Kent Academic Repository
Full text document (pdf)

Citation for published version

DOI

Link to record in KAR

https://kar.kent.ac.uk/66734/

Document Version

Author's Accepted Manuscript

An Empirical Comparison of Consumer Innovation Adoption Models: Implications for Subsistence Marketplaces

Dr Rajibul Hasan
Assistant Professor in Marketing
Rennes School of Business,
2 rue Robert d'Arbrissel
CS 76522 35065
Rennes, France
rajibul.hasan@esc-rennes.com

Professor Ben Lowe
Professor of Marketing
Kent Business School
University of Kent
Parkwood Rd
CT2 7FS, Kent
United Kingdom
b.lowe@kent.ac.uk

Dr Dan Petrovici
Kent Business School
University of Kent
Parkwood Rd
CT2 7FS, Kent
United Kingdom
d.petrovici@kent.ac.uk

An Empirical Comparison of Consumer Innovation Adoption Models: Implications for Subsistence Marketplaces

Abstract

So called "pro-poor" innovations may improve consumer wellbeing in subsistence marketplaces. However, there is little research that integrates the area with the vast literature on innovation adoption. Using a questionnaire where respondents were asked to provide their evaluations about a mobile banking innovation, this research fills this gap by providing empirical evidence of the applicability of existing innovation adoption models in subsistence marketplaces. The study was conducted in Bangladesh among a geographically dispersed sample. The data collected allowed an empirical comparison of models in a subsistence context. The research reveals the most useful models in this context to be the Value Based Adoption Model and the Consumer Acceptance of Technology model. In light of these findings and further examination of the model comparison results the research also shows that consumers in subsistence marketplaces are not just motivated by functionality and economic needs. If organizations cannot enhance the hedonic attributes of a pro-poor innovation, and reduce the internal/external constraints related to adoption of that pro-poor innovation, then adoption intention by consumers will be lower.

Over the last two decades management and marketing scholars have taken an increased interest in the world's poorest consumers. These consumers, often termed the "Bottom-of-the-Pyramid" (BOP – e.g., Cañeque and Hart 2015; Prahalad 2005; Prahalad and Hammond 2002; Simanis, Hart, and Duke 2008), reside within subsistence marketplaces with unique characteristics (Viswanathan and Rosa 2007; Viswanathan and Sridharan 2009). Interest in the area has led to a better understanding of consumers within these subsistence marketplaces, as illustrated by a number of recent special issues (Nakata and Viswanathan 2012; Viswanathan and Rosa 2010; Viswanathan, Shultz and Sridharan 2014). Yet, despite these advances, important questions still remain.

Increasingly, innovation in products and services has been called for to help provide solutions to challenges that consumers face within these markets (Hart 2005; Kaplinsky et al. 2009; Morales-Gomez and Melesse 1998; Prasad and Ganvir 2005). Numerous examples have been discussed within the literature, including sanitary latrines (Ramani, Sadre Ghazi, and Duysters 2012), solar powered LED lighting (Altman, Rego and Ross 2009), mobile banking (Berger and Nakata 2013; Maurer 2012) and fuel efficient stoves (Khandelwal et al. 2016; Miller and Mobarak 2014). Such innovations have come to be known as "pro-poor" innovations (e.g., Ramani, Sadre Ghazi, and Duysters 2012) because they have developmental impact and may help improve the livelihoods of the poor (Cecchini and Scott 2003; Kaushik and Singh 2004). As such, questions have arisen as to what factors affect the speed of consumer adoption (Khandelwal et al. 2017; Lowe, Dwivedi, and D'Alessandro 2018; Prahalad 2005; Zainudeen and Ratnadiwakara 2011). On the one hand innovations in mobile banking (e.g., services such as Bangladesh's bKash and Kenya's M-Pesa) have been adopted rapidly by consumers. However, other innovations which offer the promise of time saving, greater efficiency and better economy have experienced resistance in their take up (e.g., fuel efficient stoves). Though some comprehensive and context specific explanations exist (e.g., Khandelwal

et als. 2017 study on the low take up of fuel efficient stoves), what explains these contrasting examples and what do we know about innovation adoption in the BOP and subsistence marketplaces?

To begin to address this question more explicitly this article aims to provide an understanding of the key determinants of pro-poor innovation adoption. The literature offers insight about innovation adoption in economically developed economies (e.g., Arts, Frambach, and Bijmolt 2011; Plouffe, Vandenbosch, and Hulland 2001) and can contribute to this question. However, research on innovation adoption within subsistence marketplaces and the developing context is sparse (notable exceptions include Khandelwal et al. 2017; Miller and Mobarak 2014; Nakata and Weidner 2012). Yet, context is important (Sridharan and Viswanathan 2008; Sheth 2011; Viswanathan and Rosa 2007) and the degree to which existing theories are applicable is likely to be affected by this market's unique characteristics (Prahalad 2005; Sheth 2011; Viswanathan and Rosa 2007). Following a highly cited model comparison approach from the information systems literature (Venkatesh et al. 2003) this research uses survey based methods to generate empirical data about consumer innovation adoption models for a mobile banking product (bKash) in Bangladesh. This allows an assessment of the applicability of these models and their antecedents in a BOP and subsistence context. In doing so, it provides guidance on which levers managers and policy makers can use to enhance adoption of pro-poor innovations in the spirit of the "bottom-up" approach espoused by subsistence marketplace scholars (Sridharan and Viswanathan 2008; Viswanathan and Venugopal 2015). In this article we take Rogers' (1983, p.11) perspective that an innovation is new if *perceived* to be new by consumers in subsistence marketplaces (Lowe and Alpert 2015; Ramani, Sadre Ghazi, and Duysters 2012).

First the subsistence marketplaces and BOP literature is reviewed to assess the factors that are likely to be salient for consumers within this context. We then briefly review and

critique extant literature in the area of consumer innovation adoption, which is typically conducted in economically wealthy countries. This helps to assess the state of knowledge in the area and how applicable this knowledge is to the subsistence context (e.g., the Diffusion of Innovations model, the Technology Acceptance Model, the Consumer Acceptance of Technology model, and others). The model comparison approach in this research is then justified and the models to be tested are selected using a systematic process, extending the methodology provided by Venkatesh et al. (2003). The implementation of the method is then explained followed by data analysis using Partial Least Squares (PLS). The paper concludes with findings emphasizing implications for theory and practice within subsistence marketplaces and the BOP.

Consumer Buying Behavior in Subsistence Marketplaces

It has been widely acknowledged that the BOP and subsistence marketplaces require further study because the market environment is characteristically different from existing and more typical research contexts. For example, Prahalad (2004) notes characteristics such as infrastructural challenges (e.g., poor road networks, unreliable electricity, lack of connectivity), economic constraints (e.g., low income, high inflation), a low literacy rate and more rigid social structures. Similarly, Sheth (2011) points to characteristics such as market heterogeneity, influential socio-political institutions, unbranded competition, resource shortages and inadequate infrastructure. While acknowledging that these consumers are economically resource poor and face unpredictable environments and literacy constraints, other research in the subsistence context takes a "bottom-up" view and points to the strong social capital and face-to-face interactions exhibited by these markets. Viswanathan et al. (2012) develop a model based around the unique 1-1 interactional nature of such marketplaces so as to better understand consumption within this unique context. Some parallels are drawn to low literate consumers in

other contexts where coping occurs through social interactions and delegating shopping responsibilities (e.g., Viswanathan, Rosa and Harris, 2005). The important roles of social networks and opinion leadership are reiterated in recent research (Miller and Mobarak 2014; Murendo et al. 2017). These characteristics are likely to have a strong influence upon consumer motivation towards consumption, information processing strategies, learning and subsequent behaviors.

For example, research on low income women in India with low to moderate literacy has looked at cognitive processing styles in subsistence contexts and finds evidence to suggest women with a lower literacy level are more likely to believe in the notion of negotiable fate; a concept which acknowledges that one does not control their fate but can negotiate control over their fate for better personal outcomes (Chaturvedi, Chiu, and Viswanathan 2009). This might imply that those with lower levels of literacy have a greater belief in personal agency, which may affect product choices.

The subsistence marketplace literature also points to various socio-cognitive characteristics of low-literate consumers such as concrete thinking. Concrete thinking means consumers are more likely to process single pieces of information (e.g., price) when evaluating products, rather than higher level abstractions across multiple product attributes. Likewise this literature highlights the distinct characteristic of pictographic thinking where consumers interpret information pictographically rather than textually, often due to low literacy (Viswanathan et al., 2005; 2009). There is evidence to show that product and service comprehensibility can be enhanced through the use of pictures and other visual stimuli within these markets and that pictographic product and communication elements are an important element of product learning (Hasan, Lowe, and Rahman 2017).

Other factors seen to be important influencers on the purchase process include psychological needs (e.g., hunger, hygiene, acceptable performance), uncertainty of product

availability, environmental hazards and convenience (Chikweche and Fletcher, 2010). These factors arise because of the unique conditions faced by consumers in these marketplaces. The authors also discuss how consumers interact with r innovations such as fridge free margarine, multi-purpose soap and flavored soya food products. One key finding was that such consumers were receptive to these new products because of deteriorating economic conditions and declining incomes. Thus, necessity seems to force consumers to search for more useful and better value alternatives in the marketplace.

Research in the subsistence and BOP context that focuses on consumer innovation adoption decisions is sparse despite strong calls in the literature about the importance of innovation in this context. Typically, researchers might study innovation adoption by picking an existing model from the literature and applying it within this context. For example, Pick, Gollakota, and Singh (2014) use frameworks by Rogers (2003) and Davis (1989) to understand the influences upon telecenter adoption within India. However, though appealing because of the widespread use of such models, there is limited conceptualization to take account of these consumers' unique situations. It is thus assumed that these models are relatively comprehensive in explaining product/service adoption and that may not be the case.

As work in the subsistence marketplaces domain suggests, factors such as self-control, personal agency, social capital/influence and visual comprehensibility become highly salient in consumer purchase decisions and ought to be explored further within consumer innovation adoption models in this context. Nakata and Weidner (2012) offer one of the only holistic consumer innovation adoption models conceptualized around the BOP and subsistence marketplaces. This has been termed the Contextualized Bottom-of-the-Pyramid model. However, though taking account of some of these factors, this model has not been empirically tested. The next section covers how the relevant innovation adoption literature has evolved and

its applicability to the BOP and subsistence marketplaces context. Key models which explain consumer innovation adoption are now reviewed.

Consumer Innovation Adoption

Innovation adoption research has considered how and why consumers adopt an innovation. Within this broad area of research, one stream of research has concentrated on *consumers'* adoption of product innovations (e.g., Arts, Frambach, and Bijmolt 2011; Rogers 2003). Research that focuses on consumers rather than organizations tends to have had less attention in the literature. However, widespread accessibility of ICTs has led to an increase in interest about consumer innovation adoption of these technologies (e.g., Berger and Nakata 2013; Brown, Venkatesh and Bala 2006; Mendoza and Thelen 2008). Models in the area tend to be based around sociological theories of diffusion, such as Rogers' (2003) Diffusion of Innovations, and social psychology theories about consumer choice behavior, such as the Technology Acceptance Model (Davis 1989) or the Theory of Planned Behavior (Ajzen 1991). While insightful and intuitive, research evidence about the applicability of these theories within different contexts is mixed and key drivers of adoption tend to be context specific. There is sparse literature on applying these models to the adoption of pro-poor innovations within subsistence marketplaces.

Rogers' (2003) seminal work on the Diffusion of Innovations is arguably the most widely recognized academic work on innovation adoption and it has been implemented across consumer and organizational domains. Rogers (2003) acknowledged the key characteristics of innovations that affect innovation adoption decisions of consumers. The Diffusion of Innovations proposes that innovation adoption is a function of key *perceived* product innovation characteristics, including a product's perceived relative advantage, complexity, compatibility, trialability, and observability. Constructs within the Diffusion of Innovations

framework have widespread appeal across a range of different contexts. Yet, despite widespread use of the framework, results among studies have been inconsistent. A meta-analytic review by Arts, Frambach, and Bijmolt (2011) suggests that relative advantage, compatibility and observability have a stronger effect on intention than complexity and trialability.

Research has also utilized social psychology theories such as such as the Theory of Reasoned Action and the Theory of Planned Behavior, which explain volitional choice more generally, to understand innovation adoption. The Theory of Reasoned Action suggests that consumers' behaviors are determined by their intentions, which are in turn determined by their attitudes towards the action and subjective norms. Extending the Theory of Reasoned Action, the Theory of Planned Behavior was developed to acknowledge the importance of an individual's self-efficacy over a behavior through the inclusion of perceived behavioral control (Ajzen 1991). A number of Theory of Reasoned Action and Theory of Planned Behavior related studies have been conducted to explain innovation adoption behavior but results have been somewhat inconsistent (e.g., Armitage and Conner 2001).

The Technology Acceptance Model, is another well-cited model used in different contexts (e.g., see the meta-analysis by King and He 2006) and uses the Theory of Reasoned Action as a guiding framework. One main contribution of the Technology Acceptance Model is that it parsimoniously recognizes the key antecedents to attitudes and intentions towards using technology. Specifically, the Technology Acceptance Model predicts that an individual's adoption of an innovation is a function of perceived ease of use and perceived usefulness. These constructs are similar to but distinct from Rogers' relative advantage and complexity. In King and He's (2006) meta-analysis, the relationship between perceived usefulness and behavioral intention was found to be reliable but the relationship between perceived ease of use and behavioral intention was found to be more variable with less consistent results. However, as

with the Diffusion of Innovations, the Theory of Reasoned Action and the Theory of Planned Behavior, there is little consistency on the influence of the predictors on intention and behavior.

Though models such as the Technology Acceptance Model have been shown to be useful in explaining adoption, a growing body of researchers have begun to extend the model with several new dimensions to take account of its limitations. For instance, Lin, Shih, and Sher (2007) proposed the Technology Readiness Model, where technology readiness is integrated into the Technology Acceptance Model. Technology readiness refers to a consumer's tendency to accept and use new technologies for achieving goals at home or in work life (Parasuraman 2000), given consumers are typically freer to choose among many available alternatives. The Technology Readiness Model has been largely supported in the literature (e.g., Lin and Hiseh 2006; Walczuch, Lemmink, and Streukens 2007).

Other competing models such as the Consumer Acceptance of Technology model (Kulviwat et al. 2007) have also been developed to take account of consumers' affective reactions to new products. One might expect these affective reactions to be less important in the BOP context which typically emphasizes the importance of affordability, social capital and other marketplace centric constructs. However, some research has suggested that affective reactions such as excitement may play a role in explaining reactions to microfinance services (Jebarajakirthy and Lobo 2015). The Consumer Acceptance of Technology model integrates constructs such as Pleasure, Arousal and Dominance with the Technology Acceptance Model in light of the Technology Acceptance Model's focus on utilitarian and rational evaluation of innovations. Using the Consumer Acceptance of Technology model, Kulviwat et al. (2007) find that relative advantage, perceived usefulness, pleasure, and arousal are significantly related to adoption behavior and addition of the new constructs significantly enhances the explanatory power of the model. Although Kulviwat et al. did not find that dominance is

significantly associated to adoption behavior, other researchers have found that it is (Nasco, Kulviwat, and Kumar 2008).

Another recent consumer based innovation adoption model is the Value Based Adoption Model, proposed by Kim, Chan, and Gupta (2007). The Value Based Adoption Model explains consumer adoption from the value maximization perspective, showing that all belief antecedents (e.g., usefulness, enjoyment, technicality, perceived fee) are mediated through perceived value. Setterstrom, Pearson, and Orwig (2013) studied the adoption of mobile enabled wireless technology, using the Value Based Adoption Model and found that usefulness, enjoyment, and perceived fee significantly influence perceived value and that perceived value significantly influences adoption behavior. Although Kim, Chan and Gupta (2007) found that technicality has a significant impact on perceived value, Setterstrom, Pearson and Orwig (2013) and Wang, Yeh, and Liao (2013) found that technicality has no significant impact on perceived value. As with other commonly used innovation adoption models, previous studies have led to inconsistent conclusions about the antecedents of the Value Based Adoption Model.

The only dedicated model of consumer innovation adoption within the BOP and subsistence marketplaces is the Contextualized BOP model developed by Nakata and Weidner (2012). The Contextualized BOP model is derived from Rogers' Diffusion of Innovations and theories about poverty adapted from the work of Amartya Sen (1999). In their model, Nakata and Weidner (2012) propose a range of contextual factors which influence a BOP consumer's intention to adopt an innovation, including poverty, affordability, adaptability, visual comprehensibility, relative advantage, compatibility, collective need, social capital, assimilationist culture, interpersonal promotions, atomized distribution, and flexible payment forms. However, though insightful and highly relevant to the BOP and subsistence context, this

model has not been empirically tested. Therefore, it is unclear whether it will improve upon existing models that have been extensively developed and tested in other contexts.

The literature review indicates that a range of consumer innovation adoption models have been used to understand how consumers evaluate innovations. However, though useful in providing insight about the *range* of factors that are likely to affect innovation adoption more generally, the majority of these models (i.e., Diffusion of Innovations, Technology Acceptance Model, Theory of Planned Behavior, Consumer Acceptance of Technology model, and Value Based Adoption Model) have provided largely inconsistent results across different contexts and have not been extensively tested on consumers in the BOP context. The model developed for the BOP context (i.e., the Contextualized BOP model) has not been empirically tested. This raises the fundamental question of how well these models will work in the subsistence context and which antecedents will be the most useful predictors of pro-poor innovation adoption. Furthermore, though there is some degree of overlap between models and their predictors, the numerous models that have been proposed include a number of unique constructs, which may be relevant in the subsistence context. The literature on consumer buying behavior within subsistence marketplaces and the BOP reveals a heightened sense of importance for factors such as collective needs, comprehensibility (affected through a range of senses and enhanced through concrete, localized, and pictographic information), social or relational elements and cultural compatibility. Likewise, more typical constructs such as perceived utility, affordability and perceived ease of use are likely to be important as well. When studying consumer innovation adoption in this context picking one favored model can mean paying little attention to the contribution of other models. One approach to deal with this issue is to leverage the collective wisdom of all relevant models by empirically comparing them in the BOP context.

Prior Empirical Model Comparison Studies

Model comparison studies are a common way for researchers to tackle research problems in mature research streams where a range of relatively well established and plausible models exist. For example, Venkatesh et al. (2003) empirically compare eight innovation adoption models in an organizational context. Taylor and Todd (1995) also utilize a model comparison approach to empirically compare the Technology Acceptance Model and two variations of the Theory of Planned Behavior for predicting usage of information technology. Mathieson (1991) empirically compares two models (Technology Acceptance Model and Theory of Planned Behavior) to predict an individual's intention to use a spreadsheet package in a western university setting. Chau and Hu (2001) also empirically compare the Technology Acceptance Model, and the Theory of Planned Behavior in a healthcare professional setting. Similarly, Davis, Bagozzi, and Warshaw (1989) empirically compare the ability of the Theory of Reasoned Action and Technology Acceptance Model to predict and explain user acceptance and rejection of computer-based technology. Such model comparison approaches are useful to assess the state of the art of the literature on innovation adoption and for assessing antecedents of innovation adoption in new contexts. We next outline the method used within the study and explain the systematic approach for selecting models for analysis and testing.

Method

This study followed the procedure used by Venkatesh et al. (2003) to compare innovation models in the subsistence marketplace. As this study sought to use existing models of innovation adoption, one issue was identifying the models for comparison. For practical purposes (e.g., questionnaire length, respondent fatigue etc.), only key models could be included and these needed to be relevant to the context under investigation. There are several articles in the literature which use a "horserace" approach to compare alternative models. Within these articles the authors tend to choose models to compare based on judgment. Given

the plethora of innovation adoption models that exist in the literature, it was important to systematically whittle down the list of possible models to test, rather than rely on judgment and personal preference. To do this, four criteria aided in model selection, including i) relevance to the consumer context, ii) number of citations, iii) relevance to subsistence marketplaces and the BOP, and iv) minimal similarity among constructs. These criteria are explained below:

- *Relevance to the consumer context.* The majority of research into innovation adoption is based in an organizational context. Therefore, models which had previously been used to predict *consumer* innovation adoption were given a higher priority than models that had been used to predict organizational innovation adoption. This also assisted given the availability of previously used and validated measures.

- *Number of citations.* Models with higher total citation counts were given higher priority than those with lower citation counts, reflecting impact and importance in the scientific community. However, this meant that newer models were penalized, therefore, we also took account of number of citations within the first three years of publication.

- *Relevance to subsistence marketplaces and the BOP.* The majority of research into innovation adoption has been undertaken within economically developed economies. Therefore, models which have previously been used in developing contexts were given a higher priority and models specifically developed for the BOP and subsistence marketplaces were selected.

- *Minimal similarity among constructs.* Given many innovation adoption models are variants and extensions of existing models it was important to choose models characteristically different from each other. Therefore, models with a low level of similarity to other models were given a higher priority.

Not all four criteria needed to be satisfied for a model to be selected, but these criteria were used as a guide to identify potential models. The fit of each model with the criteria is

summarized in Table 1. For example, the Contextualized BOP model (Nakata and Weidner 2012) does not have a high total citation count (perhaps because it was published more recently), and has never been empirically tested, but it is highly relevant to the subsistence/BOP context. Using the criteria seven models were selected, including the Theory of Reasoned Action, (Fishbein and Ajzen 1975), the Theory of Planned Behavior, (Ajzen 1991), the Technology Acceptance Model, (Davis 1989), the Diffusion of Innovations (Rogers 1983, 2003), the Consumer Acceptance of Technology model (Kulviwat et al. 2007), the Value Based Adoption Model (Kim, Chan, and Gupta 2007), and the Contextualized BOP model (Nakata and Weidner 2012).

<center>"Insert Table 1 about here"</center>

Research Context

Bangladesh was chosen as the research context for this study because it has large segments of subsistence consumers. For instance, 31.5% of the population of Bangladesh was under the national poverty line in 2010 (World Bank 2013). Another reason for choosing Bangladesh was that it has primarily concentrated on infrastructure innovations and innovations useful for social development. Therefore, innovations such as sanitary latrines, mobile banking, and community information centers are beginning to diffuse in this largely subsistence market. Bangladesh has also been considered as a research context in other BOP or subsistence market related studies (e.g., Kolk, Rivera-Santos, and Rufín 2014; Rahman, Hasan, and Floyd 2013). Also, one of the authors is familiar with Bangladesh as well as fluent in Bangla, which is the national language of Bangladesh and this facilitated the research process.

Selected Product

In this research, pro-poor innovations were considered as the product category. A range of pro-poor innovations within Bangladesh were considered and evaluated for inclusion in this research. Potential new products for inclusion in the research had to satisfy the criteria outlined by Ramani, Sadre Ghazi, and Duysters (2012). At the time of the research, they needed to be relatively new to consumers, but which consumers had also heard about and potentially used. Thus, product selection was a delicate balancing act. The products and services considered included portable clinics, mobile phones, mobile banking, and community internet service centers, among others. Of these pro-poor innovations, bKash mobile banking was selected. bKash provides 24 hour mobile banking services to consumers within Bangladesh and is often used by subsistence consumers as a way to transfer money easily and quickly on conventional mobile phones. Specifically, it was an example of a successful innovation that was growing quickly at the time data collection took place and reached a large segment of the population. It was relatively widespread because a large proportion of subsistence consumers live in rural areas and mobile phone penetration is high (due to poor fixed line telecommunications infrastructure and several alternative low costs mobile providers). This allowed a wide geographic segment to be targeted and represented within the research (e.g., rural and urban consumers). Subsistence consumers in Bangladesh and other countries have had difficulty accessing conventional banking services efficiently – e.g., less than 15% of Bangladeshi consumers are connected to the formal banking system (bKash, 2017) – because of costs, transport constraints, social mores and a range of other factors. Such services have diffused rapidly and are now more pervasive in the marketplace among subsistence consumers. They have also been shown to have a number of development impacts within such marketplaces (Govindarajan 2012; The Economist 2009; Maurer 2012). Therefore, the newness of bKash at the time, its high level of awareness in the marketplace, and potential for impact within

subsistence marketplaces justify the choice of mobile banking as an appropriate product category to investigate determinants of pro-poor innovation adoption intention in Bangladesh.

Questionnaire Design and Measurement

A questionnaire was developed to measure the constructs from each of the seven models. Because of a lower literacy rate among subsistence consumers, several issues like difficulty of reading and writing emerged during the administration of this questionnaire, as might be expected (Viswanathan, Gau and Chaturvedi 2008; Viswanathan, Hastak, and Gau 2009). Therefore, face-to -face questionnaires administered verbally were used to assist respondents in answering the questions, given their reading and writing constraints. Some screening questions were asked to ensure the respondents met our criteria. For example, respondents were asked whether they had heard about bKash mobile banking before. Then respondents were asked about their responses to the measured constructs from the models. Again, given their literacy constraints, visual stimuli for the Likert scales were used in this study (i.e., pictographic symbols demonstrating level of agreement or various type rectangle boxes) following Martini and Page (1996). These were pictographic symbols demonstrating level of agreement using a range of different visual stimuli depending on the nature of the question. Respondents were asked to rate their responses to Likert scale items along a continuum from strongly disagree to strongly agree. Finally, respondents were asked about their demographic characteristics.

Since this study empirically compares models of innovation adoption, previous literature was first reviewed to identify suitable measurement items. For all models (except the Contextualized BOP model), prior measures were available for adaptation in the literature. Therefore, items validated in previous research were adapted for use here and in the case of the Contextualized BOP model, new measures were developed. The list of these measures, their sources and descriptive statistics are provided in Table 2.

"Insert Table 2 about here"

To develop the items for constructs within the subsistence market, we followed the scale development procedures of Hsu, Chiu, and Ju (2004) and Moore and Benbasat (1991). This included i) assessing content validity through expert evaluation, ii) careful pre-testing and pilot-testing, iii) testing internal consistency, and iv) testing construct validity through assessing convergent and discriminant validity. The newly developed items and their descriptive statistics are provided in Table 3. Judgements by experts were utilized to justify the content validity of the items and this was performed in this research with a quantitative approach as in Hardesty and Bearden (2004). The expert panel consisted of ten experienced academics who had published in the innovation adoption area. This type of face validity study is consistent with previous research (e.g., Wang and Mowen 1997).

"Insert Table 3 about here"

Sampling and Questionnaire Administration

In this study, 351 subsistence consumers with low-income levels (i.e., who earn less than US$5 in a day) were approached and 320 responded to the questionnaire. This study used convenience non-probability sampling to select participants. Convenience non-probability sampling was used because there was no reliable sample frame for the target population. Though not an optimal sampling approach, this is consistent with other studies in this context for pragmatic reasons (e.g., Wentzel, Diatha, and Yadavalli 2013). The response rate was high. Nine responses were considered invalid due to the extent of missing data resulting in the final sample size of 311. The sample was skewed towards males (91%) but represented a range of age groups (18-25=19%, 26-30=35%, 31-35=31%, 36-50=13%, 50+=3%) and respondents came from urban and rural areas (urban=62%, rural=38%). The sample may have been skewed

towards males due to cultural issues such as the lower likelihood of female interaction with strangers in public places.

Respondents were approached in areas surrounding bKash agents, including tea stalls and marketplaces, at different times of the day (between 7am and 6pm). To ensure geographic dispersion, interviewing took place within three districts (Dhaka, Comilla and Feni) in a number of major cities, towns and villages (e.g., Dhaka: Badda, Sahajadpur, Bashtoli and Jhilpar; Comilla: Abdulipar, Aligamara, Badarpur, Bagmara; Feni: Dagonbhuiyan). This enabled a representation of urban and rural consumers, consistent with literature in the area (Ireland 2008). Interviews lasted around 50 minutes on average because they were administered face-to-face and enabled questionnaire clarifications, where necessary, to facilitate data collection among a group of consumers who were not used to taking part in questionnaires and who sometimes exhibited low literacy.

Questionnaire administration followed typical guidance from the literature (e.g., Zikmund et al. 2016) but was adapted to suit the context under investigation. Specifically, an initial meeting was arranged with community representatives (e.g., village chairperson, teachers, the target group) with whom the intention to conduct the survey was discussed. This process was about establishing trust, being visible within the community and learning from locals how best to approach participants from the target population. However, it also assisted in refining the questionnaire to take account of language used and colloquialisms. For example, pre-testing revealed some words were difficult to understand by subsistence respondents leading to replacement with words that were better understood by the target population. After significant changes were made to ensure greater understanding and interpretability, the questionnaire was tested once again on subsistence consumers and no further revisions were deemed necessary. Pilot tests (n=29) were conducted prior to launch to establish further confidence in the questionnaire on a larger sample of respondents, to understand issues in

identifying and approaching the target sample, the nature and duration of the interview, and the number of questionnaires that could be completed in one shift.

Data was collected by field workers who had training and experience in market research methods. The researcher briefed the field workers in detail about the questionnaire and its contents based on a series of pretests and a pilot study. The researcher informed the field workers about the start and finish dates, the minimum number of completed questionnaires expected in one shift, the need to input responses on a daily basis, the length of interview, ensuring fully completed questionnaires, and eligibility of the respondents to take part in the study (e.g., the screening questions).

Common Method Bias

The effects of Common Method Bias (CMB) were minimized through following the procedural controls suggested by Podsakoff et al. (2003). This included careful reflection on the writing and format of the questionnaire, and careful pretesting to avoid ambiguous and unfamiliar terms in the questionnaire. In this research, the pretesting phase carried out with subsistence consumers and local authorities enabled evaluation of the questionnaire and this helped to clarify any ambiguous and unfamiliar terms. Respondents were informed that the study was not conducted for commercial purposes but as a university research project. Moreover, respondents were assured that there were no right or wrong answers. Three sets of questionnaires were utilised to counterbalance the order of questions and reduce bias related to priming effects and item context induced mood effects.

Data Analysis: Empirical Comparison of the Seven Models

PLS was appropriate for testing the reliability and validity of the measures and analyzing the data as this study consists of both reflective and formative constructs (Fornell and Bookstein 1982; Jarvis, MacKenzie, and Podsakoff 2003). Unlike covariance-based-structural equation modeling (CB-SEM), PLS was also appropriate to test theoretical models like the Contextualized BOP model. This is because this model has not previously been empirically validated, and can be considered exploratory. PLS uses standardized latent variable scores and outputs, such as path loadings, are standardized. This is particularly helpful when comparing models (Henseler, Ringle, and Sarstedt 2012). Using PLS to compare models is consistent with the procedure outlined in Venkatesh et al. (2003).

According to Compeau, Meister, and Higgins (1991), focusing on direct effects is appropriate when predicting behavior, (in this case between the innovation antecedents and behavioral intention). This approach to predicting behavioral intention is followed here in line with the procedure of Venkatesh et al. (2003). To do so the seven models were empirically compared to identify the key determinants of pro-poor innovation adoption intentions in the subsistence marketplace context. In this research, the selected models were compared based on the following criteria: 1) explained variance (adjusted R^2) of the endogenous construct, 2) percentage of the model's statistically significant parameters, 3) theoretical interpretation of the paths and, 4) model parsimony. To compare models Venkatesh et al. (2003) use only explained variance to assess the value of one model over another. The other three criteria were used here to take account of theoretical meaningfulness and model parsimony.

Reliability and Validity

The reliability and validity of the reflective constructs were established through the use of PLS by running a bootstrap of the seven models using 5000 resamples. Firstly, convergent validity was established by identifying whether the items loaded significantly on their respective constructs. To assess reliability, PLS computes a composite reliability score, which is similar to Cronbach's alpha in that they both measure internal consistency. In this research, each reflective construct represents a level of reliability well above the recommended threshold of 0.70 (Chin 1998). Discriminant validity for each construct was also tested. To test the discriminant validity of the reflective constructs, the correlations of each construct with each other construct was assessed, and these correlations were compared with the AVE square roots for each construct (Lowry and Gaskin 2014). The Square root of AVE for each factor was higher than the respective inter-construct correlations, which suggests strong discriminant validity between the constructs (see Appendix).

Explained Variance of the Endogenous Constructs

Table 4 shows that the seven models explained between 26% and 40% of the variance in subsistence consumers' intentions to use pro-poor innovations. The Value Based Adoption model appears to have the highest adjusted R^2 (40%), followed by the Consumer Acceptance of Technology model (adjusted $R^2 = 38\%$), the Theory of Planned Behavior (adjusted $R^2 = 32$ %), the Contextualized BOP model (adjusted $R^2 = 30\%$), the Technology Acceptance Model (adjusted $R^2 = 30$ %), the Diffusion of Innovations (adjusted $R^2 = 29\%$), and the Theory of Reasoned Action (adjusted $R^2 = 26\%$). The Theory of Planned Behavior appears to be superior to the Theory of Reasoned Action, the Technology Acceptance Model, and the Diffusion of Innovations in explaining subsistence consumers' intention to use pro-poor technology (adjusted $R^2 = 32\%$ $_{TPB}$, 26% $_{TRA}$, 30% $_{TAM}$, and 29% $_{DOI}$). The Contextualized BOP model also has a relatively high adjusted R^2 of 30%. However, using explained variance as a criterion, the

Value Based Adoption Model appears to be superior to the Contextualized BOP model, and the Consumer Acceptance of Technology model in explaining subsistence consumers' intention to adopt (adjusted $R^2 = 40\%$ $_{VAM}$, 30% $_{CBOP}$ and 38% $_{CAT}$). Therefore, the Value Based Adoption Model is able to explain the highest variance in predicting subsistence consumers' intention to use pro-poor technology and the Theory of Reasoned Action explains the lowest variance in predicting subsistence consumers' intention to use pro-poor technology (see Table 4). Next we compare the percentage of the models' statistically significant parameters.

Percentage of the Model's Statistically Significant Parameters

Table 4 also shows the percentage of each model's statistically significant parameters. Although the Contextualized BOP model had a relatively high adjusted R^2, only 25% of the paths were statistically significant. This was less than the number of statistically significant paths for the other models such as the Theory of Reasoned Action (100%), the Theory of Planned Behavior (100%), the Technology Acceptance Model (100%), the Diffusion of Innovations (60%), the Value Based Adoption Model (60%), and the Consumer Acceptance of Technology model (71%). Only 60% of paths for the Value Based Adoption Model were statistically significant, which is less than the percentage of statistically significant paths for the Consumer Acceptance of Technology model (71%). Consequently, the Consumer Acceptance of Technology model exhibited the highest percentage of statistically significant paths along with a relatively high adjusted R^2, indicating good model characteristics.

Table 4 shows the coefficients from each model behaved broadly as would be expected, except for those constructs which were statistically insignificant. This pattern in itself is not necessarily surprising given the inconsistency displayed by antecedents in previous research. Consequently, Table 4 indicates that the theoretical interpretation of the paths was broadly consistent with what we would expect.

"Insert Table 4 about here"

Discussion

In light of significant recent interest in innovation adoption at the BOP and subsistence marketplaces (Altman, Rego and Ross 2009; Frykman 2013; Miller and Mobarak 2014; Nakata and Weidner 2012; Ramani, Sadre Ghazi, and Duysters 2012) this research set out to ascertain which consumer innovation adoption models best explain pro-poor innovation adoption and to identify the key antecedents influencing adoption. Despite insightful conceptual work which acknowledges the unique characteristics of the BOP and insights about consumer buying behavior from subsistence marketplaces (e.g., Chikweche and Fletcher 2010; Viswanathan, Rosa, and Harris 2005; Viswanathan, Rosa, and Ruth 2010; Viswanathan et al. 2012) there is little empirical research about the factors most likely to affect pro-poor innovation adoption. This research makes a contribution by empirically comparing existing innovation adoption models within this context. Table 5 summarizes key findings from the research, the implications of which are elaborated on below.

"Insert Table 5 about here"

The Role of Affect for Subsistence Consumers

The first major finding from this research showed that the Value Based Adoption Model and the Consumer Acceptance of Technology model were the most useful models in explaining consumer adoption intentions. Interestingly, and most surprisingly, this could be attributed to the fact that both models captured hedonic and affective dimensions of a consumer's evaluation, in contrast to the other models tested, which were predominantly based around utilitarian and cognitive evaluations. This is consistent with research in the subsistence marketplaces literature that has emphasized the affective dimensions arising from associated factors such as low literacy (Viswanathan, Rosa, and Harris 2005, Adkins and Ozanne 2005),

and the importance of these elements in functional literacy in the marketplace or marketplace literacy (Viswanathan, Gau and Chaturvedi 2008). In this regard, Jebarajakirthy and Lobo (2015) conclude that excitement and happiness have a strong influence on BOP consumer attitudes and intention to adopt micro-credit in war ravaged contexts.

Consistent with the findings above about the inclusion of hedonic and affective constructs, the strongest influence on intention was enjoyment. Prior research has investigated the influence of enjoyment on perceived value, perceived usefulness and ease of use (Kim, Chan and Gupta 2007; Setterstrom, Pearson and Orwig 2013) without observing a direct effect on behavioral intention (Koenig-Lewis et al. 2015). However, consumer research conducted by Smart Communication in the Philippines found that potential BOP consumers wanted to use their phone for both enjoyment and practical purposes (Anderson and Markides 2007); i.e., technology is not just a functional tool. Therefore, models of pro-poor innovation adoption should explore in more detail the ways in which affect influences purchase decisions in this context and models should be updated to reflect this.

The Role of Utilitarian Evaluations for Subsistence Consumers

Interestingly, relative advantage did not have a significant *direct* influence on intention. This finding is contrary to the common consensus in the literature (e.g., Rogers 2003). In this regard, it should be noted that Arts, Frambach, and Bijmolt (2011) find that relative advantage has a weaker relationship for intention than for actual behavior. As might be expected though, the majority of these studies did not consider subsistence consumers as the unit of analysis. Subsistence consumers, given their income constraints, cannot continuously update to new products and services even if these products and services offer an incremental benefit (unlike in economically wealthier countries where new versions of products are the norm in a competitive marketplace). The concept of relative advantage takes account of a product's

incremental benefit over what currently exists, but a new product may also have an incremental cost which cannot be borne regularly. Therefore, concepts like relative advantage may explain the success of subsequent versions of a new product in economically wealthier countries where a product's cost is not such a strong deterrent to purchase as in subsistence marketplaces. For subsistence consumers to adopt a new product, its benefit to cost ratio is likely to have to be very high to justify the increased expense. Khandelwel et al. (2017) observe a similar phenomenon in relation to fuel efficient stoves when analyzing their relatively slow diffusion. For many consumers, traditional wood burning stoves might simply be "good enough". This means that, in spite of their relative economic and environmental benefits, there will not be a compelling reason to go out and purchase one. On the other hand, mobile phones have a penetration rate close to 100% in many countries and have diffused rapidly. Perhaps, pro-poor innovations may need to have a *significant* relative advantage over existing products and services which fulfill a similar need to enhance adoption.

The related but distinct concept of perceived usefulness was found to be a significant predictor of intention in this study. Although perceived usefulness and relative advantage may be terms which are used interchangeably, they represent subtly different concepts. Relative advantage is the degree to which consumers perceive the innovation as offering an incremental improvement over existing alternatives, rather than the overall utility of the product to them. Needless to say, the two concepts are related and this is captured within the Consumer Acceptance of Technology model (Kulviwat et al. 2007) where relative advantage affects intention through perceived usefulness and attitudes. Based on a subsequent analysis of the indirect paths (not reported here), the data showed a similar mediating relationship. Consequently, it is anticipated that innovation adoption models within the BOP ought to include both relative advantage and perceived usefulness. But these concepts and their

interrelationships should be carefully conceptualized for a more in-depth theoretical understanding of how BOP consumers evaluate pro-poor innovations.

Behavioral Constraints and Social Networks

Our research also found that the Theory of Planned Behavior explains adoption intention better than the Theory of Reasoned Action, the Technology Acceptance Model, the Diffusion of Innovations and the Contextualized BOP model. This is consistent with the literature which points out the unique internal and external constraints experienced by the BOP (e.g., Viswanathan, 2013; Jebarajakirthy and Lobo 2015; Nakata and Weidner 2012). For example, BOP consumers may be more concerned about constraints such as interest rates, service charges and collateral than a product's usefulness per se (Li, Gan, and Hu 2011).

Perceived behavioral control has a significant effect on intention to use the new service. In light of prior meta-analysis findings from the broader Theory of Planned Behavior literature, which indicate an inconsistent effect for perceived behavioral control (e.g., Armitage and Conner 2001), the results here suggest that it is an important variable in the adoption of new products for these consumers. This could reflect subsistence consumers' unique circumstances, characterized by multiple internal and external constraints (Nakata and Weidner 2012; Prahalad 2004). Also, consistent with prior research (Viswanathan, Rosa, and Harris 2005; Viswanathan et al. 2009b, 2009c; Nakata and Weidner 2012), this research suggests that visual comprehensibility was an important determinant of adoption intention. This could reflect BOP consumers' constraints in relation to literacy and product comprehension. Visual comprehensibility might enhance perceived behavioral control for consumers through the use of pictographic symbols and other graphics to make brands more easily recognizable, understandable and clearly distinguishable from one another (Viswanathan, Rosa, and Harris 2005; Viswanathan et al. 2009b, 2009c). Consumers in these marketplaces need to be reassured

that they are able to operate the new banking service. The functionality of such new services should be compatible with the cultural expectations, norms and constraints (e.g. low literacy, environmental challenges) of these communities (Chikweche and Fletcher 2010). Consistent with typical consumer innovation adoption models, ease of use is also important (Ahlstrom 2010) and factors that assist in enhancing visual comprehensibility are likely to positively influence adoption (Hasan, Lowe, and Rahman 2017).

The Theory of Reasoned Action points out that both attitudes and subjective norms are significant predictors of the intention to use bKash. New product claims from advertisers, shopkeepers and retailers may be regarded with suspicion in subsistence markets where basic literacy is low (Viswanathan 2007). Hence claims should be clear to facilitate comprehension and fair to show an understanding of community welfare needs (Viswanathan et al. 2009b). Claims should also be substantiated and information about the product benefits should be straightforward in order to reduce the need for additional information search. Given the influence of word-of-mouth, opinion leaders (Miller and Mobarak 2014) and other family and social connections (Murendo, et al. 2017; Viswanathan et al., 2012), negative experiences are likely to spread quickly. Likewise, managers launching products and services can facilitate adoption by aiming to generate positive word-of-mouth among these networks and targeting opinion leaders in the community to boost self-efficacy (Miller and Mobarak 2014; Viswanathan, Sridharan, and Ritchie 2010). This requires developing significant knowledge of subsistence consumers, and embracing a value frame and networks to establish formal and informal partnerships with them (Elaydi and Harrison 2010; Sethia 2005) leading to co-creation of products (Kolk, Rivera-Santos, and Rufín 2014). This may be best served by taking a bottom-up approach to interaction with subsistence consumers.

Compatibility with Existing Lifestyles

With respect to the Diffusion of Innovations, trialability, observability and particularly compatibility were significant predictors of intention to use bKash. Yet complexity does not play a significant role, at least in this research. The role of compatibility in the intention to adopt pro-poor innovations is consistent with the findings from Arts, Frambach, and Bijmolt (2011). BOP consumers tend to spend money on products, which are consistent with their essential needs (Rangan, Chu, and Petkoski 2011) representing the compatibility of a product. Specifically, Stewart (1977) suggests that innovations designed for subsistence marketplaces should be compatible with income levels, resource availability, existing technologies and costs. This may reflect the notion of compatibility and the need to overcome existing constraints and impediments. Understanding lifestyles of subsistence consumers and creating tailored products compatible with their needs requires immersion in these marketplaces and a thorough understanding of the needs and constraints of subsistence consumers (Viswanathan, Sridharan, and Ritchie 2010). Again, such understanding may best be served by a bottom-up approach co-creating value with these consumers, as emphasized by the subsistence marketplaces stream.

Additionally, these BOP consumers seemed to be more collectivist in nature, and adoption intention seems to be influenced by collective needs. The literature suggests this influence is related to a lack of traditional assets (e.g., economic and political capital) and the uncertainty produced by unstable environments (e.g., food shortages, civil unrest) (Nakata and Weidner 2012). This research, therefore, corroborates the conclusions drawn by Nakata and Weidner (2012) in this regard. As pointed out by Viswanathan et al. (2012), subsistence marketplaces may be poor in disposable income but are characterized by pervasive one-to-one interactions, interdependencies and richness in social capital.

The Role of Perceived Value

Our study reinforces the importance of perceived value as a strong predictor of adoption intention in the BOP and subsistence contexts. Given the severe financial constraints facing this market, new products and services must have a very compelling value proposition to be considered attractive. However, although perceived value was a significant predictor of intentions to use bKash, surprisingly perceived fee and affordability were not significant. Considering that costs are sometimes covered by other actors such as non-profit agencies and aid agencies, affordability needs to be regarded in a broad sense and calls have been made to work in coordination with government and non-profit organizations in providing innovative products and solutions that are economically, socially and culturally sustainable (Viswanathan and Sridharan 2009). Perceived value may embrace different forms such as the "right" price, pay per use, good value (Sethia 2005; Viswanathan, Sridharan, and Ritchie 2010) and reduced price points (Viswanathan et al. 2009a). This is critical in such marketplaces when decisions in general and purchases in particular are planned with short time horizons (Viswanathan, 2013).

Managerial and Public Policy Implications

The model comparison process presented here has several implications for managers and policy makers aiming to facilitate adoption of their products and services in BOP markets. Although it may be common to assume that consumers in these markets search for cheaper and more functional products (Ahlstrom 2010; Anderson and Billou 2007), the comparison of models in this study indicates that successful public policy innovations need to go beyond addressing a utilitarian need for such consumers. Although affordability was thought to be important in resource-constrained settings (Anderson and Markides 2007; Sethia 2005), the role of this factor was not as prominent as expected. Whereas perceived value was indeed a significant predictor in the Value Based Adoption Model, the Contextualized BOP model showed affordability as nonsignificant.

In addition to personal needs, collective needs should be catered to by public policy makers and marketers through a deeper understanding of the networks and communities within which consumers interact. Notions of social acceptability and influence within such communities from friends, aspirational groups or family members is particularly important in subsistence marketplaces (Viswanathan et al. 2012; Miller and Mobarak 2014). This is a distinctive characteristic more likely to be apparent in such marketplaces than in typical economically wealthier contexts.

Similar to more advanced economies, adoption intention is also based around hedonism and affect, even though the constraints faced by the BOP are more significant. Across models, hedonism and pleasure show some of the strongest effects on adoption intentions. This implies that managers and policy makers ought to place a greater emphasis on communicating the affective consequences of adopting an innovation. To take an example used in this research, the mobile banking service bKash has a strapline stating "The easiest and safest way to send or receive money…". Whereas ease of use and safety are clearly important dimensions within a mobile banking service the ability to exchange money easily and safely may have a range of hedonic benefits (e.g., the enjoyment and happiness associated with advancing the wellbeing of a loved one, generating social harmony etc.). According to this research these affective dimensions may be at least as important in communicating product benefits as the more utilitarian dimensions like safety and ease of use. To requote Levitt, "People don't want to buy a quarter-inch drill. They want a quarter-inch hole!" and the service may be a means to an end in this case. Thus, practitioners need to understand what is *really* motivating consumers in the BOP to purchase a given product. Communications that cater for this motivation are likely to be more effective than relying on more utilitarian diffusion and technology adoption dimensions.

The design of public and business policy campaigns should aim to increase personal acceptability of innovations by communicating their usefulness, and emphasizing their ease of ease and compatibility with existing lifestyles. However, perceived usefulness may be best thought of as a mediating variable with key proximate antecedents such as perceived ease of use and perceived relative advantage (Kulviwat et al. 2007). A product's perceived usefulness, may be a necessary but not sufficient condition for adoption, likely influenced through enhancing perceived ease of use and enhancing consumer perceptions of a product's relative advantage. This may take the form of marketing communications that emphasize these elements, but may also take the form of local product demonstrations like Shakti Vani in India (women from local communities who perform a communication role for the products of Hindustan-Lever Ltd), which enables demonstrations of how the product satisfies a basic need beyond what existing alternatives do and how it is best used (Sridharan and Viswanathan 2008). This type of promotion is likely to be viewed as being more trustworthy by members of the community than other forms of marketing communication and may also help to overcome impediments in relation to perceived behavioral control.

Managers and policy makers also need to ensure visual comprehensibility of a pro-poor innovation through its design and packaging (e.g., colors, shapes, photos, physical package size) and restrain from textual descriptions that rely on abstract thinking. This ensures that numeracy and literacy constraints are able to be tackled given the tendency for concrete thinking and pictorial representations as also highlighted in other studies (Hasan, Lowe and Rahman 2017; Viswanathan, Rosa, and Harris 2005; Viswanathan et al. 2009b, 2009c).

Marketers and policy makers can influence perceived behavioral control through ensuring that barriers to adoption are tackled and that consumers are reassured about using a novel product or technology where they may not have the technical skills. This is particularly pressing in the context of the BOP and subsistence marketplaces where there are multiple

factors that impede the purchase and use of a new product. Typical constraints include a product's cost, compatibility with existing infrastructure, social mores, basic literacy and numeracy, and marketplace literacy. Technical aspects of innovations may be simplified or redesigned, and some consumers may benefit from the opportunity to test the new product/service in a non-threatening environment to avoid anxiety related to performance risk.

Marketers need to pay attention to factors that are impeding the ability of individuals when purchasing and using the product through product design, marketing communications, and the product's ecosystem. The influence of these factors will vary for different products and in other contexts. However, the success of bKash may be partially due to allowing easier access to banking services for BOP consumers, enhancing their level of control over performing the behavior and strengthening social bonds which are so important in these marketplaces.

Conclusions

This study set out to identify the factors that were most useful in explaining consumer adoption of pro-poor innovations in subsistence marketplaces. As might be expected, social networks and internal/external constraints seemed to be important influencers along with functionality and value for money. However, surprisingly, subsistence consumers are not just motivated by functionality and economic needs. Organizations may need to enhance the hedonic attributes of a pro-poor innovation to enhance adoption. Even though a large scale survey approach was used the findings here are nonetheless exploratory, given the specific context of the research (e.g., one product category, one country context etc.). Thus, while we do not present conclusive evidence about the factors likely to enhance pro-poor innovation adoption in subsistence marketplaces the research adds value to our understanding of this phenomenon in two ways. First, it shows that existing models of consumer innovation adoption do not capture the complexity and differences apparent within the subsistence context. Second, it highlights the

range of factors that future researchers, practitioners and policy makers may need to take into account in order to develop a more nuanced understanding of the adoption process. Consequently, there does not appear to be one "right" existing model which best predicts adoption intentions. This purpose may best be served by a hybrid model which is more relevant to the unique context of the subsistence consumer. New models for the subsistence consumer are needed and can be developed through a bottom-up approach emphasized by the subsistence marketplaces stream and taking into account the findings here. These models should then be tested and compared to existing models. Further research across different contexts and cultures is needed using a variety of different methodological approaches. This article serves as an impetus to further our understanding about this socially rich, yet poorly understood, group of consumers.

References

Ahlstrom, David (2010), "Innovation and Growth: How Business Contributes to Society," The Academy of Management Perspectives, 24(3), 11.

Ajzen, Icek (1991), "The Theory of Planned Behavior," Organizational Behavior and Human Decision Processes, 50(2), 179-211.

Altman, David G., Lyndon Rego, and Peg Ross (2009), "Expanding Opportunity at the Base of the Pyramid," People and Strategy, 32(2), 46.

Anderson, Jamie, and Costas Markides (2007), "Strategic Innovation at the Base of the Pyramid," Sloan Management Review, 49,83–88.

Anderson, Jamie, and Niels Billou. (2007), "Serving the World's Poor: Innovation at the Base of the Economic Pyramid," Journal of Business Strategy, 28(2), 14-21.

Armitage, Christopher J., and Mark Conner (2001), "Efficacy of the Theory of Planned Behaviour: A Meta-analytic Review," British Journal of Social Psychology, 40(4), 471-499.

Arts, Joep WC, Ruud T. Frambach, and Tammo HA Bijmolt (2011), "Generalizations on Consumer Innovation Adoption: A Meta-analysis on Drivers of Intention and Behavior," International Journal of Research in Marketing, 28(2), 134-144.

Berger, Estelle, and Cheryl Nakata (2013), "Implementing Technologies for Financial Service Innovations in Base of the Pyramid Markets," Journal of Product Innovation Management, 30(6), 1199–1211.

bKash | Company Profile [Online], (accessed September 01, 2016), [available at http://bkash.com/about/company-profile].

Brown, Susan A., Viswanath Venkatesh, and Hillol Bala (2006), "Household Technology Use: Integrating Household Life Cycle and the Model of Adoption of Technology in Households," The Information Society, 22 (4), 205–218.

Cañeque, Fernando Casado, and Stuart L. Hart (2015), Base of the Pyramid 3.0: Sustainable Development through Innovation and Entrepreneurship. Greenleaf Publishing.

Cecchini, Simone, and Christopher Scott (2003), "Can information and communications technology applications contribute to poverty reduction? Lessons from rural India," Information Technology for Development, 10 (2), 73–84.

Chaturvedi, Avinish, Chi-yue Chiu, and Madhubalan Viswanathan (2009), "Literacy, negotiable fate, and thinking style among low income women in India," Journal of Cross-Cultural Psychology, 40(5), 880-893.

Chau, Patrick YK, and Paul Jen-Hwa Hu (2001), "Information Technology Acceptance by Individual Professionals: A Model Comparison Approach," Decision Sciences, 32 (4), 699–719.

Compeau, Deborah R., Darren B. Meister, and Christopher A. Higgins. (1991), "From Prediction to Explanation : Reconceptualizing and Extending the Perceived Characteristics of Innovating," Journal of the Association for Information Systems, 8(8), 409–439.

Davis, Fred D (1989), "Perceived Usefulness, Perceived Ease of Use, and User Acceptance of Information Technology," MIS Quarterly, 319-340.

Davis, Fred D., Richard P. Bagozzi, and Paul R. Warshaw (1989), "User Acceptance of Computer Technology: A Comparison of Two Theoretical Models," Management Science, 35 (8), 982–1003.

Elaydi, Raed, and Charles Harrison (2010), "Strategic Motivations and Choice in Subsistence Markets," Journal of Business Research, 63(6), 651-655.

Fishbein, Martin E., and Icek Ajzen (1975), Belief, Attitude, Intention and Behavior: An Introduction to Theory and Research. Reading, MA: Addison- Wesley.

Fornell, Claes, and Fred L. Bookstein (1982), "Two Structural Equation Models: LISREL and PLS Applied to Consumer Exit-voice Theory," Journal of Marketing Research, 440-452.

Frykman, Peter (2013), "Accelerating Customer Adoption at the Bottom of the Pyramid," Harvard Business Review, https://hbr.org/2013/01/accelerating-customer-adoption

Govindarajan, Vijay. (2012), "Developing Countries are Revolutionizing Mobile Banking." HBR Blog Network (April 30), https://hbr.org/2012/04/innovations-in-mobile-banking

Hardesty, David M., and William O. Bearden (2004), "The Use of Expert Judges in Scale Development," Journal of Business Research, 57(2), 98–107.

Hart, Stuart L. (2005), "Innovation, Creative Destruction and Sustainability," Research Technology Management, 48(5), 21-27.

Hasan, Md Rajibul, Ben Lowe, and Mizan Rahman (2017), "Visual Cues and Innovation Adoption among Bottom of the Pyramid Consumers," Qualitative Market Research: An International Journal, 20(2), 147-157.

Henseler, Jörg, Christian M. Ringle, and Marko Sarstedt, (2012), "Using Partial Least Squares Path Modeling in Advertising Research: Basic Concepts and Recent Issues," Handbook of Research on International Advertising, Shintaro Okazaki, ed., Edward Elgar, 252-276.

Hsu, Meng H., Chao M. Chiu, and Teresa L. Ju. (2004), "Determinants of Continued Use of the WWW: An Integration of Two Theoretical Models," Industrial Management & Data Systems, 104(9), 766-775.

Ireland, John (2008), "Lessons for Successful BOP Marketing from Caracas' Slums," Journal of Consumer Marketing, 25(7), 430-438.

Jarvis, Cheryl Burke, Scott B. MacKenzie, and Philip M. Podsakoff (2003), "A Critical Review of Construct Indicators and Measurement Model Misspecification in Marketing and Consumer Research," Journal of Consumer Research, 30(2), 199-218.

Jebarajakirthy, Charles, and Antonio Lobo (2015), "A Study Investigating Attitudinal Perceptions of Microcredit Services and their Relevant Drivers in Bottom of Pyramid Market Segments," Journal of Retailing and Consumer Services, 23, 39-48.

Kaplinsky, Raphael, Joanna Chataway, Norman Clark, Rebecca Hanlin, Dinar Kale, Lois Muraguri, Theo Papaioannou, Peter Robbins, and Watu Wamae. (2009), "Below the Radar: What Does Innovation in Emerging Economies have to Offer other Low-income Economies?" International Journal of Technology Management & Sustainable Development, 8(3), 177-197.

Kaushik, P.D. and Nirvikar Singh (2004), "Information Technology and Broad-based Development: Preliminary Lessons from North India," World Development, 32 (4), 591–607.

Khandelwal, Meena, Matthew E. Hill, Paul Greenough, Jerry Anthony, Misha Quill, Marc Linderman, and H.S. Udaykumar (2017), "Why Have Improved Cook-stove Initiatives in India Failed?," World Development, 92, 13–27.

Kim, Hee-Woong, Hock Chuan Chan, and Sumeet Gupta. (2007), "Value-based Adoption of Mobile Internet: An Empirical Investigation," Decision Support Systems, 43(1), 111–126.

King, William R., and Jun He. (2006), "A Meta-analysis of the Technology Acceptance Model," Information & Management, 43(6), 740-755.

Koenig-Lewis, Nicole, Morgan Marquet, Adrian Palmer, and Anita Lifen Zhao (2015), "Enjoyment and Social Influence: Predicting Mobile Payment Adoption," The Service Industries Journal, 35(10), 537-554.

Kolk, Ans, Miguel Rivera-Santos, and Carlos Rufín (2014), "Reviewing a Decade of Research on the "Base/Bottom of the Pyramid" (BOP) Concept," Business & Society, 53(3), 338-377.

Kulviwat, Songpol, Gordon C. Bruner II, Anand Kumar, Suzanne A. Nasco, and Terry Clark (2007), "Toward a Unified Theory of Consumer Acceptance," Psychology & Marketing, 24, 1059–1084.

Li, Xia, Christopher Gan, and Baiding Hu (2011), "Accessibility to Microcredit by Chinese Rural Households," Journal of Asian Economics, 22(3), 235-246.

Lin, Chien-Hsin, Hsin-Yu Shih, and Peter J. Sher. (2007), "Integrating Technology Readiness into Technology Acceptance: The TRAM Model," Psychology & Marketing, 24(7), 641-657.

Lin, Jiun-Sheng Chris, and Pei-Ling Hsieh (2006), "The Role of Technology Readiness in Customers' Perception and Adoption of Self-service Technologies," International Journal of Service Industry Management, 17(5), 497–517.

Lowe, Ben, and Frank Alpert. (2015), "Forecasting Consumer Perception of Innovativeness," Technovation, 45(Nov-Dec), 1-14.

Lowe, Ben, Yogesh Dwivedi and Steve D'Alessandro (2018), "Consumers and Technology in a Changing World," European Journal of Marketing, Forthcoming.

Lowry, Paul Benjamin, and James Gaskin (2014), "Partial Least Squares (PLS) Structural Equation Modeling (SEM) for Building and Testing Behavioral Causal Theory: When to Choose It and How to Use It," IEEE Transactions on Professional Communication, 57(2), 123-146.

Martini, Tanya S., and Stewart Page. (1996), "Attributions and the Stigma of Illiteracy: Understanding Help Seeking in Low Literate Adults," Canadian Journal of Behavioural Science, 28(2), 121-129.

Mathieson, Kieran (1991), "Predicting User Intentions: Comparing the Technology Acceptance Model with the Theory of Planned Behavior," Information Systems Research, 2(3), 173-191.

Maurer, Bill (2012), "Mobile Money: Communication, Consumption and Change in the Payments Space," Journal of Development Studies, 48 (5), 589–604.

Mendoza, Ronald U. and Nina Thelen (2008), "Innovations to Make Markets more Inclusive for the Poor," Development Policy Review, 26 (4), 427–58.

Miller, Grant, and A. Mushfiq Mobarak (2014), "Learning about New Technologies through Social Networks: Experimental Evidence on Nontraditional Stoves in Bangladesh," Marketing Science, 34(4), 480-499.

Moore, Gary C., and Izak Benbasat (1991), "Development of an Instrument to Measure the Perceptions of Adopting an Information Technology Innovation," Information Systems Research, 2(3), 192-222.

Murendo, Conrad, Meike Wollni, Alan De Brauw, and Nicholas Mugabi (2017), "Social Network Effects on Mobile Money Adoption in Uganda," The Journal of Development Studies, 1–16.

Nakata, Cheryl, and Kelly Weidner (2012), "Enhancing New Product Adoption at the Base of the Pyramid: A Contextualized Model," Journal of Product Innovation Management, 29(1), 21–32.

Nasco, Suzanne A., Songpol Kulviwat, Anand Kumar, and Gordon C. Bruner II (2008), "The CAT Model: Extensions and Moderators of Dominance in Technology Acceptance," Psychology & Marketing, 25(10), 987–1005.

Parasuraman, Ananthanarayanan (2000), "Technology Readiness Index (TRI): A Multiple-item Scale to Measure Readiness to Embrace New Technologies," Journal of Service Research, 2, 307–320.

Pick, James B., Kamala Gollakota, and Manju Singh (2014), "Technology for Development: Understanding Influences on Use of Rural Telecenters in India," Information Technology for Development, 20(4), 296-323.

Plouffe, Christopher R., John S. Hulland, and Mark Vandenbosch (2001), "Research Report: Richness Versus Parsimony in Modeling Technology Adoption Decisions—Understanding

Merchant Adoption of a Smart Card-Based Payment System," Information Systems Research, 12(2), 208-222.

Podsakoff, Philip M., Scott B. MacKenzie, Jeong-Yeon Lee, and Nathan P. Podsakoff (2003), "Common Method Biases in Behavioral Research: A Critical Review of the Literature and Recommended Remedies," Journal of Applied Psychology, 88(5), 879-903.

Prahalad, Coimbatore Krishna (2004), Fortune at the Bottom of the Pyramid: Eradicating Poverty through Profits. Upper Saddle River, NJ: Wharton School Publishing.

Prahalad, Coimbatore Krishna and Allen Hammond (2002), "Serving the World's Poor, Profitably," Harvard Business Review, 80(9), 48-57.

Prasad, V. C. S., and Vivek Ganvir (2005), "Study of the Principles of Innovation for the BOP Consumer — The Case of a Rural Water Filter," International Journal of Innovation and Technology Management, 2(04), 349-366.

Rahman, Mizan, Md Rajibul Hasan, and David Floyd (2013), "Brand Orientation as a Strategy That Influences the Adoption of Innovation in the Bottom of the Pyramid Market," Strategic Change, 22(3), 225–239.

Ramani, Shyama V., Shuan SadreGhazi, and Geert Duysters (2012), "On the Diffusion of Toilets as Bottom of the Pyramid Innovation: Lessons from Sanitation Entrepreneurs," Technological Forecasting and Social Change, 79(4), 676–687.

Rangan, V. Kasturi, Michael Chu, and Djorjiji Petkoski (2011), "Segmenting the Base of the Pyramid," Harvard Business Review, 89(6).

Rogers, Everett M. (1983), Diffusion of Innovations. 3rd edition. New York; London: Free Press; Collier Macmillan.

Rogers, Everett M. (2003), Diffusion of Innovations. 5th edition. New York: Free Press.

Sen, Amartya (1999), Development as Freedom. Oxford University Press.

Sethia, Nirmal (2005), "At the Bottom of the Pyramid: Responsible Design for Responsible Business," Design Management Review, 16(3), 42-49.

Setterstrom, Andrew J., J. Michael Pearson, and Robert A. Orwig (2013), "Web-enabled Wireless Technology: An Exploratory Study of Adoption and Continued Use Intentions," Behaviour & Information Technology, 32(11), 1139-1154.

Sheth, Jagdish N. (2011), "Impact of Emerging Markets on Marketing: Rethinking Existing Perspectives and Practices," Journal of Marketing, 75(4), 166-182.

Simanis, Erik, Stuart Hart, and Duncan Duke (2008), "The Base of the Pyramid Protocol: Beyond "Basic Needs," Business Strategies. Innovations, 3(1), 57-84.

Sridharan, Srinivas, and Madhu Viswanathan. (2008), "Marketing in Subsistence Marketplaces: Consumption and Entrepreneurship in a South Indian Context," Journal of Consumer Marketing, 25(7), 455-462.

Taylor, Shirley, and Peter A. Todd (1995), "Understanding Information Technology Usage: A Test of Competing Models," Information Systems Research, 6(2), 144-176.

The Economist (2009), "The Power of Mobile Money", http://www.economist.com/node/14505519

Venkatesh, Viswanath, Michael G. Morris, Gordon B. Davis, and Fred D. Davis (2003), "User Acceptance of Information Technology: Toward a Unified View," MIS Quarterly, 27 (3), 425–478.

Viswanathan, Madhubalan (2013), Subsistence Marketplaces, eBookpartnership, eText, and Stipes Publishing.

Viswanathan, Madhubalan, Roland Gau, and Avinish Chaturvedi (2008), "Research Methods for Subsistence Marketplaces," in Sustainability Challenges and Solutions at the Base-of-the-Pyramid: Business, Technology and the Poor, Prabhu Khandachar and Minna Halme, eds.,Greenleaf Publishing, Sheffield, UK, 242-260.

Viswanathan, Madhubalan, Manoj Hastak, and Roland Gau (2009), "Understanding and Facilitating the Usage of Nutritional Labels by Low-literate Consumers," Journal of Public Policy & Marketing, 28(2), 135-145.

Viswanathan, Madhubalan, and José Antonio Rosa. (2007), "Product and Market Development for Subsistence Marketplaces: Consumption and Entrepreneurship Beyond Literacy and Resource Barriers," in Product and Market Development for Subsistence Marketplaces, José Antonio Rosa and Madhubalan Viswanathan, eds., Emerald Group Publishing Limited, 1-17.

Viswanathan, Madhu, and José Antonio Rosa (2010), "Understanding Subsistence Marketplaces: Toward sustainable Consumption and Commerce for a Better World," Journal of Business Research, 63(6), 535-537.

Viswanathan, Madhubalan, José Antonio Rosa and James Edwin Harris (2005), "Decision Making and Coping of Functionally Illiterate Consumers and Some Implications for Marketing Management," Journal of Marketing, 69(1), 15-31.

Viswanathan, Madhubalan, José Antonio Rosa and Julie A. Ruth (2010), "Exchanges in Marketing Systems: The Case of Subsistence Consumer-Merchants in Chennai, India," Journal of Marketing, 75 (3), 1-17.

Viswanathan, Madhubalan, Anju Seth, Roland Gau, and Avinish Chaturvedi (2009a), "Ingraining Product-relevant Social Good into Business Processes in Subsistence Marketplaces: The Sustainable Market Orientation," Journal of Macromarketing, 29(4), 406-425.

Viswanathan, Madhu, Clifford J. Shultz, and Srinivas Sridharan (2014), "Introduction to the Special Issue on Subsistence Marketplaces: From Micro-level Insights to Macro-level Impact," Journal of Macromarketing, 34(2), 119-121.

Viswanathan, Madhubalan, and Srinivas Sridharan (2009), "From Subsistence Marketplaces to Sustainable Marketplaces: A Bottom-up Perspective on the Role of Business in Poverty Alleviation," Ivey Business Journal, 73(2), 1-15.

Viswanathan, Madhubalan, Srinivas Sridharan, Roland Gau and Robin Ritchie (2009b), "Designing Marketplace Literacy Education in Resource-constrained Contexts: Implications for Public Policy and Marketing," Journal of Public Policy and Marketing, 28(1), 85-94.

Viswanathan, Madhu, Srinivas Sridharan, and Robin Ritchie (2010), "Understanding Consumption and Entrepreneurship in Subsistence Marketplaces", Journal of Business Research, 63(6), 570-581.

Viswanathan, Madhubalan, Srinivas Sridharan, Robin Ritchie, Srinivas Venugopal and Kiju Jung (2012), "Marketing Interactions in Subsistence Marketplaces: A Bottom up Approach to Designing Public Policy," Journal of Public Policy and Marketing, 31(2), 159-177.

Viswanathan, Madhubalan, Carlos J. Torelli, Lan Xia and Roland Gau (2009c), "Understanding the Influence of Literacy on Consumer Memory: The Role of Pictorial Elements," Journal of Consumer Psychology, 19(3), 389-402.

Walczuch, Rita, Jos Lemmink, and Sandra Streukens (2007), "The Effect of Service Employees' Technology Readiness on Technology Acceptance," Information & Management, 44(2), 206-215.

Wang, Cheng Lu, and John C. Mowen (1997), "The Separateness-connectedness Self-schema: Scale Development and Application to Message Construction," Psychology & Marketing, 14(2), 185-207.

Wang, Yi-Shun, Ching-Hsuan Yeh, and Yi-Wen Liao (2013), "What Drives Purchase Intention in the Context of Online Content Services? The Moderating Role of Ethical Self-efficacy for Online Piracy," International Journal of Information Management, 33(1), 199-208.

Wentzel, John P., Krishna Sundar Diatha, and Venkata S. Sarma Yadavalli (2013), "An Application of the Extended Technology Acceptance Model in Understanding Technology-enabled Financial Service Adoption in South Africa," Development Southern Africa, 30(4-5), 659-673.

World Bank Website (2013), Banladesh Data, http://data.worldbank.org/country/bangladesh

Zainudeen, A. and Ratnadiwakara, D. (2011), "Are the Poor Stuck in Voice? Conditions for Adoption of More-than-voice Mobile Services," Information Technologies & International Development, 7(3), 45.

Zikmund, William, Steve D'Alessandro, Hume Winzar, Ben Lowe, and Barry Babin (2016), Marketing Research: 4th Asia Pacific Edition, Melbourne: Cengage Learning.

Table 1. Criteria Used in Model Selection

Model	Number of Google scholar citations (as of 03/02/2015)	Relevance to the Consumer Context	Relevance to the subsistence market	Similarity among Constructs
TRA	30227	High	Moderate	Low
TPB	30507	High	High	Moderate
TAM	22597	High	High	Moderate
DOI	62330	High	High	Low
VAM	630	High	High	Moderate
CAT	143	High	High	Moderate
CBOP	32	High	Very High	Moderate

Note: TRA = Theory of Reasoned Action, TPB = Theory of Planned Behavior, TAM = Technology Acceptance Model, DOI = Diffusion of Innovations, VAM = Value Based Adoption Model, CAT = Consumer Acceptance of Technology model, CBOP = Contextualized Bottom-of-the-Pyramid model

Table 2: Measures Used for Existing Constructs

Construct Name	Items	References
Adoption intention M=6.03; SD=.76; AVE=.67	1) Given the opportunity, I will use bKash mobile banking services. 2) I am likely to use bKash mobile banking services in the near future. 3) I am willing to use bKash mobile banking services in the near future 4) I intend to use bKash mobile banking services when the opportunity arises.	Schierz, Schilke and Wirtz (2010)
Perceived Usefulness M=6.47; SD=.47; AVE=.55	1) bKash is a useful mode of payment. 2) Using bKash makes the handling of payments easier. 3) bKash allow for a faster usage of mobile applications (e.g., Money Transfer, Cash In, Cash Out). 4) By using bKash , my choices as a consumer are improved (e.g., flexibility, speed).	Schierz, Schilke and Wirtz (2010)
Ease of use M=6.12; SD=.70; AVE=.61	1) It is easy to become skillful at using bKash 2) The interaction with bKash is clear and understandable 3) It is easy to perform the steps required to use bKash 4) It is easy to interact with bKash.	Schierz, Schilke and Wirtz (2010)
Subjective norm M=6.10; SD=.88; AVE=.79	1) People who are important to me would recommend using bKash . 2) People who are important to me would find using bKash beneficial 3) People who are important to me would find using bKash a good idea	Schierz, Schilke and Wirtz (2010)
Perceived Behavior Control M=5.97; SD=.91; AVE=.67	1) I would be able to use bKash . 2) Using bKash is entirely within my control. 3) I have the resources and the knowledge and the ability to make use of bKash .	Taylor and Todd (1995)
Relative Advantage M=5.93; SD=1.19	1) bKash offer advantages that are not offered by competing products. 2) bKash is, in my eyes, superior to competing products. 3) bKash solves a problem that I cannot solve with competing products.	Cooper and Kleinschmidt (1987)
Complexity M=3.83; SD=1.42	1) Working with bKash is complicated, it is difficult to understand what is going on . 2) Using bKash involves too much time doing mechanical operations. i.e., data input, understanding the menu 3) It takes too long to learn how to use bKash to make it worth the effort . 4) In general, bKash is very complex to use.	Cheung, Chang and Lai (2000)
Compatibility M=5.78; SD=.98	1) Using bKash fits well with my lifestyle 2) Using bKash fits well with the way I like to purchase products and services 3) I would appreciate using bKash instead of alternative modes of payment (e.g., credit card, cash)	Schierz, Schilke and Wirtz (2010)
Trialability M=5.68; SD=.72	1) Before deciding on whether or not to use bKash , I want to be able to use it on a trial basis. 2) Before deciding on whether or not to use bKash , I want to be able to properly try it out. 3) I want to be permitted to use bKash , on a trial basis for some time long enough to see what it can do.	Zolait (2009)

Table 2 (*continued*)

Construct Name	Items	References
Observability M=6.32; SD=.56	1) I would have no difficulty telling others about the results of using bKash. 2) I believe I could communicate to others the outcomes of using bKash. 3) The results of using bKash are apparent to me.	Meuter et al. (2005)
Pleasure M=3.75; SD=.97	1) Happy/Unhappy 2) Pleased/Annoyed 3) Satisfied/Unsatisfied 4) Contented/Melancholic 5) Hopeful/Despairing 6) Relaxed/Bored	Kulviwat et al. (2007)
Arousal M=3.65; SD=1.04	1) Stimulated/Relaxed 2) Excited/Calm 3) Frenzied/Sluggish 4) Jittery/Dull 5) Wide-awake/Sleepy 6) Aroused/Unaroused	Kulviwat et al. (2007)
Dominance M=3.14; SD=.59	1) In Control/Cared For 2) Controlling/Controlled 3) Dominant/Submissive 4) Influential/Influenced 5) Autonomous/Guided 6) Important/Awed	Kulviwat et al. (2007)
Enjoyment M=4.99; SD=.73	1) I have fun interacting with bKash 2) Using bKash provides me with a lot of enjoyment 3) I enjoy using bKash 4) Using bKash bores me (reversed)	Agarwal and Karahanna (2000)
Technicality M=6.37; SD=.55	1) It is easy to use bKash 2) bKash can be connected instantly 3) bKash takes a short time to respond 4) It is easy to get bKash to do what I want it to do 5) The system of bKash is reliable.	DeLone, and McLean (1992), Davis (1989)
Perceived Fee M=3.85; SD=1.05	1) The fee that I have to pay for the use of bKash is too high. 2) The fee that I have to pay for the use of bKash is reasonable. 3) I am pleased with the fee that I have to pay for the use of bKash.	Voss, Parasuraman, and Grewal(199)
Attitudes towards using bKash M=6.12; SD=.73	Overall, please describe how you feel about bKash. For me, using bkash is: 1) Bad-Good 2) Negative- Positive 3) Unfavorable- Favorable 4) Unpleasant- Pleasant	Kulviwat et al. (2007)
Perceived Value M=5.17; SD=.96	1) Compared to the fee I need to pay, the use of bKash offers value for money 2) Compared to the effort I need to put in, the use of bKash is beneficial to me 3) Compared to the time I need to spend, the use of bKash is worthwhile to me 4) Overall, the use of bKash delivers me good value	Sirdeshmukh, Singh, and Sabol (2002)

Table 3: New Measures Developed for the Contextualized BOP model

Constructs	Items	References
Visual Comprehensibility M=5.99; SD=.91	1) The color, shapes, pictures, symbols and other relevant elements of bKash help me to clarify how to use this service. 2) Using bKash I find myself thinking of the color, shapes, pictures, symbols and other relevant elements of bKash. 3) I find it easy to remember any color, shapes, pictures, symbols and other relevant elements of bKash. 4) I find the colors, shapes, pictures and symbols of bKash help me to understand how to use bKash more than any written text associated with it.	Unnava, Agarwal, and Haugtvedt (1996)
Affordability M=6.27; SD=.85	1) I would use bKash because the service is affordable. 2) I would buy the lowest price brand of mobile banking services that will suit my needs. 3) When it comes to choose bKash, I would rely heavily on price.	Lichtenstein, Bloch, and Black (1988)
Adaptability M=6.39; SD=.50	1) bKash is usable for multiple purposes (e.g. Money transfer, buying and selling products, recharging mobile balance etc.) 2) bKash is usable even when resources are lacking (e.g., even in remote villages, when electricity is not working etc.) . 3) bKash has the ability to provide consistent services even when resources are lacking (e.g., even in remote villages, when electricity is not working etc.) 4) bKash mobile banking fulfills multiple functional needs.	Rijsdijk and Hultink (2009)
Assimilationist culture M=5.92; SD=1.12	1) Affluent people who are important to me would support the idea of using bKash. 2) I think that those wealthy or modern people who are important to me would want me to use bKash. 3) Affluent or modern people whose opinions I value would prefer me to use bKash.	Bandyopadhyay, and Fraccastoro (2007)
Collective needs M=6.39; SD=.50	1) To satisfy the expectation of people in my working place, my decision to use bKash is influenced by their preferences. 2) My decision to use bKash is influenced by the preferences of people with whom I have social interaction. 3) My decision to use bKash is influenced by the preferences of family members. 4) My decision to use bKash is influenced by the desire of others.	Bearden and Etzel (1982)
Interpersonal promotion M=6.23; SD=.76	1) I often hear good things about bKash from the people around me, including friends, family and people in my working place. 2) When I look at mobile banking service providers, people around me often recommend bKash for me to use. 3) In the past people around me have often recommended bKash for me to use.	Parry, Kawakami and Kishiya (2012)
Social Capital M=5.34; SD=.76	1) I maintain close social relationships with some members in my community. 2) I spend a lot of time interacting with some members in my community. 3) I know some members in my community on a personal level. 4) I have frequent communication with some members in my community.	Chiu, Hsu, and Wang (2006)
Atomized Distribution M=6.42; SD=.69	1) I am satisfied with the distance of the bKash agent's shop is to my home 2) I am satisfied with the distance of the bKash agent's shop is to where I work. 3) The bKash agent's shop is convenient as it is on route to my place of work.	Ganesh, Arnold, and Reynolds (2000)
Flexible payment Forms M=3.62; SD=1.06	1) I have the flexibility to pay the charge of bKash in instalments. 2) I have the freedom to pay the charge of bKash, wherever is best for me. 3) I am not able to pay the charge of bKash in instalments.	Shockley and Allen (2007)
Poverty M=n/a; SD=n/a [*]	1) Income deficit 2) Number of family member 3) Level of education 4) Status of employment	Khan, Murray, and Barnes (2002)

[*] This construct is formative and it is not possible to compute descriptive statistics

Table 4. Model Comparison (Direct effects)

Model	Independent Variables	Adjusted R²	Beta	% of Statistically significant parameter
TRA	Attitude	26%	.37**	100%
	Subjective Norm		.21**	
TPB	Attitude	32%	.25**	100%
	Perceived Behavioral Control		.27**	
	Subjective Norm		.21**	
TAM	Perceived Usefulness	30%	.19**	100%
	Perceived Ease of Use		.15**	
	Attitude		.35**	
DOI	Relative Advantage	29%	.02	60%
	Complexity		-.02	
	Compatibility		.40**	
	Trialability		.12**	
	Observability		.17**	
VAM	Enjoyment	40%	.48**	60%
	Perceived Fee		.04	
	Perceived Value		.14**	
	Technicality		-.05	
	Perceived Usefulness		.21**	
CAT	Arousal	38%	.20**	71%
	Attitude		.26**	
	Dominance		-.24**	
	Perceived Ease of Use		0.12	
	Pleasure		.31**	
	Relative Advantage		-0.11	
	Perceived Usefulness		.22**	
CBOP	Adaptability	30%	-.01	25%
	Affordability		-.02	
	Assimilationist Culture		-.03	
	Atomized Distribution		.01	
	Collective Need		.25**	
	Compatibility		.42**	
	Relative advantage		-.08	
	Social Capital		-.02	
	Visual comprehensibility		.14*	
	Flexible payment		.10	
	Interpersonal promotion		.05	
	Poverty		-.15	

Note: 1. **p<0.05 2. *p<0.1

Table 5: Summary Findings from Model Comparison

Model	Relative Advantage	Complexity	Compatibility	Trialability	Observability	Attitudes	Social Norms	Perceived Behavioral Control	Perceived Ease of Use	Perceived Usefulness	Pleasure	Arousal	Dominance	Enjoyment	Perceived Fee	Perceived Value	Technicality	Poverty	Visual Comprehensibility	Affordability	Adaptability	Assimilationist Culture	Collective Needs	Flexible Payment	Interpersonal Promotion	Social Capital	Atomized Distribution	Further Model Notes
TRA						✓	✓																					Relatively low R^2. Model may be too simple and may not capture the full complexity of subsistence consumption. Scope to be augmented in this context.
TPB						✓	✓	✓																				Reasonable R^2. All key constructs useful. Reflects the constraints and social situations subsistence consumers face. Scope to be augmented in this context.
TAM						✓			—	✓																		Reasonable R^2 but model may be too simplistic to capture the nuances of subsistence marketplace consumption. Scope to be augmented in this context.
DOI	x	x	✓	✓	✓																							Reasonable R^2 but relative advantage and complexity not significant. May not capture the nuances of subsistence marketplace consumption.
CAT	x					✓			—	✓	✓	✓	✓															Relatively high R^2 and best performing model. Hedonic aspects of model may be useful but model may not reflect nuances of subsistence consumption.
VAM										✓				✓	x	✓	x											Relatively high R^2 and best performing model. Hedonic aspects of model may be useful but model may not reflect nuances of subsistence consumption.
CBOP	x		✓															x	—	x	x	x	✓	x	x	x	x	Relatively low R^2. Designed specifically for BOP. Few significant constructs. Acknowledges nuances of subsistence consumption

Notes: ✓ Empirical support for applicability to the subsistence context, — Marginal empirical support for applicability to the subsistence context, x No support for applicability to the subsistence context

Appendix: Interconstruct Correlations and AVEs

Constructs (TRA/TPB)	Att	PBC	SN
Att	**.94**		
PBC	.43**	**.67**	
SN	.55*	.23**	**.79**

Constructs (TAM)	Att	PEU	PU
Att	**.94**		
PEU	.39**	**.61**	
PU	.41**	.46**	**.55**

Constructs (DOI)	RelAdv	Complex	Compat	Trial	Observ
RelAdv	**.87**				
Complex	.01	**.74**			
Compat	.56**	-.04	**.72**		
Trial	-.06	-.04	.01	**.67**	
Observ	.31**	-.04	.59**	.12*	**.52**

Constructs (CAT)	Arous	Att	Dom	PEU	Pleas	RelAdv	PU
Arous	**.78**						
Att	.49**	**.94**					
Dom	.36**	.05	**.63**				
PEU	.37**	.39**	-.07	**.61**			
Pleas	.85**	.47**	.30**	.34**	**.77**		
RelAdv	.66**	.42**	.41**	.32**	.57**	**.87**	
PU	.36**	.41**	.23**	.46**	.34**	.42**	**.55**

Constructs (VAM)	Enjoy	PercFee	PercVal	Tech	PU
Enjoy	**.73**				
PercFee	.08	**.96**			
PercVal	.29**	.30**	**.57**		
Tech	.23**	.02	.40**	**.54**	
PU	.23**	-.04	.28**	.50**	**.55**

Constructs (CBOP)	Adap	Afford	AsCul	AtDist	ColNee	Compat	RelAdv	SocCap	VisCom	FlexPay	IntProm
Adap	**.71**										
Afford	.15**	**.71**									
AsCul	.34**	.25**	**.84**								
AtDist	.34**	.03	.20**	**.75**							
ColNee	.19**	.17**	.57**	.13	**.78**						
Compat	.30**	.10	.47**	.31**	.30**	**.72**					
RelAdv	.36**	.22**	.65**	.19**	.36**	.56**	**.87**				
SocCap	.18**	.13*	.40**	.08	.18**	.29**	.34**	**.77**			
VisCom	.47**	.11*	.34**	.24**	.47**	.44**	.49**	.32**	**.80**		
FlexPay	.22**	.06	.25**	.33**	.22, **	.47**	.26**	.06	.36**	**.61**	
IntProm	.33**	.22**	.65**	.25**	.33**	.55**	.59**	.35**	.37**	.26**	**.75**

Notes: **p<0.05 *p<0.1. Values on the diagonals represent AVEs. Att=Attitude, PBC=Perceived Behavioral Control, SN=Subjective Norm, PEU=Ease of Use, PU=Perceived Usefulness, RelAdv, Complex=Complexity, Compat=Compatibility, Tria=Trialability, Observ=Observability, Arous=Arousal, Dom=Dominance, Pleas=Pleasure, Enjoy=Enjoyment, PercFee=Perceived Fee, PercVal=Perceived Value, Adap=Adptability, Afford=Affordability, AsCul=Assimilationist Culture, AtDist=Atomized Distribution, ColNee=Collective Needs, Compat=Compatibility, RelAdv=Relative Advantage, SocCap=Social Capital, VisCom=Visual Comprehensibility, FlexPay=Flexible Payment, IntProm=Interpersonal Promotion