

ENABLING MECHANISMS FOR INNOVATION AT THE BASE OF THE PYRAMID

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Abstract

There is an emerging body of literature that examines how pro-poor innovations should be created and what business models should accompany them. However, there is little on actual implementation practises and the present paper attempts to fill this void by analyzing the findings of the literature and confronting them with the actual field practises of sanitation activists in India. It demonstrates that the common thread that unifies progressive sanitation activists is their adoption of the 'market based approach', which works from the premise that if the facilities constructed are to be used efficiently, first a real demand must be created among end-users. Market failures stemming from the demand side are shown to be due to problems of expressions of demand as a function of perception of needs and their mismatching with perceptions of the value of the innovation which is targeted to eliminate the market failure in the first place. It also identifies how activists go beyond the academic model of assessing need, appropriateness of technology and demand to include practises for 'accompaniment', 'sustainable maintenance' and 'generation of knowledge, demand and innovation spillovers' in an endogenous fashion, providing an alternative to the 'centralized platform delivery' model.

Enabling Mechanisms for Innovation at the Base of the Pyramid

Introduction

Pro-poor innovations – their creation, diffusion and adoption have simply not received the kind of attention meted out by economists and management science experts to mainstream innovations with high profit margins. A plausible reason for this lapse could be that till recently pro-poor innovations were considered to be the domain of the State and much less a management issue. Government laboratories were entrusted with the mission of creating pro-poor innovations which would then be diffused through public platforms. It is only recently, given State failures in most developing countries to tackle the needs of the poor, and a near world-wide adoption of liberalization and open markets, that market-based delivery of pro-poor innovations is gaining attention. However, as in the public-delivery model, the market-based delivery systems are also not perfect and furthermore there exist a number of needs of the poor, for which there are solutions, but no markets. In fact, despite the noted advantages of market-based approaches (Prahalad, 2005; Hart, 2005), in practice firms still seem to perform rather poorly in the effective diffusion of pro-poor innovation. Companies are increasingly aware of the potential of pro-poor innovations but are struggling to cope with the challenges they face in these hitherto unexplored markets. In this context, the central research question of the present paper is: How can pro-poor innovations be effectively diffused through the market? This question is addressed in two steps. First, we analyze the existing literature to identify the main principles prescribed for integration into a management strategy for pro-poor innovation delivery. Second, we examine how actual practices confirm or improve upon existing results identified in the first step through an examination of the management practices of sanitation activists diffusing pro-poor low-cost low-technology toilets in India. The latter is based on extensive interviews with leading sanitation activists and direct observations in field visits over four years.

The study of innovation for low-income communities is not new. Early work in the area focused on ‘technology or product innovation design’ to fit the constraints of the context and the resource base of the final user. For instance, at the micro-level, there exists an extensive literature on ‘appropriate technology’ following the ‘small is beautiful’ concept a la Schumacher (1973) to make optimal use of local resources. By default, it led to the reigning explanation that if an innovation is unsuccessful with the poor, it is because the technology is not designed appropriately. However, the onus of innovation-diffusion has been broadened in recent times with the seminal works of Prahalad (2005) and Hart (2005) to look beyond the ‘design of the technology’ to ‘the design of business models and delivery mechanism’ incorporating the interests of both innovation providers and potential end-users. They emphasize that for success, mutual benefits need to be generated both for the recipient community and the commodity provider. The growing literature on optimal win-win strategies to address low-income communities has spelt the optimal characteristics of a pro-poor innovation (see for example: Prahalad and Hart, 2002) and has identified various strategies for ‘co-creation’ or joint-value creation with the user community through non-traditional forms of collaboration (Brugmann and Prahalad, 2007; London et al., 2005; Franceys and Weitz, 2003).

A common thread that links the public-policy and the market-oriented literature on pro-poor innovations is the implicit assumption that any appropriate innovation that enhances the welfare of end-users will be adopted successfully by the low-income community. However, a number of examples contradict this hypothesis. For instance, low-cost micro-irrigation pumps and multi-purpose toolcarriers in Africa (Simanis and Hart, 2006); low-cost efficient cook stoves in Asia (Manibog 1984), 1298 dial ambulance service in India (Novogratz, 2007) and toilets in India (Ramani, 2008) are all illustrations of innovations created to serve the low-income community, but which have failed to get adopted widely for various reasons. Thus, it cannot be taken for granted that once a product has the features that are believed to satisfy the unmet needs of the BOP community, a market is going to emerge for this product. Diffusion of innovations is a challenge for new products in general, and in the specific context of pro-poor innovations the trials are likely to be even greater. Hence, the present paper is focused on the strategies to promote adoption of pro-poor innovations in their post-production phase.

The paper is organized as follows. The next section discusses the factors that impinge on markets for the poor, summarizing the main findings of the literature on the diffusion of innovations as pertinent to this specific environment. Then the context of sanitation in India is presented, followed by an examination of the practices used by sanitation activists to promote

adoption. The last section concludes with lessons from the sanitation case study for management practices.

Poverty context and diffusion of Innovations

Definitions of poverty and their measurements are subjects of current debate among economists and policy makers. For the purposes of this paper, we use the term introduced by Prahalad (2005), namely the 'bottom of the income pyramid' or BOP referring to households whose working members earn less 2\$-5\$ daily. The BOP market is not a single homogeneous market segment but a set of distinct market sharing the common feature of low household income. Even at the highest level of aggregation, in any country, the nature of poverty faced by the 'urban' pyramid and the 'rural' pyramid households is different. Although urban and rural poverty have some common characteristics, since urban dwellers have to earn an income in order to purchase their necessities, they are more integrated into markets and have easier access to public infrastructure and support schemes (Forsyth, 2004:731) On the other hand, it may be easier for the rural poor, with their family farms to be self-sufficient with minimal market participation and they may also have less space constraints. Furthermore, within the urban and the rural pyramids, there are sub-groups that are extremely heterogeneous in terms of household income, consumer preferences and willingness to pay for products. The nature of the BOP market is also likely to be specific to the sector concerned (see UNDP 2008 and Prahalad 2005 for examples).

Though BOP consumers are similar to higher-income consumers in that they make consumption decisions to maximize their expected utility given their budget constraints, they have lesser access to existing markets and express lower effective demand because of their resource and capacity constraints, which we see as being a combination of three types.

(i) Lower and more variable income: A high percentage of BOP workers are unemployed, self-employed or employed in the informal sector. Indeed, in developing countries, informal employment comprises one half to three-quarters of non-agricultural employment (ILO, 2002). Therefore, unlike mainstream workers employed in formal sectors, the income of BOP families is subject to greater seasonal, temporal and regional variance.

(ii) Lower knowledge, information and skills base: Individuals of the BOP group are likely to be less educated, less skilled and less aware of the market possibilities (UNDP, 2008). They might be unfamiliar with certain goods and services, such as new technologies or financial services, which in turn deters them from using these products. For example, individuals in rural areas are less likely to have knowledge about benefits of IT services, so their demand for them is low, unless they learn how to utilize them.

(iii) Lower access to credit and complementary assets: The BOP community is likely to have less access to formal credit and insurance schemes. They may not have electricity, water connections or the space needed to install and use many commodities. Such features reduce consumption possibilities.

The above conditions translate into a lower reservation price that the BOP group is willing to pay for a commodity as compared to the mainstream group. This in turn implies that they can purchase only the low-quality low-price versions of commodities available in markets. Moreover, the opportunity cost of any purchase is high for a BOP consumer as compared to his higher-income counterpart. For instance, a good that is deemed a casual consumption for the mainstream group like shampoo might be a luxury for the BOP consumer. However, even though BOP individuals have to very careful 'money managers' in addition to being 'consumers', it should not be assumed that they consume only low quality commodities and services in keeping with their income, for careful planning goes into saving for consuming goods that constitute a luxury for them such as cinema and high quality rice for special occasions (Banerjee and Duflo, 2007).

In the above context, the central proposition of a number of scholars (Prahalad and Hammond 2002; Prahalad and Hart 2002; Hammond and Prahalad 2004; Hart 2005; Prahalad 2005; Rangan et al. 2007) is that facilitating market access to the lower income groups is more welfare enhancing than unilateral transfers made through aid or charity, even if market entry implies a cost burden for them. In other words, it is postulated that taking the BOP group as potential customers and serving them through markets yields higher gains for both the firms supplying the market and the target community as compared to pure charity.

While the characteristics of BOP markets make innovation diffusion a real challenge, their size, estimated as about \$5 trillion is enticing to both firms and NPOs (Hammond et al. 2007). Sector wise, the potential market is higher in food, energy and housing

which is witnessing more corporate incursion, while NPOs are more active in health, water, sanitation and education. On the demand side, the opening up of markets increases the consumption possibilities of the poor, who frequently pay more for comparable goods and services than the middle-class because slums and rural areas are often only served by informal markets. Thus, fulfilling demand in BOP markets will generate benefits to the organizations on the supply side as well as to consumers on the demand side and promote economic development in the process. There is a clear business case for the involvement of the private sector in BOP markets and *innovation* is considered to have a key role in devising such win-win solutions.

Promoting adoption of innovations in BOP markets

By BOP innovations, we refer to products and services that are engineered, designed or adapted with the intention of addressing the needs of a low-income community or communities, which are new to the community or communities concerned. Innovations may further be re-designed so as to be more pertinent to a specific target income or regional group. For example BOP innovations in agriculture sector have mainly been targeted at the rural communities and often they have involved public-private partnerships and collaboration of NPOs (Spielman and Von Grember, 2006).

As argued earlier, standard results on mainstream markets have not been put to good use in the context of low-income communities, because the poor had been mainly viewed as wards of the State, a homogeneous mass addressed with standardized programs of assistance developed at the national and international level. Not only did such provision of innovations as 'merit goods' produce mismatches between local needs and solutions, but rates of effective adoption were often low in the case of innovations that did not directly enhance income or productivity. However, with the entry of NGOs and firms to the BOP context, an understanding of the market characteristics, socio-cultural norms and power-structures has come to play an important role in addressing the low-income communities (Letelier et al 2006; Kotler et al 2006). Acknowledging the limitations of traditional donor-based development models, these actors look for alternative approaches to promote development goals and have initiated a new and emerging trend to adopt private sector management principles to fulfil market demand (Ghobadian et al, 2004). At the same time, it must be noted that although the BOP school advocates market-based approaches to tackle poverty, there are segments of society that the market is unprepared to serve - the bottom billion, as Collier (2008) calls it and thus there is a real role to play still for national and international aid agencies with respect to these extremely poor communities.

The main findings of the mainstream literature on innovation diffusion, and especially on the more recent literature on the poverty context can now be summarized in the following result. *The necessary conditions to ensure successful adoption of an innovation in the BOP context include ensuring a real need, compatibility of innovation with need, positive consumer perception of innovation value, possibilities for experimentation and accessibility to market in which the innovation is supplied.*

Real needs: Need for any innovation is generated by socio-economic structures and cultural norms. Therefore, the first step is to examine the nature of needs. As Katz (1961) explains, "it is as unthinkable to study diffusion without some knowledge of the social structures in which potential adopters are located as to study blood circulation without adequate knowledge of the veins and arteries."

Compatibility of innovation to serve the real need: Stewart (1977) points out that the new technology must be compatible with the income levels, resource availability, existing modes of production, existing technologies and costs in the society for which it is designed.

Positive value perception of innovation: The real needs of a community and the intrinsic value of innovation may not be in line with actual consumer perceptions of either need or value of the innovation. As a result, many well-intentioned technologies and innovations targeting the poor can fail because of the way they are perceived by them (Bertrand et al, 2006). Examples range from clean water and birth control technologies to energy efficient cook stoves and agriculture equipment. Recipients' willingness to receive changes depends not only on their willingness (or disposition) but also on their ability (or capability) in different groups of individuals, communities, organisations and agencies to absorb accept and utilize innovation options (Jeffrey and Seaton 2004). In addition, different perceptions about new technologies

and bias towards existing/ traditional solutions can lead to consumer 'resistance' to innovation (Garcia et al, 2007).

Experimentation: It has been emphasized time and again that a pure technocentric models of transfer focused on the transferred hardware may not succeed due lack of complementary resources or assets needed for sustained functioning of the innovation (Levine, 1993). Triggering demand can stimulate adoption and this can be done more effectively through identifying appropriate 'change agents' whose adoptions convinces others to do the same (Rogers, 2003). The 'change agents' most recruited are women, self-help groups, micro-credit women's groups, school going children, candidates who are likely to win elections, upcoming religious leaders etc.

Accessibility to markets: The price of the innovation should be such that it is within the means of the BOP community. Otherwise, cost-sharing schemes ranging from free provision to partial payment by end-user can be devised, according to the objective of the supplier and nature of demand (e.g. from pure philanthropy to standard profit or sales maximization). A variety of financial credit options may also be mobilized ranging from loans from money lenders or banks or participation in micro-credit schemes.

This completes our brief analysis of the literature on the BOP context, appropriate pro-poor innovations and delivery mechanisms. These are clear in theory – but very little is known about how exactly they are put into practice in the field. Therefore, we now turn to the second part of our paper consisting of a detailed case study which identifies management practices in order to derive a scheme for decision making for firms and NGOs working to diffuse an innovation in a particular BOP context.

Sanitation in the Indian BOP context

Strangely enough, despite the fact that about 2.4 billion in the world do not have access to proper sanitation facilities, the issue of sanitation coverage did not figure in the agenda of pro-poor development programs of even international aid agencies. However, with mounting evidence and arguments on the positive impact of sanitation coverage on hygiene, health conditions, environmental security and ultimately poverty reduction, sanitation targets were finally added to the Millennium Development Goals in the 2002 "World Summit on Sustainable Development" (IRC, 2007).

In India today, only one in three Indians has access to any form of a functioning toilet (UNDP, 2006). In 2007, out of 5000 towns in India, only parts of 232 towns are connected to a central sewage system. Less than half (48.95 percent) of the 738,150 government primary schools countrywide are equipped with toilet facilities and only 28.25 percent of primary schools countrywide offer separate toilet facilities for girl children, leading many girls to drop out of school after adolescence (IWP, 2009). Thus, lack of sanitation coverage is a major problem in India.

No lack of appropriate technology: BOP innovations exist

The problem of lack of sanitation coverage cannot be attributed to a lack of "appropriate technology". Presently, there are four types of toilet technologies designed and introduced in India for the BOP group. They are the single-pit latrine, double-pit latrine, the ecological toilet and the septic tank toilet. Of these, the double-pit latrine and the ecological toilet are the new product innovations that are sustainable and environmental friendly. The two other traditional models, which are more popular, are unsustainable toilet systems that are contributing to the soil and water contamination.

The two traditional models – the pit-latrine and the septic tank, are the cheapest and the costliest toilet model respectively. The pit latrine essentially consists of a leach pit, which is covered once filled. In the septic tank model, the human waste goes into a tank. In the simplest and cheapest varieties, the waste settles in the septic tank, sludge gathers at the bottom and the liquid at the top leaches away into the soil. The septic tank has to be emptied once a year or once in two years depending on the capacity of the tank, and this is effectuated by paying a private or public sanitation agency. The obvious disadvantages of the pit latrine are that it lets out a very foul stench, it overflows during the rainy season and the location has to be changed as soon as it filled. The septic tank is presents two disadvantages: maintenance charges and outsourcing of sludge treatment. Agencies handling sludge often throw it into the nearest water body or on the outskirts of garbage dumps near which the slums are often located, areas where none but the poor are willing to live.

The first major innovation in Indian BOP sanitation was created by Dr. Bhindeshwar Pathak, founder of the NGO 'Sulabh' during the 1970's. From the outside, the Sulabh toilet model for individual households looks just like the standard Indian squatting style toilet slab with one hole for flushing, but actually it embodies three innovations. First, the Sulabh toilet pan has a smooth floor with very steep sides so that little remains to be flushed and very little water is required for flushing. Optimising water use, it requires only 1.5 litres of water per flush, in contrast to conventional toilets that require a minimum of 10 litres. Second, instead of the flushed waste going directly into the ground or a septic tank or to a central sewer canal, it falls into one of two deep pits that are outside the toilet. Third, the pan also has a water trap and a gas-trap with a water-seal that keeps the toilet odour free and isolated from organisms in the pits. Each pit is about one and a half meters deep and lined with a lattice of bricks, conceived to permit a family of five to use the first pit for up to four years. The pits are covered by air tight lids. When the first pit is full, the family can switch to the second pit, while the waste in the first pit is gradually and naturally transformed into a rich material that can be removed and used as dry, powdery fertilizer. When the second pit is nearly full, the first pit can be emptied and its contents can be used as compost and the two pits can be used alternatively and continuously. Currently the Sulabh toilet is being used in about 1.2 million poor households and has been declared a 'Global Best Practice by United Nations HABITAT and Centre for Human Settlements'. It is being diffused by the UNDP all over the world.

The Sulabh toilet model, while being suitable for dry areas was found to be unsuitable for those with a high water table such as coastal zones or those receiving high degree of rainfall, because of water logging of the pits. Hence, the Sulabh model was never adopted widely in such regions. For these regions, a second major toilet innovation was created during the late 1980's by a British engineer named Paul Calvert who is now settled in India. The Calvert model now popularly called the ecological-toilet or an 'ecosan toilet', features three distinct innovations in product design. First, the toilet pan has three holes, one behind the other, with different slopes. The user urinates first and shifts slightly back to defecate permitting the faeces to fall into a compost pit. A mug of ash or saw dust is then thrown into this hole facilitating dehydration of the faeces. Then the user moves back further to wash the behind. The urine goes out through a bamboo pipe to irrigate a garden planted around the toilet. The wash water is filtered through layers of gravel so that the water that leeches out into the soil is harmless. Thus, urine, faeces and wash water are completely separated and recycled. Second, the toilets are on raised platforms, so that the toilets themselves can be entered only by climbing a few steps but there is no water logging during the rains. Third, there is a vent pipe going from the compost chamber to remove moisture by the passage of air. This is not a vent pipe for smells - there is no smell when these toilets are used correctly. Bad smells come from septic (ie anaerobic) tanks and water flush pit toilets because they are septic, or anaerobic systems - anaerobic decomposition gives off bad odours not the faeces and urine themselves.

The pit latrine and the septic tank models are more popular both with NGOs and the government because of the advantages they present in terms of delivery. Under the 'Total Sanitation Coverage' campaign launched by the Indian government in 1999, every household which builds a toilet gets Rs 2000, completely covering the costs of construction of a pit-latrine. The septic tank model is useful because to meet construction targets, platforms can be built, using only masons. In both there is practically nothing to 'teach' to the end-users by way of maintenance.

The 'Sulabh' and the 'Ecosan' toilet model demand more effort both on the part of the end-user and the promoter. They require having to 'educate' the users to ensure proper functioning in the long term. Furthermore, education may have to be coupled with 'monitoring' to ensure proper maintenance, as lapses can lead to malfunctions and in the worst case, environmental contamination. However, it is widely acknowledged that these two models if properly constructed and maintained represent 'totally decentralized' and 'sustainable sanitation systems; that close the loop - completely recycling the waste without any risk of environmental contamination.

Defining Sanitation Activists

There are three types of actors linked with sanitation on the supply side in India: financiers & facilitator; sanitation service providers and sanitation activists.

The financiers and facilitators group comprises the Indian State, international agencies and international NGOs. The leader among the financiers is the Indian government joined by international organizations like UNICEF, HABITAT, The Gates Foundation, Water Aid international etc. They finance the construction of toilets through collaboration and contracts

with NGO sanitation service providers and companies specializing in construction of septic tanks. Then there are facilitators, mainly of European origin, like the GTZ, BORDA, WASTE that offer workshops to NGOs to train them in the construction of toilets and educating and motivating the end users. Often, they identify leading NGOs in the area and make them speak to others about their experience, in order to diffuse knowledge on the technology and supporting organizational routines. Finally, there are a variety of citizen's groups that provide funds to NGO sanitation service providers.

For the purposes of this paper, we refer to sanitation activists as those promoting the cause of sustainable and environmental friendly toilet models, such as the Sulab model and the Ecosan model, while being totally aware of the extra effort required to ensure proper functioning. There are not many in India, though we do not have exact statistics. We focus on the most renowned sanitation activist of India, Dr. Bhindeshwara Pathak and three other organizations which have made a mark in the field of Ecosan toilets for households.

Two activists invented the two pro-poor environmental friendly toilet models: Dr. Bhindeshwar Pathak of Sulab (two pit Sulab toilet) and Paul Calvert of Ecosolutions (Ecosan toilet). Two other activists are M. Subburaman of SCOPE and Shyama V. Ramani of Friend-in-Need, whose works have earned the 'Nirmal Gram Puraskar Award' for sanitation coverage in Ecosan from the Government of India, for the organization and for the target village respectively. In order to identify the actual practices implemented in the field, we conducted a number of extensive interviews with the founders of Sulab, EcoSolutions and SCOPE. The last activist shares in the present article her observations and practices developed over four years of work in the field.

Promotional strategies of sanitation activists

The common thread that unifies progressive sanitation activists is their adoption of the 'market based approach', which works from the premise that if the facilities constructed are to be used efficiently, first a real demand must be created among end-users. Any sanitation program consists of three phases: pre-construction, construction and post-construction activities. A sanitation program can have a perceptible impact only if a certain critical mass of neighboring households also adopts toilets. Therefore, the end-user cannot be merely taken at the individual level but must be considered at a collective level in terms of a set of adjacent households, indicating the existence of minimum scale constraints.

As may be recalled, the literature suggests that a real need must be confirmed first. Thereafter the compatibility of the innovation to satisfy that need in the given context must be verified. This should be followed by an evaluation of demand and the formulation of a strategy for innovation delivery. How do the sanitation activists do this? In what follows we present the strategies followed by the leading activists mentioned above, Sulab, Ecosolutions, SCOPE and Friend in Need.

Assessing the needs

The most widely used method to assess the needs of the area is to conduct a 'socio-economic survey'. Such a survey is usually conducted even if secondary data is available at a more aggregated level in order to understand the distribution of revenue, employment, demographic features and religious affiliations of the population concerned. The survey also gathers information on the distribution ownership of assets as well as the availability of complementary infrastructure accessible to all, local markets for the materials required, local prices etc.

The survey has a three fold objective that goes much beyond a simple gathering of information. First, a survey permits a direct interaction in an impersonal setting with targeted recipients to assess a real need and interest in adoption of the innovation. Second, in casual conversation, the willingness to pay for the innovation can be gauged. For instance, in the case of sanitation such an assessment helps to decide whether toilets must be freely provided or whether end-users can partially finance the cost of the toilet. Third, the sample selection of target households and identification of the prices of materials and costs of transport to the locality, gives an estimate of the costs of diffusion.

Evaluating demand

When demand is not explicitly expressed, it could be because of a lack of awareness and knowledge of the recipient of not only the benefits of the innovations but also the disadvantages and risks of using alternatives or not adopting the innovation. Therefore effective demand cannot be gauged before educating the target population.

For instance, in the case of sanitation, as Calvert succinctly put it, "The need for interactive training and awareness raising is to unravel and dispel the misunderstandings and confusion that often surrounds sanitation, health, hygiene, water and the environment." Indeed, sanitation activists agree that education is an essential ingredient for success. Not only do potential investors have to be educated on the advantages of having a toilet, but they must also be made aware of the disadvantages of open defecation. Furthermore, consumers are rarely aware that toilet use can improve health conditions only if all their neighbours also have and use toilets. The benefit of a toilet in terms of hygiene is not immediately visible to them. Therefore, awareness building is absolutely necessary to create an endogenous demand by which potential investor-households convince their neighbours and a group of households comes forward to experiment with the introduction of toilets.

Attracting members of the target community to an educational workshop is not easy. There is intense competition from television and other work of the families. Therefore, in order to gather an audience, education has to be theatrical, entertaining and interactive. The most widely used methods for education are: street dramas, leaflets, jokes, quizzes, songs, films to pass the message. Children and the elderly should not be taken lightly as they can also influence family decision making even if they are not earning members of the household. Furthermore, in order to motivate consumers to leave their work and come to a meeting, refreshments need to be provided.

The next step after education is house to house visits, with inter-personal discussions so that the family can ask questions or discuss details of the points raised during the workshop within the intimacy of their homes.

If there is still doubt about the nature of demand, after the educational workshop and house to house visit, additional 'focussed group discussions' may be organized with various groups in the villages to make a final evaluation of the nature of effective demand.

A major difficulty is that most financiers do not see the importance of this step and consider 'entertaining education' combined with fun and refreshments as an unnecessary waste of funds. They also see this as an effort that should be given freely by NGOs as they are interacting with BOP consumers without realizing that imparting entertaining education is not costless. Financiers do not understand that unless a real demand is created through interactive education over an initial period of time, the program cannot be a success.

How a delivery mechanism is formulated

A delivery mechanism proceeds in three stages starting with the education discussed above, then continuing with the building some pilot models that all can use and test, and finally, ends with the scaling up and diffusion of the innovation to the entire target community.

The choice of participants for the first two steps is very important. Indeed, an interesting strategy that is evoked is that the 'change leaders' must be selected so that they have something to gain also by being a 'change leader'. Unlike what conventional wisdom indicates, often the change leaders are not the power brokers of the community, for the latter may not have much to gain from being a 'change leader'. The 'change leaders' in sanitation are usually those who are trying to climb up the ladder of power, so that trying out the innovation increases their visibility and their networks within the target community, thereby benefiting them as well. For instances, candidates can be chosen among those trying to improve their position in the local government, religious body, school, hospital or firm etc.

A pilot project consists of three steps: construction of a few models (for the chosen 'change leaders' if this step is followed), testing and discussion followed by visits by other members of the community and wider discussion. Building a set of models is a necessary step, but its usefulness is maximized only if it is accompanied by discussion with the target community. The BOP consumers are often so grateful for receiving an innovation that even as 'change leaders' they rarely mouth any form of discontent. Special efforts must be made to make them feel comfortable so that they are able to voice drawbacks freely or suggest possible improvements. Informal rather than formal meetings serve the purpose best. Once all issues are attended to, slowly visits can be arranged for a larger set of target users.

Additional Practises – Accompaniment for sustained use

While most management theories stops with indicators for devising an optimal mode of delivery, most sanitation activists adopt a variety of practises to enhance the value of the innovation in the eyes of the consumer so that it is maintained well and also accompany the

end-users during the initial phase of adoption to ensure efficient exploitation. Some even go so far as to create feed-back-loops through promoting further innovations on the technology and improving the design from the end-users themselves. We summarize these practises below.

(i) Value enhancement through involvement of end-users: Involvement of end-users in product development has been advocated as a way for more efficient innovations (von Hippel, 1988). When end-users are involved in the design of an innovation they are empowered with a greater sense of 'proprietorship' and therefore are more likely to maintain the product well. For instance, in the case of toilets, if at least some features of a toilet are decided by the family, then there is a family-specific, personal touch to the design of each toilet that integrates a toilet to the rest of the residence. The value of such a toilet is much higher than that of a carbon copy of a set of identical toilets installed in a locality. Families can also be involved through requesting them to participate in the construction of a toilet along with the professional masons. This usually increases the feeling of ownership and the commitment to use the toilet.

(ii) Celebrations for the acquisition of the innovation: The value of rituals involving the celebration of life with loved ones cannot be underestimated in any society. Everywhere a toilet is perceived as a room that is impure, smelly, dirty and used by others and therefore, undesirable. In order to inculcate pride in owning such a room, sanitation activists introduce rituals, to mark the acquisition and evolution of the life of a toilet, as it is normally done for the inauguration of a new house in India. For instance, the blessings of the Earth Goddess are invoked as the site of the toilet is chosen in a simple ceremony with prayers and partaking of sweets. Then its construction is celebrated upon completion, followed by a final festivity as the first compost pit is opened and the compost is used on new saplings.

(iii) Accompanying the initial phase of adoption and trouble-shooting: All NGOs unanimously insist that monitoring of use after construction is necessary for two reasons. If there are any problems of maintenance, and if the users cannot approach anyone to correct them, slowly such toilets fall into disuse. This is indeed the main reason for the thousands of 'unused toilet fossils' marking the landscape of India in an ugly fashion. Second, toilets could be diverted to other use, if the women are not very empowered in the family. Normally, a good education and awareness creation prior to construction of toilets ensures proper use of the toilets. However, a period of three months of monitoring is recommended in the case of even conventional toilet models and in the case of Ecosan monitoring is necessary for the first 18 months with special attention being paid during the closure of the first chamber and the removal of the compost chamber by a qualified personnel. So sanitation activists make regular visits to households and train members of the Self Help Groups of that area to monitor use.

(iv) Toilet innovation contests for local masons: The quality of workmanship and the finish of most structures for the poor are not very appealing as most pro-poor installations are constructed by unskilled casual labour, who are given minimal training and even less motivation. On the one hand, such workers have no incentive to improve the quality of workmanship or try out new ideas. On the other hand, the construction managers, and especially the financiers of the project are only interested in achieving 'quantitative targets' in terms of the number of installed toilets and do not impose conditions on their quality. In other words, there is little interest and attention paid to exploring ways to improve the quality of construction or promote good workmanship. Thus, to enhance existing capacity 'innovation tournaments' with cash prizes provide masons an opportunity to showcase their skills and gain recognition for being an 'innovation leader' or 'best mason'. Subsequent visits by other masons to examine the 'best toilet' and discussions with the winner create knowledge-spillovers within the community.

(v) Toilet beauty contests for households: Some product innovations are gender discriminatory and toilets in rural areas fall in this category; while women greatly appreciate the privacy provided by a toilet, men scorn it. Therefore, to encourage men to use toilets 'Toilet Beauty Contests' are organized to enhance the perceived value of a toilet as part of the family residence. Using a simple carrot and stick approach, a toilet beauty contest is open only to families in which all members – both men and women - use the toilets. To maximize the scope of use of the Ecosan toilets by end-users, the contest involves three interrelated 'sub-contests': the layout of the garden irrigated by urine from the toilet; the external appearance and cleanliness of the toilet and its immediate surroundings; and any innovation introduced on the functionality or structure of the toilet by the family. Such contests elevate the status of a toilet while bringing publicity to the family, drawing attention to fact that the men of the family also

design to use the toilet. Finally, they make ownership of a toilet a sign of social mobility supporting the creation of new demand.

Discussion and concluding remarks

The main objective of the present paper was to provide insight on management strategies for the diffusion of pro-poor innovations. In the first part of the article, we showed that there is an emerging stream of management literature examining how pro-poor innovations should be created and diffused and we briefly summarized its main findings. However, the analysis also revealed that there is little on actual implementation practises, making the main findings of this useful literature suggestive rather than practical for the formulation of strategy. Thus, we attempted to add some insight on delivery of pro-poor innovations, by analyzing the findings of the literature and confronting them with the actual field practises of sanitation activists in India. Such an exercise yields four main results that can also be considered as recommendations for firm strategy or public policy to diffuse pro-poor innovations.

First, demand is constructed as a function of two components: perception of needs and perception of the value of innovation to meet such needs. Therefore, market failures stemming from the demand side could be due to problems of expressions of demand as a function of perception of needs and their mismatching with perceptions of the value of the innovation which is targeted to eliminate the market failure in the first place. This implies that for the diffusion of pro-poor innovation, the nature of consumer perceptions both of needs and of solutions must be well understood before diffusion is attempted. Furthermore, since these features tend to be zone-specific, an in-depth examination is required for every new target community.

In terms of perception of needs, we identify three types of problems, which could hold for any other BOP innovation as well.

(i) Unrequited or Pending demands: The need for sanitation is perceived and there is awareness of solutions available in the market, but these solutions are found to be inefficient or inaccessible and therefore there is no effective demand.

(ii) Latent demands: There is perception of need but there is imperfect or incomplete awareness of available solutions leading to lowering of demand.

(iii) Invisible or Potential demands: There is no perception of need for sanitation and this could be accompanied by a low or high awareness of existing market solutions, which is of no use to generate demand.

Similarly four gradations of perceptions of innovation can be distinguished. For households at the precipice of poverty, the most valued innovations are those that *increase the income generating capacity directly*. Next come innovations that *increase the income generating capacity indirectly*, through increasing the productivity of the consumer directly or indirectly. The last could occur even through an enhancement of the sense of self through empowerment or a higher level of comfort enjoyment provided by consumption of the innovation. Higher the value of the innovation perceived, greater is the expression of effective demand.

With respect to sanitation for instance, this gives us the following matrix in terms the existing demand segments, though of course there can be exceptions in each target community with respect to demand expression.

Figure 1
Assessing the nature of consumer perceptions:
The case of sanitation

Expression of demand	consumer perceptions of the value of innovation			
	Income generating	Direct productivity enhancing	Indirect productivity enhancing	Comfort/well being enhancing
Unrequited or Pending demands		urban slum-dwellers		
Latent demands			rural women	
Invisible or Potential demands				rural men

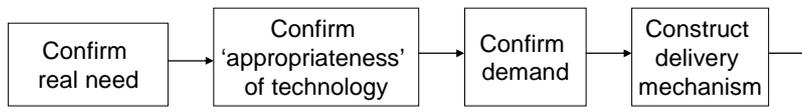
As the above matrix indicates urban slum dwellers are more aware of the advantages of toilets. Here sanitation is an unsatisfied demand as existing alternatives: the street, dirty public toilets or costly private-collective toilets – are inefficient or inaccessible alternatives. For women in rural areas it is a pending demand because they often work at or near their homes and there is a lack of privacy with steady deforestation and population increase, but they are often not aware of the various technologies available and their costs. For men in rural areas it is only a potential demand as they see no need for toilets or undue privacy.

Second, while the case studies validate the four-step methodology of confirming need, appropriateness of technology, demand, and formulating a delivery mechanism, they also identify field practises that go beyond the linear model in non-linear feedback loops as shown in figure 2.

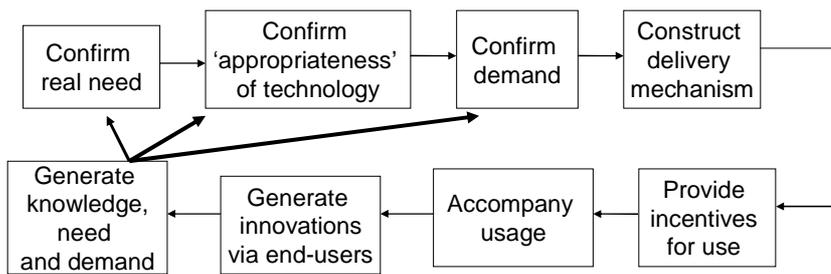
Most promoters of pro-poor innovations start by ascertaining the nature of consumer perceptions of needs and innovation value through multi-purpose socio-economic surveys that also serve to initiate relations with the target community. The appropriateness of technology and demand is confirmed through entertaining-educational workshops, house-to-house visits and focussed group discussions. The most important component of a delivery mechanism consists of choice of 'change leaders' and gaining target community acceptance of the innovation through a pilot project.

Furthermore, as figure 2 explains, implementation strategies of activists go beyond the standard model to create feed-back loops through steps that accompany the end-user, monitor use and provide incentives for maintenance. Accompaniment and monitoring are necessary to ensure solutions to problems encountered and effectuate required repairs as well as to prevent diversion of innovation to other uses or even abandoning of the innovation in the medium term. Poor quality and poor workmanship characterize pro-poor installations and a variety of measures including tournaments can be used promote innovation and upgrading of quality by motivating the workers and the recipient families. These in turn generate knowledge and demand spillovers beyond the targeted community.

Figure 2
The standard model of pro-poor innovation diffusion



Lesson from sanitation activists



Third, while the implementation of the standard model calls for the construction of platforms of physical and institutional infrastructures to bring down costs through the creation of scale economies, the present paper points to the need for ‘decentralized’ and ‘localized’ capacity building to ‘accompany end-users in the initial stages of adoption’ for pro-poor innovations such as toilets. Therefore, ‘centralized platform construction’ and ‘decentralized and localized capacity building’ are two alternatives that must be evaluated according to the context of target community and the nature of pro-poor innovations. These are two distinct delivery mechanisms and more work is needed to ascertain the contexts for which each is more appropriate.

Finally, we note that ‘market oriented’ or ‘market delivered’ innovation does not mean that the end-user effectuates a transaction through a market, but rather that it is a not a State delivered innovation at zero price. Behind a market delivery, there is a complex network of actors, comprising financiers, facilitators, service providers and field staff, the last interacting most closely with the target community to deliver the innovation. It is evident that the connections between the different actors and especially between the financiers and field staff are minimal with very little by way of feedback loops. Thus, there is a disparate set of activists experimenting with different technology models and delivery mechanisms alongside a set of financiers dealing with targets and budgetary constraints. Therefore, the returns to any large scale diffusion programme financed by large organizations would be increased if there is a pre-project study to understand the different existing delivery practises. Finally, if the programme could facilitate feedback loops of information and best practises between the different actors, with a strong focus on discussing what is ‘not right’ or what ‘can be improved’ rather than only on ‘how targets are being met’ there will be maximum internalization and transfer of knowledge spillovers.

In conclusion we have tried to shed more light on practices to diffuse pro-poor innovations. The actual field practices of sanitation activists in India seem to hold promising venues for improving our current understanding of pro-poor innovation models that go beyond the traditional ‘centralized platform delivery’ models. Such understanding can be seen as an important step towards the formulation of more effective pro-poor innovation diffusion strategies.

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