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IMPROVING ACCESS AND SUSTAINABILITY****Disruptive design in sanitation marketing: lessons from
product and process innovations in Bangladesh***J. MacArthur, F. C. Riggs & R. Chowdhury (Bangladesh)***BRIEFING PAPER 2176**

Based in Dhaka, the Sanitation Marketing (SanMark) team at iDE – Bangladesh, is harnessing principles of disruptive innovation to change the landscape of how latrines are produced and sold to rural households. iDE's Bangladesh SanMark Pilot (BSMP) project (2012-2014) aimed to develop a proof of concept around private-sector led delivery of customer-oriented improved sanitation technologies through three phases: i) identification of existing disruptee conditions, ii) support of an "entry point" innovation that generated key "disruptive design principles", and iii) robust ideation and prototyping of a disruptor system grounded in the design principles. Through these phases, the project experienced an initial "entry point innovation" through the plastic SaTo[®] Pan. The resulting design principles then informed development of the disruptor system of the plastic "Sanitation in a Box" (SanBox) offset plastic latrine, a promising sanitation product grounded in a scalable business model connecting grassroots latrine producers to a national supply chain.

Introduction

Based in Dhaka, the Sanitation Marketing (SanMark) team at iDE – Bangladesh, is harnessing principles of disruptive innovation to change the landscape of how latrines are produced and sold to rural households. The team is seeking to leverage investment and existing values chains from more traditional industries, which have built their capacity on less risky product categories. In a country where over 30% of the population is under the poverty line (WSP, 2012), the authors have yet to see a household without a plastic *bodna* (the bucket that is used to take water to the latrine). By leveraging this existing plastic supply chain, access to the remotest parts of the country through pre-existing service and delivery modalities becomes possible, at a scale that would not be feasible otherwise. The team has set out to see the commercial disrupt the noncommercial, while encouraging existing public and donor funding to be used for the ultra-poor at the end of the value chain. Disruptive innovation in both product and market system design for private-sector-led sanitation services offers a means to achieve sustainable hygienization at scale across Bangladesh.

Disruptive design

When Clayton M. Christensen coined the phrase "*disruptive innovation*" in the mid 1990s, the term was primarily poised to describe technology innovation that overtakes an existing market, by applying a different set of values (Christensen, 1997). Nearly two decades later, innovation continues to overtake existing markets, but innovation for *Bottom of Pyramid (BoP)* consumers (Prahalad 2004), is moving beyond simply product design. Markides (2006) defines disruptive design as being in two distinct categories: process (business-model innovation) and product (technical innovation). Paap and Katz (2004) state that "change – not technology – creates value" and that leveraging both internal process operations and an external customer base is critical to productive change. The SanMark team would further defend that it is the combination of both process and product innovations, leveraging existing market systems that moves a system to being disruptive. Here innovation is seeking to disrupt market modalities in product delivery, supply chain, services and manufacturing. While these innovations could be seen as evolutionary

developments to existing paradigms, they are ultimately disruptive as they aim to overtake markets sustainably and at scale.

Sanitation in rural Bangladesh

Globally, 2.5 billion people do not have access to improved sanitation facilities and access in South Asia has increased by 19% since 1990 (JMP, 2014). Nonetheless, rural access to latrines has improved markedly in Bangladesh and the practice of open defecation has been greatly reduced in rural areas from 38% in 1990 to only 5% in 2011 (JMP, 2014). It has been widely accepted that the main force behind the shift in the number of latrines installed has been motivational campaigns rather than subsidized hardware. Yet evidence suggests that the level of ‘hygienic’ coverage remains low at approximately 48-53% of all rural households. Health-related losses in Bangladesh are estimated at over 4 billion US dollars, equal to 5% of GDP (WSP 2012).

Subsidy-driven demand creation activities have mobilized communities to eliminate open defecation and extensive groundwork has been laid by donors and NGOs over the last twenty years in Bangladesh to develop more than 5,000 Latrine Producers (LPs). Currently investments in sanitation service delivery are estimated to be up to 96% private and 96% of rural households pay for their own sanitation services with as little as 11% receiving public assistance.

However, the long-term results are often marginal scale, depressed consumer demand, discouraged private sector interest, and widespread dependency mentalities amongst program beneficiaries and the private, public and development actors aiming to improve sanitation services and conditions throughout the country. The decentralized LPs remain unconnected into a larger commercial network and few are offered incentives to ensure hygienic latrines. Further, public funds appear insufficient to meet overall demand for hygienic latrine products and subsidized latrine distribution is not always targeted according to objective criteria of need.

The lack of linkages in the current sanitation market in Bangladesh continues to create barriers for consumers, LPs and the wider private sector to engage with a well-managed sanitation market system and with quality controlled products.

Moving towards disruption

Figure 1 elaborates on the iDE Bangladesh’s experience utilising a Human Centred Design (HCD) process (IDEO, 2013) to learn from existing offerings characterised by variable products (the current ring/slab designs) and unmanaged processes (disconnected ring/slab makers) to a disruptive solution with quality controlled product and managed process. This system points towards sustainability and scale and is based on consumer and supply chain insights through ideation and prototyping. The disruptor system includes a bespoke latrine design: the SanBox, which is a mass manufactured, bundled and standardised plastic latrine mid-structure that leverages existing manufacturing and supply chain infrastructure to connect traditionally isolated grassroots latrine producers into an established retail system across the country.

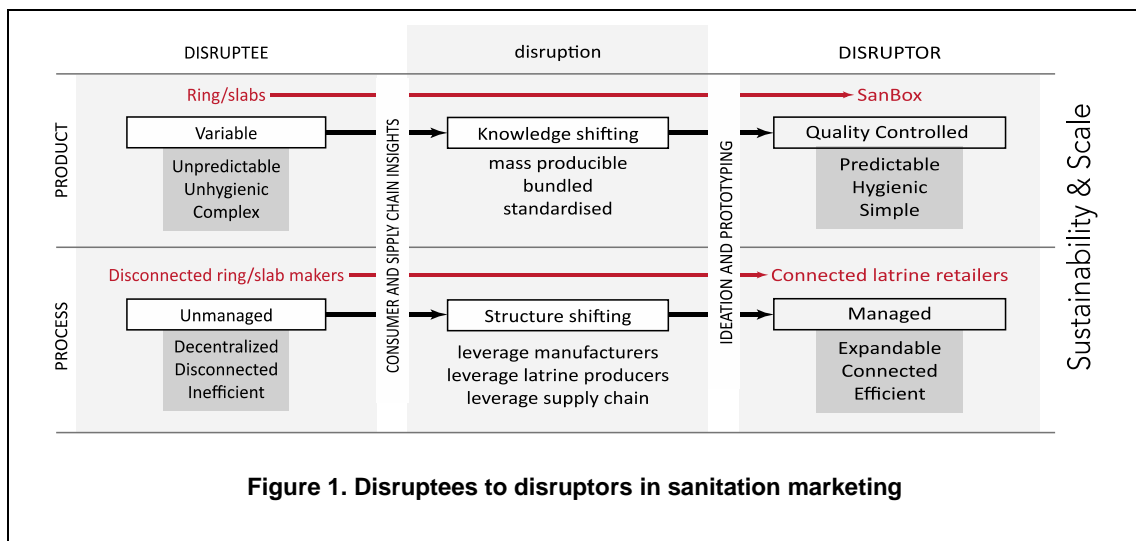


Figure 1. Disruptees to disruptors in sanitation marketing

The development of this disruptor system was the primary achievement of iDE’s Bangladesh SanMark Pilot (BSMP) project (2012-2014)¹. BSMP aimed to develop a proof of concept around private-sector led delivery of customer-oriented improved sanitation technologies. In practice, the project’s journey toward a disruptive product and process occurred in three broad phases: i) identification of existing disruptee conditions, ii) support of an “entry point” innovation that generated key “disruptive design principles”, and iii) robust ideation and prototyping of a disruptor system grounded in the design principles.

Identification of existing disruptee conditions emerged from BSMP’s HCD research at the onset of the project in early 2012. During these activities, BSMP was able to leverage global ties between iDE and American Standard Brands (ASB), a US-based kitchen and bath multinational enterprise, to support an ASB initiative to develop innovative new products in sanitation through funding from the Bill and Melinda Gates Foundation (BMGF). As a result, ASB experts joined iDE’s BSMP team in field-based deep dives to identify key weaknesses and opportunities across consumers’ desires for improved sanitation solutions in their lives, technical feasibility constraints in existing latrine technologies, and the commercial viability of existing business models at the grassroots and within wider market systems in Bangladesh. The resulting consumer and supply chain insights are summarized in Table 1 (product) and Table 2 (process).

Table 1. Disruptees (variable)		
Product	Current conditions	Implications
Unpredictable	<ul style="list-style-type: none"> Existing latrine options are predominantly concrete Maintaining consistent quality throughout the production cycles requires adherence to specific production techniques and consistent supply and use of inputs LPs have clear incentives to modify the specifications of the product to increase profit margins 	<ul style="list-style-type: none"> Inconsistently consistent impact Increased necessity for greater investments in building and maintaining producer capacity Difficult and costly to monitor quality
Unhygienic	<ul style="list-style-type: none"> LPs are unable to consistently adhere to hygienic specifications in sourcing, production and installation Typical inputs are often functionally suboptimal (e.g. syphon traps, plastic pans and ceramic pans) Installation is the responsibility of the consumers and not by a trained service provider Consumers have perverse incentives to reduce the hygienic standards for perceived improvements in performance Installation quality is suboptimal leading to hygienic components of latrines often being left out or incorrectly placed 	<ul style="list-style-type: none"> Non-existent value propositions around delivery and installation of latrines Adherence to hygienic standards is at odds with customer behaviour and perceptions of functionality in a highly personal experience and space Existing designs of offset systems have a higher likelihood of suboptimal functionality and breakage
Complex	<ul style="list-style-type: none"> Procurement of the latrine components is consumer’s responsibility for higher level latrines (offset options) Higher level latrines require un-optimised components such as junction boxes and chambers which add manufacturing complexities and reliance on local manufacturing and specification of moulds Proper assembly requires extensive jerry-rigging (“installation improve”) 	<ul style="list-style-type: none"> LPs are often confused about what constitutes quality design LPs have incentives to cut corners in complexity for simplified production and installation Reduced likelihood of adherence to hygienic standards according to design specifications

These insights immediately guided the development of an initial product innovation that ultimately informed BSMP’s development of a full disruptor system. The results of BSMP’s field research enabled ASB, with further support from iDE/BSMP, to develop the plastic SaTo[®] Pan, an innovative new “user interface” for consumers that emphasizes affordability while reducing water usage for flushing and discouraging breakage of hygienic water seals observed in pre-existing pan offerings. By March 2013, the SaTo[®] Pan had been tested and put into production by RFL Plastics, Ltd. (RFL), a Bangladeshi plastics

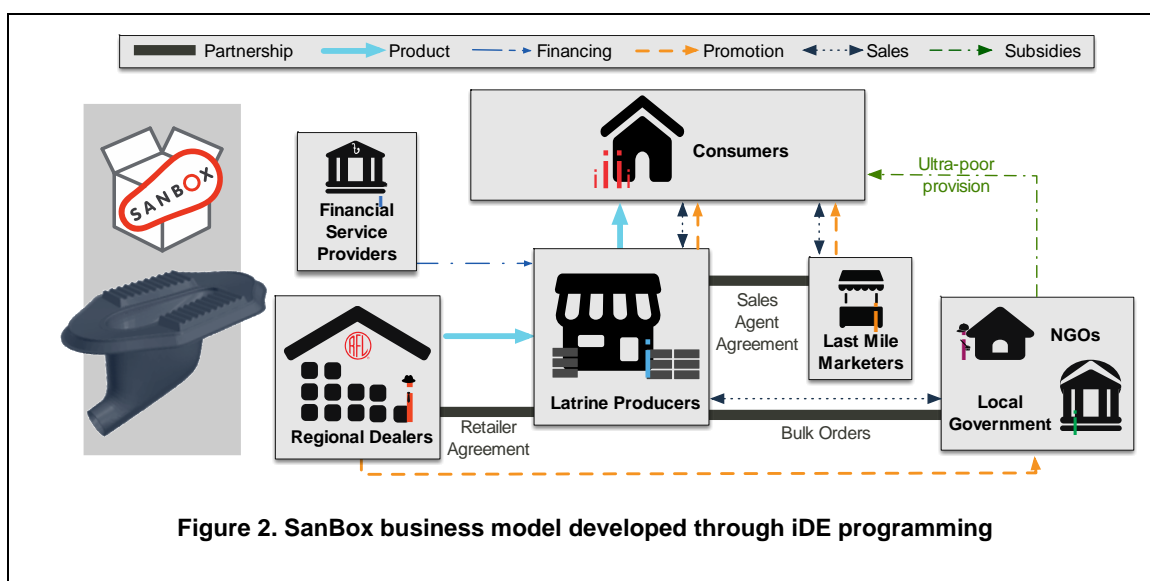
manufacturer within PRAN-RFL Group Ltd. Within several months mass production and distribution of the SaTo[®] Pan began through both commercial and NGO channels, resulting in over 300,000 SaTo[®] pans produced and distributed from April 2013 to August 2014.

While the success of the SaTo[®] Pan was encouraging, this initial product innovation proved to be a critical inspiration for wider design principles informing the development of a fully disruptive system. In terms of the product offering itself, the SaTo[®] Pan demonstrated that a mass producible concept could

standardise product quality while significantly increasing the ability to diffuse the technology at scale, and could enable bundling of several mass produced components to expand these benefits to other elements of the offering. At the process level, the SaTo[®] Pan indicated that a product grounded in a robust manufacturing and distribution infrastructure could significantly increase the efficiency of diffusion at scale and increase the likelihood of sustainability by reducing the need to create new supply chains.

Process	Current conditions	Implications
Decentralized	<ul style="list-style-type: none"> • Production of existing solutions is highly decentralized • Passive marketing at LP level is unsupported by mass marketing propositions and promotional channels 	<ul style="list-style-type: none"> • Lower returns on investment for scalable diffusion of improved sanitation solutions • Increased necessity for greater investments in building and maintaining producer capacity • Consumers have weak perceptions of value addition from adoption
Disconnected	<ul style="list-style-type: none"> • There is low access to critical supporting services for consistent, scalable enterprise growth (e.g. marketing services) • There is low access to knowledge and market intelligence • Physically distant from both supply chain inputs and consumers • There is a low degree of communication between LPs 	<ul style="list-style-type: none"> • Disconnected designers are unable to review designs through consumer lenses • Overemphasis on product-orientation over customer-oriented products and service models • Overemphasis on technical feasibility than in tandem with consumer desirability and socioeconomic viability • Genuine, sustained feedback loops between designers and producers are scarce
Inefficient	<ul style="list-style-type: none"> • There is weak competition between technically sound solutions • Evolution of sector is fully dependent on donor-funded strategies and programming 	<ul style="list-style-type: none"> • Relatively high barriers to entry outside of public and/or development sector programmatic support

With these design principles in hand, the BSMP team set out to leverage the SaTo[®] Pan experience and develop a fully disruptive solution to use the SaTo[®] Pan in improved offset latrine systems. To address this challenge, the BSMP team utilized iDE’s global experience in sanitation marketing and product innovation to adapt functional elements of its successful Easy Latrine² developed by iDE in Cambodia. Additionally, the team aimed to build on the extensive local level concrete ring and slab manufacturing capacity and to start with the latrine mid-structure where the challenge of hygienization is focused and which is easily addressed in a centrally manufactured product. The team will aim to address the super-structure and sub-structure of the latrine in subsequent projects. The result was ideation around a mass-producible “flush funnel” that could house the pan and connect it to an outlet pipe to an offset pit. Further, iDE recognized that existing offset latrines typically do not provide space for upgrading from a single pit to twin-pit system, and conversion is an unsanitary and unpleasant process. The solution was inclusion of several PVC pipes connected by a 45° elbow bend, making switching from one pit to the other a simple matter of rotating the outlet pipe from a filled pit to an unfilled one. The result is a more hygienic and desirable process with minimal material costs. Finally, the SaTo[®] Pan experience suggested that standardizing the material of these components and bundling them together would embed functional effectiveness and hygienic standardization at scale.



Accordingly, the BSMP team worked closely with RFL to co-create the “Sanitation in a Box” (SanBox) product. The plastic SanBox enables households to purchase a standardized, hygienic latrine product that improves average quality, increases water use efficiency, and improves upgrading and conversion of single-to twin-pit offset systems. Included in the box is a squat slab and pan cast in plastic and made to look like stone; pipe and pipe joins for a twin pit offset system; glue for the piping; a gas pipe for the clay based areas of Bangladesh; and a scrub brush. It is estimated that the SanBox will retail in Bangladesh for under USD 25. The SanBox is installed with twin cement three ring pits, commonly found in Bangladesh to encourage rotational composting. Most importantly, this research and design process revealed the critical importance of grounding product innovation within a sustainable and scalable service model. The process-level design principles of Table 2 led iDE to pilot a fully-commercial supply chain model with leading national plastics firm that links small scale sanitation entrepreneurs to a large-scale marketing and distribution infrastructure with over 3,000 retail points across all sixty-four districts of Bangladesh, as illustrated in Figure 2. Under the model developed, the lead firm develops new linkages with sanitation entrepreneurs, treating them as semi-formal retailers in their existing national supply chain. Sanitation entrepreneurs will receive discounted prices for the SanBox from RFL, and will also receive vital supporting services such as production training and marketing through a sustainable commercial business model. These sanitation entrepreneurs have consequently become RFL Sanitation retailers, and a part of the formal supply chain of the firm. As pit emptying is a robust and extensive informal sector within Bangladesh and this project focused specifically on the latrine mid-structure, pit emptying has not been included in this discussion.

Table 3 presents the insights from the disruptor situation, which is quality controlled and managed. This system has moved through the three HCD lenses of desirability, viability and feasibility. Here the product is predictable, hygienic and simple and the process is expandable, connected and efficient. The process is not designed to be replicable in different nations around the world per se, but is developed to be expandable into new markets through natural market flows.

Table 3. Disruptor (quality controlled and managed)		
Product	Anticipated conditions	Anticipated Implications
Predictable	<ul style="list-style-type: none"> • Mass produced in a quality controlled setting • Standardised inputs ensure high fidelity product outputs that can be mass produced • Reduced price variations for LPs to inflate the market and reduce profit through unhealthy competition 	<ul style="list-style-type: none"> • Product quality is predictable from manufacturing level to the household level

Hygienic	<ul style="list-style-type: none"> • Bundled design ensures that components are designed to fit together hygienically • Increased consumer incentives for future upgrading of latrines to twin pit models • Design incorporates features that overcome hygienic concerns seen in existing systems 	<ul style="list-style-type: none"> • Product installation remains hygienic due to design principles which force behaviour change and pragmatic faecal sludge management
Simple	<ul style="list-style-type: none"> • Bundled and mass produced design (in a box) simplifies the procurement process for LPs for inputs in a clear procurement channels • Reduces the technical capacity requirements for a LPs through components that are meant together 	<ul style="list-style-type: none"> • Reduces the risk associated with improper production and complicated capacity trainings • Eliminates the ability for LPs to cut-corners and the need for “installation improv” that affects quality
Process		
Expandable	<ul style="list-style-type: none"> • Distributed leverages pre-existing national supply chains with reach to all areas of the country • Centralized production • Lead firm augmented marketing at a national level ensures further and deeper reach with effective value propositions 	<ul style="list-style-type: none"> • Higher returns on investment for scalable diffusion of improved sanitation solutions • Decreased necessity for greater investments in building and maintaining producer capacity • Consumers have increased knowledge and stronger perceptions of value addition from adoption through marketing • Leveraged supply chains are easily scalable and expandable into new markets
Connected	<ul style="list-style-type: none"> • Increased access to critical supporting services for consistent, scalable enterprise growth (e.g. financial services) • Increased access to knowledge and market intelligence 	<ul style="list-style-type: none"> • Customer-oriented product and service model • Improved balance between technical, consumer desirability and socioeconomic viability • Creation of feedback loops between lead firms and producers
Efficient	<ul style="list-style-type: none"> • Diffusion of solutions is less dependent on donor-funded strategies and programming 	<ul style="list-style-type: none"> • Relatively high barriers to entry outside of public and/or development sector programmatic support • Increased returns on investment

Conclusions

While Lepore (2014) warns that one should not be hasty to define a technology or concept as disruptive before there is sufficient evidence, the SanMark team at iDE – Bangladesh has created a system which seeks to build into existing systems for sustainable growth and scale. The plastic mould for SanBox is currently being manufactured in India and the team will be rolling out sales in three separate programs starting in May 2015. Over 60,000 latrines are expected to be sold in the first year (2014/2015) based on experience with the SaTo pan, a strong marketing campaign, and RFL’s robust brand power in Bangladesh. Capitalizing on a strong private sector for manufacturing and robust supply chains in Bangladesh, the team has created both a unique product and a unique business process while fully understanding the country context. This model reduces risk for the donor and private sectors by leveraging the capacities of both. It also views product innovation as an entry to process innovation grounded in HCD. The extensive work in Bangladesh over the last thirty years in building the foundation for such a model should not be understated and this disruption is predicated on this exceptional groundwork.

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Notes

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² Developed by iDE in collaboration with a consultant from the design firm IDEO, the Easy Latrine consisted of a squat pan, slab, catchment box, pipe and offset storage rings, which made household decision-making easier with a relatively standardized product that was easy to produce and install.

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