

***Title:** Factors Affecting Information Obtained for the Purpose of Decision-Making Using Mobile Phones

Teleuse@BOP4 working paper

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***Abstract:** Mobile phone adoption and usage is increasingly gaining in importance among users at the bottom of the economic pyramid (BOP). This paper investigates the phenomenon of information obtained through voice services and SMS via mobile phones, among users at the BOP to examine the impact of the two services in the intention to continue using mobile telecommunication. This investigation brings together theories on technology adoption and the information search paradigm to identify factors that affect information obtained through mobile phones. A structured survey conducted among individual telecommunication users as part of the Teleuse4@BOP project by LIRNEasia (a think tank initiative based in Colombo, Sri Lanka), provides the required data from owners of mobile phones from the BOP population. Findings reveal that perceived cost and perceived benefits significantly affect the information obtained using mobile phones using voice services. However, contrary to expectations, findings reveal that perceived ease of use has a negative relationship with information obtained using SMS services. Findings also reveal that subjective norm impacts information obtained more in the context of SMS services compared to voice services. These insights should prove helpful for policy formulation as well as for business development. The paper ends with a discussion on contributions, and directions for future research.

***Keywords:** mobile telecommunication, BOP, mobile phone, information, technology adoption, TAM, TPB

Factors Affecting Information Obtained for the Purpose of Decision-Making Using Mobile Phones

Adoption of mobile telecommunication services has witnessed tremendous growth over the past few years, and the expected revenue from mobile services in the Asia-Pacific region (excluding Japan) is expected to grow to about USD 250,000 million in 2015, up from around USD 185,000 million in 2011 (International Data Corporation 2012). Mobile telecommunication service providers offer a large array of services that users can choose from. In addition to voice-based services (that allow the user to use the mobile phone for making voice calls), service providers offer other services that include peer-to-peer short messaging services (SMS), mobile alerts (e.g., weather information), mobile money applications (e.g., banking, payments), and access to the Internet (e.g., browsing the Internet, mobile commerce). In the Asia-Pacific region, broadly speaking, revenues for voice-based services are projected to stand at USD 150,000 million in 2015 (USD 130,000 million in 2011), while non-voice services are projected to reach USD 65,000 million in 2015 (USD 55,000 million in 2011), indicating a steeper growth rate for the non-voice services (IDC 2012).

Various studies investigate the phenomenon of adoption of mobile phones and services in settings that include developed economies (e.g., Fillion and Ekionea 2010; Pope 2011) as well as emerging and developing economies (e.g., Ilahiane and Sherry 2012; Islam et al. 2011; Martin and Abbott 2011; Rangaswamy and Nair 2010). Though the factors affecting mobile phone adoption is a widely-researched topic, little research has been done to investigate the role of work-related information obtained via specific types of mobile telecommunication services in the context of a user's intention to continue using mobile phones. The importance of work-related information in the context of adopting a technology, has been acknowledged by Venkatesh and Davis (2000) in their extension of the Technology

Acceptance Model (TAM) (Davis 1989), which is also referred to as TAM2. In the context of telecommunication services, a user can obtain work-related information through the different services used by the user. However, the information obtained via these different services may be different in form. For example, a user may obtain the same information from a business associate through a voice call or via an SMS. Though the content of that information may be the same, the forms of communication are different: the former is audio-based and synchronous, while the latter is (usually) text-based and asynchronous. Specifically, in trying to reap work-related benefits via mobile telecommunication services, will the information obtained via different services differently affect the user's intention to continue to use mobile phones? This question is pertinent for policy makers, researchers, and practitioners in the domain of mobile telecommunication especially concerned with the population at the bottom of the economic pyramid (BOP¹) in developing and emerging economies, where mobile phone adoption and usage is increasingly gaining in importance among this user group (Bala and Alampay 2010).

This research addresses the above-stated gap in extant literature through an investigation of usage of mobile telecommunication services by users at the BOP across five countries in the Asia-Pacific region. Specifically, this research investigates the following issues: 1) What is the relationship between the work-related information obtained via telecommunication services, and the intention to continue using mobile phones?, and 2) What are the factors that affect work-related information obtained through mobile telecommunication services? These research questions are investigated for two separate groups of users: Group 1 (G1) users who use voice only services, and Group 2 (G2) users

¹ BOP is defined as those individuals belonging to the socio-economic classification (SEC) D and E, as per the classification of households followed by the Market Research Society of India, which takes into account the education and occupation of the chief wage earner of the house (A, B and C represent the upper strata as per the above-mentioned SEC).

who predominantly use SMS (i.e., a non-voice service), though some of them use voice-services as well. The two groups are mutually exclusive.

This investigation contributes to our understanding of the differences in the perceived benefits obtained by users at the BOP through voice and SMS services. This research also highlights the factors that affect work-related information obtained through voice and SMS services. From a theoretical perspective, this investigation situates the use of mobile phones for obtaining work-related information by users at the BOP within established and accepted research paradigms of adoption of technology and information search. From a managerial perspective, this understanding is critical for organizations in the telecommunications sector, as the findings have implications for business in general, and marketing in particular. The findings also have implications for product research, product development, and policy formulation.

The rest of the paper is organized as follows: the following section discusses the literature on information search and technology adoption. The next section discusses the research methodology, data analysis and the empirical findings. The final section presents implications of the findings, limitations and proposals for future research.

Literature Review and Hypotheses

This research is grounded in the information search paradigm and technology adoption theories (TAM, TAM2 and Theory of Reasoned Action (TRA)). The theoretical frameworks and the variables used to build the proposed model are discussed below.

Theory of Reasoned Action (TRA), Technology Acceptance Model (TAM), Social Cognition Theory, and Information Search

Theory of Reasoned Action (TRA) has been extensively applied to explain user behavior regarding adoption of technology. TRA proposes that an individual's actual behavior is determined by the person's intention to perform the behavior, and this intention is influenced by the individual's attitude. Attitude is defined as "a learned predisposition to respond in a consistently favorable or unfavorable manner with respect to a given object" (Chau & Hu, 2001, p. 6). A person's attitude toward a behavior is largely determined by salient beliefs about the consequences of that behavior and the evaluation of the desirability of the consequences (Fishbein & Ajzen, 1975). The Technology Acceptance Model (TAM) (Davis 1989) consists of three components that shape a user's attitude and intention toward using a technology. *Perceived ease of use* (PEU), *perceived usefulness* (PU) and other external variables predict the *intention* to use a technology. An extension of TAM through TAM2 (Venkatesh and Davis 2000), identifies *subjective norm* as a variable that affects intention to use the technology.

One of the most powerful theories of human behavior is Social Cognition Theory (Bandura, 1986). Compeau and Higgins (1995) applied and extended SCT to the context of computer utilization, which was further extended by Venkatesh et al. (2003) to the realm of intention and usage of technology in general. *Self efficacy* is identified as a key variable that affects a user's intention to use a technology, and is defined as the judgment of one's ability to use a technology to accomplish a task.

There exists widespread acknowledgment that there are costs associated with acquiring and processing information (e.g., Punj & Staelin, 1983; Srinivasan & Ratchford, 1991; Bakos, 1997). As a consequence of the costs involved in information search, Stigler (1961) argues that consumers will continue to search for additional information until the benefit obtained from additional information is less than the cost of obtaining it, which corresponds to the cost-benefit framework. Normative models of information search derived from

economic theory propose that consumers screen alternatives to form consideration sets. Some of the widely investigated factors in the context of *information obtained* include *perceived cost*, and *perceived benefit* (Punj and Staelin 1983).

Therefore, in our model, we include the following variables: *information obtained*, *perceived cost*, *perceived benefit*, *perceived usefulness*, *perceived ease of use*, *subjective norm*, *self efficacy* and *intention* (Figure 1).

Put Figure 1 About Here

Intention (Continued Usage)

Information Systems research has extensively investigated the adoption of new information technologies by individuals (Venkatesh, Morris, Davis, and Davis 2003). One of the streams of research looks at adoption of technology where the dependent variable is usage intention. In technology adoption models (e.g., TAM, TAM2), the direct link between attitude and intention is well established. In addition, the positive relationship that attitude has in predicting intention is well-established in marketing literature (Venkatesh, et. al 2003). This relationship (attitude → intention) is assumed in the model presented in this study. We define *intention* as the user's intention to continue to use a mobile phone.

Information Obtained (Work-Related)

Information Obtained is conceptualized as any information related to job and livelihood-related issues that is accessible to the user by using mobile telecommunication services. The effort required for obtaining such information is low. For example, a user of voice or SMS services can easily exchange information with other such users at the touch of a few buttons. Traditionally, this type of information would be accessible to the user when the user interacted with the source of the information (e.g., a person, an organization) in a face-

to-face situation, or access the source of the information, which required a high level of effort. For most users in this user-base, mobile telecommunication is an individual-level technology that they have interacted with probably for the first time. Venkatesh and Davis (2000) identify *job relevance* as a variable that affects a user's decision to adopt a technology, where they conceptualize the construct as whether adopting a technology "is applicable" for one's job or not (p. 191). In our conceptualization, *information obtained* is the information that the user is able to obtain *because* of the mobile phone, and broadly encompasses any information that may be accessible through mobile phones. Our construct is, therefore, conceptually different and broader from *job relevance*, which has a much narrower scope and is relevant for a specific task at hand. The information obtained is a benefit of using the mobile telecommunication services, and is expected to positively affect the intention to continue to use the technology:

H1: A higher level of information obtained leads to a greater intention to use mobile telecommunication.

Perceived Cost

As consumers continue their search for information, the cost associated with acquiring information increases. As such, consumers progressively search for less and less information. Diminishing returns set in after marginal costs outweigh the marginal benefits of the search (Srinivasan & Ratchford, 1991). Information load—the number of information cues present to the consumer—is another theory that is well examined in the context of information search (Evaristo, Adams, & Curley, 1995). Hart (1986) indicates that an increase in task demands (i.e., task complexity) directly influences mental workload and can lead to information overload. Information overload occurs when the amount of input to a system exceeds its processing capacity (Milford & Perry, 1977). There are some limits on an individual's capacity for processing information. Decision makers have fairly limited cognitive processing

capacity (Simon, 1979). When information overload occurs, it is likely that a reduction in decision quality will occur, leading to fewer and less-involved information search.

The effort required by customers is frequently considered in the context of obtaining information. The proposed model includes *Perceived Cost* as one of the antecedents to obtaining work-related information, and is represented by the hindrances posed by the telecommunication network. For example, the strength of the signal that is available on a network often determines the ease with which a call can be placed or an SMS can be sent from a mobile device. In other words, if the strength of the signal is weak, a user may have to make several attempts before the call can be successfully completed, or the SMS can be successfully sent. Therefore, we expect the relationship between perceived cost and information obtained to be negative due to costs such as cognitive, time, and energy that comprise perceived cost in the context of using a mobile device. Therefore, it is hypothesized that:

H2: A higher level of perceived cost leads to a lower level of information obtained through mobile telecommunication.

Perceived Benefit

Perceived benefit in the context of information search has been variously conceptualized in extant literature. For example, the benefits of search may refer to realized benefits (e.g., Punj and Staelin 1983). In this study, too, *perceived benefits* is conceptualized as the actual benefits that users obtain by using mobile phones. Specific benefits, in our research, include work-related outcomes. Hence, the following hypothesis is made:

H3: A higher level of perceived benefit leads to a higher level of information obtained through mobile telecommunication.

Perceived Usefulness

PU is “the degree to which a person believes that using a particular system would enhance his or her job performance” (Davis, 1989, p. 320). In our investigation, PU is the user’s perception of the usefulness of mobile telecommunication services for obtaining work-related information. The usefulness of a device or technology is documented in systems literature as having a positive impact on the user’s intention to use it in future (Rao & Troshani, 2007). Consumers use mobile telecommunication services to obtain work-related information. It is expected that the overall perception of the usefulness of mobile telecommunication on intention to continue using the services will be positive. Thus it is hypothesized that:

H4: A higher level of perceived usefulness leads to a greater intention to use mobile telecommunication.

Similarly, it is expected that high perceived usefulness will lead a user to obtain more information through the mobile device. Therefore, it is hypothesized that:

H5: A higher level of perceived usefulness leads to a higher level of information obtained through mobile telecommunication.

Perceived Ease of Use

PEU is “the degree to which a person believes that using a particular system would be free of effort” (Davis, 1989, p. 320). In our investigation, PEU is the user’s perception of the ease with which mobile telecommunication services can be used for obtaining work-related information. A system that is relatively effortless to operate is more likely to be adopted (Davis, 1989; Rao & Troshani, 2007). Therefore, it is hypothesized that:

H6: A higher level of perceived ease of use leads to a greater intention to use mobile telecommunication.

Similarly, it is expected that high perceived ease of use will lead a user to obtain more information through the mobile device. Therefore, it is hypothesized that:

H7: A higher level of perceived ease of use leads to a higher level of information obtained through mobile telecommunication.

In line with TAM, we expect that:

H8: A higher level of perceived ease of use leads to a higher level of perceived usefulness of mobile telecommunication.

Subjective Norm

The TRA states that intention is the best predictor of behavior and that intentions are influenced by attitudes and subjective norms. According to Fishbein and Ajzen, attitudes toward a behavior comprise individuals' appraisals of how positive or negative performing the behavior would be, and subjective norms reflect individuals' perceptions of the social pressure to either perform or not perform the behavior. Fishbein and Ajzen considered both *attitudes* and *subjective norms* to be based on beliefs and their effects on *actual behavior* to be mediated by *intentions*. Therefore, it is hypothesized that:

H9: A higher level of subjective norm leads to a greater perceived usefulness of mobile telecommunication.

Similarly, it is expected that high perceived ease of use will lead a user to obtain more information through the mobile device. Therefore, it is hypothesized that:

H10: A higher level of subjective norm leads to a greater intention to use mobile telecommunication.

H11: A higher level of subjective norm leads to a higher level of information obtained through mobile telecommunication.

Self Efficacy

Self-Efficacy is an important consumer trait that has been identified to predict the adoption and use of a technology by an individual (e.g., Davis, 1986; Dabholkar & Bagozzi, 2002; Ellen, Bearden, & Sharma, 1991; Hill, Smith, & Mann, 1987). Self-efficacy is defined as “the belief that one has the capability to perform a particular behavior” (Compeau & Higgins, 1995, p. 189), and it is also referred to as “people’s judgments of their capabilities to organize and execute the course of action required to attain designated types of performances” (Bandura, 1986, p. 391). In our research, self-efficacy refers to a consumer’s perception of the degree of efficiency with which she or he is able to obtain work-related information through mobile telecommunication. Previous research suggests that “self-efficacy can help individuals determine what actions to take, how much effort to invest, how long to persevere, and what strategies to use” (Lankton & Wilson, 2007, p. 89). Low self-efficacy leads to higher resistance to change (Lankton & Wilson, 2007).

In contrast, a relatively high level of self-efficacy is seen to have a positive effect on cognitive processing, to enhance self-motivation, to reduce anxiety, and to allow an individual the resilience to innovate or persevere in long-term behaviors with ambiguous outcomes. Similarly, Ellen et al. (1991) suggest that self-efficacy may be a critical influence on decision-making technology. People with self-esteem deficits are uncertain about their capacity to deal with new technology and may choose to avoid it. Thus, the following hypothesis is formed:

H12: A higher level of self efficacy leads to a greater perceived usefulness of mobile telecommunication.

Similarly, it is expected that high self efficacy will lead a user to obtain more information through the mobile device. Therefore, it is hypothesized that:

H13: A higher level of self efficacy leads to a greater intention to use mobile telecommunication.

Research Methodology

Data Collection

A structured survey was conducted among individual telecommunication users as part of the Teleuse4@BOP project by LIRNEasia (a think tank initiative based in Colombo, Sri Lanka), to obtain telecommunication usage data from owners as well as non-owners of mobile phone from the BOP population. The Teleuse4@BOP project is the fourth in a series of studies undertaken to obtain an understanding of how people at the BOP use mobile telecommunication. This study was carried out with the aid of grants from the International Development Research Centre, Ottawa, Canada (www.idrc.ca), and UKaid from the Department of International Development, UK (www.dfid.uk). Data were collected from 9066 respondents across five countries in Asia (i.e., Bangladesh, India, Pakistan, Sri Lanka, and Thailand). All participants were between 15 and 60 years of age. Participants were approached at their households to take part in the survey. The mean age of the respondents was 32.82 years, 55.0% were females, and 74% were from the rural areas.

The study used a multi-stage stratified cluster sampling by Probability Proportionate to Size (PPS). It covered all provinces of each country except India where the majority of states were covered, and selected the target number of urban and rural centers in each province using PPS. Within the selected centers, a common place such as a road, park or hospital was assigned as the starting point to contact households for survey using the right-hand or left-hand rule. The number of starting points in each center was determined proportionate to the population and then a fixed number of interviews conducted per starting point. The structured survey questionnaire was first created in English and then translated in local languages. Back-translation and pre-tests were conducted to modify any obscure questions and words. The survey was conducted face-to-face by sufficiently trained

administrators who read out each question and marked the answers on behalf of the respondents. A set of pictorial or text card was used for Likert-scale or complex questions.

The following analysis concentrates on mobile phone owners only. Of the total respondents, 4926 users own mobile phones. Analysis regarding the primary reason for using the mobile phone, reveals that 4567 users use the phone for making voice calls, 1582 users use SMS services, 37 users access information services, while only 6 use banking services (359 users did not provide any response). In order to investigate the stated objectives, only valid responses to users' perceptions of usage regarding the services that they use on the mobile phones and the benefits obtained due to the usage are included in the analysis. Our analysis concentrates on the following two user groups: a) Group 1: those that use the mobile phone for voice only services (valid responses: 1171); b) Group 2: those that use the mobile phone for predominantly SMS services (valid responses: 1125). (The two groups are henceforth referred to as G1 and G2).

Measurement

Existing literature is used as the source of measure for some of the constructs defined in the theoretical model. Specifically, *intention*, *perceived usefulness*, *perceived ease of use*, *subjective norm* and *self efficacy* were measured using validated scale items. The measures for *information obtained*, *perceived cost*, and *perceived benefit* were collected through other items that were included in the survey. All items were measured on a five point scale. A refined list of question items (indicators) that survived an exploratory factor analysis (EFA) and a confirmatory factor analysis (CFA) is summarized in Table 1.

For each of the two groups of users, the underlying factor structure among the variables was assessed by EFA with a varimax rotation (i.e., an oblique rotation). The scales factored as expected with factor loadings for the specific scale items recording an excess of .50. Subsequently, a more rigid statistical procedure (CFA) was employed to assess the

dimensionality and validity of the measures. In particular, a CFA can assess the convergent and discriminant validity of the studied constructs in the measurement model. SPSS-AMOS (version 18.0) was used as the analytical tool for the estimation of the measurement model as well as the structural path model. The descriptive statistics, Cronbach's alpha values, composite reliability, average variance extracted, and the standardized factor loadings are reported in Table 2. All coefficient alphas are substantially higher than the generally recommended benchmark of .60 (Churchill, 1979), revealing internal consistency for all constructs included in the study.

The convergent validity (i.e., the degree of association between measures of a construct) and composite reliability (i.e., the internal consistency of the indicators measuring each CFA construct) were tested and the results were satisfactory (see Table 2). The discriminant validity (i.e., the degree to which items of constructs are distinct) was empirically assessed by using the variance-extracted test. The criterion to examine the discriminant validity is to check whether the variance shared between measures of two different constructs (the squared correlation) is less than the amount of variance extracted for the items measuring each construct (Tables 3a and 3b). Empirical results indicated that discriminant validity was achieved in this study. In addition, an examination using the Chi-square difference test also confirmed that the studied constructs should be viewed as distinct (Anderson & Gerbing, 1988).

Put Tables 2, 3a and 3b About Here

Empirical Results

To assess the overall fit of the measurement model for the two user groups, we reviewed a number of goodness-of-fit indices: a) G1: RMSEA (.033), CFI (.974), TLI (.966), and a Chi-square value of 480.41 (degree of freedom = 161; $p < 0.05$); b) G2: RMSEA (.041), CFI (.966), TLI (.955), and a Chi-square value of 462.05 (degree of freedom = 161; $p < 0.05$). Though the chi-square value is significant, this result is expected in large samples. However, according to the criteria summarized in Hair et al. (2010), a battery of fit indices reveals a good fit between the proposed model and the data for both the user groups.

Next, we test the hypothesized model (as shown in Figure 1), on the two user groups. The fit indices of the path model present good fit to our model for the two user groups: a) G1: (RMSEA (.040), CFI (.961), TLI (.951), and a Chi-square value of 643.11 (degree of freedom = 166; $p < 0.05$); b) G2: (RMSEA (.042), CFI (.962), TLI (.952), and a Chi-square value of 500.58 (degree of freedom = 166; $p < 0.05$).

Observation of the magnitudes and the directional signs of the standardized regression weights lead us to different conclusions regarding the two sets of users. For the voice only users, our results find support for nine of the 13 hypotheses. We do not find support for H₅, H₆, H₇, and H₁₃. *Perceived cost*, *perceived benefit*, *subjective norm* and *self efficacy* were found to be significant drivers of *information obtained* via voice services through mobile phones. The *information obtained*, *subjective norm*, and *perceived usefulness* are significant predictors of the *intention* to continue using mobile phones, while *subjective norm* and *self efficacy* significantly affect *perceived usefulness*.

For the SMS users, our results find support for seven of the 13 hypotheses. We do not find support for H₁, H₂, H₅, H₇, H₁₀, and H₁₃. *Perceived benefit*, *subjective norm* and *self efficacy* were found to be significant drivers of *information obtained* via SMS through mobile phones. The *perceived usefulness* and *perceived ease of use* are significant predictors of the

intention to continue using mobile phones, while *subjective norm* and *self efficacy* significantly affect *perceived usefulness*.

Put Figure 2 About Here

Overall, the proposed model provides a better explanation of the BOP users' use of mobile voice services to obtain work-related information, as compared to obtaining similar information via SMS. The present study finds support for variables that are important in the traditional information search paradigm (e.g., *perceived cost*, *perceived benefit*) as well as variables that have specific importance in the context of technology adoption (e.g., *subjective norm*, and *self efficacy*).

Discussion and Conclusion

Our model achieved an R^2 value of: a) G1: 0.320 for *information obtained*, 0.654 for *perceived usefulness* and 0.428 for *intention*; b) G2: 0.224 for *information obtained*, and .673 for *perceived usefulness* and 0.598 for *intention*.

Some unexpected findings are noted for G1. It is noted that the relationship between *perceived ease of use* and *intention* is not significant. As expected, the relationship between *perceived ease of use* and *perceived usefulness* is positive and significant, reducing the possibility that the findings are confounded by measurement errors. The psychometric tests also provide support that the measurements for the construct *perceived ease of use* are reliable and valid. One possible reason for this finding could be that the notion of "ease-of-use" is not applicable in the context of obtaining information through voice services. In other words, using voice services is probably perceived as being equivalent to conducting a face-to-face conversation, and an evaluation of whether the service is easy to use or not, does not

occur, rendering the variable less relevant. Another possible reason could be that the construct *perceived ease of use* does not have any specific meaning for this particular user-base. This user group traditionally has had to travel long distances or make special efforts to obtain information that most users towards the top of the economic pyramid (e.g., consumers in developed Western economies, and users in SEC A, B, and C) usually take for granted because of a greater access to different modes of communication. Therefore, in the context of using mobile phones for obtaining information, the notion of ease is probably less relevant to this user group. Similar arguments probably explain why *perceived usefulness*, *perceived ease of use* and *self efficacy* are not significant drivers of *information obtained* through voice services.

Some unexpected findings are also noted for G2. First, it is surprising to note that *perceived ease of use* has a negative relationship with *information obtained* through SMS. Though this finding is not significant, it is however, worthy of some discussion. Once again, as in G1, the relationship between *perceived ease of use* and *perceived usefulness* is positive and significant, reducing the possibility of measurement errors; the constructs are reliable and valid. One possible reason for this finding could be that surmounting the difficulties of using a mobile phone provides some sort of satisfaction to this group of users. In other words, a decrease in perceived ease of use leads to an increase in the usage of the device for accessing information via SMS. Extending this argument, one might further argue that the users may be willing to use this device for accessing information despite the odds that adoption of the device might present. Elsewhere, it has been noted that adoption of mobile devices have led to an enhancement of self-worth and a sense of inclusion for users at the BOP, which resonates with the argument presented here.

Second, *perceived cost* has a non-significant relationship with *information obtained*. We operationalize perceived cost in terms of the effort needed to negotiate with the network

in order to use a telecommunication service. The asynchronous nature of an SMS allows a user to send a message at any time, with an expectation that the SMS will be delivered over the next few minutes, even if a network might not be immediately available. Similarly, low signal strength is often sufficient to successfully send and receive SMS. These reasons probably reduce an SMS user's dependency on the available network (compared to a user of voice services), providing possible reasons for this finding.

Third, *perceived usefulness* and *self efficacy* are not significant indicators of *information obtained* for SMS users. The findings on these two variables, though not significant, are in the expected directions. However, both these variables significantly affect *perceived usefulness* (the importance of *self efficacy* been noted in the extended technology acceptance model (Yousafzai, Foxall and Pallister 2007)). Fourth, the non-significant relationship between *information obtained* and *intention* is unexpected. This finding underscores that the work-related information obtained through SMS does not contribute to a user's intention of continuing to use the mobile phone. This finding, along with the negative relationship between *perceived ease of use* and *information obtained*, probably indicates that users find it somewhat difficult to use SMS services, and therefore, the extent of work-related information obtained through these services is low.

Implications

The present study contributes to policy research in several ways. First, this study demonstrates that users at the BOP perceive a higher benefit from using voice-based services as compared to SMS services (0.376 vs. 0.193). This finding indicates that a greater deployment of the voice-based mode needs to be undertaken in order to provide different types of information that may otherwise be offered through other types of services (e.g., SMS, Internet). Second, for voice-based services, the impact of *subjective norm* on *information obtained* is weaker than for SMS services (0.273 vs. 0.400). This finding implies

that whether a user uses SMS services for obtaining work-related information, to a great extent, is determined by whether those close to him/her use the service or not. A greater emphasis may be placed on disseminating information among potential SMS users through groups that influence their behavior, because we note that the total effect of *subjective norm* on *intention* is significant and positive (0.103) (for G2), even though the direct effect is not significant (0.038). Such trainings may be imparted at the time of purchasing handsets, and incentives (e.g., on top-ups, etc.) may be offered if a user is able to persuade other users to partake in the training. Third, this study also demonstrates that very few users at the BOP are currently accessing the Internet in order to address their information-related needs, which underscores the need to investigate the barriers to the adoption of these services.

The present study makes several contributions to the marketing and information technology literature. First, this study identifies factors that affect the use of voice-based services and SMS services for obtaining work-related information by users at the BOP. Second, this study brings together existing research from management information systems and marketing literatures to study and contributes by studying a heretofore under-researched population. The proposed model, along with the empirical findings, shed new light on mapping the phenomenon of information obtained using mobile phones by users at the BOP. Third, this study reveals that certain constructs (e.g., *ease of use*) behave differently in the context of this user group when compared to user groups in developed countries.

Limitations and Future Research Directions

This study has several limitations. First, note that many of the items (that were included in the study to measure specific constructs, e.g., *perceived usefulness*, *perceived ease of use*), have been developed and used in the context of organizational settings in Western countries. This study adopts these existing scales for studying the BOP population. Second, many of the other constructs (e.g., *perceived cost*, *perceived benefit*) are measured by

anchoring the scales between “no change” and “greatly improve”, instead of “strongly disagree” and “strongly agree”. It might be possible that some users, who have in fact used their phones to obtain information using voice or SMS services, have not responded to the specific question because they have not seen a change (or have seen a negative one). Though the possibility of this happening is low, it is necessary to make a note of this issue.

This study opens up several avenues for future research. First, future studies need to investigate the extent of benefits obtained because of accessing information via mobile phones. The users studied in this investigation, are probably using a somewhat sophisticated set of services for the first time, and the benefits obtained by using these services probably outweigh the problems that they may encounter while using the services. More research is necessary in order to understand the ways in which the use of these services has positively affected the lives of these users. Second, future research also needs to focus on whether the well-being of the users has been affected because of information obtained via mobile phones. Third, this research investigates information obtained through only two types of services. Further investigations need to investigate information obtained through other services, including access to the Internet. Fourth, this research looks at a utilitarian benefit (i.e., information obtained) obtained via a set of services offered on a mobile phone. How do hedonic benefits (e.g., playing games) affect the continued usage of mobile phones? The findings of these studies will provide a deeper understanding of the impact of information obtained on the continued use of mobile phones, and will have implications for policy formulation and practitioners.

References

- Ajzen I. (1991). The theory of planned behavior. *Organisational Behavior and Human Decision Process*, 52 (2), 179-211.
- Ajzen I. (2002). Perceived behavioral control, self-efficacy, locus of control, and the theory of planned behavior. *Journal of Applied Social Psychology*, 32, 665-683.
- Anderson, J. C., and Gerbing, D. W. (1988). Structural equation modeling in practice: A review and recommended two-step approach. *Psychological Bulletin*, 103 (3), 411–423.
- Bakos, J. Y. (1997). Reducing buyer search costs: Implications for electronic marketplaces. *Management Science*, 43(December), 1676–1692.
- Bala, Gemma, and Alampay, Erwin. (2010). Mobile 2.0: M-money for the BoP in the Philippines. *Information Technologies & International Development*, 6 (4), 77-92.
- Bandura, A. (1986). *Social foundations of thought and action*. Englewood Cliffs, NJ: Prentice Hall.
- Chau, P. Y. K., and Hu, P. J.-H. (2001). Information technology acceptance by individual professionals: A model comparison approach. *Decision Science*, 32 (4), 699-719.
- Churchill, G. A. (1979). A paradigm for developing better measures of marketing constructs. *Journal of Marketing Research*, 16 (1), 64–73.
- Compeau, D. R., and Higgins, C. A. (1995). Computer self-efficacy: Development of a measure and initial test. *MIS Quarterly*, 19 (2), 189–211.
- Dabolkar, P. A., Shepard, C. D., and Thorpe, D. I. (2000). A comprehensive framework for service quality: An investigation of 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*, September, 319-340.

- Ellen, P. S., Bearden, W. O., and Sharma, S. (1991). Resistance to technological innovations: An examination of the roles of self-efficacy and performance satisfaction. *Journal of the Academy of Marketing Science*, 19 (4), 297–307.
- Evaristo, R., Adams, C., and Curley, S. (1995). Information load revisited: A theoretical model. In Proceedings of the 16th Annual International Conference on Information Systems (pp. 197–206). Atlanta, GA: Association for Information Systems.
- Fillion, Gérard, and Ekionea, Jean-Pierre Booto. (2010). Testing a moderator-type research model on the use of mobile phone. *Academy of Information & Management Sciences Journal*. 13 (2), 59-81.
- Fishbein, M., and Ajzen, I. (1975). *Belief, Attitude, Intention and Behavior: An Introduction to Theory and Research Reading*. MA: Addison-Wesley.
- Hair, J. F., Black, W. C., Babin, B. J., and Anderson, R. E. (2010). *Multivariate data analysis*. Upper Saddle River, NJ: Prentice Hall.
- Hill, T., Smith, N., and Mann, M. (1987). Role of efficacy expectations in predicting the decision to use advanced technologies: The case of computers. *Journal of Applied Psychology*, 72 (2), 307–313.
- Huneke, M. E., Cole, C., and Levin, I. P. (2004). How varying levels of knowledge and motivation affect search and confidence during consideration and choice. *Marketing Letters*, 59 (2–3), 67–79.
- Ilahiane, Hsain, and Sherry, John W. (2012). The Problematics of the "Bottom of the Pyramid" Approach to International Development: The Case of Micro-Entrepreneurs' Use of Mobile Phones in Morocco. *Information Technologies & International Development*, 8 (1), 13-26.

International Data Corporation (2012).

http://www.idc.com/getdoc.jsp?containerId=IDC_P563#IDC_P563_genericsection00

30, Last accessed on Aug 28, 2012

Islam, Md. Aminul, Khan, Mohammad Aktaruzzaman, Ramayah, T., and Hossain, Muhammad Muazzem. (2011). The Adoption of Mobile Commerce Service among Employed Mobile Phone Users in Bangladesh: Self-efficacy as A Moderator.

International Business Research. 4 (2), 80-89.

Kim, S. S., and Malhotra, N. K. (2005), "A Longitudinal Model of Continued IS Use: An Integrative View of Four Mechanisms Underlying Postadoption Phenomena,"

Management Science, 51 (5), 741-755.

Lankton, N. K., and Wilson, E. V. (2007). Factors influencing expectations of e-health services within a direct-effects model of user satisfaction. *E-Service Journal*, 5 (2), 85–111.

Li, H., Edwards, S. M., and Lee, J.-H. (2002). Measuring the intrusiveness of advertisements: Scale development and validation. *Journal of Advertising*, 31 (2), 37–47.

Martin, Brandie Lee, and Abbott, Eric. (2011). Mobile Phones and Rural Livelihoods: Diffusion, Uses, and Perceived Impacts among Farmers in Rural Uganda. *Information Technologies & International Development*. 7 (4), 17-34.

McCoy, S., Everard, A., Polak, P., and Galletta, D. F. (2007). The effects of online advertising. *Communications of the ACM*, 50 (3), 84–88.

Milford, J. T., and Perry, R P. (1977). A methodological study of overload. *Journal of General Psychology*, 97, 131–137.

Moore, William L., and Lehmann, Donald R. (1980). Individual Differences in Search Behavior for a Nondurable. *Journal of Consumer Research*, 7 (3), 296-307.

- Povey, R., Conner, M., Sparks, P., James, R., and Shepherd, R. (2000). Application of the Theory of Planned Behaviour to two dietary behaviours: roles of perceived control and self-efficacy. *British Journal of Health Psychology*, 5, 121-139.
- Pope, Meiling; Pantages, Ryan; Enachescu, Nadeshda; Dinshaw, Ryan; Joshlin, Corey; Stone, Robert; Austria, P. Albert; and Seal, Kala. (2011). Mobile payments: The reality on the ground in selected Asian countries and the United States. *International Journal of Mobile Marketing*. 6 (2), 88-104.
- Punj, G. N., and Staelin, R. (1983). A model of consumer information search behavior for new automobiles. *Journal of Consumer Research*, 9 (March), 366–380.
- Rangaswamy, Nimmi; and Nair, Sumitra. (2010). The Mobile Phone Store Ecology in a Mumbai Slum Community: Hybrid Networks for Enterprise. *Information Technologies & International Development*. 6 (3), 51-65.
- Rao, S., and Troshani, I. (2007). A conceptual framework and propositions for the acceptance of mobile services. *Journal of Theoretical and Applied Electronic Commerce Research*, 2 (2), 61-73.
- Simon, H. A. (1979). Information processing models of cognition. *Annual Review of Psychology*, 30, 363–396.
- Srinivasan, N., and Ratchford, B. T. (1991). An empirical test of a model of external search for automobiles. *Journal of Consumer Research*, 18 (September), 233–242.
- Terry, D. J., and O'Leary, J. E. (1995). The theory of planned behaviour: The effects of perceived behavioural control and self-efficacy. *British Journal of Social Psychology*. 34, 199-220.
- Venkatesh, Viswanath, Morris, M. G., Davis, G. B., & Davis, F. D. (2003). User acceptance of information technology: Toward a unified view. *MIS Quarterly*, 27, (3) 425-478.

- Venkatesh, V., and Davis, Fred. (2000). A Theoretical Extension of the Technology Acceptance Model: Four Longitudinal Field Studies. *Management Science*, 46 (2), 186-204.
- Yousafzai, S. Y., Foxall, G. R., and Pallister, J. G. (2007). Technology acceptance: A meta-analysis of the TAM: Part 1. *Journal of Modeling in Management*, 2 (3), 251–280.

Table 1. The Measurement Items

| Construct | Items | Sources |
|------------------------------------|---|----------------------------|
| Information Obtained ^a | <ul style="list-style-type: none"> * Access to a mobile phone has improved your access to information you need in your job. * Access to a mobile phone has improved your ability to plan and make decisions relating to your livelihood. * Access to a mobile phone has improved your ability to find out about employment/work opportunities. | LIRNEaisa Researchers |
| Perceived Cost ^c | <ul style="list-style-type: none"> * Often, I can't get a signal, or signal strength is weak. * Often, I can't get a call through (network is busy). * The connection is not clear when I get connected. | LIRNEaisa Researchers |
| Perceived Benefit ^a | <ul style="list-style-type: none"> * Access to a mobile phone has improved your ability to reduce travel. * Access to a mobile phone has improved your ability to act or contact others in an emergency. * Access to a mobile phone has improved the efficiency of your day to day work. | LIRNEaisa Researchers |
| Perceived Usefulness ^b | <ul style="list-style-type: none"> * I find voice calls/sms to be useful in my life. * Using voice calls/sms increases my chances of achieving things that are important to me. * Using voice calls/sms helps me accomplish things more quickly, ** * I find voice calls/sms gives me useful information. | Davis (1989) |
| Perceived Ease of Use ^b | <ul style="list-style-type: none"> * I find voice calls/sms to be easy to use. * I think learning how to use voice calls/sms is easy to me. * My interaction with voice calls/sms is clear and understandable. | Davis (1989) |
| Subjective Norm ^b | <ul style="list-style-type: none"> * I use voice calls/sms because I want to use the same service people around me use. * I use voice calls/sms because it is common to use it in my community. | Venkatesh et al. (2003) |
| Self Efficacy ^b | <ul style="list-style-type: none"> * I am confident of using voice calls/sms if there was no one to show me how to do it. ** * I am confident of using voice calls/sms if someone showed me how to do it first. * I am confident of using voice calls/sms if I could ask someone for help if I got stuck. * I am confident of using voice calls/sms if I had a lot of time to try and use "the service". ** | Compeau and Higgins (1995) |
| Intention ^b | <ul style="list-style-type: none"> * I intend to use voice calls/sms in the future. * I expect that I would use voice calls/sms frequently in future. | Davis (1989) |

Five-point Likert scales:

^a1=No Change; 5=Greatly Improve

^b1=Strongly Disagree; 5=Strongly Agree

^c1=I always face this problem; 5=I never face this problem

** Item dropped after EFA

Table 2. Properties of the Two Measurement Models (CFA) (Voice Only | SMS)

| Construct and Indicators | Mean (S.D.) | Standardized Loading | Average Variance Explained | Composite Reliability (α) | Mean (S.D.) | Standardized Loading | Average Variance Explained | Composite Reliability (α) |
|---------------------------------|--------------------|-----------------------------|-----------------------------------|--|--------------------|-----------------------------|-----------------------------------|--|
| <i>Information Obtained</i> | 3.43 (1.21) | | .59 | .81 (.81) | 3.42 (1.22) | | .49 | .74 (.74) |
| Info1 | | 0.815*** | | | | 0.781*** | | |
| Info2 | | 0.767*** | | | | 0.559*** | | |
| Info3 | | 0.709*** | | | | 0.743*** | | |
| <i>Perceived Cost</i> | 3.66 (.87) | | .60 | .82 (.82) | 3.77 (.83) | | .53 | .77 (.77) |
| Cost1 | | 0.81*** | | | | 0.715*** | | |
| Cost2 | | 0.765*** | | | | 0.734*** | | |
| Cost3 | | 0.753*** | | | | 0.738*** | | |
| <i>Perceived Benefit</i> | 4.34 (.79) | | .54 | .78 (.77) | 4.54 (.62) | | .43 | .69 (.68) |
| Benefit1 | | .782*** | | | | 0.713*** | | |
| Benefit2 | | .711*** | | | | 0.623*** | | |
| Benefit3 | | .716*** | | | | 0.618*** | | |
| <i>Perceived Usefulness</i> | 4.32 (.57) | | .43 | .69 (.69) | 4.27 (.66) | | .59 | .81 (.81) |
| Useful1 | | 0.63*** | | | | 0.788*** | | |
| Useful2 | | 0.648*** | | | | 0.809*** | | |
| Useful3 | | 0.687*** | | | | 0.71*** | | |
| <i>Ease of Use</i> | 4.19 (.66) | | .51 | .76 (.76) | 4.21 (.68) | | .59 | .81 (.81) |
| Use1 | | 0.637*** | | | | 0.743*** | | |
| Use2 | | 0.734*** | | | | 0.773*** | | |
| Use3 | | 0.772*** | | | | 0.792*** | | |
| <i>Subjective Norm</i> | 3.92 (.97) | | .63 | .77 (.77) | 3.68 (1.04) | | .76 | .86 (.86) |
| SubNorm1 | | 0.829*** | | | | 0.886*** | | |
| SubNorm2 | | 0.757*** | | | | 0.859*** | | |
| <i>Self Efficacy</i> | 4.00 (.94) | | .54 | .70 (.70) | 3.94 (.83) | | .55 | .70 (.68) |
| Efficacy1 | | 0.737*** | | | | 0.625*** | | |
| Efficacy2 | | 0.733*** | | | | 0.838*** | | |
| <i>Intention</i> | 4.22 (.73) | | .60 | .75 (.75) | 4.24 (.72) | | .66 | .79 (.79) |
| Intention1 | | 0.791*** | | | | 0.813*** | | |
| Intention2 | | 0.763*** | | | | 0.809*** | | |

*** indicates significance at $p < .01$ level; Coefficient alphas are reported within the parentheses in the last column.

Table 3a. Correlations among Latent Constructs (Voice Only)

| Construct | Information Obtained | Perceived Cost | Perceived Benefit | Perceived Usefulness | Perceived Ease of Use | Subjective Norm | Behavioral Control | Self Efficacy | Intention |
|--------------------------|-----------------------------|-----------------------|--------------------------|-----------------------------|------------------------------|------------------------|---------------------------|----------------------|------------------|
| 1. Information Obtained | 1.00 | | | | | | | | |
| 2. Perceived Cost | -.078 | 1.00 | | | | | | | |
| 3. Perceived Benefit | .437 | .063 | 1.00 | | | | | | |
| 4. Perceived Usefulness | .364 | .026 n.s. | .322 | 1.00 | | | | | |
| 5. Perceived Ease of Use | .332 | -.020 n.s. | .228 | .756 | 1.00 | | | | |
| 6. Subjective Norm | .384 | -.077 | .105 | .466 | .504 | 1.00 | | | |
| 7. Behavioral Control | .351 | -.002 n.s. | .251 | .638 | .782 | .512 | 1.00 | | |
| 8. Self Efficacy | .257 | .007 n.s. | .226 | .425 | .396 | .338 | .450 | 1.00 | |
| 9. Intention | .326 | -.070 | .280 | .581 | .536 | .414 | .586 | .579 | 1.00 |

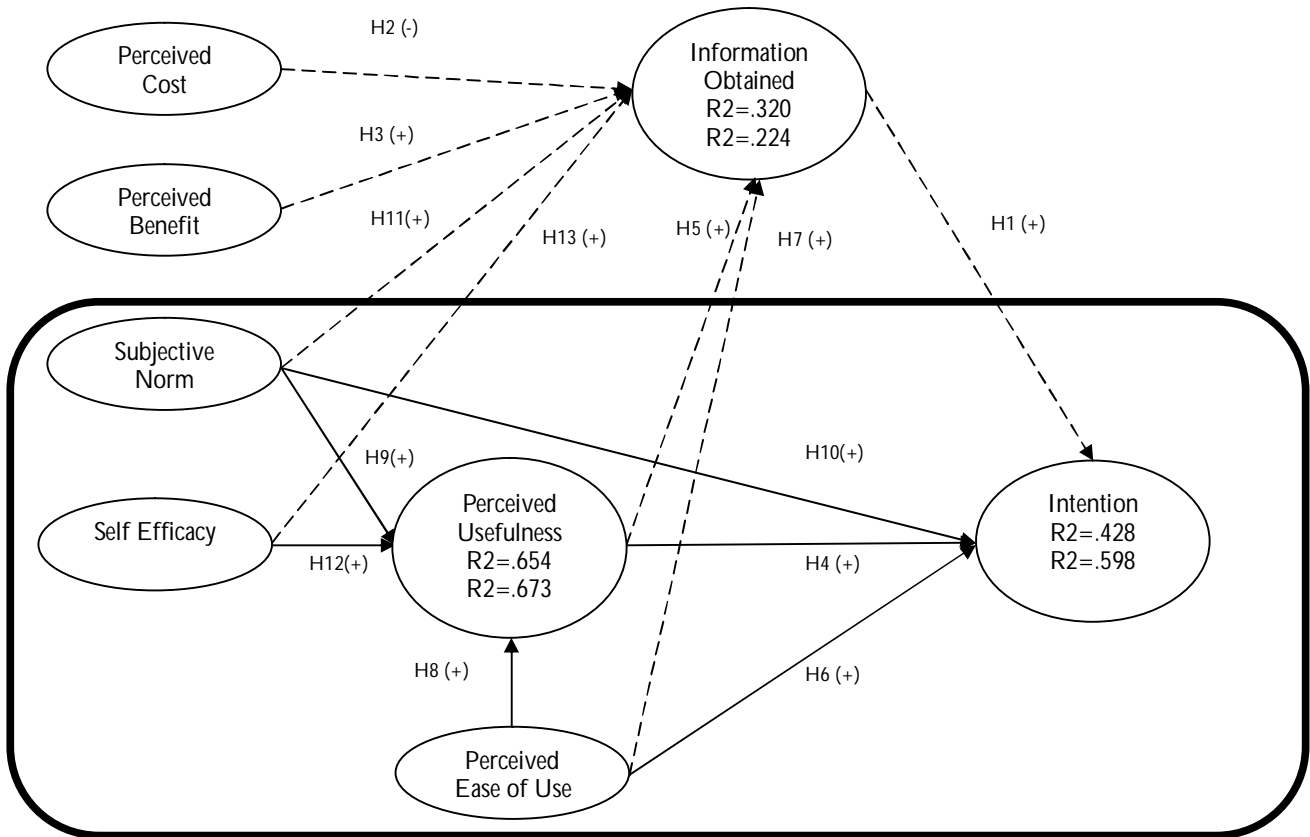
Notes: All correlations, except those with n.s. (non significant), are significant ($p < 0.05$)

Table 3b. Correlations among Latent Constructs (SMS)

| Construct | Information Obtained | Perceived Cost | Perceived Benefit | Perceived Usefulness | Perceived Ease of Use | Subjective Norm | Behavioral Control | Self Efficacy | Intention |
|--------------------------|-----------------------------|-----------------------|--------------------------|-----------------------------|------------------------------|------------------------|---------------------------|----------------------|------------------|
| 1. Information Obtained | 1.00 | | | | | | | | |
| 2. Perceived Cost | -.115 | 1.00 | | | | | | | |
| 3. Perceived Benefit | .228 | .010 n.s. | 1.00 | | | | | | |
| 4. Perceived Usefulness | .252 | .057 n.s. | .355 | 1.00 | | | | | |
| 5. Perceived Ease of Use | .213 | -.039 n.s. | .339 | .775 | 1.00 | | | | |
| 6. Subjective Norm | .428 | -.208 | .092 | .458 | .451 | 1.00 | | | |
| 7. Behavioral Control | .289 | -.093 | .328 | .601 | .720 | .507 | 1.00 | | |
| 8. Self Efficacy | .243 | .067 | .268 | .538 | .454 | .389 | .465 | 1.00 | |
| 9. Intention | .250 | .043 n.s. | .302 | .752 | .641 | .407 | .588 | .543 | 1.00 |

Notes: All correlations, except those with n.s. (non significant), are significant ($p < 0.05$)

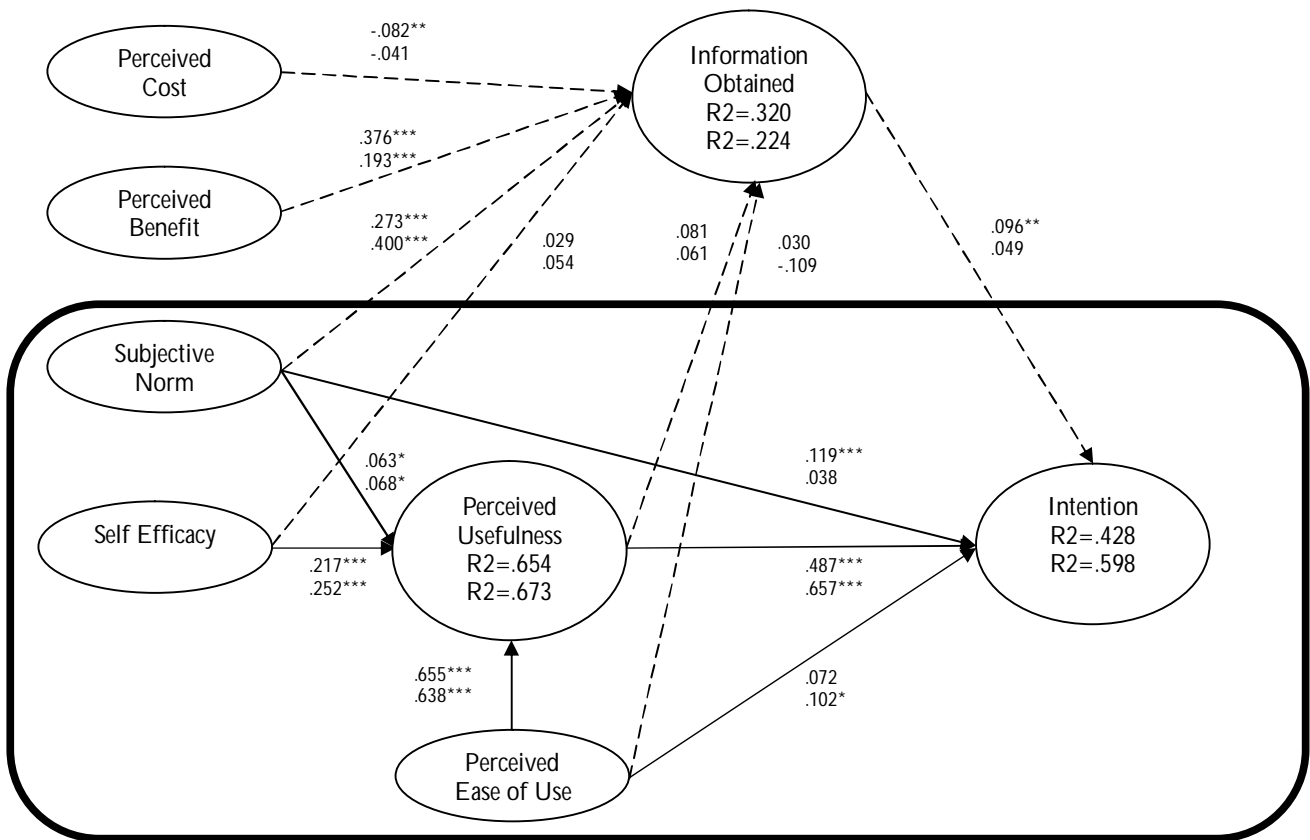
Figure 1. Hypothesized Framework



Variables inside the box: Adapted from Technology Adoption Theories (e.g., TAM2, TRA)

Variables outside the box: Adapted from the Information Search paradigm

Figure 2. Results of Hypothesized Framework (Voice Only | SMS)



1. *** indicates significance at $p < .001$ level; ** indicates significance at $p < .01$ level;
 * indicates significance at $p < .05$ level;
 Number of respondents: 1771 | 1125