

REDUCING MARKET SEPARATIONS IN SUPPLY CHAINS AT THE BOTTOM OF THE PYRAMID

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ABSTRACT

This study examines the reduction of spatial and temporal market separations in supply chains at the bottom of the pyramid (i.e. BOP). We develop propositions in which we argue that IT can reduce these market separations. Our findings support our propositions, and highlight the potential for supply chain management practices that resides at the BOP.

Keywords: Bottom of the Pyramid; Case Study; Amul; Supply Chain Management

1. INTRODUCTION

Market separations, as described by the Theory of Market (Economic) Separations characterize markets as consisting of a producer and consumer who are far removed from each other due to the presence of one or more of the following separations: (1) *financial separation* refers to the inability of buyers to make purchases during times a purchase is necessary; (2) *information separation* is when participants have dissimilar knowledge concerning the same products and/or market characteristics; (3) *spatial separation* concerns production and consumption taking place in different physical locations; (4) *temporal separation* is represented by a disconnect between the time a good is produced and consumed (Bartels, 1968). The reduction of market separations provides for a relationship to formulate between producers and consumers, enabling exchange and consumption to occur (Bartels, 1968).

Market separations are very important to consider at the BOP since BOP areas are more subject to wider market separations than developed countries (Banerjee, 2005). BOP markets, typically rural poor societies, have three important characteristics – (1) BOP producers and consumers exist in physically remote areas, (2) these areas have poor transportation and communications infrastructure, and (3) they have producers of perishable goods such as farming and dairy products. The first two conditions create challenges associated with *distribution* (Vachani and Smith, 2008). The third creates conditions where, if the produce is not sold and consumed within a given *time*, they would perish. Thus BOP markets are particularly vulnerable to spatial and temporal separations. Ultimately, these separations represent major barriers-of-entry into BOP markets. Hence, the reduction of these spatial and temporal separations is critical at the BOP.

The purpose of this study is thus to examine how firms can reduce spatial and temporal market separations in supply chains at the BOP. Based on literatures from BOP markets and information technology (IT) applications to supply chains, we develop propositions which argue that firms can use IT to reduce spatial and temporal separations. We illustrate and validate our propositions through analysis of published, secondary data on two organizations in India that have successfully reduced these separations.

2. THEORETICAL FRAMEWORK: THEORY OF MARKET SEPARATIONS

The Theory of Market (Economic) Separations explains that the very purpose of marketing is to reduce or remove separations that are present between producers and consumers (Bartels, 1968). In particular, spatial and temporal separations are very critical at the BOP. First, spatial separation is critical because it represents the single largest barrier-of-entry into rural poor areas. Firms will face many challenges in their efforts to conduct business activities, especially with product delivery and management of the supply chain. Temporal separation is critical when we consider that rural farmers make up a vast majority of perishable goods producers. It is important to minimize the time between production and consumption of these product so that they are not wasted. In addition to each separation in isolation, the interaction between spatial and temporal separation at the BOP can potentially create an even more problematic situation.

3. BOP SOCIETIES, INFORMATION TECHNOLOGY, AND SUPPLY CHAINS

3.1. Market Separations at the BOP

It is evident that supply chains in BOP markets suffer from spatial and temporal market separations, but in order to get a deeper understanding, knowing why BOP markets have an extreme subjectivity to these separations must be investigated. Some of the main reasons BOP markets suffer from these separations include: (1) Poor infrastructure (electricity, roads, telecommunications), (2) Poor level of knowledge and skills, and (3) Illiteracy (Vachani and Smith, 2008). Coupled with the absence of quality technology and in an effort to integrate data, supply chains in BOP markets will suffer, in part, from the inability of rural customers to send information to upstream partners. Insufficient knowledge and skills is caused by the inability to access information, and consequently, BOP participants purchase products from urban markets that do not align with the needs of their own market, while also choosing the wrong location and times to sell their own products and services, and negotiating disadvantageous provisions (Vachani and Smith, 2008). Lastly, illiteracy develops in rural market societies because of deficiency in knowledge impedes, and in some cases restricts BOP society members from gaining access to other products/service markets without being taken advantage of, and causes them to experience failure in taking profit increasing opportunities (Vachani and Smith, 2008).

3.2. Information Technology & Supply Chains at the BOP

While BOP markets are subject to perceptions that highlight the fact that there exists poor infrastructure, lack of knowledge and skills, and the presence of illiteracy (Cecchini and Scott, 2003), Prahalad and Hammond (2002) perceive BOP markets to not only be a new source of rapid market growth and potential, but also as a profit-increasing opportunity for organizations

while helping those in dire need of making a living for themselves, providing for their families, and strengthening their societies economic condition. While both of these perceptions are true and vary on their focal points, they both collide on the fact that these areas are far removed from markets in central locations, and that in order for exchange and consumption to take place, and for value to be created, reduction of market separations must take place. This reduction of spatial and temporal separations in BOP societies is where IT holds the most promise; “information and communications technologies can grant access to otherwise isolated communities, provide marketing and distribution channels, bypass intermediaries, drive down transaction costs, and help aggregate demand and buying power” (Prahalad and Hammond, 2002, pg. 56). In addition, the identity of BOP market participants, and their transaction and credit history can be stored and secured using IT.

Using IT in supply chains to help reduce spatial separation improved connectivity, even over far geographically-displaced areas. Thus, firms can use IT to significantly increase the efficiency with which the difference in physical location between participants can be covered. For example, regardless of factors including location, the implementation of web-based systems have allowed networked supply chain partners to collaborate and cooperate with each other in a fast and easy way, and ultimately enabling manufacturers to develop a closer and stronger relationship with customers (Gunasekaran et al., 2008). Therefore, while actual physical distance between supply chain partners is not reduced, spatial separation is reduced in the sense that it no longer is as critical of an issue since IT is used to account for physical distance. Thus, in order for firms to reduce spatial separation, reduction of physical distance between producers and consumers, or the increase in efficiency to cover the distance should be the objectives. Applying this concept to BOP supply chain, we frame the following.

Proposition 1: *Firms can use IT within supply chains to reduce spatial market separation for communities at bottom of the pyramid.*

Supply chain and manufacturing literature has noted how IT can reduce temporal separations. Concerning agile manufacturing, IT can be used to implement concurrent engineering principles within the product development phase and the reduction of time to market is a result (Gunasekaran et al., 2008). In fact, Gunasekaran et al. (2008) framework of a responsive supply chain (i.e. supply chain management and agile manufacturing conceptualized together) is defined from the standpoint that it creates wealth for stakeholders through quick responses to market changes, with IT being the most necessary component. Moreover, this type of supply chain may have partners that actually have IT, which in part, was developed for the need of reducing temporal separation. For example, optimal reaction development systems have been developed for manufacturers of responsive supply chains, with a portion of the system designed specifically for the firms’ ability to monitor their response and time with respect to the market (Noonan and Wallace, 2004; Gunasekaran et al., 2008). Applying this concept to BOP supply chain, we frame the following.

Proposition 2: *Firms can use IT within supply chains to reduce temporal market separation for communities at bottom of the pyramid.*

4. RESEARCH DESIGN

4.1. Method and Site Selection

A qualitative approach was selected in order to examine these propositions and understand how spatial and temporal separations can be reduced by the use of IT in supply chains at the BOP. The selection of this method is considered appropriate, given the nature of the research questions, which calls for detailed analysis of the phenomenon, and for the purpose of concretely demonstrating that IT can reduce market separations. We developed case studies (Yin 2004) of two firms – ITC and Amul - that have operations in rural markets in India and applied IT to supply chains at the BOP. We used the ITC case to explore spatial separation reduction, and the Amul case for exploring temporal separation reduction. These sites are appropriate and were chosen for a few important reasons. First, both ITC and Amul have operations in BOP markets that have successfully tapped into the potential residing in BOP societies, and have incorporated local citizens into their supply bases. Secondly, both organizations used sophisticated IT to successfully connect to and include these rural citizens in their daily business operations, ultimately providing this study with the real-world applications needed to support our postulations concerning the phenomena under study. Lastly, the domestic and global reputations (ITC, 2011; Amul, 2011) of both firms is significant for the purpose of our study; they both exemplify that firms can strengthen local economic conditions, be highly profitable, and become industry leaders through reducing the separation between them and BOP societies.

4.2. Data Collection Sources and Analysis

Explanations of particular processes and the associated use cases of IT, the stimulation for making the associated decisions, benefits gained by the local BOP societies and the organizations, and the subsequent outcomes represented the focus of data collected. The data sources used for collecting information on organization profiles and business operations consisted of academic and practitioner journal articles, as well as corporate websites and other public websites. We used 14 different sources (i.e. 10 different journal sources and 4 websites). Our journal sources include *Harvard Business Review*, *California Management Review*, *American Journal of Economics and Business Administration*, *World Resources Institute*, *Comparative Technology Transfer and Society*, *International Journal of Services Technology and Management*, *Indian Institute of Management*, *Information Technology for Development*, *The Electronic Journal on Information Systems in Developing Countries*, and *Asia-Pacific Development Information Programme*. This resulted in a total number of 10 journal articles. We also used both ITC and Amul corporate websites - www.itcportal.com and www.amul.com, respectively -, in addition to Rediff.com and Expresscomputeronline.com. Rediff.com is an information, news, shopping and entertainment portal headquartered in Mumbai, India (Rediff, 2012), and Expresscomputeronline.com is India's #1 IT-related business magazine (Express Computer, 2002).

For both case studies, the usage of IT in BOP supply chains with regard to reducing market separations was examined. Specifically, for ITC we examined how IT was used to reduce spatial separation, and for Amul we looked at how temporal separations were reduced through application of IT. We thus conducted a bottom up, grounded analysis of the data to examine our

research propositions and identify how and why the use of IT reduced spatial and temporal separations. This strategy is consistent with qualitative methodological considerations (Yin, 2004; Eisenhardt, 1989). In addition, this study takes the recommendation of prior research for developing case studies, in which analyzing and evaluating the strength and consistency of processes found in the case study to aspects of the proposed theory is encouraged.

5. CASE STUDY ANALYSIS

5.1. Case Study #1: ITC - Reducing Spatial Market Separation

As one of the largest India-based organizations, ITC has a market capitalization that exceeds \$33 billion, and an Agri-Business division that is one of the largest agri-exporters in India (ITC, 2011). This is mostly due to the implementation of the *E-Choupal Initiative*, which is comprised of the company installing IT-enabled procurement systems in rural Indian villages, ultimately resulting in the enhancement of ITC's agribusiness performance, and the empowerment of rural India farmers (ITC, 2011; Vachini and Smith, 2008).

Increased efficiency of the procurement process that allows farmers in rural India to more easily purchase ingredients and sell their products is the main objective of ITC's E-Choupal initiative. Developmental benefits in sections of India where E-Choupal has been instituted is an empowering result of the decrease in transaction cost, increase in the bargaining power of the farmers, and the agglomeration of farm input demands, which cumulatively lead to greater economic efficiency (Mukerji, 2008). E-Choupal has also provided for easier communication between Indian farmers and to the rest of the world; the initiative is the beginning of a rural transformation for Indian farmers because it eliminates isolation, which allows them to be more visible to potential customers, and realize increases in both productivity and incomes (Annamalai and Rao, 2003).

During implementation of E-Choupal, ITC knew they had to train and hire personnel to manage local procurement operations and information kiosks placed in the villages. *Sanchalaks* are farmers in rural India who are the managers of kiosk centers and send ITC aggregate demand for farmers, allowing farmers to achieve congruency between their output and market demand due to the "real-time information and customized knowledge provided by E-Choupal" (Dangi and Singh, 2010, p. 181). Direct communication between consumer and producer via kiosks provide price benefits to the farmers that were not available to them when farmers purchased their products from village traders. Now after farmers have harvested their crops, ITC will place an offer to purchase the products from the farmers (Dangi and Singh, 2010). The next step was for the farmers to have their products weighed and assessed. Traditionally, this process was carried out by intermediaries known as *mandis*. However, when the mandis were removed from the supply chain, electronic weighing and processing centers were put in place to automate the process. The farmers now send their crops to these processing centers for weighing and quality assessment and following the transport of the products to the consumer, farmers are not only paid higher prices for their products, but also paid for transfer fees (Dangi and Singh, 2010).

5.2. Case Study #2: Amul - Reducing Temporal Market Separation

Amul (Anand Milk Union Limited) is the pinnacle organization of the Gujarat Cooperative Milk Marketing Federation (GCMMF) of India, which is the largest dairy products exporter in India (Amul, 2011). In fact, Amul's productivity has enabled India to be the largest milk producer in the world (Amul, 2011).

The Gujarat Co-Operative Milk Marketing Federation (GCMMF) took upon IT related efforts towards the implementation of the AMCUS system in rural Indian villages (Bowonder et al, 2005). AMCUS stands for the Automatic Milk Collection Unit System, and it enables higher levels of transparency in daily transactions between farmers and the Co-Operative Society. In addition, other benefits include increased trust between farmers and the society, and a reduction in processing time up to 10% of what it took to process milk prior to implementation of the collection system (Bowonder et al, 2005). Amul's use of IT has allowed for the streamlining of milk production, milk collection, and milk processing. Prior to the installation of the AMCUS, dairy farmers had to carry passbooks which contained information such as the members' identification number, quality of their produce (i.e. quality of milk is based on the percentage of fat that is contained in the milk), and the volume of the produce (Express Computer, 2002). When the milk was tested for its quality, a small sample was taken from the milk and placed in a plastic bottle for testing; this entire process caused the members to have to wait approximately a week or longer to receive payment for their produce (Express Computer, 2002). After the implementation of the AMCUS system, each member farmer had a plastic card that was electronically readable. This card served as the member farmers' identification number, and from this card farmers had access to the AMCUS system. Farmers would have their card read by a machine, which would tell the database which individual farmer's produce is going to be evaluated (Express Computer, 2002). The milk is then weighed for volume, and the percentage of fat contained in the milk is measured using an electronic fat testing machine called the *milk-o-tester* (Express Computer, 2002; Harris and Rajora, 2006). The details from the testing is then saved to a database, the computer calculates the amount that is owed to the farmers, and then prints a payment slip for the farmer to take to the payment booth, and receive his/her payment (Express Computer, 2002). Since the implementation of AMCUS, the member waiting time at the collection centers has gone from 20 minutes to 50 seconds, and the farmer payment wait time was reduced from between 1 and 2 weeks to minutes, and therefore the entire process, from milk collection to milk processing to farmer payment reduced from weeks to minutes (Harris and Rajora, 2006). In fact, the 2002 daily average of milk collection was 6 to 7 million liters of milk every day from approximately 2 million farmers (Express Computer, 2002). Today, the average maximum milk collection per day is 12 million liters from approximately 3 million farmers (Amul, 2011). This move to a sophisticated automation process ultimately reduced the time between the production and consumption of milk.

Reducing waste of products during storage has always been a factor that Amul has deemed as critical to their success. With the provision of e-commerce training and the development of e-competencies at the supply and distribution parts of the value chain, the CIO of GCMMF in 2002 verbalized the importance of preserving milk through its AMCUS initiative - he states "As milk is a highly perishable commodity, the AMCUS initiative is vital for our operations ... this

initiative has increased the trust and transparency among the rural people” (Express Computer, 2002, p. 2; Bowonder et al, 2005, p. 11).

6. CONTRIBUTIONS, RESEARCH IMPLICATIONS, AND CONCLUSION

Our study makes a number of contributions to existing literature. Our first contribution is our use of the Theory of Market (Economic) Separations to explain the challenges that emerge in supply chains in BOP areas. From this perspective, this paper helps in understanding the problems and challenges faced by supply chains operating in BOP areas as a result of both spatial and temporal market separations. These problems include barriers to market entry, dealing with poor physical infrastructure, lack of communication, slow local economic growth and development, the location of rural societies, and inefficient processes. Our second contribution comes by way of examining how the aforementioned problems can be alleviated through the use of IT, ultimately describing how spatial and temporal separations can be reduced. It is explained that IT can automate supply chain processes, create efficient processes to facilitate upstream and downstream communication, and in some cases transform business models. The results indicate the potential power of tapping into the BOP society, where the goal is not only to sell products to its participants, but to also include them in daily business operations by incorporating them into the supply chain. In both of the cases presented in this study, BOP participants are customers as well as business partners. While these cases successfully demonstrate that firms can help the advancement of economic conditions in deprived regions, the positive outcomes of both cases also inform us that at the BOP, a source of growth opportunities, innovation, and reliable supply chain partnership exists.

There are a couple of future research implications that can be drawn from this study. First, this study covers how IT can reduce spatial and temporal separations only. Future research can investigate how firms use IT to reduce other market separations (i.e. informational separation, financial separation, etc.). Also, future research can conduct empirical investigations that test the postulations presented in this study.

The BOP presents a myriad of supply chain challenges, most prominently due to its far flung constituent areas and infrastructural and communication challenges. Many of these challenges remain unexamined in the current literature. Integrating theoretical concepts from the BOP, supply chain and IT literatures, and drawing from secondary data, this paper develops a first level explanation and a starting point for understanding how supply chain processes can be streamlined and distribution channels developed using IT, at the BOP. We expect that our findings will spur further inquiry into supply chains at the BOP, with the goal of identifying mechanisms that can reduce the separations between marketers and BOP consumers, and can expand the market reach of BOP producers.

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