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MARKETS AT THE BOTTOM OF THE PYRAMID: EXAMINING THE ROLE OF INFORMATION AND COMMUNICATION TECHNOLOGIES

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ABSTRACT

This paper examines how Information and Communication Technology (ICT) can enable development of markets at the Bottom of the Pyramid (BOP). Integrating ideas centered on the three-fold role of ICT (automate-informate-transform) and on market mechanisms, we develop research propositions explaining how (1) ICT roles facilitate development of market mechanisms at the BOP, (2) market mechanisms enable economic and social benefit outcomes for BOP markets and members, and (3) particular complementary conditions sustain ICT-enabled market development. We illustrate and support our propositions using published and secondary examples. Theoretical contributions and implications for practice and further research are also discussed.

Keywords: The Bottom of the Pyramid, ICT-enabled market development, ICT-enabled market mechanisms.

1. INTRODUCTION

The Bottom of the Pyramid (BOP) is widely considered to include people with incomes of less than US\$2 a day (Prahalad and Hammond 2002). Over four billion people belong to this economic class, primarily from countries in Asia, Africa and South America (Hammond et al, 2007). A principal problem they face is inability to purchase essential goods and services, due in parts, to unavailability (Prahalad, 2005) and non-affordability (Karnani 2007). Traditionally, means of addressing this problem have largely included poverty-alleviation and developmental assistance from government and non-government agencies, the corporate sector and developed countries (e.g. Walsh et al, 2005)¹.

Emerging scholarly research suggests that enabling the creation and development of markets at the BOP is potentially an important mechanism for tackling this problem. Markets at the BOP are those that include consumers

¹ Multiple references are relevant for most descriptions. To adhere to the word limit, we have not included all.

or producers (or both) that belong to BOP communities. Markets that serve BOP consumers are inefficient, partly because the remote location of most BOP communities makes physical distribution of goods and services costly and unattractive for large corporations. These markets also tend to have “informal” exploitative intermediaries who further raise costs (Prahalad and Hammond, 2002). “*When the poor at the BOP are treated as consumers, they can reap the benefits of respect, choice, and self-esteem and have an opportunity to climb out of the poverty trap*” (Prahalad 2005). Similarly, BOP producers find it difficult to connect to potential customers, adopt appropriate pricing methods, and distribute their goods and services, due in part to lack of information. This is a critical reinforcer of the poverty trap (Karnani, 2007). Well-functioning markets at the BOP are thus necessary, so that corporations find it viable and attractive to sell to communities at the BOP and BOP consumers have access to goods and services. They are also important, for BOP producers, to find customers for their products and raise their income. Market creation and development are thus important and critical challenges facing BOP communities.

The research question thus addressed in this paper is, “How can the use of ICT facilitate development of markets at the BOP?” IS research in developing countries (ISDC) generally agrees that ICT can positively affect economic growth and social development (e.g. Avgerou, 2008). However, much of this research has focused on the role of ICT interventions in social services by facilitating development of healthcare, education, and community/government services (Qureshi, 2005; Braa et al, 2004). The role of ICT in market development and other related outcomes for BOP communities has not been examined.

In this conceptual paper, we combine the Automate-Informate-Transform classification of ICT roles with theoretical concepts from the economics and marketing literature, to understand how the application of ICT can facilitate development of markets in BOP communities. We propose a framework and research propositions analyzing (1) the role of ICT in facilitating market mechanisms, (2) individual- and market-level outcomes of these market mechanisms, and (3) complementary conditions that reinforce the influence of ICT on market mechanisms. We illustrate our propositions and arguments from secondary case studies and literature examples of ICT application to BOP communities.

Avgerou (2008) has identified three salient discourses in ISDC literature – (1) transfer of IS knowledge from developed countries and its diffusion and adaptation in developing countries, (2) social embedded-ness of IS innovation in developing countries, and (3) the role of ICT in facilitating transformative socio-economic process. This paper contributes to the latter two discourses. Specifically, we advance theoretical understanding of how ICT facilitates creation and development of markets, and thus enables positive social and economic outcomes at the BOP. In addition, we provide a conceptual framework for linking the automate-informate-transform aspects of ICT with key market mechanisms.

The paper is organized as follows. We first provide theoretical background of key BOP market characteristics and the role of ICT. We then present the methodology, conceptual framework and research propositions. We finally conclude with a discussion of contributions and future directions.

2. THEORETICAL BACKGROUND

This section presents the theoretical background for our study. Specifically, we first provide relevant definitions and context, for markets and market mechanisms in BOP communities. We then describe the different roles attributed to ICT.

A market is “an arrangement whereby buyers and sellers interact to determine the prices and quantities of a commodity” (Samuelson and Nordhaus, 1992). “Market mechanisms” are means through which consumers and producers interact to determine the conditions (i.e. price and frequency) of exchange, and appropriate/efficient quantities of producing goods and services. The three primary functions of a market are - matching of buyers and sellers, facilitation of transactions, and providing institutional infrastructure (Bakos, 1998). “**Matching of buyers and sellers**” includes search for entities to buy from or sell to, identification of product offerings, and price discovery. “**Facilitation of transactions**” includes logistics, transfer of payments, and facilitation of credit and buyer-seller communication. “**Institutional infrastructure**” takes care of enforcement of legal and regulatory requirements. Communities at the BOP are plagued by three principal problems, each of which makes accomplishment of these mechanisms, and hence creation and development of BOP markets, difficult. Firstly, they are characterized by restricted physical access, since a large percentage of BOP communities are located in rural areas (Hammond et al, 2007) with poor transportation facilities. From the point of view of BOP markets, this makes physical matching of buyers and sellers difficult, and hampers logistics and facilitation of payments. Secondly, they suffer from restricted information access, wherein physical location coupled with poor communication infrastructure makes flow of information between consumers and producers difficult. For BOP markets, this lack of information hampers determination of which products/services are available (from BOP producers) or desired (by BOP consumers), and what their price should be. It thus restricts facilitation of transactions. Third, BOP communities suffer from regulatory deficiencies, since many of their governing mechanisms are informal in nature. This makes enforcement of contracts and regulatory requirements in BOP markets difficult, as a result of which institutional and corporate entities are reluctant to operate in them.

Research on how ICT can improve business processes and facilitate transactions among entities (i.e. individuals, departments and organizations) has conceptualized three roles of ICT – automate, informate, and transform (e.g. Armstrong and Sambamurthy 1999). “Automate” looks at ICT as means for automating repetitive, structured and high-volume information processing. “Informate” provides decision-support information to senior management (informate-up) and other employees (informate-down). The “transform” role looks at fundamentally redefining processes and relationships within an organization or between organizations, by facilitating new forms of information transfer. ICT therefore, substitute for human effort (automate), augment human decision-making (informate) and restructure human tasks or processes (transform).

Given the difficulties in developing markets at the BOP, and the three roles of ICT in enabling information processing and exchange efficiencies, we suggest that it is worthwhile and interesting to explore why and how ICT can help develop markets at the BOP.

3. METHODOLOGY

Our research question focuses on *how* ICT can facilitate market development at the BOP. Given the paucity of frameworks in this area and the nature of the research question, we adopted a qualitative methodology. We examined our research question in two steps. First, integrating theoretical ideas from the literature on ICT roles from the IS literature and on market mechanisms from the marketing literature we developed propositions explaining the role of ICT in developing markets at the BOP, and the associated social and economic outcomes for BOP members. Next we used case studies and illustrative instances of ICT application to projects in rural communities from the IS literature (eg: Bhatnagar, 2000; Mukerji, 2008; Parikh, 2009 etc.) to examine, substantiate and characterize our propositions.

4. RESEARCH FRAMEWORK AND PROPOSITIONS

Figure 1 shows our framework for analysis. Specifically, we first argue that automate, informate, and transform roles of ICT enable accomplishment of the three market mechanisms, and thus facilitate creation and development of markets at the BOP by (Proposition 1). We then suggest that these market mechanisms lead to beneficial outcomes at the BOP, three for BOP markets and five for BOP individuals (Proposition 2). Finally we identify key complementary conditions that reinforce the effectiveness of ICT in enabling market mechanisms at the BOP (Proposition 3).

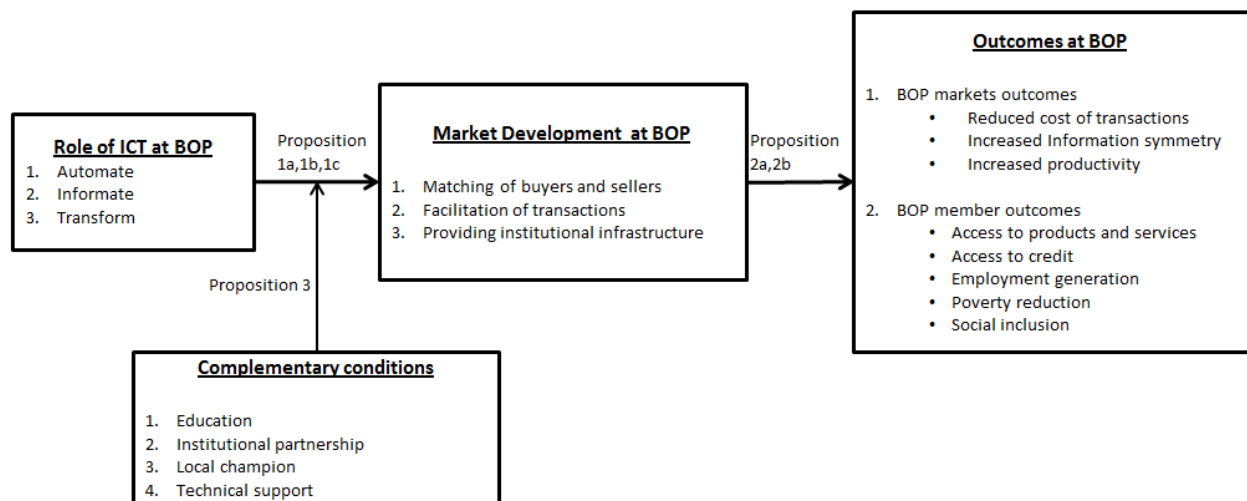


Figure 1: Research Framework

4.1. How ICT facilitates Market Development at the BOP

ICT-enabled automation increases the speed and accuracy of information processing in business processes. ICT implementation at milk collection centers operated by the National Dairy Development Board (NDDB) of India provides an illustration in the context of the BOP (Bhatnagar, 2000). NDDB comprises over 100,000 village dairy cooperatives that collect milk from rural farmers (in this case, BOP producers of milk). Traditionally, manual processes of milk collection (primarily weighing and fat content determination) were time-consuming and inaccurate, and hence open to malpractice and under-payment. Farmers waited for hours for milk collection and several days for payment. With the NDDB's implementation of a computerized milk collection system, weighing, fat content determination and payment calculation together take 20 seconds for each farmer. Further, NDDB analyzes data from individual transactions to forecast milk collection, track seasonal variation in fat content of milk and provide price and quality related information to the farmers.

In other examples from rural Mexico and Guatemala (Parikh, 2009), inspectors in coffee-producing farmers' cooperatives use mobile phones to increase the efficiency and accuracy of their transactions with farmers (in this case, BOP producers of coffee). These inspectors represent respective coffee-buying organizations. Traditionally, inspectors manually recorded their observations about coffee quality and farm practices (from visual inspection of coffee plants and conversations with farmers) in a lengthy form. These hand-written records were often lost, leading to conflict between farmers and inspectors. Further, farmers would often question their authenticity. An application called Digital Internal Control System was implemented to run on mobile phones. Inspectors used these phones to record and upload to a web-based database, not just text, but also visual and voice data about each inspection. Each transaction between the inspector and farmer (i.e. each inspection) is now faster, traceable and recorded in greater richness. The grading process is thus more accurate. This has enabled the inspectors to institute reward mechanisms tied to farm-level quality.

As these two examples show, in the BOP context, the “automate” role primarily improves **facilitation of transactions** mechanism. It does so by enabling faster and more efficient execution of processes such as logistics of transfer of goods between producers and buyers at the BOP, transfer of payments, and quality control. It also provides more accurate communication between BOP producers and buyers of their goods.

Thus, we suggest:

Proposition 1a: “Automate” role of ICT positively influences Market Development at the BOP.

Restricted access to information is an important problem that plagues communities at the BOP. In their “informate” role, ICT provide access to valuable, timely and accurate information to BOP consumers and producers.

Telecenters provide a good example. Telecenters are shared public facilities that rely on computers and the internet to make available information and communication services (Mukerji, 2008). In developing countries, they are seen as rural information or knowledge centers that provide access to details of products and services (for BOP consumers) and possible selling prices (for BOP producers) (Mukerji, 2008). For example, BOP consumers, use telecenters to buy railway and bus tickets and electronically purchase talk-time for pre-paid mobile phones (Schware, 2009). BOP producers use them for price discovery, as in the case of the “Janmitra” telecenters where farmers from rural India can access information on grain and other commodity prices in international markets so that they can determine the prices at which to sell their produce (Gorla, 2009).

ICT, in the informate role, enables matching of buyers and sellers at the BOP. For instance, the “Nemmadi” telecenter project in the state of Karnataka in India has been successful in matching buyers and sellers using an ICT based platform (Gorla, 2009). It functions as a business-to-consumer platform for insurance, travel and mobile phone service providers selling to BOP consumers. In the Indian state of Kerala, fishermen at sea (i.e. BOP producers) use their mobile phones to get in touch with potential buyers, so as to assess demand and determine prices. This results in matching of buyers and sellers and helps fishermen decide on quantities of fish that they should catch (Jensen 2007).

As these examples show, in the BOP context, the “informate” role of ICT primarily facilitates the **matching of buyers and sellers** market mechanism. It does so by enabling BOP producers (consumers) to find potential buyers (sellers), BOP producers to accomplish price discovery, and BOP consumers to determine availability of product offerings.

Thus we suggest:

Proposition 1b: “Informate” role of ICT positively influences Market Development at the BOP.

The “transform” role of ICT significantly alters or reengineers business processes or relationships between business entities. In the BOP context, inherent difficulties in developing markets present considerable scope for ICT-enabled transformation, in processes for exchange of goods and services, and in relationships between producers and consumers.

The “e-choupal” initiative from ITC provides a good example of this role. The “e-choupal” is a privately operated “grain-exchange” that brings together the BOP producer (farmers in rural India producing food-grains and commodities) and a corporate food-grain buyer (ITC Limited) (World Resources Institute, 2003). It has transformed the practice of procurement of agricultural produce in rural India. Traditionally, farmers have been dependent on “mandis” (i.e. government-mandated markets for transactions involving agricultural produce) for selling food-grains. Mandis are plagued by three primary problems - exploitative control by commission agents, very little transparency in the pricing mechanism, and highly inefficient collection processes resulting in spillage, wastage and improper weighing of produce. The BOP producer (the farmer) has no control over the price, which is often lower than prevailing prices on international exchanges. The “e-choupal” is an ICT-enabled market place that provides (1) a physical place for farmers to sell their produce to ITC, (2) a telecenter where farmers have access to current food grains prices on international exchanges and other local grain markets, and (3) computerized processes for accurate weighing, inventory recording and payments. (1) and (2) are examples of how the transform role enables the **matching of buyers and sellers** mechanism, and (3) an example of how it enables the **facilitation of transactions** mechanism.

Another example is that of process reengineering in the microfinance sector in BOP markets, where the “transform” role has significantly improved the **facilitation of transactions** mechanism. Field loan officers of microfinance organizations (e.g., by SKS Microfinance in India) use Smart cards and internet-based and remote-access capable loan management applications so that loans for BOP customers can be quickly approved (Cecchini, 2003). Microfinance organizations are also considering cell-phone accessible applications that customers can use to keep track of their balances and payments (Parikh, 2009).

The “transform” role has also enabled market development at BOP by **providing institutional infrastructure** to market mechanisms. In India for instance, semi-independent microfinance groups called Self-Help Groups (SHG) have been active in many rural areas. These groups collectively save money that is then given to group members as loans on a need basis. Interest rates vary with loan amounts, increasing the group’s corpus. SHGs are usually supported by local non-government organizations and farmers. Since SHG’s provide physical access to remote areas ideally, banks and financial institutions would also find it attractive to work with them. However, poor record keeping and lack of internal control mechanisms within SHGs has hampered collaboration. An application called “Self-Help MIS”, jointly developed by Ekgaon Technologies (a technology firm) and the Covenant Centre for Development (an NGO), was implemented by a network of SHGs in the Indian state of Tamil Nadu. This application runs on mobile phones and enables automated capture and storage of data and improved record keeping, thus improving the speed and accuracy of credit eligibility assessment of SHG members. These improvements have provided an infrastructure for internal control and regulatory compliance by the SHG, making it attractive for banks and other financial institutions to collaborate with it (Parikh, 2009).

Based on these arguments and examples, we suggest that:

Proposition 1c: “Transform” role of ICT positively influences Market Development at the BOP.

4.2. Benefit-Outcomes of Market Development at the BOP

Market development through ICT-enabled market mechanisms leads to benefit-outcomes for BOP markets and individuals. For BOP markets, they include **reduced cost of transactions, decreased information asymmetry between producers and consumers** (when either or both are at the BOP), and **increased productivity**. Outcomes for BOP consumers and producers are **access to products and services, access to credit, job creation, poverty reduction, and social inclusion**. We describe these below.

Benefit-Outcomes for BOP markets

Reduced cost of transactions: Cost of transactions is the cost incurred in making an economic exchange between the producer and consumer of goods/services. Components of this cost include, among others, search, distribution, marketing, commission and financing costs (World Resources Institute, 2003). Markets at the BOP have high cost of transactions due to geographical dispersion and cultural heterogeneity (that increase marketing and distribution costs), low purchasing power of consumers (that increase financing and distribution costs), and inadequate transportation and communication infrastructure (that increase search and distribution costs) (Karnani, 2007). Improved facilitation of transactions made possible by ICT has reduced cost of transactions by reducing time and human labor required to perform business processes relating to exchange of goods and services. In the case of NDDDB's milk collection centers, ICT usage for tracking and controlling collection has reduced process and waiting time and has led to fewer errors in generating milk inventory and payment information. Similarly, the use of mobile phones by the farmer cooperatives in Mexico and Guatemala has increased process speeds and minimized process errors. Improved matching of buyers and sellers has reduced cost of transactions by eliminating intermediaries and the associated search costs for producers and buyers, and brokerage and commissions paid to middlemen, as illustrated by the e-choupal initiative. ICT has also enabled cost-effective distribution of information-based goods such as cell-phone calling cards, to consumers at the BOP, as illustrated by Smart Communications, a telecommunication company in Philippines, (Anderson, 2006).

Decreased information asymmetry: Because of lack of reliable information, BOP consumers do not have information about possible goods and services they may have access to and BOP producers may not be aware of customers, prices and demand levels for their goods. As illustrated by the e-choupal example, improved matching of buyers and sellers enables BOP producers and consumers to access reliable information about the other transacting entity and about products and prices, through, for example, the internet, telecenters and mobile phones, thus decreasing information asymmetry.

Increased productivity: Partly because of high cost of transactions and partly because of lack of availability of information, businesses that operate at the BOP put in more resources (monetary and human) and effort for relatively less output. For BOP producers, improved facilitation of transactions and better matching of buyers and sellers have thus led to productivity improvements by reducing resources required for executing processes relating to exchange of goods and services. Similarly for BOP consumers, the ability to execute transactions such as purchasing tickets and accessing government services through telecenters eliminates the need to travel long distances, thus improving productivity.

Based on these discussions, we suggest:

Proposition 2a: Market development at the BOP positively influences benefit- outcomes for BOP markets.

Benefit-Outcomes for BOP members

Access to products and services: Traditionally, consumers at the BOP have found it difficult to access essential goods and high product variety, due to lack of matching between producers and sellers and high cost of transactions (Karnani, 2007). The market mechanisms of matching of buyers and sellers and transaction facilitation have thus provided improved access to products and services to BOP consumers. For example, ITC has leveraged the physical gathering space provided by e-choupal to create “Choupal Saagars”, which are rural malls. They have used these as a distribution channel, providing farmers with access to products like seeds, fertilizers and services like crop insurance and life insurance. They also stock soap and toothpaste (Vachani and Smith, 2008).

Access to credit: Traditionally, credit access at the BOP has been through local moneylenders with interest rates ranging between 20% and 120% (Conning and Udry 2005). ICT enabled facilitation of transactions has created easier access to credit and other financial services for BOP consumers and producers. Similarly, improved institutional infrastructure has improved credit terms and conditions (Conning and Udry 2005).

Employment Generation: Improved matching of buyers and sellers has enabled BOP producers to reach out to a larger market, thus fuelling the creation of employment opportunities. For instance, there are about 6500 e-choupal centers all over India and each of them is run by a rural entrepreneur (<http://www.echoupal.com>), thus creating at least 6500 jobs. Similarly, micro-credit support has enabled BOP producers to start new enterprises or expand existing enterprises, creating employment opportunities (SIDBI, 2008).

Poverty reduction: ISDC literature has documented the relationship between ICT implementation and increased per capita income (e.g. Avgerou, 2008). We suggest that improved market development is a mediating mechanism. Improved matching of buyers and sellers, and microfinance has the potential to create jobs as does improved, leading to poverty reduction. Studies conducted on clients of one of the largest micro-finance organizations in India (SIDBI Study, 2008) suggest that client households recorded an increase of 68.6% in average household income as compared to non-clients (31.2%) and that the proportion of client households having three meals a day increased from 66.2 to 78.9%.

Social inclusion: Social exclusion is the phenomenon where particular segments of society do not have access to or cannot afford specific goods and services (Chigona et al 2009). Improved matching of buyers and sellers has enabled BOP members to access new products and services. Some of these products and services, such as insurance services or internet access were historically beyond the access of individuals at the BOP. New employment opportunities and resulting financial betterment have also increased their purchasing power. Thus, social inclusion is a benefit of ICT facilitated market development.

We therefore propose that:

Proposition 2b: Market development at the BOP is associated with benefit- outcomes for BOP members

4.3. Complementary Conditions

A common characteristic of ICT intervention initiatives in developing countries has been their failure to achieve large-scale and sustained operation (Heeks, 2003). It is therefore important to note the presence of particular complementary conditions that might be expected to increase the probability of sustained ICT-enabled market

development. Based on literature on failure of ICT projects in developing country contexts (e.g. Best and Kumar, 2008), we identify four such conditions.

First, high education levels of BOP consumers and producers increase their proclivity to adopt ICT-enabled process changes in their transactions. A survey of telecenter users in rural south India shows average users to be more educated than non-users (Kumar and Best, 2006). Second, institutional partnership of the organization implementing the ICT initiative, with public and/or private entities are essential for ensuring monetary support, ironing out logistical and implementation difficulties and addressing regulatory requirements. Failure of sustained and long-term use, of the “Chirag” telecenter kiosks in India is largely attributed to collapse of institutional partnerships. N-logue was a private-sector institutional partner providing connectivity and technology. Kiosks that closed down reported lack of support from n-logue as a primary reason (Best and Kumar, 2008). Third, local champions play a crucial role in advocating the benefits of ICT-enabled process changes and addressing resistance issues among BOP consumers and producers. In the e-choupal initiative, “sanchalaks” (or host farmers) have been identified by ITC. These farmers take a leading role in running the operations of the centers and in a sense, are ITC’s partners within the BOP community. They take on the role of champions to promote the initiative among farmers (World Resources Institute, 2003). Fourth, adequate technical support and user-friendly application interfaces for BOP consumers and producers are necessary for continued use of applications.

We thus suggest that:

Proposition 3: Complementary conditions strengthen the positive influence of ICT on market development at the BOP.

5. CONCLUSION

The primary contribution of this paper is in providing a starting point for understanding how ICT can positively influence market development at the BOP. Integrating concepts from the Automate-Informate-Transform classification of ICT roles and market mechanisms, we analyze how each of these roles can facilitate development of the three market mechanisms of facilitation of transactions, matching of buyers and sellers and providing institutional infrastructure. We further argue that these mechanisms can lead to beneficial social and economic outcomes for BOP markets and BOP members. Given emerging ideas on the importance of market development for BOP producers and consumers (Karnani 2007, Prahalad 2005) and scant research on the enabling role of ICT therein, this paper speaks to an interesting and relevant research gap. Academic discourse on ICT in developing countries has addressed various aspects of ICT-enabled social and economic development. We contribute to this discourse by suggesting that ICT-enabled market development is a mediating mechanism for ICT-enabled social and economic benefits at the BOP.

For practice, the paper identifies specific mechanisms that might form the focus of ICT interventions by corporations and other entities, in their attempts to sell to or buy from BOP consumers and producers. It suggests that using ICT to enhance the three market mechanisms is likely to make their marketing efforts at the BOP more efficient and profitable. The automate-informate-transform classification provides broad guidance in identifying specific types of applications that may be applied to develop particular market mechanisms.

For policy, the proposed framework can be used by government and non-government agencies that aim to accomplish ICT-enabled development at the BOP. Particularly, many e-government projects aimed at rural populations have run aground, due to lack of adequate response from the intended participants. The ideas presented in this paper point to ways for using ICT to create and develop markets for government services at the BOP.

We note here that the paper is a conceptual starting point for understanding how ICT interventions can help create markets and associated social and economic benefits at the BOP. Our arguments are supported and illustrated by secondary and published observations and case examples. Future scholarly development of this area will need to consider field studies for more detailed understanding and elaboration of our propositions and empirical validation of the ideas outlined in this paper.

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