was better than what I expected. CO2: The service level provided by mHealth was better than what I expected. CO3: Overall, most of my expectations from using mHealth were confirmed.	0.955 0.945 0.944	0. 964	0.899
Satisfaction	How do you feel about your overall experience of mHealth use: SA1: Very dissatisfied / very satisfied SA2: Very frustrated / very contended. SA3: Very displeased / very pleased SA4: Absolutely terrible / absolutely delighted	 0.971 0.968 0.968 0.957	0.982	0.933
Continuance intention	CI1: I intend to continue using mHealth service to get medical information services. CI2: My intentions are to continue using mHealth service than use any alternative means (e.g., traditional health systems) CI3: I will not discontinue my use of this service.	0.945 0.948 0.956	0.965	0.902
Perceived usefulness	PU1: Using mHealth improves the conditions of my health. PU2: Using mHealth improves my overall health. PU3: Using mHealth serves my medical purpose very well. PU4: mHealth services are very useful to me.	0.941 0.933 0.909 0.787	0. 941	0.801
Perceived service quality	PQ1: The overall quality of mHealth service is of a high standard. PQ2: The overall quality of this service is superior in every way. PQ3: The overall quality of this service is impressive. PQ4: The overall quality of this service is excellent.	0.928 0.928 0.948 0.934	0.964	0.870
Perceived trust	PT1: This mHealth service provider is trustworthy. PT2: This service provider gives reliable information. PT3: This service provider keeps promises and commitments. PT4: This service provider's behavior meets my expectations.	0.921 0.916 0.944 0.868	0. 952	0.833
Control Variables	Formative Items	Weights	t-value	VIF
Situational Factors	SF1: Experience (How many times did you use this service in the past 12 months?) SF2: Cost (High, Medium, Low)	0.600 0.581	7.378 7.102	1.232 1.210
Demographic Factors	DF1: Age DF2: Gender DF3: Income	-0.436 0.789 0.706	0.960 2.231 1.929	1.095 1.109 1.205

In order to check the properties of the measurement scales, we conducted confirmatory factor analysis (CFA) to assess reliability, convergent validity and discriminant validity of the scales (Table 6). Initially, we calculated average variance extracted (AVE) (Chin 2010, 1998; Fornell and Larcker 1981) and the composite scale reliability (CR) (Chin 1998; Fornell and Larcker 1981) of all the *reflective constructs* to assess reliability of the measurement scales. Here, the CR and AVE of all constructs are either equal to or exceed 0.80 and 0.50 cut off values respectively (Fornell and Larcker 1981). The lowest AVE (0.801) and CR (0.94) are for perceived usefulness; however, all those values compellingly meet up their adequacy criteria. Then, we ensured convergent validity as all the indicators for reflective constructs load much higher on their hypothesized factor than on other factors (own loading are higher than cross loadings) (Chin 1998, 2010). In addition, in Table 7, we calculated the square root of the AVE that exceeds the intercorrelations of the reflective construct with the other constructs in the model in order to ensure discriminant validity (Chin 2010, 1998; Fornell and Larcker 1981). In the case of formative indicators (i.e., situation factors and demographic factors), we examined factor weights, instead of factor loadings, which represent the contribution of each indicator to the respective construct (Mathwick et al. 2001; Chin 2010). As shown in table 6, all the formative items, except age, significantly contribute to their respective constructs as they are significant at $p< 0.01$ (Chin 1998). Then we assessed potential mulitcollinearity among the formative items and the results showed minimum collinearity with the variance inflation factor (VIF) of all items ranging between 1.095 and 1.232. Thus, the measurement model was considered satisfactory with the evidence of adequate reliability, convergent validity and discriminant validity, and employed for testing hypotheses and proving the research model.

Table 7: Intercorrelations of the latent variables

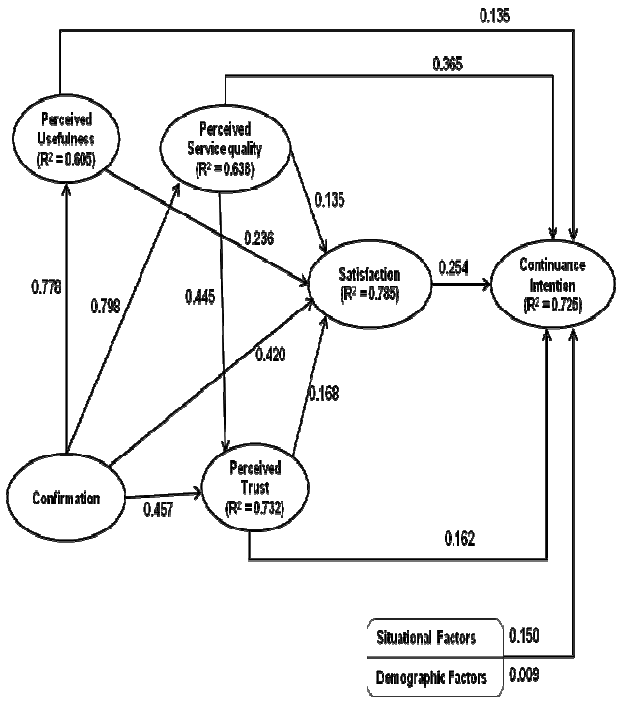
Construct	*PU*	*CO*	*PQ*	*PT*	*SA*	*CI*	*DF*	*SF*
Perceived Usefulness	*0.895**							
Confirmation	*0.578*	*0.948**						
Perceived quality	0.580	0.598	*0.933**					
Perceived trust	0.556	0.612	0.610	*0.913**				
Satisfaction	0.596	0.648	0.591	0.598	*0.966**			
Continuance intention	0.544	0.590	0.602	0.562	0.579	*0.945**		
Demographic Factors	-0.212	-0.132	-0.199	-0.170	-0.176	*-0.160*	*n.a*	
Situational Factors	0.352	0.355	0.404	0.408	0.330	*0.380*	*-0.128*	*n.a*
*square root of the AVE on the diagonal								

Assessment of the Structural Model

The results of the structural model using PLS are summarized in Table 8 shows that the proposed model has a strong prediction power, because R^2 of all endogenous variables are greater than 0.60 including continuance intentions (0.725). The results of the hypotheses testing based on the original ECM (H1-H5) show that all the relationships confirmed in the baseline model are still valid (see Appendix-1 for t-statistics).

The results of the proposed model show that all the hypotheses (H6-H12) are significant. For example, confirmation is strongly associated with perceived service quality (path = 0.798) and perceived trust (path = 0.457) and, in turn, perceived service quality (path = 0.135) and perceived trust (path = 0.168) are significantly associated with satisfaction. We also confirmed that perceived service quality has a significant impact on perceived trust (path = .445). It is also evident that both perceived service quality (path = 0.365) and perceived trust (path= 0.162) had a strong positive influence on continuance intentions. Among control variables, situational factors (experience and cost) were found to have a strong association with continuance intention, while demographic factors (age, gender & income) did not have any impact. Implications of these results are explained in the discussion section.

Table 8: Structural model assessment

Results of Hypotheses Testing	Structural Model
Hypotheses based on original ECM H1: Satisfaction → Continuance * H2: Confirmation → Satisfaction* H3: perceived usefulness → Satisfaction* H4: perceived usefulness → Continuance** H5: Confirmation → Per. usefulness* **Hypotheses based on Proposed Model** H6: Confirmation → Perceived quality* H7: Perceived quality → Satisfaction** H8: Perceived quality → Continuance* H9: Perceived quality → Perceived trust* H10: Confirmation → Perceived trust* H11: Perceived trust → Satisfaction** H12: Perceived trust → Continuance** **Control Variables** Situational factors → Continuance* Demographic factors → Continuance*** *Path coefficients significant at p < .01, **Path coefficients significant at p < .05 , not significant***	 Figure 3: Results of Hypotheses Testing

A Comparison between ECM and the Proposed Research Model

In Table 9, we compared the baseline model (ECM) with the proposed model using an incremental F test to test whether inclusion of two additional constructs (i.e., perceived quality and perceived trust) significantly increased the variance explained for satisfaction and continuance intention. Our results suggest a significant impact of the proposed model on the variance explained in the satisfaction ($\Delta R^2 = 0.018, f^2 = 0.08, P<0.01$) and continuance intention ($\Delta R^2 = 0.075, f^2 = 0.27, P<0.01$) .Overall, our findings suggest that both *perceived service quality* and *perceived trust* made a unique contribution to the understanding of how users form their satisfaction and continuance in the context of mHealth services.

Table 9: Comparison between original ECM and the Proposed Research Model

Criterion Variables	R^2		ΔR^2		f^2
	ECM (A)	Proposed Model (B)	B - A	(B-A) /A (%)	$(R^2.B) - (R^2.A) / 1 - (R^2.B)$
Satisfaction	0.767	0.785	.018	.02	0.08**
Continuance Intention	0.650	0.725	0.075	11.54	0.27**
**F statistic = $f^2 * (n-k-1)$, with 1, $(n-k)$ degrees of freedom where n is the sample size, k is the number of constructs in the model.					

An Evaluation of PLS Findings

Power Analysis (1-β)

We conducted power analysis (1-β) to validate the empirical findings of our PLS analysis. Power test is generally defined as the probability of rejecting a false null hypothesis (H_0) (Cohen 1988), and regarded as type II error (Barudi & Orlikowski 1989; Cohen 1992). We used G*Power 3.1.2 (Faul et al. 2009) to conduct the power test and found that all the parameters in our research model exceed 0.99 which compellingly exceed the cut off value 0.80 (Barudi & Orlikowski 1989; Cohen 1992).

Predictive Relevance (Q^2)

Though the magnitude of R^2 is widely used as a criterion to assess the predictive validity of the PLS model, the predictive sample reuse technique (or, Q^2) can also be used for the same purpose (Stone 1974, Geisser 1975, Fornell and Cha 1994, Chin 1998a, Chin 2010). It shows how well the data collected empirically can be

reconstructed with the help of model and the PLS parameters (Fornell & Cha 1994). Using blindfolding procedure with the omission distance of 7, we obtained a cross validated redundancy Q^2 of 0.630 (> 0.50), which is indicative of a highly predictive model (Chin 2010).

Global Fit Measure (GoF)

we conducted a global fit measure ($GoF = \sqrt{\overline{AVE} \times \overline{R}^2}$) for PLS path modeling which is defined as the geometric mean of the average communality and average R^2 for all endogenous constructs (Tenenhaus et al. 2005). Following the established guidelines (Tenenhaus et al. 2005; Wetzels et al. 2009; Chin et al. 2010), we estimated the GoF values which may serve as cut-off values for global validation of PLS models. In this study, we obtained a GoF value of 0.78 for the complete model, which exceeds the cut-off value of 0.36 for large effect sizes of R^2 (Cohen 1988). Thus, it allows us to conclude that our model has a better prediction power in comparison with the baseline values (GoF_{small} = *0.1,* GoF_{medium} = *0.25,* GoF_{large} = *0.36),* which adequately validates the PLS model globally (Wetzels et al. 2009).

Discussion

Summary of Results

This study develops an IS continuance model for mHealth services at the BOP exploring the effects of two additional post adoption expectation beliefs, that is, *perceived service quality and perceived trust*. It shows that confirmation of expectations have a significant positive association with perceived service quality and perceived trust, which, in turn, play an instrumental role in enhancing the prediction power the overall model. Conceptualizing these constructs and validating their effect on continuance intention (via satisfaction) are significant contributions of this study. This study also demonstrates that perceived service quality has a strong positive impact on service satisfaction and perceived trust, which eventually contribute to continuance intention. Similarly, perceived trust has a strong association with satisfaction and continuance intentions. Overall, this study contributes to the IT continuance literature by demonstrating that perceived service quality and perceived trust can be seamlessly incorporated into the ECM perspective to explain users' continued usage behavior.

Our study confirms that all the structural parameters and predictive power of Bhattacherjee's (2001b) original ECM are still valid in our study. For example, the R^2 of perceived usefulness (0.605), satisfaction (0.785) and continuance intention (0.725) in this study are significant like the original study. Results of the study support the original study that satisfaction ($\beta = 0.254$) with IS use is a stronger predictor of users' continuance intention in comparison with perceived usefulness ($\beta = 0.135$). Furthermore, our examination of path coefficient between confirmation and satisfaction shows a consistent result with the original study, that is, 0.420 in this study and 0.525 in the original ECM study. Likewise, the path coefficient between confirmation and perceived usefulness in both studies shows the same pattern. Finally, we examined the path coefficient between satisfaction and continuance intention, which is 0.254 in this study and 0.567 in the original study. Though this path is highly significant in both studies, however, the relative lower value in our study may be caused by inclusion of two additional post adoption expectation constructs [i.e., perceived service quality ($\beta = 0.365$) and perceived trust ($\beta = 0.162$)] and contextual factors (i.e., situational factors) which have significant impact on continuance intentions. Overall, better prediction power of the proposed model ($R^2 = 0.725$) can be explained by Lin & Bhattacherjee (2007, p. 14) as, *" ...Constructs, new to IT usage research, helps open the 'black box' of information systems and explore specific system features and their relationships with the cognitive and affective perceptions that influence their usage."*

In both studies, satisfaction is regarded as a significant predictor of continuance which was predicted jointly in this study by users' confirmation of expectation ($\beta = 0.420$), perceived usefulness ($\beta = 0.236$), perceived service quality ($\beta = .135$) and perceived trust ($\beta = 0.162$). These determinants jointly explain a sizeable 78.5 % of the satisfaction variance which adequately explain Bhattacherjee's (2001) concern that *"IS satisfaction may have additional salient predictors than those identified using the ECT lens".* As expected from ECM, confirmation still has the strongest influence on satisfaction than other post adoption beliefs in this study. It is also evident that inclusion *perceived quality* and *perceived trust* significantly increased the overall variance of satisfaction and continuance intentions. It confirms Lin & Bhattacherjee's recent findings (2007, P. 6) that "..... '*external variables' may help shape user beliefs regarding usage and eventually their usage intention and behavior."* It also suggests that user perceptions may be adjusted by the extent of confirmation of service benefits (perceived usefulness), service excellence (perceived quality) and trusting beliefs (perceived trust).

Contribution to Theory

Our findings have several theoretical implications. First, to the best of our knowledge, this is the first study to theoretically articulate or empirically test the impact *of perceived service quality and perceived trust* on continuance intentions in IT research. Thus, it has added novelty in theory by modeling both the joint and individual impact of these constructs on continuance intentions which have not been investigated before. Second, this study has extended theoretical contribution by developing a comprehensive, yet parsimonious, set of dimensions that help predict the continuance of mHealth services adequately. Third, the study has advanced knowledge by applying the IS continuance theory in a new research setting (mHealth in BOP markets) based on the logical evidence of perceived service quality, perceived trust and contextual factors. According to Whetten (1989) *"the common element in advancing theory development by applying it in new settings.....that is, new applications should improve the tool, not merely reaffirm its utility"*. In addition, the literature on IS in developing countries is relatively sparse when related to the breadth and importance of the area (Walsham et al. 2007). Thus, this study has advanced knowledge in the BOP markets of developing countries by providing some new insights and clarifications to continuance modeling.

Contribution to Practice

The results of this study have important implications for managers. Specifically, the study identifies that perceived service quality influences economic value, whereas perceived trust influences social value to continue using mHealth services. Managers can positively influence economic value (or, economic benefits) by improving overall service quality. Managers need to be aware that a good technological platform (e.g., information systems & good wireless network) is not enough satisfy customers. Instead, they need to address, in a coordinated manner, the quality of a platform, the quality of patient-provider interaction and above all, the quality of service benefits. These findings highlight that mHealth platforms have different quality dimensions which are different in natures. For example, quality of patient-physician interaction over mobile platform and interface design are different from back office dimensions, such as, capacity management, software and hardware quality, security, and IT scalability (souse & voss 2006). As such an integrated approach is necessary to improve *overall service quality*. Our results confirm that overall service quality has a significant impact on trust, satisfaction and continuance intentions. In the similar vein, managers can influence social value (or, relationship benefits) by establishing a trustworthy relationship and demonstrating a genuine focus on customer well-being. Our results

show that both trust and satisfaction affect continued use of mHealth services. We suggest *trust* as a critical factor in mHealth services exchange because there is a lack of rules and regulations in this electronic market and such services are not immediately verifiable (Gefen & Straub 2004). Thus managers of mHealth platforms should focus on improving trusting beliefs (e.g., ability, benevolence, integrity and predictability) in order to influence trusting attitude (continuance).

In addition, this study strongly suggests managers to focus on contextual factors (e.g., demographic and situational factors) to promote continuance intentions. For example, our study suggests that cost of service & past use experience (i.e., situational factors) have a significant impact on the intention to continue using mHealth services at the BOP. Specifically, it suggest that the per unit cost of mHealth service should be affordable enough to attract the vast customer base so that profit might come from large scale consumption (Prahalad 2004). In fact, the greatest situational hurdle identified at the BOP is to ensure low cost mHealth solutions, which can ultimately lead to a scalable healthcare platform. Abundant evidence suggests that such low cost business models with positive quality experience, useful solutions and a high level of commitment (or, trust) can generate acceptable economic returns to the investors and provide valued societal returns to the community they serve (Hart and Milstein 2003; London and Hart 2004; London 2008).

Overall, the model offers managers an understanding of how perceived service quality, perceived trust and contextual factors interact in the formation of satisfaction and continuance intentions. Specifically, the findings of our study support the importance of quality and trust as important decision-making variables in predicting mHealth continuance. Since continuance is one of the critical challenges to ensure viability of mHealth platforms around the world, our findings will contribute to the sustainability of this innovative IT artifact. Managers can now consider mHealth implementation as a success if a significant number of users move beyond the initial adoption stage and use this service on a continued basis.Though proposed in the context of BOP; however, we believe that these findings are equally applicable to other high involvement, high contact, and ongoing IT service platforms in any settings, which aim to improve its long term viability through continued patronage.

Limitations & Future Research Directions

Several limitations are worth noting. First, this research was conducted within the specific domain of mHealth services. As a result, it is uncertain about the applicability of findings more broadly. As such, researchers and practitioners need to take a more holistic, learning oriented approach to assess the performance of such mHealth platforms at the BOP (London 2009). Second, data was collected under cross sectional design, so the study contains the typical limitations associated with this kind of research methodology. To gain deeper understanding into IS continuance study, this study suggests longitudinal study in future research. This research believes that additional research is needed to develop a refined understanding of the relationships proposed in our model. Based on the current research stream on IS continuance (Jasperson et al. 2005; Limayem et al. 2007, Kang et al. 2009), the moderating roles of demographic and situational factors can be evaluated to provide some new insights.

Conclusion

The sole objective of this study was to develop an IS continuance model at the BOP exploring the role of service quality and trust. To fulfill that objective, we extended ECM to develop a continuance model for 'mHealth', a new paradigm of the emerging IT artifact. We believe our model provides an important step on the path to providing theoretical and practical contribution in the ICT continuance modeling at the BOP. Though the extant literature in the reference disciplines has identified conceptual linkages among quality, trust and continuance; however, a comprehensive focus has been surprisingly absent from the IS literature. One of the key contributions of this study is the confirmation of service quality & trust as significant predictors of IS continuance. Though the model has been proposed for mHealth services at the BOP, it can be of value to any ICT platforms serving vast number of customers in electronic markets.

Acknowledgement

The authors appreciate and gratefully acknowledge guidance and constructive comments of Wynne W. Chin of University of Houston, which improved the quality of the study.

References

Ahluwalia, P. & Varshney, U. (2009). Composite quality of service and decision making perspectives in wireless networks, *Decision Support Systems,* 46, 2009, 542-551

Akter, S., D'Ambra, J., Ray, P. (2010). User perceived services quality of mHealth services in developing countries, in the *Proceedings of the Eighteen European Conference on conference on Information Systems, Pretoria, South Africa, June 2010*

Anderson, E. W., and Sullivan, M. W. (1993). The Ante-cedents and Consequences of Customer Satis-faction for Firms," *Marketing Science* (12:2), 125-143.

Angst, M. C. & Agarwal, R. (2009). Adoption of electronic health records in the presence of privacy concerns: the elaborate likelihood model and individual persuasion, MIS *Quarterly*, Vol. 33, No. 2, 339-370

Andaleeb, S.S. (2001). Service quality perceptions and patient satisfaction: a study of hospitals in a developing country. *Social Science & Medicine*, 52(9), 1359-1370.

Baroudi, J. J. and Orlikowski, W. J. (1988). A Short-Form Measure of User Information Satisfaction: A Psychometric Evaluation and Notes on Use, *Journal of MIS,* 4(4), 44-59.

Barrett, C.R. (2008). Perspectives on Inclusive ICT business by Intel, *Electronic Markets*, 18 (4), 300-301

Bauer,H., Grether,M., Leach, M. (2002). Building customer relations over the Internet, *Industrial Marketing Management* (31), 155–163.

Bejou, D., Ennew, C. T., & Palmer, A. (1998). Trust, ethics and relationship satisfaction, *International Journal of Bank Marketing,* 16(4), 170-175.

Bendapudi, Neeli and Leonard L. Berry (1997). Customer Receptivity to Relationship Marketing, Journal *of Retailing*, 73(1), 15-37.

Bhattacherjee, A. (2001a). An empirical analysis of the antecedents of electronic commerce service continuance. *Decision Support Systems*, 32, 201–214.

Bhattacherjee, A. (2001b). Understanding information systems continuance. An expectation–confirmation model. *MIS Quarterly*, 25(3), 351–370.

Bhattacherjee, A. (2002). "Individual Trust in Online Firms: Scale Development and Initial Test," *Journal of Management Information Systems,* Vol. 19, No. 1, pp. 211-241.

Blau PM. Exchange and power in social life. New York: Wiley; 1964.

Boulding, William, Ajay Kalra. Richard Staelin. and Valarie A. ZeithamI (1993). "A Dynamic Model of Service Quality: From Expectations to Behavioral Intentions." *Journat of Marketing Reseanh,* 30 (February), 7-27.

Bowen, D. E. & Jones, G. R. (1986). A transaction cost analysis of service organization-customer exchange. *Academy of Management Review*, 11: 428-441.

Brady, Michael K. and J. Joseph Cronin (2001), "Some New Thoughts on Conceptualizing Perceived Service Quality: A Hierarchical Approach," *Journal of Marketing*, 65 (July), 34-49.

Brommey M. Challenges in e-health service delivery. 2nd annual online summit. Available at: http://www.health.gov.au/healthonline/docs/summit2/brommeyer.pdf [accessed 2010 September 24]

Chatterjee, S., Chakraborty, S., Sarker, S., Sarker, S., Lau., Y.F (2009) Examining the success factors for mobile work in healthcare: a deductive study, *Decision Support Systems, 46, 620-633*

Chin, W. W. 1998. The Partial Least Squares Approach to Structural Equation Modeling, in *Modern Business Research Methods*, G. A. Marcoulides (ed.), Mahwah, NJ: Lawrence Erlbaum Associates, 295-336.

Chin, W. W. How to write up and report PLS analyses, in *Handbook of Partial Least Squares: Concepts, Methods and Application.* Esposito Vinzi, V.; Chin, W.W.; Henseler, J.; Wang, H. (Eds.), Springer, Germany, 2010, 645-689.

Chiou, J & Drog, C. (2006). Service Quality, Trust, Specific Asset Investment, and Expertise: Direct and Indirect Effects in a Satisfaction-Loyalty Framework, *Journal of the Academy of Marketing Science*, 34 (4), 613-627.

Cohen, J. *Statistical Power Analysis for the Behavioral Sciences* (2nd ed.), L. Erlbaum Associates, Hillsdale, NJ, 1988.

Cronin, J. J, Brady, M.K. and Hult, G. T. (2000), Assessing the Effects of Quality, Value and Customer Satisfaction on Consumer Behavioral Intentions in Service Environments, *Journal of Retailing*, 76 (2), 193-218.

Cronin, J. and Taylor, S. A (1992), Measuring Service Quality: A Reexamination and Extension, *Journal of Marketing*, 56 (July), 55-68.

Crosby, L. A., Kenneth R. E., and Deborah C. (1990), Relationship Quality in Services Selling: An Interpersonal Influence Perspective, *Journal of Marketing,* 54 (July), 68-81.

Dabolkar, P. A.; Shepard, C. D.; and Thorpe, D. I. (2000). A Comprehensive Framework for Service Quality:A n Investigationo f Critical Conceptual and Measurement Issues Through a Longitudinal Study, Journal of Retailing(76:2), 139-173

Davis, F. D. (1989). Perceived usefulness, perceived ease of use, and user acceptance of information technology. *MIS Quarterly*, 13(3), 319–340.

Dagger, T.S., Sweeney, J.C. & Johnson, L.W. (2007). A Hierarchical Model of Health Service Quality: Scale Development and Investigation of an Integrated Model. *Journal of Service Research*, 10(2), 123-142.

DeLone, W. H. and McLean, E. R. (2003). The DeLone and McLean model of information systems success: a ten-year update, *Journal of Management Information Systems* 19 (4), 9–30.

DeSarbo, W. S., Leonard, H., Marccllo M. R. and Jungwhan C. (1994). On the Measurement of Perceived Service Quality: A Conjoint Analysis Approach, in *Service Quality: New Directions in Ttieory and Practice,* Roland T. Rust and Richard L. Oliver, eds. Thousand Oaks, CA: Sage Publications, 201-22.

Deutsch M. (1958). Trust and suspicion, Conflict Resolution, 2(4):265–79.

Deluca J.M. and Enmark R. (2000). E-health: the changing model of healthcare. Front Health Service Management, 17(1), 3-15.

Efron, B., and Tibshirani, R. J. (1993). *An Introduction to the Bootstrap*, New York: Chapman and Hall.

Eisingerich, B.A. & Bell, J.S. (2008). Perceived Service Quality and Customer Trust: Does Enhancing Customers' Service Knowledge Matter?, *Journal of Service Research*, 10 (3), 256-268

Faul,F., Erdfelder, E., Buchner, A., Lang, G. A. (2009). Statistical power analyses using G*Power 3.1: Tests for correlation and regression analyses, *Behavior Research Methods,* 41 (4), 1149-1160

Flavian, C., Guinaliu, M., Gurrea, R. (2006). The role played by perceived usability, satisfaction and consumer trust on website loyalty, *Information and Management*, 43, 1-14

Fornell, C., and Larcker, D. F. (1981). Evaluating Structural Equation Models with Unobservable Variables and Measurement Error, *Journal of Marketing Research* (18:1), pp. 39-50.

Fornell C., and Bookstein F. L. (1982). Two Structural Equation Models: LISREL and PLS Applied to Consumer Exit-Voice Theory, *Journal of Marketing Research* (19), November 1982, pp. 440-452.

Fornell, C. And Cha, J. (1994). Partial least squares. In R. Bagozzi (Ed.), Advanced methods of marketing, (pp.52-78). Cambridge:Blackwell.

Garbarino, Ellen and Mark S. Johnson. (1999). The Different Roles of Satisfaction, Trust, and Commitment in Customer Relationships. *Journal of Marketing* 63 (April): 70-87.

Gefen, D. Karahanna, E., and Straub D. W. (2003), Trust and TAM in Online Shopping: An Integrated Model, *MIS Quarterly, 27 (1),* 51-90

Gefen, D. (2000). E-commerce: the role of familiarity and trust. *Omega: The International Journal of Management Science* 28 (6), 725–737.

Gefen, D. & Straub, D.W, (2004) Consumer trust in B2C e-ecommerce and the importance of social presence: experiments in e products and e services, *Omega*, 32, 407-424

Geisser, S. (1975). The predictive sample reuse method with applications. *Journal of the American Statistical Association*, 70 (350), 320-328.

Gotlieb, J.B., Dhruv, G. and Stephen W. B. (1994), Consumer satisfaction and perceived quality: complementary or divergent constructs, *Journal of applied psychology*, 79 (6), 875-85

Gronroos, C. (1982). Strategic Management and Markeling in the Service Sector. Helsingfors; Swedish School of Economics and Business Administration.

Gronroos, C. (1984). A Service Quality Model and Its Marketing Implications, *European Journal of Marketing*, 18 (4), 36-44.

Gregor, S. (2006). The nature of theory in information systems, MISQ, 30 (3), 611-642

Gwinner, K.P., Gremler, D.D., Bitner, M.J. (1998). Relational benefits in services industries: The customer's perspective. *Journal of the Academy of Marketing Science* 26(2), 101-114.

Hammond AL, Kramer WJ, Katz RS, Tran JT, Walker C. (2007). The next four billion: market size and business strategy at the base of the pyramid.Washington, DC:World Resources Institute and International Finance Corporation.

Hart SL, Milstein MB. (2003). Creating sustainable value. *Acad Manage Exec* 17(2):56–67. Huberman AM, Miles MB. Data management and analysis methods. In: Denzin NK, Lincolneditors YS, editors. Handbook of qualitative research. London: Sage Publications; 1994

Ivatury,G., Moore, J. & Bloch, A . (2009). A Doctor in Your Pocket: Health Hotlines in Developing Countries, *Innovations: Technology, Governance, Globalization* 4(1), 119□153.

Jasperson, J., Carter, P. E., & Zmud, R. W. (2005). A comprehensive conceptualization of post-adoptive behaviors associated with information technology enabled work systems. *MIS Quarterly*, 29(3), 525–557.

Jarvenpaa SL, Tractinsky N, Vitale M. (2000). Consumer trust in an internet store. *Information Technology and Management* 1(1–2):45–71.

Jarvis, C. B., MacKenzie, S. B., and Podsakoff, P. M. (2003). A Critical Review of Construct Indicators and Measurement Model Misspecification in Marketing and Consumer Research, *Journal of Consumer Research* (30), 199-218.

Jenkins, A. M. (1985). Research Methodologies and MIS Research, *Research Methods in Information Systems*, E. Mumford et al. (Ed.), Elsevier Science Publishers B.V., Amsterdam, Holland

Johnson, D., Grayson, K., (2005). Cognitive and affective trust in service relationships, *Journal of Business Research* (58) , 500–507.

Kang, S.Y., Hong, S., Lee, H. (2009). Exploring continued online service usage behavior, the roles of self image congruity and regret, *Computers in Human Behavior*, 25, 111-122

Kandachar P and Halme M. (2008). Sustainability challenges and solutions at the base of the pyramid. Sheffield, UK: Greenleaf Publishing.

Kaplan, B., and Litwka, S. (2008). Ethical challenges of telemedicine and telehealth, *Cambridge Quarterly of Healthcare Ethics*, 17, 401-416

Karahanna, E., Straub, D. W., & Chervany, N. L. (1999). Information technology adoption across time: A cross-sectional comparison of pre-adoption and postadoption beliefs. *MIS Quarterly*, 23(2), 183–213.

Kassim, N.M. and Abdullah, N.A. (2008). Customer Loyalty in e-Commerce Settings: An Empirical Study, *Electronic Markets*, 18: 3, 275 — 290

Liao, C., Chen, J.-L., & Yen, D. C. (2007). Theory of planning behavior (TPB) and customer satisfaction in the continued use of e-service. *An integrated model.Computers in Human Behavior*, 23(6), 2804–2822.

Limayem, M., Hirt, S. G., & Cheung, C. M. K. (2007). How habit limits the predictive power of intention: The case of information systems continuance. *MIS Quarterly*, 31(4), 705–737.

Lin, C. S., Wu, S., & Tsai, R. J. (2005). Integrating perceived playfulness into expectation–confirmation model for web portal context. *Information and Management*, 42(5), 683–693.

Lohmöller, J.-B. (1989). *Latent Variable Path Modeling with Partial Least Squares*, Heidelberg: Physica-Verlag. Luhmann N. Trust and power. London: Wiley; 1979.

London T. And Hart SL. (2004). Reinventing strategies for emerging markets: beyond the transnational model. *J Int Bus Stud* ;35(5): 350–70.

London T. (2008).The base-of-the-pyramid perspective: a new approach to poverty alleviation. Proceedings of the sixty-sixth annual meeting of the Academy of Management (CD); ISSN 1543-8643 .

London T. Making better investments at the base of the pyramid. *Harvard Bus Rev* 2009;87(5):106–13.

Mahmood, M. A. et al. (2000) Variables Affecting Information Technology End-User Satisfaction:A Meta-Analysis of the Empirical Literature, *International Journal of Human-Computer Studies*,52(5), pp. 751-771.

Mechael, P. (2009) The case for mHealth in developing countries, *Innovations: Technology, Governance, Globalization*, 4(1), 103-118.

Morgan, R M and, and S D Hunt. (1994). The commitment-trust theory of relationship marketing. *Journal of Marketing*, July, 20 - 38.

Morris, *M.* G,, and Venkatesh, V. Age Differences in Technology Adoption Decisions: Implications for a Changing Workforce, *Personnel Psychology* (53:2), 2000, pp. 375-403.

Norris, T., Stockdale, R., Sharma, S.(2008) Mobile Health: Strategy and sustainability, *The Journal of Information Technology in Healthcare* , 6(5), 326-333

Oliver, R. L. (1980). A cognitive model of the antecedents and consequences of satisfaction decisions. *Journal of Marketing Research*, 17(4), 460–469.

Oliver, R. L. (1993). Cognitive, affective, and attribute bases of the satisfaction response. *Journal of Consumer Research*, 20(3), 418–430.

Orlikowski, J.W. & Baroudi, J.J. (1991) Studying Information Technology in Organizations: Research Approaches and Assumptions, *Information Systems Research,* 2(1), 1-28

Orlikowski, W., and Iacono, C.S. (2001). Research commentary: Desperately seeking the "IT" in IT research—A call to theorizing the IT artifact. *Information Systems Research, 12(2)*, 121-134.

Parthasarathy, M., & Bhattacherjee, A. (1998). Understanding post-adoption behavior in the context of online services. *Information Systems Research*, 9(4), 362–379.

Petter, S., Straub, D. and Rai, A. 2007. Specifying FormativeConstructs in Information Systems Research, *MIS Quarterly,* (31:1), pp. 623-656.

Patterson, P. G.; Johnson, L. W. and Spreng, R. A. (1997). Modeling the Determinants of Customer Satisfaction for Business-to-Business Professional Services, *Journal of the Academy of Marketing Science* (25:1), 4-17.

Prahalad CK and Hammond A. (2002). Serving the world's poor, profitably. Harvard Bus Rev; 80 (9):48–57.

Prahalad CK and Hart SL. (2002). The fortune at the bottom of the pyramid. Strateg Bus;26:2–14.

Prahalad CK. (2004). The fortune at the bottom of the pyramid: eradicating poverty through profits. Upper Saddle River, NJ: Wharton School Publishing.

Quelch, J. & Klein, L. (1996). The internet and international marketing, *Sloan Management Review* 1996, pp. 60–75.

Rangan VK, Quelch JA, Herrero G, Barton B.(2007). Business solutions for the global poor: creating social and economic value. San Francisco: Jossey-Bass.

Rosa JA and Viswanathan M. (2007). Product and market development for subsistence marketplaces. Oxford, UK: Elsevier Ltd.

Rust, R.T. and Zahorik, A.J. (1993), Customer Satisfaction, Customer Retention, and Market Share, *Journal of Retailing*, 69 (2), 193-215.

Rust, R.T., Christine Moorman, and Peter R. Dickson (2002), "Getting Return on Quality: Revenue Expansion, Cost Reduction, or Both?" *Journal of Marketing*, 66 (October), 7-24.

Rust, R.T. and L. Oliver, (1994), Service Quality Insights and Managerial Implications from the Frontier, in *Service Quality: New Dimensions in Theory and Practice*, T. Roland Rust and L. Oliver, eds. Thousand Oaks, CA: Sage, 1-9.

Saga, V. L., and Zmud, R. W. (1994). The Nature and Determinants of IT Acceptance, Routinization, and Infusion, *Diffusion, Transfer and Implementation of Information Technology,* L. Levine (ed.), Elsevier Science, Amsterdam, 67-86.

Sharma, N. & Patterson, P.G. (1999). The impact of communication effectiveness and service quality on relationship commitment in consumer, professional services, *Journal of Services Marketing*, 13 (2),151 – 170

Spreng, R. A., MacKenzie, S. B., & Olshavsky, R. W. (1996). A reexamination of the determinants of customer satisfaction. *Journal of Marketing*, 60(3), 15–32.

Sneha, S., and Varshney, U., (2009) "Enabling ubiquitous patient monitoring: model, decision protocols, opportunities and challenges", *Decision Support Systems* 46 (3), 606–619.

Srideshmukh, D. Singh, J. & Sabol, B. (2002), Consumer Trust, Value and Loyalty in Relational Exchanges, *Journal of Marketing*, 66, 15-37.

Stone, M. (1974). Cross validatory choice and assessment of statistical predictions, *Journal of the Royal Statistical Society*, 36(2), 111-147

Tenenhaus, M., Vinzi, V. E. Chatelin, Y-M., and Lauro, C. 2005. "PLS Path Modeling," *Computational Statistics and Data Analysis* (48:1), pp. 159-205.

Taylor, Steven A. and Thomas L. Baker (1994), "An Assessment of the Relationship between Service Quality and Customer Satisfaction in the Formation of Consumers' Purchase Intentions," *Journal of Retailing*, 70 (2), 163-178.

Thong, J. Y. L., Hong, S.-J., & Tam, K. Y. (2006). The effects of post-adoption beliefs on the expectation–confirmation model for information technology continuance. *International Journal of Human-Computer Studies*, 64(9), 799–810.

Teo, T.S.H., Liu and J., Jing Liu (2007), "Consumer trust in e-commerce in the United States,Singapore and China" *Omega* , Vol. 35., 22 – 38

Teo, T.S.H., and Liu, J. Consumer trust in electronic commerce in the United States, Singapore and China. *Omega, 35,* 1 (2006), 22–38.

Varshney, U. and Vetter, R. (2000) Emerging Wireless and Mobile Networks, *Communications of the Association for Computing Machinery* (43)6, 73-81

Van der Heijden, H. (2004). User acceptance of hedonic information systems. MIS Quarterly, 28(4), 695–704.

Varshney, U. (2005) Pervasive Healthcare: Applications, Challenges and Wireless Solutions, *Communications of the Association for Information Systems*, 16(3), 2005, 57-72

Venkatesh, V., Morris, M. G., Davis, G. B., and Davis, F. D. (2003), User Acceptance of Information Technology: Toward a Unified View, *MIS Quarterly* (27:3), pp. 425-478.

Viswanathan M, Gajendiran S, Venkatesan R. Understanding and enabling marketplace literacy in subsistence contexts: the development of a consumer and entrepreneurial literacy educational programs in south India. Int J Educ Dev 2008a;23(3):300–19.

Varshney, U. (2008), "A middleware framework for managing transactions in grouporiented mobile commerce services", *Decision Support Systems* 46 (1), 356–365.

Wetzels, M., Schroder, G.O., Oppen, V.C. (2009), Using PLS path modeling for assessing hierarchical construct models: Guidelines and empirical illustration, *MIS Quarterly*, 33 (1), 177-195, 2009

Wold, H. "Partial Least Squares," in *Encyclopedia of Statistical Sciences,* S. Kotz and N. L. Johnson (eds.), Wiley, New York, 1985

Zeithaml, Valarie A., Leonard L. Berry, and A. Parasuraman (1996), "The Behavioral Consequences of Service Quality," *Journal of Marketing*, 60 (April), 31-46.

Zeithaml, V.A. (2000), "Service Quality, Profitability, and the Economic Worth of Customers: What We Know and What We Need to Learn," *Journal of the Academy of Marketing Science*, 28 (1), 67-85.

Zviran, M. & Erlich, Z. (2003), Measuring IS user satisfaction: Review & Implications, *Communications of the AIS*, 12, 81-103

Appendix

A1. (Path Coefficients, Standard Error, T-Values)

Hypotheses	Path Coefficients	Standard Error	T Statistics
CO -> PT	0.456949	0.077357	5.907024
CO -> PU	0.777660	0.030264	25.696015
CO -> SA	0.419656	0.073646	5.698262
CO -> SQ	0.798498	0.026921	29.661003
PT -> CI	0.161723	0.097031	1.666720
PT -> SA	0.168488	0.078330	2.151007
PU -> CI	0.134785	0.079303	1.699613
PU -> SA	0.236455	0.061616	3.837578
SA -> CI	0.254482	0.092665	2.746256
PQ -> CI	0.364731	0.081889	4.453974
PQ -> PT	0.445102	0.075851	5.868073
PQ -> SA	0.135122	0.074554	1.812399
SF-> CI	0.148501	0.047975	3.095371
DF-> CI	0.009121	0.035805	0.254734