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**Applying Information Science Lens for Advancing Critical Research on IT
Adoption: Insights from Continued Usage of Mobile Phones by Poor Women in
Rural India**

Applying Information Science Lens for Advancing Critical Research on IT Adoption: Insights from Continued Usage of Mobile Phones by Poor Women in Rural India

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ABSTRACT

Critical research on IT adoption dominated by cognitive models grounded in psychology and communication is always in search of new theoretical perspectives to understand, explain, and interpret social issues. Since information plays an important role in IT adoption, this study applies an information science lens to investigate the factors affecting the continued usage of mobile phones in rural India. Analysis of interviews with 22 women earning less than a dollar day reveals the influence of social, economic, cognitive, technological, and information-related factors on their continued usage of mobiles. Micro- and meso-level socioeconomic motives and active information-seeking behavior emerge as the most significant factors encouraging respondents to continue using mobiles against several technical and human barriers. The application of information science lens yields three constructs and ten micro-, meso-, and macro-level variables, advancing critical research on IT adoption with the help of a theoretical lens outside of psychology and communication literature.

Keywords: Active Information-Seeking Behavior, Barriers to Using Information, Critical Research on IT Adoption, Context of Information and Communication Needs, Continued Usage of IT, Information Behavior

INTRODUCTION

Critical research, one of the fastest growing research streams in information systems (IS), studies social issues like social control, power structures in society and organizations, organizational adoption of IS, use and impact of information technology (IT), and development

of disadvantaged communities (Kvasny & Keil, 2006; Myers & Klein, 2011; Orlikowski & Baroudi 1991). Theoretical lenses from psychology and communication have always dominated critical research on IT adoption. For instance, the Theory of Reasoned Action (TRA) (Fishbein & Ajzen, 1975), the Theory of Planned Behavior (TPB) (Ajzen, 1985),

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the Diffusion of Innovation Theory (Rogers, 1995), and the Technology Acceptance Model (TAM) (Davis, 1989) are the most frequently employed lenses for explaining the challenges, risks, and benefits associated with individual IT adoption including continued usage of IT in a specific context (Musa, 2006). However, to understand, explain, and interpret IT adoption phenomenon, critical research on IT adoption is always in search of theories from other disciplines (Myers & Klein, 2011).

The current study applies an information science lens to study continued usage of mobile phones by poor women in rural India. Specific research question for the study was: *How can information science aid critical research on IT adoption for explaining the continued usage of mobile phones by poor women in rural India?* Rarely any critical research study on IT adoption applies an information science lens to understand the continued usage of IT in a developing nation context, which is the unique contribution of this study.

Typically, critical research on IT adoption takes one of the following three approaches: insight, critique, or transformative redefinition (Alvesson & Deetz, 2000). The first approach is concerned with interpreting elements and their interactions in a system to gain insights. The second approach goes beyond insights to focus on the power structures, the genealogy of knowledge, and the social practices of control that lie behind accepted interpretations. The third approach suggests improvements to the existing human conditions by emancipating people from undesirable social, economic, and physical constraints (Myers & Klein, 2011). This study draws insights from the continued usage of mobile phones by one of the most disadvantaged communities in the world.

Women participants in this study belong to the lowest stratum of the rigid structured social hierarchy in India. People from the lowest social stratum are often times not treated equally by other factions in the Indian society (Tenhunen, 2008). Due to male-dominated cultural practices, the living conditions of the women in the lowest social stratum are the worst in the country

(Khan & Ghadially, 2009). The participants in this study engage in several blue-collar seasonal jobs in Bhor, a small village in Maharashtra, one of the western states in India. They work part-time for a small cooperative business called MGU where they are involved in preparing traditional Indian snacks. Despite earning less than a dollar a day, they had been using their own mobile phones for more than 13 months.

The second section points out a gap in critical research on IT adoption and provides rationale for selecting Wilson's model of information behavior, an information science lens for studying the continued usage of mobile phones. The third section elaborates research method. The fourth section illustrates findings using the narratives of poor female mobile phone users. The fifth section demonstrates the contributions of this study along with limitations of the study. The concluding section summarizes how this study injects a fresh theoretical perspective to advance critical research on IT adoption in developing nations.

RESEARCH ON IT ADOPTION

IS studies have explored the phenomenon of IT adoption by considering a number of dependent variables such as intention to adopt (Karahanna et al., 1999), intention to use (Venkatesh & Davis, 2000), acceptance (Chau & Hu, 2002), adoption (Keil et al., 1995), continued usage (Szajna, 1996), and continued intention (Choi et al., 2007). Table 1 summarizes key constructs and independent variables explored to study IT adoption by individuals.

IS research defines *continued usage of IT* as a "myriad of feature adoption decisions, feature use behaviors, and feature extension behaviors made by an individual user after an IT application has been installed, made accessible to the user, and applied by the user in accomplishing his/her work activities" (Jasperson et al., 2005, p. 531). Theoretical advancements in the continued usage of IT research are based on variance-based static models such as TRA, TPB, TAM, the technology-organization-en-

Table 1. Summary of constructs and variables in the "IT adoption" research

Constructs	Independent Variables	Theoretical Framework(s)	Source
Intrinsic Motivation	Perceived enjoyment and social image	TAM, TPB, & SCT	Sen & Bhattacharya, 2001
	Perceived fun, playness	TAM	Hong et al., 2006
Extrinsic Motivation	Perceived ease of use	TAM, EECM-IT, ECM	Hong et al., 2006
	Usefulness and Perceived usefulness	DIT, SLT, & TAM	Lippert & Foreman, 2005
	Perceived monetary value	TAM	Choi et al., 2007
Technology	IT performance	DIT, SLT, & TAM	Lippert & Foreman, 2005
	IT features	UTAUT	Jasperson et al., 2005
Risk	Perceived product risk	UTAUT	Liu & Forsythe, 2011
Social Force/ Social Influence	Training and Subjective norms Perceived pressures from social networks	SIPT	Lu et al., 2005
	Subjective norms toward using IT	TRA	Karahanna et al., 1999
	Social identity	SIT	Shen et al., 2011
Innovation	Personal innovativeness in IT and	DIT	Agarwal & Prasad, 1998; Lu et al., 2005
	Perception of the innovation Self-perception of innovation adopters and non-adopters		
	Voluntariness, relative advantage, image, compatibility, ease of use, result demonstrability, visibility, and trialability	DIT	Moore & Benbasat, 1991
Time	Temporal dimension of IT adoption	TAM	Carroll et al., 2003
Cognitive Behavior	Perceived characteristics	TAM	Moore & Benbasat, 1991
	Attitude toward using IT		Karahanna et al., 1999
	Satisfaction & confirmation	ECM, TAM	Bhattacharjee, 2001
	Cognitive absorption	ET, IMT	Magni et al., 2010
	Perceived behavioral control	TPB	Taylor and Todd, 1995
	Objective-contingent cognition	TAM, EECM-IT	Hong et al., 2006
	Performance expectancy	TAM, SCT	Venkatesh and Davis, 2000
	Emotions	CDT, TAM	Wang et al., 2010
Self-image		Yim et al., 2007	
Culture	Social norms in Chinese culture	TRA, TAM	Mao & Palvia, 2006

continued on following page

Table 1. Continued

Constructs	Independent Variables	Theoretical Framework(s)	Source
Information	Information quality Integration of information with IS	SIPT	Saeed & Helm, 2008
Experience	Usage experience	TAM, TPB, TRA	Karahanna et al., 1999; Venkatesh & Davis 2000; Venkatesh et al., 2003
	Repeated use	TAM	Kim & Malhotra, 2005
	Prior use	UTAUT	Jasperson et al., 2005
Memory	Accumulated past experiences such as prior evaluations and behavior into memory Outcomes of learning stored in memory	3PMM	Kim, 2009
Reactions to usage of IT	User dedication to the firm as generated by the prospect of long-term mutual benefits Constraint that makes it difficult for the customer to switch to an alternative	SET ABF	Kim & Son, 2009
Context	Organizational environment for IT	TOE, RBV	Teo et al., 2008

3PMM: Three-stage Processing Model of Memory

ABF: Attitude-based Framework

CDT: Cognitive Dissonance Theory

DIT: Diffusion of Innovation Theory

ECM: Expectation-Confirmation Model

EECM-IT: Extended Expectation-Confirmation Model of IT

ET: Exploration Theory

IMT: Individual Motivation Theory

RBV: Resource-based View

SCT: Social Cognitive Theory

SET: Social Exchange Theory

SIPT: Social Information Processing Theory

SIT: Social Influence Theory

TAM: Technology Acceptance Model

TOE: Technology–Organization–Environment

TPB: Theory of Planned Behavior

TRA: Theory of Reasoned Action

UTAUT: Unified Theory of Acceptance & Use of Technology

vironment framework (Tornatzky & Fleischer, 1990), the task-technology-fit (Goodhue, 1995), the computer self-efficacy theory (Compeau & Higgins, 1995), and the decomposed theory of planned behavior (Taylor & Todd, 1995). These models explain user behavior based on

cognitive variables like perceived usefulness, perceived ease of use, attitude, etc.

The main stream IS/IT adoption research published by the Association of Information Systems' basket of 8 journals, including Information Systems Research, MIS Quarterly, and

Journal of Association for Information Systems, heavily relies on cognitive variables from psychology and communication for studying the adoption of IT by individuals. The over-intensive focus on cognition-oriented behavioral theories like TAM, TRA and TPB is being criticized as lacking innovation in IT adoption research (Benbasat & Barki, 2007; Venkatesh et al., 2007). The existing understanding of the IT adoption process is far from being complete and exhaustive (Hung & Cho, 2008).

Gap in Critical Research on IT Adoption in Developing Nations

A majority of critical research studies on IT adoption employ cognitive models like TAM, TRA, TPB, DIT, and their combinations to study IT adoption in developing nations. However, frequently such studies find that a wide range of social, economic, political, technological, and communication factors dominate cognitive factors in terms of influencing IT adoption in developing nations (Touray et al., 2014). Cognitive factors fall short of providing sufficient theoretical explanation for IT adoption by individuals in developing nations. For instance, after studying the diffusion of Internet banking in Jordan, Al-Sukkar & Hasan (2005) found that the impact of culture is the most pervasive of the factors that could inhibit technology acceptance, because it controls people's beliefs and shared values. The findings suggest that cultural factors and trust from the user side could enhance the generalizability of TAM when studying IT adoption by individuals in developing nations.

Culture and gender roles affect female IT users the most in developing nations. Vodanovich et al. (2010) discovered that barriers to IT adoption faced by women in Islamic world are unique from that of the rest of the world. Based on national statistics and prior field-studies conducted in Kenya, Bolivia, Cameroon, and Sri Lanka, Hallberg et al., 2014 found that national policies and regulations affect the everyday adoption of IT by women in respective countries. Bankole et al. (2011) applied the UTAUT model, an extension of TAM, to study

the factors affecting the adoption of mobile banking in Nigeria; however, culture, a non-cognitive factor, emerged as the most influential factor affecting the adoption behavior of mobile banking users. Despite repeatedly underscored inapplicability of TAM, TRA, TPB, and DIT, researchers continue studying IT adoption phenomenon in developing nations using the same set of cognitive models grounded in psychology and communication literature.

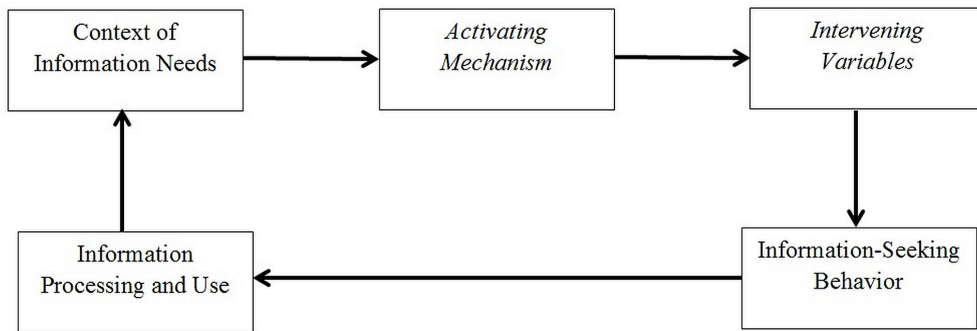
There is a great need to inject fresh theoretical perspectives from other disciplines to enhance our ability to understand, explain, and interpret IT adoption in developing nations. For a long time, HCI researchers have been advocating the application of theoretical frameworks from non-IS disciplines to link back our understanding of human reactions to IT to IT design and development (Gerlach & Kuo, 1991). Drawing on empirical work in Tanzania, Smith et al. (2008) propose to study and interpret the process of IT adoption in developing nations from development, management, and sociology viewpoint.

Applying Information Science Lens to Study IT Adoption

Information plays an important role in the continued usage of IT (Huerta & Sandoval-Almazan, 2007; Saeed & Helm, 2008). In the backdrop of growing information-intensive services and products offered over mobile phones, the use of a wide range of information communicated over mobile phones is critical for users to continue using the technology. For instance, in rural India, illiterate mobile phone users may receive information related to agriculture, health, and local developments in voice, text, or multimedia mode. Their failure to use information may discourage them to continue using mobile phones.

Research on the potential of IT for women's transformatory empowerment identifies several information-related factors that shape women's ability to derive benefits after accessing IT. For instance, background studies commissioned by the United Nation's International Research

Figure 1. Simplified Version of Wilson's Model of Information Behavior. (Adopted from [Wilson, 1997])



and Training Institute for the Advancement of Women found that IT can create benefits for women if they are capable of determining their information needs and the means to use information (Huyer & Sikoska 2003). Several attributes of information such as currency, accuracy, quality, source of information, and mode of communicating information influence access to and use of information. For instance, in a field research with farmers working on maize farms in Africa, Meyer (2005) discovered that the successful use of information by the farmers depended upon attributes of information and the type of mechanism used for communicating information. In addition, micro-level factors including skills, literacy, self-efficacy, and meso- and macro-level factors like physical resources, social practices, gender roles, cultural norms, etc. play a significant role in influencing one's ability to process and apply information communicated over IT. As a result, everybody may seek, search, store, process, and apply information differently; this user behavior is referred to as information behavior.

Information behavior is defined as the totality of user behavior "in relation to sources and channels of information, including both active and passive information seeking and information use" (Wilson, 2000, p. 49). Thus, information behavior refers to the active seeking of information and the passive reception of information. Information behavior of poor female mobile phone users in rural India could

shape their ability to use information, affecting their continued usage of mobile phones. Hence, the current study applied an information behavior model to explain their continued usage of mobile phones. In particular, the researcher selected Wilson's model of information behavior to inform and advance critical research on IT adoption.

Why Wilson's Model of Information Behavior?

In 2005, Fisher et al. published a collection of more than 70 established theories of information behavior. The theories proposed and refined by more than 85 researchers in computer science, humanities, social science, library science, and information science, depict the evolution in our understanding for the term "information behavior" in the last 60 years. While few researchers use the term narrowly to refer to information seeking activities alone, a majority follow Wilson's conceptualization of the term encapsulating the context of information needs, the information sources, and the factors affecting information seeking and processing, and use of information (Fisher et al., 2005). For instance, around 35 theories in the collection are related to the constructs and variables proposed by Wilson to investigate one's information behavior. The application of Wilson's process-based information behavior model in the current study moves beyond dichotomous "adoption versus

non-adoption” (Zhu & Kraemer, 2005), and accounts for the “missing link”—actual usage—as a critical stage of value creation.

Wilson’s Model of Information Behavior

The model integrates theoretical concepts from decision-making, psychology, innovation, health communication, and consumer research to cover all the possible aspects related to one’s information behavior. The model consists of three constructs, context of information needs, information-seeking, and information processing and use, and two moderating variables such as activating mechanism and intervening variables. The moderating variables represent effects of various external conditions on the information behavior of individuals.

Each construct can be described briefly as follows.

Context of Information Needs

Wilson defines “need” as a subjective experience that occurs only in the mind of a person in need (Wilson, 1997). There are various ways in which one discovers or realizes information needs, and they can be classified based on the motives behind them. The model recognizes the following motives: (a) unlearned motives, which cover curiosity and sensory stimulation; (b) social motives which cover the desire for affiliation, approval or status, or aggression; (c) economic motives which address financial gains, savings, and other monetary enhancements; (d) physiological motives such as hunger, health-related motives, and thirst; (e) affective needs such as escapism, emotional release, companionship, social utility, reality exploration, and value reinforcement; and (f) cognitive needs which include the desire to learn new information, the psychological state resulting from perception, the pursuit of reasoning for existing form of knowledge, and the attempt to confirm values and beliefs held by users.

Information Seeking

Wilson’s model segments the process of information-seeking into active and passive modes, with the active mode consisting of ac-

tive searching and ongoing searching and the passive mode consisting of passive attention and passive searching. When an individual actively seeks out information, it is called an active search, and this establishes a basic framework of knowledge, ideas, beliefs, or values. The ongoing search builds upon the active search with an occasional continuing search to update or expand one’s established basic framework of knowledge, ideas, beliefs, or values. By contrast, passive searching signifies those occasions when one type of search (or other behavior) results in the acquisition of information that happens to be relevant to the individual.

Information Processing and Use

Wilson (1999) defines “information processing and use” in terms of human barriers and technical barriers. When beliefs, perceptions, and knowledge of others act as barriers to any user’s information processing and usage, these are known as human barriers. On the other hand, technical terminology, lack of technical support, and other technology-related problems create technical barriers for information users.

RESEARCH METHOD

Data Collection

Due to the researcher’s social contacts and family connections in India, he had established ties with MGU, a cooperative business in rural India. More than 100 female employees of MGU owned and used mobile phones and belonged to the lowest social stratum. To increase the response rate, announcements, including financial incentives were made seven days in advance of the study’s introduction to the workplace. However, several women opted out of participating in the study due to family resistance and social pressures. In the male-dominated culture, male family members were against the idea of their mothers, wives, or sisters sharing their personal experiences of using mobile phones and other relevant information with someone outside of their families and community. Due to rigid socio-cultural norms for women in the rural area, and limited budget and time constraint for

this study, the researcher could not interview more than 22 female mobile phone users; all of them had 13 months of experience for using mobile phones at the time of data collection. Restricting this study to the female employees (of the same organization) with almost the same amount of experience for using mobile phones helped the researcher maintain internal validity for this study.

To overcome sociocultural barriers and facilitate the field research, a female employee of MGU was appointed as a local facilitator of research activities. The local female facilitator appointed for this study was responsible for engaging all of the respondents for a compensation of 50 cents each. All interviewees were contacted on their mobile phones at their time of preference. This method of contact helped them to answer all the open-ended questions without any social or family pressure. Moreover, incoming calls are not billed in India, thus participants did not spend on their phone conversations with the researcher.

The interview guide developed for collecting qualitative data was a combination of semi-structured questions and prompts. Some of the questions were as follows: (i) How did you realize the need to own your own mobile phone? (ii) Did advertisements and promotions influence your decision to buy a mobile phone? (iii) What was your confidence level when you used a mobile phone for the first time? (iv) With whom did you communicate with your mobile phone? (v) Did anybody encourage or discourage you from using a mobile phone? (vi) Do you use text messaging? (vii) Which languages do you prefer on mobile phones? (viii) What was the main reason for using mobile phones? (ix) Who paid your mobile phone bills? and (x) Would you be interested in sharing your experience of using mobile phones in-depth over phone?

Interviews were conducted in Marathi, the native language for interviewees and the researchers. Many regional and context-dependent linguistic expressions would be missed if the interviews had been carried out in English. Conducting the interviews in the respondents'

native language enabled the interviewer to extract information about vernacular norms of behavior. Many native expressions, adages, local references, and current developments helped to capture attitudes, perceptions, feelings, and thoughts of interviewees effectively. The researcher then translated the interviews himself, and the translation was cross-checked by a female social scientist whose native language was also Marathi. The inter-rater agreement between the researcher and the female social scientist was 99%, which confirmed the level of accuracy for the translation.

Data Analysis

Data analysis went in tandem with data collection, i.e., interview transcripts in English were analyzed right after each interview. Audio recordings of in-depth interviews at the interviewer's end helped to reduce the errors that could have been introduced if the interviewer's memory had been relied on solely for the data. A theory-driven coding was used to analyze the corpus of qualitative data formed from the transcripts of interviews in English. Coding is part of content analysis, a qualitative data analysis technique that transforms and analyzes communication content or messages through the systematic application of constructs (Kassarjian, 1977). One of the key strengths of content analysis is its emphasis on the systematic coding, counting, and analysis of content. It is a standardized, objective analysis of messages (Neuendorf, 2001) relying on codes clustered around constructs of any theoretical framework. Typically, codes are developed either manually (known as human coding), or with the help of technology (known as software coding). A frequency count of codes keeps track of the occurrences of codes in a given message or communication content to be analyzed. Inferences are drawn from identifying specified codes in text, message, or communication content. The greater the replicability of codes representing a particular theme or a construct, the higher the validity associated with inferences that

Table 2. Frequency count and PNS

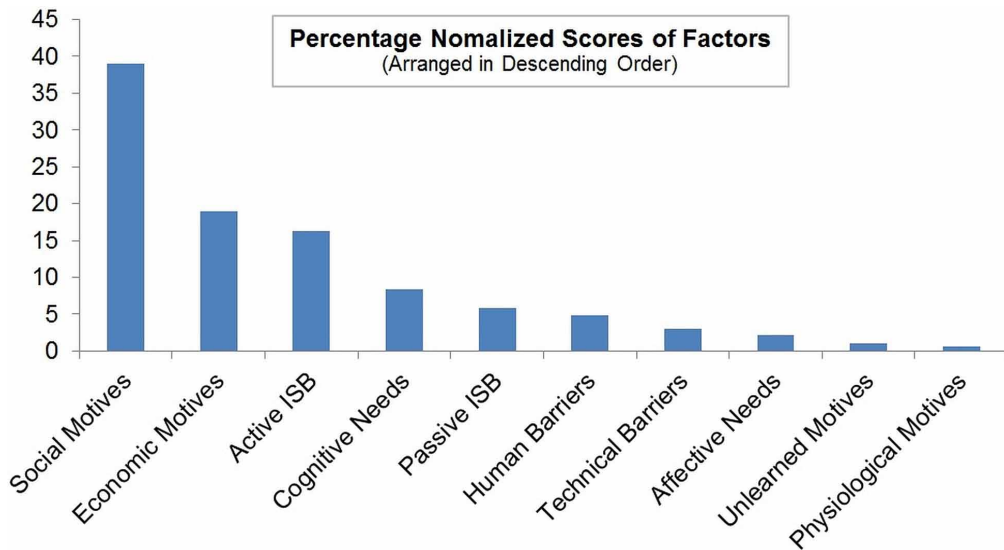
#	Construct	Frequency Count	Percentage Normalized Scores (PNS)
1	Context of information and communication needs		
i	Economic Motives	267	18.92
ii	Unlearned Motives	14	0.99
iii	Social Motives	551	39.05
iv	Physiological Motives	8	0.56
v	Affective Needs	31	2.19
vi	Cognitive Needs	118	8.36
	<i>Sub-total</i>	<i>989</i>	<i>70.06</i>
2	Information-seeking behavior		
i	Ongoing Search	155	10.98
ii	Active Search	74	5.23
iii	Passive Attention	80	5.66
iv	Passive Search	2	0.14
	<i>Sub-total</i>	<i>310</i>	<i>22.01</i>
3	Information processing & use		
i	Human Barriers	69	4.89
ii	Technical Barriers	43	3.04
	<i>Sub-total</i>	<i>112</i>	<i>7.93</i>
	TOTAL	1,411	100

are derived from that content analysis (Krippendorff, 2004).

The researcher generated codes based on the model's (Wilson, 1997) conceptualization of information behavior. Units for coding were theoretical concepts presented in Wilson's model. Codes were then clustered into three constructs (see Appendix 1, Appendix 2, and Appendix 3). Codes generated in English were cross-checked by a female social scientist who speaks English and Marathi. The inter-rater agreement between the researcher and the female social scientist was 95%, which confirmed the level of accuracy for the codes.

Due to the variation in the number of codes generated for the three constructs, direct comparison of frequency count would have introduced error, and could have challenged the internal validity of the study. Hence percentage normalized score (PNS) was calculated for each construct. For example, the frequency count for "Information-seeking Behavior" summed up to 310. The total frequency count for all the codes in 22 interview transcripts was 1,411. The PNS for "Information-seeking Behavior" was calculated using the following formula.

Figure 2. Factors Affecting the Continued Usage of Mobile Phones



$$= (\text{Frequency count for "Information-seeking Behavior"} / \text{Total frequency count}) * 100$$

$$= (310/1411) * 100$$

$$= 22.01$$

Similarly frequency count and PNS for the remaining constructs are shown in Table 2. The researcher used Concordance software (version 3.2) to store and manage transcripts, codes, and relations among the codes.

FINDINGS AND DISCUSSION

Results of the content analysis yielded the following key findings.

1. With a PNS of 70.06%, the *context* in which the respondents realize and pursue *information and communication needs* is the most dominant factor influencing the continued usage of mobile phones in the rural Indian setting.
 - a. Social motives, economic motives, and cognitive needs, with PNS of 39.05%, 18.92%, and 8.36%, respectively, emerge as the top three sub-categories

of *information and communication needs* that motivate respondents to continue using mobile phones.

2. Active information-seeking behavior emerged as the most important activity enabling respondents to continue using mobile phones. The PNS of 16.21% for their active information-seeking behavior over 5.8% for passive information-seeking behavior suggests *active* involvement of the respondents when using mobile phones.
3. PNS of 4.89% and 3.04% for human and technical barriers, respectively, indicate that both types of barriers affect respondents almost equally in acquiring, processing, and using information over their mobile phones.

Thus social motives, economic motives, and active information-seeking behavior (ISB) of respondents emerge as the top three factors influencing the continued usage of mobile phones (see Figure 2).

The following sub-sections illustrate the above findings using narratives collected from the respondents.

Context of Information and Communication Needs

Wilson (1997) defines the context of information and communication needs in terms of cognitive needs, affective needs, physiological motives, social motives, economic motives, and unlearned motives (Wilson, 1997). Social motives, economic motives, and cognitive needs, three most influential types of information and communication needs of respondents, drive them to continue using mobile phones and benefit them personally and their families, relatives, neighbours, and friends.

Social Motives for Continued Usage of Mobile Phones

Wilson's model (1997) describes social motives as the desire for affiliation, approval, or status for an individual. The study found that prominent social benefits derived from the continued usage of mobile phones include: social-networking (e.g., keeping in touch with friends, planning events with them, inquiring about children to their teachers, etc.), family-bonding (e.g., sharing family issues with close relatives who do not live together), and daily communication with core-family members (e.g., discussing daily matters with family members who live together). Respondents pursued social motives, such as maintaining social contacts and strengthening their social network.

Mobile serves as a social networking tool for women (Ling, 2002). During interviews conducted with female mobile phone users in Israel, Lemish, and Cohen (2005) found that women associate benefits of phone usage in terms of other people having to access the female mobile phone users. Interestingly, women measured social inclusion by the number of calls they receive from others.

In the current study, husbands, children, and female friends were instrumental in helping married mobile phone users realize their information needs. The same group of people also made the respondents realize the crucial role of mobile phones in satisfying women's

information needs. Primarily, respondents used their mobile phones to stay in touch with their husbands, children, parents, family members, and friends. For instance, Ra, an illiterate married woman interviewee only knows how to receive and make calls. She uses her mobile phone to be in touch with her husband, who is a chauffeur. She said:

I am an illiterate woman. I don't understand anything about phone. I only know how to receive and make calls. My children are savvy in operating phones. My husband is just a "driver." Phone is useful to me in finding out his whereabouts, when he would be home, and where his vehicle is, etc. Children ask me whether I need their help in making calls.

In some instances, women pursue their information needs through mobile phones due to their family and other relevant responsibilities. Rb reported:

I live in a rural area close to Bhor. I work for a hospital in Bhor. I can get any help through mobile. Hence, I use mobile. My mother is old, plus I have old sisters. I set out at seven in the morning and return back at around six in the evening. So, mobile is of great use to me. Patients from the hospital can contact me anytime and I can help them. When I am not in a position to help them, I could at least guide them. Plus, I could tell other nurse that I am coming, let us take this particular preparation, etc. Earlier, I never felt that mobile was of any use, but recently in the last year I started feeling the need to use it.

Rc, a married woman who thought that a mobile phone was not a necessary investment for her, eventually ended up buying mobile because of her need to communicate with her children at any time of the day. Rc confessed:

I did not like using mobile phone in the beginning. Children also do not need mobiles. But now, my son and daughter are in Pune (the

closest city to Bhor), and we can carry mobile anywhere we wish. So we can contact each other anytime...It is best to use mobile only to take care of our needs.

For unmarried mobile phone users representing the younger generation, sometimes information needs are realized in the context of their relationship with their parents. An unmarried girl explained how she uses a mobile phone for seeking her parents' help, saving on her long-distance travel. Rd informed:

If I go out to some other village, I could contact my parents. I work locally, so if there is anything important to share with family, mobile allows me to do so even from my workplace. I can contact my family anytime. After giving them a message, they can bring things that I need from home.

The mobile phone seems to be used extensively by the younger generation for supporting each other and maintaining social relations. For Re, a young unmarried girl, her mobile phone is an important communication bridge with the surrounding world. She stated:

Mainly, to maintain contact with all, and to connect with all. If we worry about someone, then we can call that person and he can call us back.

Economic Motives for Continued Usage of Mobile Phones

Wallis (2011) shows how mobile phone can benefit young Chinese women in terms of access to jobs and other resources, but mobile phones also provide opportunities for women to be taken advantage of or controlled by their employers and others. Respondents in the current study, who work in family-run businesses, use their mobile phones to earn income by actively searching for information. For instance, Rf, a housewife who helps her in-laws run a mom-and-pop shop said:

On one call, I can get market rate for goods in different areas. I did not have any other tool to do that earlier. Hence, we decided to buy this phone. When we are doing business, we should buy everything that is required for business. Isn't it? In Bhor, goods are available as that of Pune's rate. So now I buy goods in Pune on the phone. Due to mobile, it becomes easy to contact wholesale shopkeepers in Pune. I order goods over the mobile.

Unlike other ICTs mobile extends access to communication with a low number of socioeconomic pre-requisites. Rg was initially against mobile phones, but expensive landline communication caused her to change her mind, as the affordability of a mobile phone saved her money on communication. The interviewee said:

Initially, I was against using mobile. We had a landline, but after being employed, my children started using mobile. They used to make calls on our landline, which increased our bill extraordinarily. Finally, I also decided to use a mobile. I switched from landline to mobile...

In some instances, interviewees realized their information needs for more than two purposes, though the realization of information needs for both social and economic purposes was the most common overlap. Information needs experienced, while pursuing socio-economic opportunities by both husband and wife encouraged one husband to buy a mobile phone for his wife. Rh explained:

I own a small business of papad[traditional Indian snack]. Five years ago, when I did not have mobile, I used to visit each and every home in Bhor to sell papad. Soon we realized that I had to get one mobile. Now I can get things done very fast. Customers call me on my mobile and could pick up their order from my home. I can make urgent calls using my mobile. My husband offers coaching every Sunday, so his*

students contact him on my mobile, if his mobile is busy or not working.

Cognitive Needs Driving Continued Usage of Mobile Phones

Cognitive needs encourage users to use information and knowledge for self-satisfaction (Wilson, 1997). Mobile intimacy changes women's perception of their current social environment. Mobile phones provide women with a sense of intimacy by functioning as a transitional object: as a means of rendering absent others present (Tuber, 2008). Transitional objects (e.g., mobile phones) make separation from loved ones more tolerable. Typically, mobile phones are infused with sentimental value and eventually the mobile phone becomes associated with comfort.

Respondents in the current study perceived mobile phones as a medium to communicate information with others when caught in emergency situations. For many respondents, a mobile phone acts as a medium to reach someone and to seek and offer emotional support anytime they wish, thereby overcoming the barriers of distance and time. The need for information in the form of emotions and supportive words is realized and pursued when bonding with friends, relatives, and other people in the mobile phone user's social circle. For example, Ri uses a mobile phone for social-networking, mainly for strengthening emotional bonds within her social circle. Her colleagues from her workplace make use of her mobile as a point of contact, when resolving day-to-day work-related queries. In her own words:

At times, mobile has definitely great utility value. If something goes wrong with any friend and if I cannot visit that friend, then at least I can call him to console. Many a times, people just need our supportive words. Even if we are not able to be with our people physically, our words could support them at times. Mobile can be of great help. We can even offer and seek advices from each other through mobile. It is really great for personal reasons and office-related work.

Unmarried mobile phone users often make use of mobile phones for keeping in touch with friends and even making fun of each other at times. Information regarding their plans for meeting each other and get-togethers is often shared over their mobile phones. Thus, the mobile phone is widely used as a socializing tool by unmarried girls.

When information needs can be satisfied exclusively by experts or knowledgeable people, women tend to use mobile phones for seeking knowledge in a short amount of time. A special piece of information, such as a password, is often also communicated over mobile phones, such as when a password could be needed at workplaces. Rj, an unmarried girl, observed:

When I need some information and I think that a particular person might be more knowledgeable, then I call that person to seek more information...Once my friend had called me to ask for a "password" to my "desk." Sometimes my colleagues call me, when they don't understand ways in which I have completed some assignment.

Based on the above findings, the researcher proposes the following hypotheses to advance critical research on IT adoption in developing nations.

- H1:** Context of information and communication needs positively influence the continued usage of IT.
- H1a:** Social motives positively influence the continued usage of IT.
- H1b:** Economic motives positively influence the continued usage of IT.
- H1c:** Cognitive needs positively influence the continued usage of IT.

Although these hypotheses are based on the information behavior patterns exhibited by the sample population considered for this study these hypotheses could be tested in the future when studying the information behavior of a

disadvantaged population randomly sampled in a developing nation context.

Active Information-Seeking Behavior

This study found that respondents' active information-seeking behavior was strongly associated with their ability to pursue and satisfy social motives, economic motives, and cognitive needs. For instance, Rk, an unmarried respondent, seeks information for social bonding with friends and colleagues. She actively uses her mobile phone for professional responsibilities such as teaching students. She said:

I use mobile mainly for friends and for my work. I am a teacher. I do many other part-time jobs, but mainly for friends I have been using my mobile...To resolve students' queries and for my friends I use my mobile for more than a year now...I wish I had bought mobile long time back.

For Rf, a married woman running family-owned business, mobile phone is a necessity for doing business. She seeks market update and searches rates of goods over her mobile phone. In support, she informed:

I run a grocery shop in Bhor. On one call I can get market rates for goods in different areas. I did not have any other tool to do that earlier. Hence, I decided to buy this phone. When we are doing business, we should buy everything that is required for the business. Isn't it?

Communicating different types of emotions, daily events, feelings, and opinions played a significant role in respondents' lives. For instance, Ri, another unmarried interviewee, uses her mobile phone precisely to communicate with others and, specifically, to vent her emotions. She stated:

Mobile is a device through which even though we cannot actually see the person, we could hear

people. We can convey our emotions, current mental status to each other and discuss on that through mobile. In fact, I have bought mobile precisely for this reason alone.

A number of similar experiences revealing the active information-seeking behavior were shared frequently by all the respondents. The above quotes show that micro-level cognitive needs and micro- and meso-level socioeconomic motives of respondents were instrumental in encouraging female mobile phone users to seek information actively.

Passive Information-Seeking Behavior

Very few times, respondents rely on others to send information or contact them, thereby exhibiting passive information-seeking behavior. Rd, a married woman, said:

Now if I go out anywhere, I can be reached also for emergency work. It is good to have mobile...I cannot imagine myself without mobile.

Rj, an unmarried owner of a stitching shop, relies on her customers to contact her over her mobile phone. She said:

I run stitching business...Even if I go out of my stitching shop, customers can contact me anytime. That is the main utility of mobile for me. Customers call me and tell me that they would come at so and so time....earlier I lost business since I did not have mobile for my customers to reach me...

Overall, the study found that passive information-seeking practice was dominated by active information-seeking behavior of respondents.

The following hypothesis, which represents information behavior pattern of the sample population in this study, could be tested with a randomly sampled disadvantaged population in a developing nation in the future, thereby

Table 3. Newly proposed constructs and variables for critical research on IT adoption

#	Constructs		Independent Variables	Level
1	Context of Information and Communication Needs	i	Social motives	Meso
		ii	Economic motives	Meso
		iii	Cognitive needs	Micro
2	Active Information-seeking Behavior	iv	Active search of information	Micro
		v	Ongoing search of information	Micro
3	Barriers to Acquiring, Processing, and Using Information	vi	User interface of IT device	Micro
		vii	Language of instruction on	Micro
		viii	IT device	Macro
		ix	Supply of electricity to operate IT device	Macro
		x	Signal strength for operating mobile technologies	Meso
			Incentives such as discouragement and resistance by others for using IT	

advancing critical research on IT adoption in developing nations.

H2: Active information-seeking behavior positively influences the continued usage of IT

Barriers to Continued Usage of Mobile Phones

Technical, social and cultural barriers exacerbate women's exclusion from benefits of using IT in developing nations (Terry & Gomez, 2010). In male-dominated societies, gender issues are intermingled with social, cultural, physical, and economic constraints (Chib & Chen, 2011). Respondents in the current study face discouragement and resistance from friends and family members for using mobile phones. Despite this discouragement, R1 insisted on using her mobile phone. For instance, R1 shared her experience as follows:

My two close friends discouraged me a lot. They said, "Why are you using this mobile? Don't use it. You don't need it at all." They used to tell me - "why use this device? What if someone gets your number and starts troubling you?" Some people do that type of fun and teasing on phones; both known and unknown people are involved in it.

R1 was using her mobile phone for more than one year at the time of interview. Interestingly, she added:

With my friends I talk to the most. Mainly, I use mobile phone for personal reasons. We "discuss" each other's problems over the phone.

Friends who tried to discourage her from using mobile phones in the past also started using mobile phones once they found that R1 was using her mobile phone to pursue her information and communication needs.

Inadequate infrastructural preparedness including lack of access to electricity is one of the most common technical barriers to using IT in developing nations. Intermittent supply of electricity and weak range of mobile phone network often create barriers for respondents in the current study to continue using mobile phones. For instance, due to lack of electricity in Bhor, respondents do not get enough time to charge their mobile phones. Sometimes, they lose signal in the middle of conversation and cannot make or receive calls over their mobile phones for a long time. In addition, respondents cannot compose text messages on their mobile phones, since they cannot read and write in English which is a foreign language for them.

The following hypothesis could be tested with a randomly sampled disadvantaged popu-

lation in a developing nation context to inform critical research on IT adoption in developing nations.

H3: Active information-seeking behavior positively influences the continued usage of IT

Advancing Critical Research on IT Adoption

The information science perspective illustrated in the current study suggests three constructs and ten independent variables for advancing the existing critical research on IT adoption (see Table 3).

Rarely any critical research studies on IT adoption have discovered the combination of following three levels of independent variables responsible for IT adoption: micro-level (e.g., cognitive needs of female mobile phone users, active and ongoing search of information, and user interface including language of instruction on mobile phones), meso-level (e.g., discouragement and resistance to using mobile phones by family members and friends), and macro-level variables (e.g., barriers created by regional technological infrastructure for using mobile phones). Insufficient electric supply and weak phone signals create hurdles for all mobile phone users in the respondents' region. The effects of these two macro-level independent variables on IT adoption are never considered by any critical research study in a developing nation context.

The dominance of the respondents' active information-seeking over their passive information-seeking behavior leads us to conclude that continued usage of IT is strongly associated with an active and ongoing search for information. Rarely any IS studies have explored the role of information in the continued usage of IT. Future IT adoption studies need to consider active and ongoing searching for information as two independent variables to explore their effects on the continued usage of IT.

In IT adoption research, the role of technical barriers in acquiring, processing, and using information for the continued usage of IT re-

main unexplored to a great extent. Although, a few studies have found IT features (Jasperson et al., 2005) and IT performance (Lippert & Foreman, 2005) to be significant in shaping the continued usage of IT, more research needs to be undertaken in this direction. The findings from the current study propose five independent variables for exploring the effects of human and technical barriers on the continued usage of IT by disadvantaged populations from developing nations.

Some newly proposed constructs and independent variables map onto the established variables in the critical research on IT adoption. For instance:

- A. The context of information and communication needs maps onto the concept of "context" explored and studied by information systems researchers in the past (Teo et al., 2008). Hence, this newly proposed construct for studying continued usage of IT is likely to ensure a stable theory development.
- B. Social motives, which emerged as the strongest motivation for the respondents to continue using mobile phones, reinforce the significance of the "subjective norm toward using IT" variable (Karahanna et al., 1999) for studying continued usage of IT.
- C. Economic motives map onto monetary value - one of the extrinsic motivations identified by Choi et al. (2007). Economic motives emerged as one of the essential independent variables that need to be considered while studying continued usage of IT by the poor.
- D. Cognitive needs map onto variables like emotions (Wang et al., 2010), objective-contingent cognition (Hong et al., 2006), and cognitive absorption (Magni et al., 2010), which were proposed and found significant in influencing users' continued usage of IT behavior.

Contributions to Information Science Research

Past studies in developing nations show that more than one individual uses the same mobile phone for pursuing a variety of micro-level benefits (Wong, 2010). In contrast, women in this study exhibited micro- and meso-level socioeconomic motives to keep using mobile phones. This finding warrants exploring: (a) the causal relationship between IT usage and meso-level motives and (b) the impact of meso-level motives on the continued usage of IT.

Social and economic benefits often times motivate individuals for adopting and keep using IT in developing nations (Terry & Gomez, 2010). A majority of the times, the socioeconomic benefits are limited to the IT users alone. However, in the current study, the continued usage of mobile phones by the respondents benefitted their families including husband, children, and relatives, and family-run businesses more than the respondents. The meso-level motives dominated micro-level motives for deriving socioeconomic benefits in case of the respondents. This finding informs Wilson's model that restricts the definition and scope of social and economic motives to micro-level alone when studying individual's information behavior.

The PNS of 16.21% for the active information-seeking behavior of respondents supported by the relevant qualitative data signify the importance of their active information-seeking behavior in their continued usage of mobile phones. For instance, women's ability to seek information actively plays far more important role than their ability to overcome human and technical barriers to acquiring, processing, and using information in their continued usage of mobile phones. This finding is in contrast to the information science studies proving the use of information to be the most significant factor affecting users' ability to derive benefits from the information communicated over IT (Huyer & Sikoska, 2003).

CONCLUSION

This study applied an information science lens to reveal the role of micro-, meso-, or macro-level social, economic, cognitive, technological, and information-related factors in the continued usage of mobile phones by poor women in rural India. For all poor respondents in this study, engaging in mobile communication was their first use of electronically mediated interaction. They show exemplary courage and determination to continue using mobile phones against a wide range of technical and human barriers.

Quantitative assessment of phone interviews (i.e., PNS of interview transcripts) revealed that their social motives, economic motives, and cognitive needs inspired them to continue using mobiles but the qualitative data (i.e., interview transcripts) showed that the motives and needs of respondents benefitted their families, relatives, friends, and neighbors more than themselves. Thus unlike past studies the respondents in the current study showed both micro- and meso-level motives and needs to continue using their mobile phones. Despite experiencing resistance from male family members, women continued creating value for their families using a wide range of information communicated over their mobiles. At the same time, women also derived individual benefits such as increased self-esteem, access to markets, reduced isolation, and access to and use of a wide range of information. Active information-seeking behavior of the respondents emerged as the most important activity enabling women to derive benefits from their continued usage of mobile phones. This finding is also in contrast to several past information science studies discussed earlier, which attribute the successful use of IT to other factors including sources of information, attributes of information, and use of information.

This research studied the information behavior of only 22 mobile phone users in a specific rural context; hence, findings from this study are not generalizable. However, since the key finding from this study suggests focusing on context-specific information and

communication needs of mobile phone users for studying their continued usage of IT behaviors, the lack of generalizability, in fact, encourages practitioners and researchers to apply the research findings according to appropriate context-specific characteristics.

Findings inform Wilson's model to enhance its applicability for studying information behavior of disadvantaged populations in developing nations. Perhaps due to its origin in the Western context, the model defines and operationalizes social motives, economic motives, and cognitive needs in terms of an individual. However, the study found that even meso-level motives and needs could shape an individual's information behavior.

Critical research on IT adoption uses variables like social norms or facilitating conditions to cluster a wide range of meso- and macro-level non-cognitive factors responsible for shaping IT adoption phenomenon (Gollakota et al., 2012). The application of an information science lens contributed new constructs (e.g., Context of Information and Communication Needs, and Barriers to Acquiring, Processing, and Using Information) and independent variables including Signal strength for operating mobile technologies, User interface of IT device, and Language of instruction on IT device, thereby dissecting the variables like social norms and facilitating conditions to advance IT adoption research in developing nations. This study injects a fresh theoretical perspective to provide new theoretical directions to the future research on IT adoption in developing nations.

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APPENDIX

Table 4. Codebook for “Context of information and communications needs”

Types of Information Needs					
Economic Motives	Unlearned Motives	Social Motives	Physio-logical Motives	Affective Needs	Cognitive Needs
sell* buy* earn* shop* job* application* employ* Business suppl* demand* Market market rate* order* manufactur* profit* deliver* Goods Economic cheap* compan*	affect* attract* curio* eager influence* interest* like*	chat* connect* celebrat* clarif* communicat* condol* congratulat* consult* contact* discuss* exchang* expir* gather in touch with inquir* teas* talk to talk with relative* neighbor* member* supervisor colleague* teacher family friend*	pain* health* medicin* medical injur*	emotion* mood feeling* attitude relax* stress* tension*	learn* reasoning thought* remember* memor* advi* inform* knowledge expert* explain* spiritual judgment* intellect* imagin* perception* understand*

Table 5. Codebook for “Information-seeking behavior”

Active Elements (Ongoing Search & Active Search)	Passive Elements (Passive Attention & Passive Search)
I seek* information I sought information I search* I gather* information I acquire* I make calls* I call* I dial* I decid* I use mobile I told I seek advi* I send message* I call to know I access My choice* I Inquire* I learnt My decision* We need* We search* We gather* information We acquire* We make calls* We decide*	* decide* * gifted me a mobile * sent me a mobile brought to my attention* *taught me * talk to me * told me * call me * ask* me to receive* I receive* call* from * * to advise me * advertise*

Table 6. Codebook for "Information processing and use"

Barriers to Acquiring, Processing, and Using Information	
Human Barriers	Technical Barriers
nobody encouragement for using mobile discourage* for using mobile illiteracy/illiterate can only make calls can only attend calls can't use all the features of a mobile don't use all the features of a mobile only send* information only receive* information only give a call useless information can't use information can't use mobile can't handle mobile don't use information don't use mobile don't talk on mobile don't get time to talk don't want to talk can't process information don't process information took me * to learn partial use of mobile partial operation of mobile don't get mobile when in need share my mobile with others scared of using mobile risk of operating mobile don't understand technical details can't pay mobile bill* high cost of using/maintaining mobile expensive mobile* can't afford mobile* can's use SMS/texting service don't understand English can't/don't use voicemail	lack of power/electricity no electricity low signal/ weak signal no range tower is far* technical difficult*/problem* battery blast* battery failure dysfunctional mobile* mobile charging problem* noise/disturbance on mobile call drop* cross-connection* can't receive/make call* from home problem* with user interface faulty/problematic mobile keyboard too small keys/buttons on mobile