

The main message argue that the developing countries should sacrifice the pace of development while others believe it's impossible to do so.

Harnessing Innovation for Change: Sustainability and Poverty in Developing Countries

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Abstract

To date, a well-developed business perspective on how to promote sustainability for developing countries is lacking. Poverty presents unique challenges for people who are designing innovations that enhance sustainability. In this paper, we argue that if sustainability enhancing innovations in developing countries are to be successful, they need to be designed with local customers, networks, and business ecosystems in mind. We illustrate this view using case examples from mobile telephony, fuel efficient stoves, clean drinking water, and household electrification. Our paper emphasizes the need for today's managers to understand poverty as an important part of the sustainability nexus and the new international business equation.

Keywords: informal economy, innovation, social entrepreneurship, sustainability

INTRODUCTION

On one side of the international debate around sustainability and poverty reduction, philosophers, like Peter Singer, argue that those in developed economies must make financial sacrifices to support the development of sustainability in poor developing countries (Singer, 2011). Environmental sceptics like Bjorn Lomborg, on the other hand, counter that it is unrealistic to ask mature economies to sacrifice for the sake of developing ones (Lomborg, 2011).

Neither Singer nor Lomborg, however, are able to offer any practical conclusions. While their arguments differ, their points of view do converge on one noteworthy theme; both urge investment in research and development to spark innovations that can address both poverty and sustainability. However, introducing sustainability enhancing innovations in developing countries does present challenges. In this paper, we argue that the right sort of innovation can indeed support sustainability, the environment and those living in poverty. For such innovations to take hold, however, they need to be designed with three things in mind: local customers, networks, and business ecosystems.

Without having these three key aspects in mind, business innovators run the risk of introducing innovations that repeatedly fail to be adopted (Karlan and Appel, 2011). Innovations that are designed with the right intentions but either do not fit well with people's way of life, or do not have business ecosystems, like the availability of parts and repairs, to support their integration to people's way of life, will continue to disappoint.

Poverty in developing countries is now recognized as a key element of business in developing countries; as a result, managers need to understand poverty as an important part of the sustainability nexus. It is no longer a matter of poverty only receiving attention from business researchers when disasters strike (Post, 2000; Shrivastava et al., 1988; Weick, 2010). Rather, the international business community and poverty stricken communities are interacting more frequently and in greater depth (i.e., Blowfield and Dolan, 2010; Enderle, 2009; Hill, 2008; Singer, 2006). Indeed, globalization has lowered the cost of doing business and allowed even small and medium sized firms to produce and sell products in dozens of countries previously inaccessible. Moreover, those living in poverty constitute a large potential market which makes poverty visible to a much larger proportion of the business community. Hence, poverty and its effects are no longer a deterrent to business. They are the realities businesses need to confront.

Despite its importance, a well-developed business perspective on how to promote sustainability for those in poverty is lacking. For example, the corporate environmental sustainability literature focuses on the costs and benefits of environmental stewardship and regulatory compliance, but rarely considers the issues of poverty (Bansal, 2002, 2003; Hoffman, 2001). Similarly, the base of the pyramid literature addresses poverty and economic sustainability but does not often directly tackle environmental issues (London, 2009;

London and Hart, 2004; Prahalad, 2005). Finally, the sustainable entrepreneurship literature is yet to engage with settings of extreme poverty in developing countries (Dean and McMullen, 2007; Hall et al., 2010; Hockerts and Wustenhagen, 2010; Shepherd and Patzelt, 2011; York and Venkataraman, 2010).

Our contribution to the literature is distinct. First, we present an integrated view of sustainability that ties together poverty, the natural environment, and innovation. Second, grounded in case examples, we draw sharp conclusions about the role of customers, networks, and ecosystems in making innovations in developing countries stick. Finally, we outline a future research agenda to move the field forward as well as offer insights for managers.

THE SUSTAINABILITY NEXUS *as connection/link*

Sustainability sits at the nexus of poverty, the natural environment, and innovation. The definition of sustainability is 'meeting the needs of the present generation without compromising the ability of future generations to meet their needs' (WCED, 1987, p. 43). The goal of sustainability is to move societies beyond 'constant consumption at no more than a subsistence level' (Stavins et al., 2003, p. 340), but without compromising the potential for the future. A sustainable society invests more than it consumes, and passes to future generations at least as much as it inherited from prior generations (Arrow et al., 2004; Dasgupta, 2010). To be meaningful, sustainability has to improve the welfare gains of people over time. Moreover, in attaining sustainability, societies cannot offload the problems of today onto future generations. Nor can sustainability be achieved in one part of the world at no cost to another.

The means of measuring sustainability is unclear. One model suggests that sustainability is the interplay between a country's rate of population growth (tightly linked to poverty), its rate of change in the stock of capital assets (including those of the natural environment), and its investments in technology and innovation (Dasgupta, 2010, p. 9). Meeting the criterion for sustainability requires simultaneously managing all of these components lest any one of them throw the equation out of balance. In countries where high and persistent levels of poverty are associated with relentless population growth and depleting natural resources, achieving sustainability is a challenge. To understand whether innovations can promote sustainability, we believe it is important to consider more directly poverty and the natural environment.

Poverty

Significance
By any standard, a third of humanity is living in dire economic impoverishment. Over the last 35 years, millions of people, particularly in China and India, have moved out of poverty (Deaton, 2006; Pinkovskiy and Sala-i-Martin, 2009). However, other countries have not realized such gains. Today, in Sub-Saharan Africa, population growth is higher, life expectancy lower, and poverty more pressing than it was 35 years ago (Dasgupta, 2010).

As a general principle, scholars argue that poverty emerges and persists where negatively self-reinforcing economic, political, or social behaviours 'make change difficult' (Wydick, 2008, p. 8). The barriers to change involve three main factors: **threshold effects, dysfunctional institutions, and neighbourhood effects** (Bowels et al., 2006). Threshold effects occur when wages from a job or earnings from a business remain permanently at subsistence level. This means people earn just enough to survive, but not enough to accumulate savings. As a result, those living in poverty cannot accumulate enough capital to invest in business or education to improve productivity. This effect stunts the growth of most businesses and leaves entrepreneurs operating at subsistence levels (Bowels et al., 2006). This view leads to the argument that to get unstuck, those living in poverty need access to capital, but it is unclear whether recent efforts at providing such capital as loans are effective or push people further into poverty by trapping them in cycles of debt (Ansari et al., 2012; Banerjee and Duflo, 2011; Bruton et al., 2011; Karlan and Zinman, 2011; Khavul, 2010; Khavul et al., forthcoming; Morduch, 2011).

Impact on
Dysfunctional institutions can also perpetuate poverty. Whether rooted in laws or customs, institutions in subtle but pervasive ways shape the behaviours of individuals and organizations (Hitt et al., 2004). Well-developed institutions define the rules of the game for society and align the incentives of individuals with the common good (North, 1990; Wydick, 2008). By contrast, dysfunctional institutions act to undermine property rights and promote corruption (Misangyi et al., 2008). For example, dysfunctional institutions create economic incentives for bribery and for expropriation of State assets with relative impunity for those doing so but at high cost to the rest of the population. Such behaviours not only persist but amplify as they become the standard for how people interact (Engerman and Sokoloff, 2006). Dysfunctional institutions imprison societies in webs of self-fulfilling expectations that not only create but also reinforce the cycles of poverty.

Bad business plans → pov

Finally, poverty can become endemic when neighbourhood effects (e.g., physical, social, or cultural group membership) act to influence 'beliefs, preferences, and constraints' of group members (Durlauf, 2004, 2006, p. 146). Neighbourhood effects arise when individuals consciously or unconsciously imitate established behaviour of an intimate group. Neighbourhood effects create interdependence between members in a community. Such interdependence lowers the cost of adopting specific behaviours, but it also reduces information about alternatives. When neighbourhood effects follow a negative dynamic, they may lock-in intergenerational persistence of poverty and make it resistant to intervention.

Natural Environment

Poverty is often blamed for exploitation and degradation of the natural environment (Duraiappah, 1998). In fact, poverty and the environment are often caught in a vicious circle that undermines attempts at sustainability. Over the last century, as human population quadrupled and industrial output increased 40-fold, the strain on more than half the world's ecosystems has brought about rapid degradation in the natural environment (MEA, 2003). Potentially, this calls into question long-term sustainability of growth in many developing countries. However, until recently, social and economic researchers rarely incorporated the natural environment into their models (Dasgupta, 2010). Scholars tended to see nature as boundless and not subject to depreciation or destruction (Daly and Farley, 2004; Dasgupta, 2007, 2010); yet this view is rapidly changing (Ostrom, 1990, 2009). Natural resources are now considered *ecological capital*, part of a country's capital stock, and an integral part of the sustainability equation. Like other capital, ecological capital can be traded and is a source of wealth (Coleman, 1988).

The governance and management of ecological capital in developing countries often falls to local customs or social norms. It lacks a clear institutional system of property rights. Many transactions around ecological capital are informal and do not account for the complexity and the interconnectedness of the natural environment over long, but often hidden commercial chains (Morris and Meiners, 2009). As a result, ecological capital, a key component of sustainability, is often extremely undervalued. The resultant degradation of the natural environment becomes a barrier to sustainability, even while certain parts of the business community start to prosper. As the ecological capital of a country declines, less is passed to future generations.

It is true to say that maintaining or improving environmental quality is costly. Countries that focus on economic growth and rapid development want to use their ecological capital aggressively (Appleton, 2006). These nations are willing to spend their ecological capital to improve the lives of their citizens today and worry about environmental effects tomorrow (Dasgupta et al., 2005, p. 617). When poverty is intense, 'poverty reduction and environmental protection' appear to be direct trade-offs. In the absence of innovative solutions, environmental protection often yields to the need to grow the economy at any cost in order to address the pressures of poverty.

In the next section, we show that innovation may offer the potential to harness change in settings of severe poverty. However, in developing countries, innovations that are intended to enhance sustainability and bring change to society have to overcome the barriers that poverty and its interconnection with the environment create. We argue that innovative solutions to poverty are more likely to stick when they explicitly account for local customers, networks, and business ecosystems.

HARNESSING INNOVATION FOR CHANGE

For those seeking to introduce sustainability enhancing innovations in developing countries, poverty presents unique challenges. Historically, policy makers from developed countries exported advanced technology ('the best we have to offer') to tackle poverty in developing countries; however, they often neglected meaningful assessment of the social barriers to the adoption. Today, those working in developing countries call for the introduction of appropriate technologies that use 'local skills and capabilities' and 'available resources in an environmentally sustainable manner' (Murphy et al., 2009, p. 159). This is consistent with developing products and services that explicitly focus on the needs, wants, and constraints of target customers, which is at the core of a successful innovation process in any environment. We argue that for sustainability enhancing innovations to be taken up by local communities, they have to be designed and marketed with local customers, their networks, and local business ecosystems in mind.

As a case in point, consider the lessons that mobile telecommunication technology, a successful innovation, has for the introduction of innovations for those in poverty. Most developing countries have a limited number of telephone landlines. Laying new landlines is not economically feasible and can degrade the natural environment. However, in countries like Kenya, mobile telecommunication technologies have now leapfrogged landlines to help individuals in poverty gain access to information and allow them to communicate in ways that substantially improve the quality of their lives. For example, millions of migrant

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workers use telephones to make mobile payments or transfer funds to their families. Before mobile payments became available, a labourer who left a village to work in the city and had to send money home used a banking or wire-service intermediary. In order to receive the transfer, his family had to travel to town where the intermediary's branch office was located. Along the way, the intermediary charged a heavy commission and the family member bore not only the cost of the journey but also lost time from productive labour. Today, the same transfer is made from the labourer's mobile phone account to his family's mobile phone account at a fraction of the cost. This drastically slashed the transaction costs of money transfers to a fraction of their previous costs.

Innovations such as mobile banking or e-money are rapidly spreading across developing countries. For success, telecommunication companies had to invest in understanding customers, their relationship to society, and the ecosystem in which they live. In this way, they were able to improve the standard of living of individuals and create opportunities for them (Sen, 1999) while developing a highly successful business enterprise.

We argue it is not viable to introduce innovations without deep customer knowledge, without due regard for the highly networked nature of the local adoption process, and without investment in local ecosystems. To illustrate the importance of customers, networks, and ecosystems, we tap into three core examples of innovations that could improve sustainability and alleviate poverty in developing countries. Specifically, the absence of fuel efficient stoves, safe drinking water, and electricity is directly associated with adverse health effects and depletion of the environment. Over the decades, each problem has attracted significant public and private attention, but with limited results. The search for innovations to solve each of these problems is currently undergoing resurgence. The cases are useful as backdrops for our arguments about what makes innovations stick. We present a brief synopsis of each of these three cases below but refer the reader for more detail about each case in the Appendix.

Customers

Most businesses invest in innovations targeted at customers living in developed economies or wealthy customers living in developing countries (D'Andrea et al., 2006). However, when customers are impoverished, their needs and preferences often go unrecognized (London et al., 2010; Viswanathan et al., 2005, 2010; Weidner et al., 2010). Take, for example, the race to design and produce a fuel-efficient stove for home cooking (Case A in the Appendix). On multiple levels, the sustainability case for fuel efficient stoves is clear. The creation and adoption of fuel efficient stoves is critical for conservation of the natural environment. Inefficient wood burning stoves significantly contribute to deforestation and air pollution. Likewise, cooking on wood burning stoves markedly increases the risk of respiratory problems in women, children, and even the unborn. Finally, the chores of collecting firewood keep young girls out of school. Despite the obvious benefits of switching to fuel-efficient stoves, repeated introductions of this innovation have failed to stick and replace traditional alternatives. We offer several explanations that highlight the importance of deep customer knowledge.

First, innovations will not be effectively and consistently utilized (i.e., stick) when they are designed with the right intentions but the wrong people in mind. Innovations designed for wealthy customers are often introduced in developing countries in a top-down fashion. There is a perception that those in poverty are a homogenous group that will adapt, or make do, with the product on offer. This one-size fits all approach, however, is frequently an obstacle to the widespread adoption of innovation.

Second, innovations that optimize factors that are not immediately meaningful to local users do not stick. For example, users want fuel efficient stoves, but, in many cases, they are not willing to change their cooking style, performance, reliability, or convenience for an additional measure of fuel efficiency. For those living in poverty, up-front costs are a large consideration. In the rare instances when competition between stove options exists the most fuel efficient stove has also been the most expensive (Abdelnour and Branzai, 2010). Moreover, customers were more likely to buy stoves that they were taught to make by themselves out of local materials. Such choices are entirely in line with a gravitational pull on the part of the users towards appropriate technologies that meet basic user needs (e.g., sound and flexible technology, using local materials, at an affordable price, with local participation in its creation) (Murphy et al., 2009). As numerous other introductions of innovations have shown, customers do not always adopt the best technical solution (Anderson and Tushman, 1990). Innovators who understand local needs and cater to local constraints are more likely to have the innovations that stick. As a result, businesses seeking to bring innovation to those in poverty in developing countries need to invest time and money to acquire deep knowledge of local customers. Without this effort, businesses run the risk of developing innovations that consumers in poverty do not need and cannot use.

Networks

Innovations that ignore the local networks in which customers in developing countries are embedded rarely stick. Consider the sustainability case of clean drinking water (see details in Case B in the Appendix). Half of the 2.6 billion people in the developing world lack access to basic sanitation (UNDP, 2006). Although governments in developing countries are nominally responsible for the provision of water services, in most cases the dysfunctional and corrupt institutions in developing countries mean that clean water remains a luxury and a private good. Surveys suggest that those living in developing countries accept that they have to pay for clean water. Many do pay, but most do not (Whittington et al., 2008). Even when clean water is available, those in desperate poverty are often forced to choose between buying food or buying water (Lawrence et al., 2003). However, even when cheap water purification solutions (e.g., chlorination) do exist, individuals fail to adopt them.

Decades of research have shown that the spread and uptake of innovations depends on information and communication not only between customers and the innovator but also among customers (Rogers, 1962/1995). As with anything new, a small number of early enthusiasts become early adopters. These early adopters signal the quality and usefulness of the innovation to the much larger group of mainstream customers who need to join them to create networks for an innovation to be successful in the market. Local networks legitimize the adoption of innovation and allow innovators to scale-up in order to reduce unit costs of production and distribution. In the closely-knit communities found among those living in poverty in developing countries, conformity or *neighbourhood effects* can stunt or stimulate the way individuals make decisions (Wydick, 2008; Young, 2001). In impoverished rural communities, the average individual is unlikely to deviate from the norm to which the rest of the community adheres. In such settings, individuals rely on each other to provide a social safety net (Viswanathan, 2007). Thus, close, trusting relationships, whether with family or outside social networks, affect customers' decisions (Hoff and Sen, 2006; Viswanathan et al., 2010). Thus, innovations introduced to those living in poverty in developing countries must reach and connect not only to the individual consumer but also to their extended families, and their local communities.

However, conformity can also be the glue that makes innovations stick. Members of a community are more likely to adopt innovations if the leadership of the community adopts. For example, this dynamic plays out in small Indian villages where residents have limited access to clean drinking water. Decisions to install water purification units depend on agreements with local leaders who allocate space to the plant and designate individuals to run the units. Community leaders signal the social legitimacy of the innovation and lower the uncertainty for would-be adopters.

Additionally, when individuals decide to imitate the behaviour of close neighbours, a critical mass in a community can adopt the innovation simultaneously. Game theorists have developed persuasive models for predicting how adoption of the innovation would proceed in a community (Wydick, 2008) and what natural limits it may reach. Knowing the physical layout of a community and the preferences of customers allows innovators to predict how pockets of adoption or resistance to adoption emerge. This allows them to scale their expectations and business model accordingly. It may be that pockets of adoption (20-25 per cent of the community) is a reasonable outcome.

Ecosystems

We argue that even the most appropriate, sophisticated, and beneficial innovations are likely to be short-lived without investment in the social and economic relationships that constitute the local ecosystem. For an innovation to be successful, there needs to be local, trained repair people who can source spare parts easily and fix problems at a reasonable cost. Even greater success can be achieved if the innovation itself is developed by locals. Innovations that are imported, with no local contribution to its development, can become orphaned, because they fail to become a part of the community's ecosystem.

In the case of the initial introduction of solar panels in Nigeria and Tanzania, manufacturers incentivized local distributors to install as many panels as possible but invested little in the training required to support them. In rural areas, few local repair shops could unpack the complexity of a malfunctioning solar panel. Once performance questions about the panels surfaced, they were difficult to suppress. Product performance information travels along social networks over long distances, so past experience, recorded in the institutional memory of the community, can anchor future behaviour and undermine product adoption.

DISCUSSION AND FUTURE RESEARCH

In this paper, we have argued that innovations around sustainability not only need to make it into the hands of the poor, but they also need to be designed with local customers, local networks, and local ecosystems in mind. We emphasize that customers in developing countries are varied in their preferences and are no more suited to a *one-size-fits-all* approach than customers in wealthy economies. Moreover, customers in developing countries are embedded in closely-knit communities which can either promote or stunt the adoption of innovations. If innovations are to stick, they have to address the strategic interdependence of customer decisions, tap into local networks to legitimize them, and use the connective structure of the networks to promote adoption. Finally, customers living in poverty in developing countries depend on local business ecosystems to support innovations, so even the most beneficial sustainability enhancing innovations are likely to falter without local investment.

Our work underscores that innovation, as a social process, is well understood but context does matter. For those trying to introduce innovations in developing countries, poverty presents unique challenges, yet, historically, we have had little to offer managers by way of guidance. We believe this article helps to inform multiple aspects of future research and business practice as scholars seek to expand the understanding of this important topic.

Future research can move our understanding of poverty and sustainability forward and yield additional insights if scholars deeply explore poverty, focus on behaviour, and embed themselves locally. Only by truly understanding the day-to-day experience of living in poverty, can researchers hope to bring insight to the design of sustainability enhancing innovations. Likewise, greater understanding of why people or community groups may resist, ignore or sidestep seemingly valuable opportunities for change is required. Embracing new innovation for cooking or sourcing water involves changing deeply entrenched behavior and researchers need to investigate the behavioural obstacles to change. Finally, the introduction of innovation in settings of poverty, require embedding within the local business ecosystem. Mapping the shape of local community and business networks, its nodes and paths calls for the skills of a detective who can bring together disparate bodies of information to create a readable landscape.

CONCLUSION

The idea that those living in developing countries are a large potential market has captured the conversation about poverty (London, 2009; London and Hart, 2004; Prahalad, 2005). By contrast, much more rarely have we asked the more consequential question: what does it take for those living in poverty to be able to meet their needs today without compromising the ability of future generations to do the same? This is the fundamental question at the intersection of poverty and sustainability, and it is ripe for future research (Bruton, 2010).

As researchers we have an opportunity to shape the multidisciplinary conversation in a domain where there are more questions than answers (Bruton, 2010). The persistence of poverty and the failure to alleviate it often involve high-level discourse: 'What is the ultimate cause of poverty? How much faith should one put in markets? Is democracy good for the poor?' (Banerjee and Duflo, 2011, p. 3). While these high-level questions are interesting we encourage scholars to focus on questions which are narrower and may provide greater insights to businesses. Thinking about sustainability can reframe the typical business research conversation about developing countries into one that has meaning and coherence previously absent in the isolated debates about poverty, environment, and innovation. Moreover, if we can help businesses understand what makes sustainability enhancing innovations succeed in developing countries, the benefits to the natural environment, poverty alleviation, and sustainability may be substantial. As scholars living in an increasingly integrated world, we ought to at least try.