

Supply chain opportunities at the bottom of the pyramid

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Abstract With fast-moving-consumer-goods and other companies in emerging economies like India seeking growth, the people in the so-called bottom of the pyramid (BoP) are potential consumers. However, some leading companies as well as entrepreneurs are looking for and finding suppliers, producers, distributors, and retailers in the BoP segment. However, these opportunities are not without challenges when it comes to building and operating supply chains that interact with the BoP segment. For supply chain scholars, these supply chains and how they interact with the BoP segment present many opportunities for research. This paper outlines such research and business opportunities.

Keywords Bottom of the pyramid · Supply chain management · Inclusive growth · Social enterprise · Corporate social responsibility (CSR)

Introduction

As potential consumers, people at the so-called bottom of the pyramid (BoP) in emerging economies like India present a market opportunity for growth for large fast-moving-consumer-goods (FMCG) and for durable goods companies. However, it is perhaps even more important to recognize that people in this segment already are—or have the potential to become—suppliers, distributors, and retailers for these large companies, expanding the reach and efficacy of existing supply chains. With large companies (and entrepreneurs) incorporating the BoP segment at different levels of the supply chain, not just as end consumers, would help make growth become “inclusive” because making the poor as producers increases income levels and quality of life with safer water, health services, and education (Karnani 2007).

These large companies would benefit directly; the people thus helped in the BoP segment would go on to become consumers as well. There are also corporate social responsibility (CSR) benefits for these companies in engaging with the BoP segment. For instance, the Indian government requires companies to invest 2 % of their profits in corporate social responsibility since April 2014. Indeed, many social enterprises and some large companies have already created business models by engaging the BoP segment in the supply chain, thus, engaging in profitable growth and at the same time fulfilling their CSR requirements.

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There are at least two reasons why traditional supply chain thinking may not suffice: (1) as the poor serve as upstream suppliers of products (or services) or as downstream distributors of finished goods, there would be a large number of small transactions for any companies. The resultant huge transaction costs would require new ways to design and operate supply chains. For instance, these supply chains would require information and communication technology (ICT) to manage transactions and bring down transaction costs in ways that could be different from traditional supply chain management. (2) The poor lack market power so we need to develop new mechanisms for the BoP suppliers or distributors to obtain equitable share of the supply chain surplus. Meeting this challenge would require building and operating supply chains around ‘social’ business models that seek both profits and poverty alleviation. As such, further supply chain research is needed.

This article seeks to report how large companies and entrepreneurs interact with suppliers, producers, distributors, and retailers in the BoP segment phenomenon and to identify opportunities for supply chain research as well as business. We discuss supply chain research and business opportunities at each echelon and across the supply chains for a canonical supply chain comprising suppliers, producers, distributors, and retailers when any echelon of this supply chain could be in the BoP segment. To do so, we use examples of ‘social enterprises’ (Seelos and Mair 2005) or like-minded efforts of established companies termed ‘social business’ that are intended to help the BoP segment (London et al. 2010).

We contribute to the OM literature on the emerging area of *socially responsible operations* by identifying research and business opportunities in this nascent area especially related to the BoP segment. Although sustainable development has been studied extensively in the development economics literature (Ray 1998; Lal 2000; Hayami 2005), *operational* issues in this context have not been explored much yet. While corporate social responsibility (CSR) remains an untapped research area of operations management (Tang and Zhou 2012; Sodhi 2015), this paper can provide a starting point for research into companies interacting with the BoP segment beyond selling the poor goods in tiny sachets.

The rest of the paper is organized as follows: The next three sections focus on each of different echelons

of the canonical supply chains: “BoP suppliers” section looks at supply chain research opportunities with BoP suppliers including smallholder farmers, “BoP producers and service providers” section deals with BoP producers, and “Distribution strategies for supporting BoP micro-retailers/micro-vendors” section deals with BoP retailers and distributors. The following three “Financing strategies for supporting the BoP segment”, “Strategies for improving productivity for the BoP Segment” “Strategies for the BoP segment to increase access to scarce resources” sections deal with alleviating constraints for people in the BoP segments regardless of their role being suppliers, producers or distributors; we discuss research opportunities around their financial needs in “Financing strategies for supporting the BoP segment” section, around productivity in “Strategies for improving productivity for the BoP segment” section and around scarce resources in “Strategies for the BoP segment to increase access to scarce resources” section. Finally, we present overall research opportunities in “BoP segment-wide research opportunities” section.

BoP suppliers

Aggregating smallholder farmers via cooperative or other aggregations has attracted the attention of policymakers, those interested in social development and certainly many OM researchers (Chen et al. 2015). But are these always beneficial for farmers? An et al. (2015) find that cooperatives (or other aggregations) of smallholder farmers are not necessarily a silver bullet relative to farmers who choose not to join the cooperative. Tang and Zhou (2012), Chen et al. (2013), Devalkar et al. (2011), McCoy (2013) and Sodhi and Tang (2014) provide good starting material for further analytical research in this area.

One way to develop resources for smallholder farmers is online or mobile forums. But how should such forums be designed and operated? For a forum with experts and (some) knowledgeable farmers, Chen et al. (2015) use game-theoretic analysis to show that knowledgeable farmers never provide answers that are more informative than the experts in equilibrium. Chen and Tang (2015) show that the value of private information providers such as RML in India decreases as the quality and the accessibility of public

information services improve, one implication being government action may be needed to provide or subsidize such services for free.

It would be useful to examine different ways social enterprises or companies create supply chains with micro-entrepreneurs who would otherwise lack market access, market information, and selling opportunities. As such, one research opportunity is studying different types of supply contracts (e.g., wholesale price, revenue sharing, or profit sharing) (Tang 2006). These contracts could include supporting the micro-entrepreneurs' need for capital, say, farmers having to buy equipment, seed or fertilizer. The role of the wholesale auction markets in India, *mandis*, also needs to be better understood as to how the government can achieve its objectives optimally.

Another research opportunity is the value of information in increasing revenues for the micro-entrepreneur supplier via such supply chains. Providing timely and relevant information to the poor is beneficial by way of reduced search cost and improved selling opportunities by way of ICT alone (cf. Jensen 2007), but the evidence on income is not so clear. For instance, although Mittal et al. (2010) report that the farmers they interviewed reported 'positive benefits' by way of higher income because of their RML subscriptions, Fafchamps and Minten (2012) did not find any significant differences in the price received by RML subscribed farmers and the price received by non-subscribed farmers. Indeed, when the same price information is available to all buyers and sellers, it may reduce price dispersion but in the short time window of the information being provided, say 1 day, it could result in price instability by attracting sellers to and buyers away from locations reported as having had high prices the previous day, and vice versa for locations that reported low prices. Likewise, researchers could explore the implications of crop advisory information regarding what to cultivate and when to harvest. It is of interest to examine how to present this information to prevent the "herd effect" (Bikhchandani et al. 1992) of all farmers being enticed to grow the same crop that could result in much lower prices at harvest time.

Combining ICT with supply chain restructuring may have a beneficial impact. After all, e-commerce success depended not only on use of web technology, but also on supply chains to carry out the physical part of the transactions. We also need to understand better

the role of the wholesale auction markets (mandis in India) with auctioneers sharing information with their regular suppliers, i.e., farmers, and their regular buyers using mobile phones prior to auctions, and with the auctioneers also being buyers themselves.

BoP producers and service providers

The BoP segment in India includes over 90 % of the total workforce selling products or services in the so-called *informal sector*. This sector is not subject to any taxes or even minimum-wage restrictions. Why do these people remain persistently poor? One reason is that without efficient marketing and sales channels, the poor find it challenging to sell their products at a fair price. Creating supply chains that help the poor sell their goods and services in a more effective manner creates an opportunity for social enterprises by providing marketing and sales channel for goods and services. Consider the following five examples:

1. Connie Duckworth founded an online portal *Arzu* (<http://www.arzurugs.com>) to sell traditional and custom designed rugs produced by Afghan women. By sourcing these rugs from various Afghan women weavers and by offering them fair price, Arzu creates jobs in the rural area of Afghanistan and provides women weavers steady income and gives their children access to education and healthcare.
2. Bal and Rakesh Joshi co-founded *Thamel* (<http://www.thamel.com>) in Oregon with an initial investment of \$25,000 in 1999 to serve the 1.2 million Nepalese diaspora around the world mainly in North America, Hong Kong, and United Kingdom. Thamel has five business divisions; the most lucrative unit is its online gift shop that enables customers to send locally made gifts to their family and friends who still live in Nepal. Hence, Thamel creates business and jobs for local vendors and manufacturers.
3. *Coconut World* (<http://www.coconutworld.com>) helps the rural poor in the Philippines to make a living by buying coconut sugar they make at good prices and selling in the US. Despite attractive properties of this sugar, which has a caramel flavor and a 50 % lower Glycemic index than cane sugar, these farmers would otherwise have limited

market access due to the lack of capital and marketing skills. As such, they have to rely on an inefficient multi-layer trader system to sell their coconut sugar that cannot give them a good price.

4. *Ecomaximus* (<http://ecomaximus.com>) is set in the rural area of Pinnawela near Kegalle, Sri Lanka. Because elephants eat their crops and damage their farm land, killing these elephants and selling elephant tusk in the black market are one way for the farmers to survive and make ends meet. As an innovative way to save the elephants and improve the economic conditions of the poor farmers, Thusitha Ranasinghe founded Ecomaximus in 1997 to sell paper made by poor farmers using elephant dung and recycled waste paper. Ecomaximus inspired Mark Wolley and Claire Gibson to co-found in 2001 a social enterprise *Paper High* (<http://www.paperhigh.com>) that sells Ecomaximus elephant dung paper in the UK.
5. In South Africa, over 100,000 people (mostly men) stand on the side of the road each day hoping to get some odd jobs to survive. However, many potential customers are fearful to hire these day laborers for odd jobs (painting, landscaping, etc.). Charles Maisel founded a non-profit organization in South Africa in 2003 called “the MSR project,” for *Men on the Side of the Road* to conduct background and reference check on each applicant wishing to register as a day laborer and also allow customers to register themselves for the laborers’ safety. MSR also set up organized sites with water and toilet facilities so that the day laborers can wait for job opportunities in a safe and humane environment.

These examples can motivate research into market channel strategies for helping producers in the BoP segment.

Distribution strategies for supporting BoP micro-retailers/micro-vendors

As mentioned before, buying from and selling to the BoP segment entail a huge number of transactions for any large company as each transaction is necessarily small. Efficient distribution strategies for such companies to sell using micro-entrepreneurs from the BoP segment have thus far not been studied much despite countries like India continuing to have many micro-

retailers. As such there are two research opportunities: (1) designing and operating supply chains that use BoP micro-entrepreneurs as distributors or retailers, and (2) devising ways to share the value created between the company and the micro-retailers they use.

In developing countries, the distribution infrastructure is inadequate and formal distribution channels do not reach most consumers unlike in developed countries with large retailers and their supply chains. As such, a social enterprise or a company can use micro-entrepreneurs to distribute finished goods in order to overcome the high cost of ‘last-mile’ distribution. Developing distribution strategies that entail micro-entrepreneurs are essential for poverty alleviation (Prahalad 2006). Also, there are research opportunities because the OM literature on distributing products or services in rural areas of developing countries is rather scant (Tang and Zhou 2012).

Consider some examples involving social enterprises or large companies using micro-entrepreneurs as distributors: Mozambique-based VidaGas uses micro-entrepreneurs to sell propane gas to food-stall owners, fishermen, health clinics, etc. (Watson and Kraiselburd 2009). Vision Spring sells affordable reading glasses to low-income individuals through a network of micro-entrepreneurs in various developing countries (Bhattacharya et al. 2010). In East Africa, Coca-Cola bottlers deliver over \$500 million worth of product to 1800 “manual” distribution centers operated by 7500 micro-entrepreneurs. These micro-entrepreneurs use push carts or even bicycles to distribute the product to small retailers (who are also micro-entrepreneurs) in congested areas, making frequent but small deliveries to these cash-strapped micro-retailers (Yadav et al. 2011). In 2000, Hindustan Unilever, a subsidiary of Unilever in India, started Project Shakti in 50 villages with woman-entrepreneurs receiving training and stocks of consumer-packaged goods from Unilever’s rural distributor to sell the goods to consumers and micro-retailers in 6–10 villages (Rangan and Rajan 2007). Social enterprises like Living Goods and Solar Sisters, both operating in Uganda, also use women micro-entrepreneurs to do last-mile distribution of household necessities and solar lamps, respectively, emulating the model of the famed Avon Ladies (Economist 2012).

There are at least two fundamental approaches to distribution involving BoP distributors. One is *hub-*

and-spoke strategy. An enterprise can set up a center in a larger village as a “hub” from which micro-entrepreneurs (or employees) can travel to the more remote rural areas as “spokes” to sell goods or provide services. Coca Cola’s distribution in East Africa is an example with each manual distribution center ‘hub’ itself being operated by a local entrepreneur and these hubs being supplied in turn from a bottling plant as a hub-of-hubs.

The other approach is the *piggy-back* strategy. It involves (a) using existing commercial/non-commercial networks for moving goods to the micro-entrepreneurs or (b) providing additional services at the hub or sell more products or services to create more supply chain surplus. In Africa, Cola Life, an independent UK charity, hopes to bring “social goods” such as oral dehydration salts, high dose Vitamin A, and water purification tablets to rural villages using a wedge-shaped container called an AidPod that fits between the Coca Cola bottles in their crates, thus reducing distribution costs (Yadav et al. 2011). Gramin Suvidha Kendra, a private–public partnership between MCX and Indian Post Office established in 2006, distributes seeds, fertilizers, water purifiers, micronutrients, and solar lanterns to farmers via the ubiquitous post offices in India (Vachani and Smith 2008).

These approaches provide research opportunities. For *piggy-back distribution*, it is not clear how the value created should be shared between the network owner and the enterprise or micro-entrepreneurs. For example, how much should India Post charge Gramin Suvidha Kendra? However, extant literature on supply chain coordination in general and on coordinated transportation for JIT in particular can help operationally “through operational planning, coordination, and information sharing” for responsive JIT delivery (Morash and Clinton 1997).

For *hub-and-spoke distribution*, inventory issues arising from a hub-and-spoke system with many micro-entrepreneurs as spokes provide interesting research opportunities. For example, a hub-based inventory at a centralized warehouse reduces the inventory due to the “pooling” effect, but makes it costly for the micro-entrepreneurs to replenish their inventories especially if they have to do so frequently owing to limited purchasing power. On the other hand, the total inventory at the spokes would be much greater than it would be if it were only at the hub,

raising the question of who should own this inventory. In general, involving local entrepreneurs as informal sales force in developing countries creates new research opportunities to extend the existing marketing and the OM literature in the area of sales force planning, sales territory design, and incentive design (Lilien et al. 1992).

Financing strategies for supporting the BoP segment

For a cash-strapped business being run by someone from the BoP segment, there is a constant need for cash to stay afloat. Working capital is often the main bottleneck for such BoP businesses. Unfortunately, many financial institutions do not lend to such micro-entrepreneurs because they are viewed as risky borrowers with insufficient collaterals.

One way out has been micro-finance, which economists have studied since the early 1990s (cf. Armendáriz and Morduch 2007) with different economic theories on group lending—see Ghatak and Guinnane (1999) and Brau and Woller (2004) for comprehensive reviews. One research opportunity is testing the assumption of risk reduction in group lending. The same could be applied to micro-entrepreneurs as distributors when provided with goods on inventory on a credit basis. Another research opportunity deals with optimal loan repayment; frequent repayment schedule reduces the amount of defaulted loans but it increases the lenders’ cost of collection. A third research opportunity is screening micro-entrepreneurs for lending to reduce the cost associated with default loans. Developing effective way to develop new credit scoring methods by analyzing the data captured by the financial transactions (remittances, loan repayments, payments) conducted over the mobile phones (Lee and Tang 2012) may be a practical way to carry out such research. Researchers have also used Kiva’s online portal to examine how this information on financial transactions would affect lending behavior among online lenders (Hartley 2010). This can be specialized to screening for distributors when the goods are provided on credit.

In 1983, Muhammad Yunus founded Grameen Bank in Bangladesh for the poor who need a little bit of money to start or sustain a business as a micro-

entrepreneur. Motivated by its phenomenal success, Grameen Bank expanded its operations from Bangladesh to the United States in 2009 (Foroohar 2010).

Inspired by Grameen Bank's success, Vikram Akula founded *SKS Microfinance* in Medhad, one of the poorest parts of India (Akula 2008). Unlike Grameen Bank, SKS is a for-profit business model, and is backed by investors that include Vinod Khosla, George Soros, venture capital firms such as Sequoia, and banks such as Citibank and ABN Amro. In August 2010, SKS became the first micro-finance organization to be publicly listed in India.

Matt and Jessica Flannery founded an online person-to-person (P2P) social micro-lending *Kiva* (<http://www.kiva.org>) in 2005. Kiva is an online portal that enables ordinary people in the developed world to lend money to individual borrowers (or groups) who need a small amount of money to start or sustain businesses in the developing world. Besides the need to get a large number of lenders to lend money, Kiva needs a large network of trusted field volunteers to manage the operations. By the end of 2008, Kiva was lending \$60,000 of loans per day. It has over 350,000 lenders lending over 37 million of Euros (cumulative since 2005) to over 67,000 borrowers in rural Africa so that they can start their businesses. The average loan was 107 Euros and the default rate around 2 %, although this fluctuates (Carrick-Cagna and Santos 2009). According to Matt Flannery, “due diligence, diversification, and a star risk rating system—are among the reasons why our default rate is currently below 3 percent” (Flannery 2009).

A research question as well as a business opportunity motivated by these examples is about the potential role that large companies can play in the supply chain. For instance, companies can offer micro-finance as working capital for the poor as suppliers or distributors, e.g., by pre-paying for supplies from the poor. Collection costs could be reduced because collection can piggy-back on the transfer of goods. Lending transaction costs are greatly reduced if micro-lending is tied to the actual transaction. Moreover, aggregation of suppliers or distributors can fit the group lending model well as we already noted. A practical way would be to provide micro-retailers inventory on credit till the end of the day: the micro-retailer would effectively get credit for the day and the company would limit its risk to the value of 1 day's inventory (Sodhi and Tang 2014). A company like ITC could

lend to farmers before the sowing season and gets its money back at harvest time when buying from the farmer.

Strategies for improving productivity for the BoP Segment

Productivity in the BoP segment can be quite low. One reason is the poor health—for instance, among all countries, India has one of the highest percentages of stunted growth for children, more so than much poorer countries in Africa (Jayachandran and Pande 2015). Another reason is not having adequate means of production.

Entrepreneurs and researchers can learn from social enterprises that have sought to meet these challenges. Recognizing the fact that 1.6 billion people need reading glasses and only 5 % have access to affordable glasses, Dr. Jordan Kassalow founded *VisionSpring* (<http://www.visionspring.org>) as a non-profit organization in 2001 to provide access to reading glasses to the poor. To keep the production cost low, VisionSpring sources only three strengths of non-prescription glasses from China. VisionSpring trains dozens of local entrepreneurs, called Vision Entrepreneurs, and provides them with loans of \$75 so that they can buy a kit of eye charts, brochures, and a stock of glasses. Because of the low cost structure, VisionSpring manages to sell its reading glasses in El Salvador, India, Haiti, and Guatemala for as low as \$2 a pair.

Martin Fisher and Nick Moon co-founded *KickStart* (<http://www.kickstart.org>) in 1991 by developing, designing and manufacturing practical equipment that help poor farmers in rural Africa to improve their productivity in farming and cooking oil production. KickStart develops and sells a manually operated micro-irrigation pumps so that the poor villagers can gain access to water so as to raise more crops. KickStart also sells a manually operated cooking oil press for the villagers so that they can increase their production of cooking oil by using an efficient press and filter. KickStart markets these practical tools at low cost to farmers who want to improve productivity and the villagers who would like to produce and sell cooking oil from oil seeds such as sunflower and sesame.

Improving the knowledge and skills of poor workers—typically from rural areas working in urban or

semi-urban industrialized areas—is critical. This is becoming even more true as services become increasingly important in the supply chain where breadth of skills and knowledge matters more than in the narrowly defined “assembly line” jobs in the Ford system. Thus, there are two different education goals for productivity: (1) deepening skills in a particular manufacturing domain (e.g., welding) and (2) providing a breadth of skills and knowledge for the so-called knowledge economy. For countries like India that are predominantly service-driven, such education can play a huge role. The question then is how education becomes an opportunity for research. One possibility is investigating the role of platforms like MOOC in enhancing (supply chain and other) education for BoP people who cannot afford formal education. Even for this we need business models because the people can neither afford computers nor access to the Internet. One such business model could be based on “train the trainer” model so the number of those trained can scale up quickly.

Strategies for the BoP segment to increase access to scarce resources

A big challenge for the producers and others in the BoP segment is getting access to scarce resources that include energy and water. Energy in many parts within emerging economies is a constrained resource even in developing countries that export energy to the west. Hundreds of millions of people walk miles to collect wood or spend their meager incomes on fuel. Solar Cookers International (<http://www.solarcookers.org>) promotes solar cookers in underdeveloped countries. Through the organization’s efforts, US-based True Vineyard Ministries bought different solar ovens manufactured by US-based Sun Oven International (<http://www.sunoven.com>) to help widowed women in Rwanda to start bakery businesses. In the rural area of Nicaragua, women use solar cookers to produce baked goods, candies, and roast coffee for sale. As such, solar cookers have enabled micro-entrepreneurs to produce products for sale.

Water is a critical element for existence; leave alone any economic activity. Over 40 % of Africans lack access to potable water supply (Purkayastha 2009). Collected water causes sickness and death, and also deprives micro-entrepreneurs to engage in basic

production such as agriculture and related industry. Because most hand pumps tend to breakdown most of the time and electric pumps are too costly to install and maintain, most women and girls trek many kilometers to collect water from rivers or springs on a regular basis. Consequently, they lack the time and energy to attend school and gain employment. Water for irrigation and consumption is similarly a problem especially with the rapidly diminishing ground water in India.

As such, some social enterprises have focused on access to water in sub-Saharan Africa. Trevor Field and Ronnie Styver developed *PlayPumps* (<http://www.playpumps.org>). In late 1989, Trevor Field and a professional engineer Ronnie Styver co-designed an innovative product: PlayPump—a child’s merry-go-around that pumps potable water from a deep borehole to an overhead 2500-l storage tank installed 7 meters above ground, connecting to taps in the community. Hence, the children have a means to play and the community has water to use. Not having to spend hours to collect water, women can seek employment and girls can attend school. Since October 2009, PlayPumps are now offered through Water For People (<http://waterforpeople.org>) as part of a broader portfolio of water pump and sanitation technologies and solutions. Besides PlayPumps, Hippo Water Roller (<http://www.hipporoller.org>) is a non-profit organization that uses charitable donations to produce the Hippo drum that requires less effort for women and children in rural Africa to transport 90 l of water by “rolling” the Hippo drum. In 2010, the UN World Food Program sponsored a large quantity of Hippo drums for the people in Somalia.

As groundwater or other natural resources get depleted, trading on the market is considered as the best possible solution. But does it actually work? Murali et al. (2015) show that exporting water through a water market with exogenous price is detrimental to both society and the environment within the community if we consider ‘triple bottom line benefits’. Their work generalizes to other commodities as well: consider for instance, India’s ban on export of cotton in 2012 and a 30 % tax to discourage export of iron ore in 2011. Also, different parties may not actually participate in the market. For instance, a significant amount of waste currently going to landfill or incinerators could potentially be re-purposed. Dhanorkar et al. (2015) consider why such exchanges have had limited take-up. Their work has implications beyond

such exchanges to those of manpower such as Men on the Side of the Road in S. Africa and freight-boards for truck transportation in Africa or Asia as there may be similar factors affecting lack of take-up.

How should government balance different interests? This is an important research topic. Park et al. (2015) consider social welfare stemming from optimal application of carbon taxes with retailers seeking to maximize profit and consumers seeking to maximize utility and show that the government will find carbon taxes more effective as the competition becomes higher. In India, there is a parallel by way of the proposed acquisition of agricultural land by companies where successive governments have not been able to pass legislation on how farmers' interests can be balanced with those of large companies needing land for factories.

BoP segment-wide research opportunities

There is shortage of well-researched case studies or even descriptions of different operations settings detailing how different groups of stakeholders became better off (or not) because of the operations. One research question can be about the type of operations and how these operations are being economically sustained: What's the business model and where's the money? Implicitly, this research question can include research objectives tied to *value creation* and *value delivery* (London et al. 2010) and *value sharing* (say between micro-entrepreneurs and the corporation as between farmers and ITC in the latter's e-Choupal project). Sodhi and Tang (2011) attempt to understand how the supply chains of individual micro-entrepreneurs can be strengthened by social enterprises, and examine the economic sustenance of such operation. Phenomenological investigation by way of field study and ethnography would be quite useful as a foundation for further research. Lee et al. (2013) explain how the Nestlé Creating Share Value (CSV) initiative benefits the poor farmers and Nestlé while Sodhi and Tang (2014) present stylized models to examine the shared value created by various supply chain initiatives that engage the poor as producers or as distributors.

One aspect of such studies could lead to better understanding of the multi-way partnership and factors behind success/failure for particular operations by

way of, say, local communities, NGOs and the regional government working or not working together. Unanticipated *side effects* of seemingly socially responsible operations would stem from studying a wider set of stakeholders. For instance, donated clothes can have a detrimental impact on the local apparel and retail industry, as seen in Africa. Looking at a wider set of stakeholders, as with SRBV, can help anticipate 'side effects'.

Research in social *irresponsibility* in the supply chain—deliberate harming of consumers, employees, the environment or suppliers among others—is limited. This is despite plenty of well-documented examples of irresponsible corporate behavior in the media such as that of Volkswagen's use of software to cheat on nitrous oxide emissions tests on as many as 11 million of its diesel cars as per the company's admission in September 2015. One argument is that corporations are often so focused on short-term profit that they behave in ways that adversely affect their employees, the environment, consumers, politics, and even the long-term well-being of the corporation itself (Mitchell 2001). This can happen anywhere in the supply chain especially where consumers, employees or suppliers' employees are in the BoP segment. Armstrong (1977), using behavioral experiments, suggests the problem of irresponsible behavior may be widespread among managers and is possibly linked to 'stockholder' perspective.

Social entrepreneurship (or social business) offers an appealing proposition—making money by doing good (cf. Kumar 2010). There are several topics that merit further study such as appropriate supply chain and other performance measures for social enterprises working with micro-entrepreneurs; supply chain coordination and collaboration between social enterprises and other organizations; how mutually created value is shared between the social enterprise and its micro-entrepreneurs; and support of government policy for social enterprises.

There are opportunities to research the decision making of the poor in emerging markets. For instance, as feature mobile phone penetration rate exceeds 90 % in India, companies such as Reuters Market Light (RML) and Nokia are offering information services to farmers (cf. Chen and Tang 2015). Some key issues to investigate include identifying the key drivers for farmers as regards paying for subscription, how farmers use the information in practice to make

farming decisions, and whether such market information actually helps farmers earn more.

Mobile-based finance has been considered as a major breakthrough to help the poor conduct financial transactions (savings, loans, remittances, loan repayments, payments) over the mobile phones (Lee and Tang 2012). One area of study could be how mobile finance services with instant access change the spending and savings habits of the poor.

Measuring the alleviation of the targeted social problem across different time frames and scopes requires field study by way of so-called ‘impact’ studies. Current studies do not have consistent results. For instance, Mittal et al. (2010) find that farmers subscribing to market information via mobile phones enjoyed higher income, while Fafchamps and Minten (2012) find no evidence supporting this claim. There is room for analytical models here as well: Chen and Tang (2015) show that more accurate market information can have a detrimental effect to prices and therefore to farmers’ wellbeing. Incidentally, studies of stock performance are not uncommon. Frooman (1997) does a meta-analysis of event studies to examine the impact of socially responsible announcements on the stock performance of a firm—similar work could be done with not only companies’ but also other stakeholders’ performance.

Thus, the bottom of the pyramid provides many opportunities to exploit as well as to extend supply chain research.

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