

A market led, evidence based, approach to rural sanitation



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Contents

Purpose of this paper	4
Executive summary	5
Context	7
Demand for toilets exists	9
A private sector product that many can afford	11
Converting demand to purchase	13
The buying process - Driving demand through key influencers	15
Potential delivery models - DIY (Do-it-Yourself) and TSP (Turnkey Solution Provider)	16
Financing options - SHG vs. MFI	18
Need for a 'market maker'	19
Best practices for business model rollout	21
Conclusions, including suggestions for government & open questions	22
Appendix 1 : Overview of 3SI project approach in the landscaping phase	24
Appendix 2 : Approach to understanding customers	26
Appendix 3 : Customers' ability to purchase	28
Appendix 4 : Construction of high quality toilets in under INR 10,000 (USD 200)	33
Glossary	36
Acknowledgements	37

Purpose of this paper

The perspectives in this white paper are based on publicly available information created as part of the “Supporting Sustainable Sanitation Improvements” (3SI) project in Bihar (see back cover for more details), supplemented by further research on sub-INR 10,000 (USD 200) sanitation options and the roles of Micro-Finance Institutions (MFIs) and key support organizations.

Many experts and practitioners concurred with the perspectives and felt they may be useful to other sanitation interventions in India, as well as, to a degree, in other developing countries. The purpose of this white paper is to document these perspectives to enable other interventions to leverage them.

Detailed findings from the 3SI project and further details on the approach used to develop potential business models for rural sanitation (called the landscaping phase – see back cover for more details) are available at <http://goo.gl/GVrxOo> or <http://goo.gl/SmXBgm>

Please note that the approach outlined in this white paper and the above documents is general in nature, and could be applied in developing sanitation solutions across the world. However, the findings and potential solutions presented here are specific to Bihar. The findings and potential solutions may be applicable to other parts of rural India, and elements may even be applicable to other developing countries depending on the local conditions and context. The aim is, therefore, not to give the reader a solution, but rather ideas and concepts that they can test in their own situation and leverage if considered valid by them solely as per their own decision.

Executive summary

Globally, lack of access to hygienic sanitation facilities causes 2.7Mn deaths annually, and 0.8Mn children die of diarrheal disease every year. The UN has made access to sanitation a Millennium Development Goal, and foundations and multilateral organizations such as the Bill & Melinda Gates Foundation (BMGF), World Bank, etc. have dedicated fund outlays and / or service verticals addressing the issue.

Lack of sanitation is an acute issue in India, where close to 600Mn people defecate in the open, and 67% of rural households do not have toilets. Efforts are being made to address this issue – the Government of India subsidizes rural toilet construction through the Nirmal Bharat Abhiyan campaign (previously known as the Total Sanitation Campaign, or TSC) and over the years has approved funding of over INR 200 Bn (USD 4Bn). However, less than 60% of these funds have actually been used. Also, data from the Census indicates that a significant proportion of the TSC toilets that are reported to have been constructed may be non-existent or not in use.²

Data from the field shows that demand for toilets exists. 84% of households surveyed in Bihar indicated their desire for a toilet, and the strength of this desire is demonstrated by the fact that 38% of these households have actually gone ahead and researched available product options. Convenience, privacy, and safety of women and children are the primary reasons for toilet demand; health is not a major driver.

However, this desire does not translate into toilet purchase, in part due to the lack of quality affordable products in the market. Normal or modified septic tank options cost at least INR 20,000 (USD 400), placing them beyond the reach of most rural customers. Government-subsidized toilets (with a 3ft brick-lined leach pit and a 3 or 6ft tall brick superstructure) are cheaper; however, an insufficient subsidy amount and poor execution have often rendered such toilets short-lived and unusable. Hence, acceptability of such toilets is low, as customers are unwilling to compromise on quality and a long-lasting structure.

Research indicates that it would be possible to construct and deliver quality, long-lasting options at a price of INR 7,000-10,000 (USD 140-200), by making judicious design choices. These toilets would have either brick-lined or cement ring circular leach pits, with full permanent superstructures. Customers in Bihar desire deep pits (8-10ft) for longer life, partly due to the cost

of getting pits cleaned frequently; however, this depth could be spread across two pits of 4-5ft depth each, with construction of the second pit postponed to reduce the upfront cost of construction. Materials required for construction are readily available in village catchment areas, and masons and laborers are used to working with them.

Toilet designs provided by organizations such as Ambuja Cement Foundation (Maharashtra), Guardian (Tamil Nadu), Water for People (Bihar, West Bengal), Sanghamithra Rural Financial Services (Karnataka) and Hand in Hand (Tamil Nadu and other states) demonstrate the feasibility of constructing toilets costing INR 10,000 (USD 200) or less.

However, the availability of a more reasonably priced product by itself may not be sufficient to drive significant toilet penetration. Irregular income patterns make it difficult for even relatively better off customers to pay INR 7,000-10,000 (USD 140-200) in one go. Research indicates that only 6-8% of rural households without toilets would be able to do this. And even if they do have the money, sanitation features lower in customers' hierarchy of needs as compared to areas like education, communication and healthcare, and hence, the money may not get used for a toilet.

Financing can drive conversion from demand to purchase. In addition to the 6-8% of the households mentioned above, an additional 10-12% of households would be able to pay INR 250-500 (USD 5-10) as monthly payments on INR 5,000-7,000 (USD 100-140) loans (70% loan-to-value ratio; interest rate of 24% and tenure of 18 to 24 months). A further 40-45% would be able to afford a toilet, if provided part-subsidy (e.g., government subsidy of INR 4,600 or USD 92, under the Nirmal Bharat Abhiyan, or NBA) in addition to financing. The experience of Guardian, a WASH³-focused MFI in Tamil Nadu, indicates that financing can drive conversion even for households that can afford a toilet without financing. Overall, this could represent demand for toilets worth INR 500-700Bn (USD 10-14Bn), with an INR 300-450Bn (USD 6-9Bn) financing opportunity (including bridge financing for part-subsidy).

However, the above solution will not solve the problem for everyone. For example, households from the poorest wealth strata may not be able to afford toilets even with financing and part-subsidy – they will need a full subsidy (and Government schemes such as the National Rural Employment Guarantee Scheme, or NREGS, can

² The sources of the information present in the Executive Summary are cited in the detailed report. The Executive Summary should be read along with the detailed report.

³ Water, Sanitation and Hygiene

be leveraged to this end). Some households do not have the space required to install a toilet, and households in flood-prone areas will need products that address their unique context.

The underlying approach here is to start with the “easiest” segment (the most affluent 16-20%), then quickly extend to the next 40-45% (using the current NBA subsidy), and subsequently reach the bottom 35-40% (with a full subsidy, leveraging the NREGS subsidy in addition to the NBA subsidy). The rationale for this approach is that once these low cost toilets start being used, others would see them and want them. Also, these initial toilets would help set the supply chain in place, and it would become easier to deliver and procure the toilets. And with the movement to direct subsidies, these too become easier, further helping increase penetration.

Multiple business models can be used to deliver such low-cost products to customers. These can be broadly classified into two categories. The first is the DIY (Do It Yourself) model, where the customer aggregates material and labor, and supervises construction. This delivery mechanism is familiar to customers, as it is similar to the process currently followed for private home and toilet construction. The second is the TSP (Turnkey Solution Provider) model, where an entrepreneur (the TSP) delivers a chosen product to the customer on an end-to-end basis at a promised quality and price. While the TSP model has the advantage of hassle-free solution delivery within a guaranteed cost at certifiable quality, the DIY model has the advantage of higher customizability and potential cost advantage to the customer.

Both the DIY and TSP models would require a central player or ‘market maker’ to conduct market-building activities to get the models started, and create an enabling environment for the market to grow. This could include activities such as incubation of TSPs, development of effective toilet designs, awareness building and demand generation, linking providers with MFIs or other financiers, training masons and TSP personnel, monitoring quality, helping households access the NBA subsidy, facilitating working capital for players in the value chain, working with the Government to define policy, etc.

Different organizations can play this role of a ‘market maker’. Non-Governmental Organizations (NGOs) are well suited as they already have strong local presence and sanitation has high social impact. However, they will need additional donor or government funding, as this intervention will not generate revenues. MFIs also have good local presence in many areas, but they tend not to have the inclination or capabilities to perform the activities of a true market maker. However, MFIs may be able to take on a ‘light-touch’ approach to being a market maker – building awareness and generating demand, providing customers some guidance on toilets that they can construct (e.g., via pamphlets), and giving them financing. Guardian, a smaller dedicated water and sanitation MFI, exemplifies this approach, while Grameen Koota, a more traditional larger MFI, uses a slightly more intensive approach. Cement companies could also play the role of a market maker – some of them have significant rural reach (through their distributors) and they can play an important role in developing cost effective designs and training masons. They could also financially support some of the work from a CSR perspective.

The Government is a key player and can facilitate development of the sanitation market through three broad sets of activities: (i) Overall facilitation of the market, e.g., by developing cost effective standard designs and funding awareness creation and demand generation, (ii) Subsidies for customers with choice of provider and more efficient transfer, and (iii) facilitating better private sector financing to the end customer – both by directly providing access to lower-cost funds and through policy changes that enable more and lower-cost funds (e.g., by treating sanitation loans as ‘priority sector lending’).

Given the complexity of the rural environment, piloting these models, product designs, etc. is crucial to refine them and their execution. A number of organizations are doing this – e.g., PSI, through the 3SI project, is piloting the DIY and TSP models in Bihar, Guardian has taken a sanitation MFI-led approach in Tamil Nadu, Grameen Koota is a large MFI that is using its ‘sister’ foundation to do ‘market building’ activities while the main business does loans, and Water.org is working with 21 organizations in India to facilitate credit for water and sanitation. These experiences will help in refining the business models and their execution, and lead to scaling them up in the longer term.⁴

⁴ The organizations named in this Report do not form an exhaustive set of organizations working in the sanitation and sanitation financing space; rather, their work is representative of the different approaches being utilized in this space

Context

Globally, lack of access to hygienic sanitation facilities causes over 2.7Mn⁵ deaths annually. 0.8Mn children die due to diarrheal disease every year⁶. With over 1Bn people (15% of the world's population) still defecating in the open⁷, tackling the issue of sanitation is critical to reducing child mortality and improving maternal health. The United Nations recognizes the magnitude of the issue and has made access to sanitation one of its Millennium Development Goals. Many major global multilateral organizations and foundations, including the Bill & Melinda Gates Foundation (BMGF), World Bank, UNICEF, etc., have dedicated fund outlays and / or service verticals addressing the sanitation issue.

The issue is more acute in developing countries such as India. Of all the people in the world who defecate in the open, a majority (600Mn) live in India. Of all the people who live in India, more than half defecate in the open. According to the Census of India (2011), 67% of rural Indian households (and 53% of all Indian households) still do not have access to proper sanitation facilities. Access to sanitation also varies by region – less than 10% of people defecate in the open in rural Kerala, as compared to more than 80% in rural areas of Bihar and Odisha. Rural areas present further challenges vis-à-vis urban areas – low population densities and relatively low or irregular incomes mean that community toilet solutions will not work at scale⁸. Moreover, access to public services and sewage facilities is limited in such areas; therefore, standalone solutions are required. In some areas, solutions may need further customization for challenging environments such as flood risk, mountainous topography, etc.

The Government of India is making efforts to increase sanitation penetration through its Nirmal Bharat Abhiyan (NBA) campaign (previously known as Total Sanitation Campaign, or TSC), which subsidizes toilet construction in rural areas. However, results from its implementation have been uneven. Nationally, funding of over INR 200Bn (~USD 4Bn) has been approved since 2001; however, only INR 115Bn (~USD 2.3Bn) has actually been spent on projects on the ground⁹. Inconsistent data from government sources regarding toilet construction makes it difficult to ascertain impact – while the Ministry of Rural Development reports that 78Mn toilets were constructed under the TSC until March 2011¹⁰, the Census (2011) shows only 51Mn households as owning working toilets. This number from the Census includes many households where

Toilet construction could be an INR 500-700Bn (USD 10-14Bn) opportunity at the national level, creating an ~INR 300-450Bn (USD 6-9Bn) financing market, including bridge loans

toilets were constructed without government support. Apart from the overall number of toilets constructed, actual usage of toilets constructed under the TSC is another issue. WaterAid's research on TSC toilets in Bihar in 2009¹¹ found that many toilets are in disrepair, and are therefore not in use. In spite of significant issues in implementation, research by Spears¹² shows that even at the mean program intensity, in an environment of generally weak government capacity, the TSC program has had a measurable impact on child mortality and growth. Improving sanitation program performance would thus be expected to lead to even better results.

Demand for toilets exists, with a large proportion of households indicating that they would like to construct and use an individual household toilet¹³. Rising disposable incomes in rural areas are making it possible for households to spend on assets, as can be seen from the increasing spend on mobile phones, televisions, home improvement, etc. Many of these households currently do not get a toilet constructed primarily due to the lack of ready availability of quality solutions in an affordable price range and low access to financing.

The 3SI team's research in rural Bihar indicates that 16-20% of rural households would be able to afford an INR 7,000-10,000 (USD 140-200) toilet, if financing support is available. A further 40-45% of households would be able to construct the same if assisted with financing and part-subsidy. The remaining ~40% would find it difficult to afford a toilet, and would require full subsidy.

A bottom-up calculation using actual costs and investigation of toilets being delivered in a few parts

⁵ United Nations (2012), as cited by Agence France-Presse in 'Poor sanitation kills 2.7Mn people a year: UN', Nov 16, 2012

⁶ Liu, L., Johnson, H.L., Cousens, S., et al. 2012. Global, regional and national causes of child mortality: an updated systematic analysis for 2010 with time trends since 2000. *Lancet*. 379 (9832), 2151-2161

⁷ World Health Organization and UNICEF, 2013. Progress on sanitation and drinking-water - 2013 update. Available at www.wssinfo.org (as on Sep 20, 2013)

⁸ Due to the low population densities and low or irregular incomes, pay-per-use group facilities – which are feasible in dense urban environments – are not viable in most rural areas. Conversations with customers, sanitation experts and practitioners highlighted that a community solution based on shared cleaning responsibilities would also not work in rural areas. Additionally, as per the current global definition of 'access to improved sanitation', such shared facilities do not constitute 'improved' sanitation facilities

⁹ Nirmal Bharat Abhiyan Website (as on Nov 10, 2013)

¹⁰ Nirmal Bharat Abhiyan Website (as on Nov 10, 2013)

of the country show that such a solution is feasible. If the value chain can deliver such toilets, and if part-subsidy from the NBA is available, this could be an INR 500-700Bn (USD 10-14Bn)¹⁴ opportunity at the national level. Providing customer financing for these toilets could represent an INR 80-210Bn (USD 1.6-4.2Bn) opportunity, with potential for an additional INR 230Bn (USD 4.6Bn) bridge financing market¹⁵ for those who want to avail subsidy post construction. These numbers are likely to increase over time as government subsidies continue and rural disposable incomes rise.

¹¹ WaterAid study on the TSC, "Feeling the Pulse", 2009

¹² Spears, D. July 2012, "Effects of Rural Sanitation on Infant Mortality and Human Capital: Evidence from India's Total Sanitation Campaign"

¹³ Based on customer research conducted in Bihar in 2012, under BMGF's 3SI grant. See Appendix 2 for more details on the research approach

¹⁴ Based on customer research conducted in Bihar in 2012, under BMGF's 3SI grant. See Appendix 3 for more details. Market size estimation assumes that toilets priced at INR 7,000-10,000 (USD 140-200) are constructed in ~70Mn rural households (households that can afford toilets with financing and / or part-subsidy - ~60% of total rural households without toilets). ~55% of rural households expected to take financing (40%-45% will get part-subsidy, post construction), of ~70% of toilet value

¹⁵ Bridge financing refers to short term financing (2-3 months) for the part of the loan that can be repaid once the household receives the part-subsidy (INR 4,600 or USD 92) post construction. However, in many cases, customers do not repay the bridge loan upon receipt of the subsidy, effectively converting the bridge loan into a regular loan

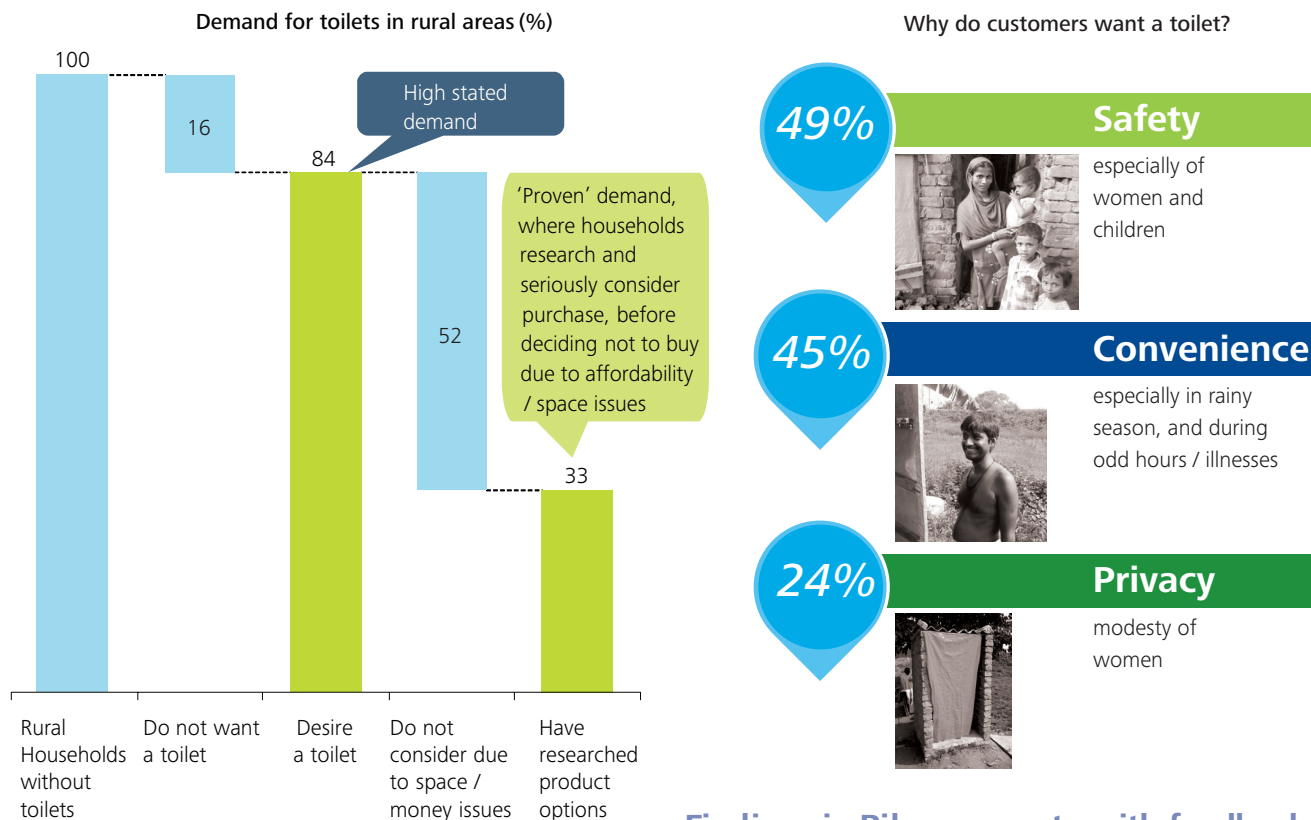
Demand for toilets exists

Contrary to popular belief, a desire for toilets does exist in rural India. 3SI's research with customers in Bihar indicates that 84% of households without toilets would like to own an individual household toilet (see Box 1 below for details of need drivers). However, there is a valid concern that such stated intent may not reflect true purchase behavior. Therefore, the 3SI team used a 'Buying Process' tool to understand the strength of this 'desire'. This process uncovered that quite a few respondents had not researched the subject in depth, often due to lack of either funds or adequate space for toilet construction in the house¹⁶. However, 38% of

these households (i.e., 33% of all households without toilets) had seriously considered building a toilet, and were able to correctly tell the team about various product options available in the market. This indicates that the desire is quite strong, and is not just a stated aspiration. Interviews with numerous local and global sanitation-related players who are close to customers reinforce many aspects of this demand, from the desire to own a toilet to the fact that health is not the most important driver (see Box 1).

Box 1: Toilet need drivers¹⁷

Health is not the primary driver for customers desiring a toilet. While over 60% of respondents in the research recognized the fact that open defecation causes health problems, only 1% indicated that as one of their main motivators for wanting a toilet.



Findings in Bihar resonate with feedback from experts and organizations working in other parts of India, indicating their validity in a larger context.

While the desire exists, there is no appropriate low-cost product in the market. The quality options being built are septic tank or modified septic tank (large rectangular pit) options with permanent brick superstructures. These cost at least INR 20,000 (USD 400) (septic tank toilets can cost up to INR 60,000 – USD 1200 – and more), placing them beyond the reach of most rural customers. Less expensive options are available in the form of government-subsidized toilets; however, the subsidy delivery model has not been equally effective across states. In states like Bihar where the subsidy was implemented via Civil Society Organizations (CSOs), the insufficient subsidy amount (approximately INR 3,500 or USD 70 till recently) and poor execution meant that even when built¹⁸, quality was usually poor, rendering the toilets short-lived, and often, unusable. This has led to low customer acceptability and a widespread market perception of government toilets being of poor quality (see Box 2 on government toilets).

The 3SI team's research indicates that customers are not willing to compromise on key criteria – even if customers can't afford relatively expensive toilets, they nevertheless desire a toilet with a permanent, stable superstructure and a deep (large¹⁹) pit with long life (i.e., 10-15 year pit life). This demand for a deep pit is often driven by a desire to avoid frequent filling up of the pit, as cleaning of pits is perceived to be expensive. This is because pit cleaning is often done using manual labor²⁰. It is possible that the introduction of less expensive, more convenient and hygienic methods for pit cleaning may influence customers to adopt smaller pits (thereby reducing the upfront cost of a toilet).

Box 2: Government-subsidized toilets

The Govt. of India provides a subsidy of INR 4,600 (USD 92) to rural households for individual toilet construction under the NBA (or TSC). Till recently, the subsidy amount was INR 3500 (USD 70) in many states. As per the policy makers' intent, this subsidy is meant to incentivize individual toilet construction by covering part of the cost of the toilet.

However, implementation bodies often aim to construct the complete toilet in the subsidy amount. Till recently, the Public Health Engineering Department (PHED), which implements the TSC in Bihar, prescribed a standard toilet model consisting of a 3ft deep brick-lined leach pit, with a rural pan and a 3 or 6ft tall brick superstructure. The delivery model in some states (e.g., Bihar) is through CSOs (Civil Society Organizations), which construct the approved toilet models in people's homes, obtain approvals and collect the subsidy amount from the government.

In many cases, construction of the complete toilet in the limited subsidy amount has led to poor quality of construction. The process also leaves customers isolated from the decision-making process – with regard to both the toilet models to be constructed, and the choice of delivery agent.



"Government toilets are not well made. The pit caved in within a month and we have not been able to use the toilet since then." – Respondent, 28, Madhubani village, East Champaran

"The contractor (CSO) just constructed a pit and not the superstructure" – Respondent, 50, Chak Nawada village, Samastipur

¹⁶ 5%-10% of households interviewed as part of customer research in Bihar cited lack of space as a key driver of non-purchase of a toilet

¹⁷ Based on customer research conducted in Bihar in 2012, under BMGF's 3SI grant. See Appendix 2 for more details on the research approach

¹⁸ During research conducted under BMGF's 3SI grant in 2012, numerous respondents cited cases where the subsidy was claimed by a CSO, but a toilet was not constructed

¹⁹ Households desire a large pit that will not fill up; usually expressed as desire for a standard diameter pit, but with greater depth

²⁰ A typical septic tank costs INR 5,000-10,000 (USD 100-200) to clean, potentially leading to the perception that cleaning of other types of pits would be similarly expensive

A private sector product that many can afford

Research done as part of the 3SI project indicates that it would be possible to construct and deliver quality, long-lasting toilet options at a price of INR 7,000-10,000 (USD 140-200) to the customer, by making judicious design choices (see Figure 1, Table 1). The toilets could have either brick-lined circular leach pits or cement-ring leach pits (cement ring pits have certain advantages over brick pits – see Box 3 on ‘Re-Engineering’) with full permanent superstructures (6ft). The materials required for construction (bricks, cement, sand, concrete, etc.) are readily available in village catchment areas, and local masons and laborers are used to working with them.

Figure 1: Low-cost toilet design

Full brick superstructure (tin door, roof) + Circular pit of cement rings

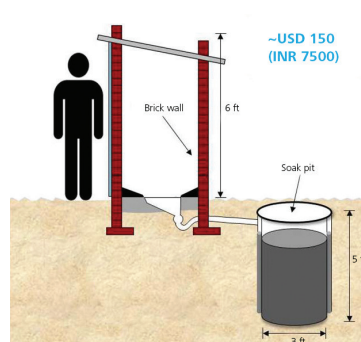


Table 1: Elements of a low-cost toilet

Parameter	Choice and rationale
Type of Pit	<ul style="list-style-type: none"> Septic tanks or modified septic tanks²¹, though preferred, are expensive, leaving circular leach pits as the only quality product option in the INR 7,000-10,000 (USD 140-200) range <ul style="list-style-type: none"> Customers recognize affordability issues, and are therefore accepting of circular leach pits Circular pits also offer advantages over more expensive rectangular pit options in terms of withstanding soil pressure; i.e., they are less prone to caving in
Depth of Pit	<ul style="list-style-type: none"> Customers do not prefer shallow pits (3ft) – fear that they will fill up soon <ul style="list-style-type: none"> Desire deep pits (>8-10ft); however, the 3SI team’s experience indicates that they would be willing to spread this depth over multiple pits (e.g., two pits of 4-5ft depth), if they are made aware of benefits (e.g., can postpone construction of second pit) Also important to educate customers regarding the life of a pit – e.g., a 5ft pit can last five years, for a family of 5²²
Material of Pit	<ul style="list-style-type: none"> Cement rings are more suitable than bricks for leach pits, as shown in Box 3 Though customers are used to brick-lined leach pits, they are open to cement ring-based pits, if made aware of benefits
Pan	<ul style="list-style-type: none"> NBA-constructed toilets primarily use rural pans, with steeper inclines and no footrests; customers prefer urban pans (with attached footrests), as these are aesthetically preferred Moreover, urban pans do not add significantly to toilet cost; cost approximately INR 100 (USD 2) more than rural pans – less than 2% of overall toilet cost²³
Superstructure	<ul style="list-style-type: none"> Customers prefer 6ft ‘pucca’ brick superstructures, as they provide a permanent structure; perceived as being of good quality, as compared to half (3ft) or ‘kuchha’ superstructures (constructed with jute, cloth, bamboo, etc.)²⁴

²¹ Septic tank-like large rectangular pits with single compartments; similar to septic tanks in size; have porous floors (to enable leaching), and plastered walls

²² Based on conversations with sanitation experts. May vary across locations, based on various factors such as soil texture, water table, etc.

²³ Rural pans have steeper inclines than urban pans, and require less water to clean after use. However, despite this utility, they aren’t preferred due to inferior aesthetics vis-à-vis urban pans. A modified rural pan, with a similar steep incline,

but with integrated footrests and better quality, finish, could be acceptable

²⁴ A pucca superstructure is one which has walls made of strong materials such as burnt bricks, stones, cement concrete, timber, etc., and roof constructed with tiles, corrugated iron sheets, asbestos cement sheets, reinforced cement concrete (RCC), etc. A kuchha superstructure has walls and roof made of materials other than the ones mentioned above, including un-burnt bricks, bamboo, mud, grass, thatch, etc. Superstructures combining both pucca and kuchha elements are called kuchha-pucca

The toilet described above differs from the traditional TSC toilet design. The TSC toilet uses a rural pan, has a 3 or 6ft superstructure (often without roof or door) and a 3ft deep brick-lined leach pit (whereas the toilet described above has an urban pan, a full 6ft superstructure with a proper roof and door, and a 5ft deep leach pit using either cement rings or bricks).

It is important to note that one would need different products for locations which lie in flood-prone zones. While some products for such conditions exist today (e.g., eco-san toilets), they usually cost more or require behavior changes in terms of usage.

A number of organizations demonstrate that toilets can be constructed in under INR 10,000 (USD 200) in India. One such organization, the Ambuja Cement Foundation, has constructed ~2,500 toilets in Chandrapur (and ~10,000 toilets in total across locations), including at a price of ~INR 7,000 (USD 140), while Guardian, an MFI working in Tamil Nadu, has provided loans for ~25,000 toilets, including at price points of ~INR 9,000-11,000 (USD 180-220). Other organizations such as Hand in Hand, Water for People and Sanghamithra Rural Financial Services have also demonstrated toilet designs that cost INR 10,000 (USD 200) or less. Appendix 4 provides more details about these organizations and the toilet designs they use²⁵.

Interventions in other countries such as Bangladesh and Cambodia are constructing toilets in the USD 40-80 price range, much lower than the price of the low-cost toilet described above. This variation is primarily due to differences in customers' desired toilet features – in particular, customers in India demand a sturdy superstructure for a toilet upfront, driving up the initial price point, whereas customers in Bangladesh and Cambodia are willing to construct the superstructure later, when they have sufficient savings. Having said that, a lower-priced product is possible. There is scope for innovation to create products that are less expensive but meet customer needs (e.g., pre-fabricated cement or plastic superstructure); however, customers may be skeptical about such options and it may require some effort to modify customer preferences and increase willingness to adopt such products.

Box 3: Re-engineering toilet construction

Masons who construct toilets typically learn on the job as apprentices, and do not go through a formal training program. While this is acceptable for the superstructure, which just requires a simple foundation and rectangular brick structure, lining bricks correctly to construct a circular pit requires skilled mason work. Thus, although circular leach pits are more affordable and resistant to soil pressure, masons advocate more expensive large rectangular leach pits, as these generate more revenues and are easier to construct.

An alternate option is to construct circular leach pits lined with cement rings of standardized quality and dimensions. Laborers would only need to dig the pit and place the cement rings in, to construct the substructure. Such a pit would also take less time to construct. This is a good example of re-engineering the construction process – it improves quality, reduces dependence on masons' expertise, and also enables speedier construction. Cement ring manufacturing is not difficult. Cement rings are also affordable – costs are comparable to brick-lined pits. Moreover, quality control can take place at the production site, and is therefore easier than in the case of brick-lined pits. Given the low upfront capital investment required to produce rings, small-scale local manufacturers can mushroom relatively quickly if demand exists – observations in Bihar reinforce this. Research also shows that customers are willing to accept cement ring toilets; in fact, in flood-prone areas, cement rings are preferred to bricks in pits, as they are more robust and flood-resilient.

This concept of 're-engineering' can be extended further to develop pre-fabricated superstructures for toilets; however, these need to be designed to be affordable and aspirational for customers.

²⁵ Although toilet designs referenced here are priced at ~INR 10,000 (USD 200) or less, these prices may vary across locations depending on locally available materials and local prices, and may sometimes rise above INR 10,000 (USD 200)

Converting demand to purchase

Desire for a toilet, though existent, features lower in customers' hierarchy of needs vis-à-vis children's education, communication, etc. Irregular income patterns in rural households are also a significant barrier to purchase. Households find it difficult to organize cash for big-ticket purchases and frequently have to rely on local moneylenders, who charge exorbitant interest rates (up to 5% per month). Only 6%-8% of households without toilets would be able to afford an investment of INR 7,000-10,000 (USD 140-200) without external help.²⁶

The 3SI team's field work indicates that affordable sanitation financing can drive conversion. An additional 10%-12% of households would be able to afford a toilet if provided with financing options. A potential loan product could have the household pay INR 250-500 (USD 5-10) as monthly installments on a loan of INR 5,000-7,000 (USD 100-140) (70% loan-to-value ratio), at an interest rate of 24% and with a repayment cycle of 18-24 months. A further 40%-45% would be able to afford a toilet, if provided part-subsidy (i.e., NBA subsidy of ~INR 4,600 or USD 92 – see Box 5) in addition to financing. In fact, financing can sometimes also act as a decision driver among households that could afford toilets without a loan, as can be seen from the experience of Guardian, a Tamil Nadu-based MFI that provides loans for toilet construction (see Box 6 for more details on Guardian).

However, financing will not solve the problem for everyone. It is important to view customers in a segmented manner – one size will not fit all. Households from the poorest wealth strata, for whom survival is often the priority, may not be able to afford a toilet even with the NBA subsidy and financing²⁷. Different groups of customers also exhibit varying levels of desire for toilets; for example, households in flood-prone areas of Bihar show very high willingness to adopt toilets, given the relative hardships faced in open defecation. However, there is a need for targeted products to meet their unique context. Box 4 shows various dimensions that affect households' propensity to adopt toilets.

Box 4: Dimensions that affect customers' propensity to construct toilets

Ability to pay is a key factor that affects households' readiness to adopt toilets. Only a small proportion of rural households can purchase a toilet outright; most would require at least financing and / or part-subsidy to afford a toilet. Having said that, ability to pay is not the only variable that affects toilet adoption.

Research shows that prior experience of using toilets plays a key role in driving purchase. Customers who have used a toilet before are far more aware of its benefits, and are therefore more open to investing in one.

Geographic location is also important – both from a demand and product technology perspective. Villagers living closer to urban centers are more exposed to sanitation facilities, and consequently are more open to investing in a toilet. Topographical features also matter – a normal leach pit toilet would not be suitable for flood-prone regions.

In general, multiple factors affect customers' propensity to construct toilets, and taken together, these factors can help segment customers into different groups, with different toilet buying behaviors. One can then design targeted solutions for each group.

Appendix 2 contains more details of the segmentation exercise conducted in Bihar.

The practically universal availability of government subsidy (see Box 5 on the government subsidy scheme) for toilet construction increases affordability, and hence, the size of the potential target market. Ability to pay is also expected to increase over time, as the economy as a whole grows, and incomes increase. Increasing toilet penetration can also have a domino effect, as more and more people get exposed to toilets, and feel the need to purchase. In fact, the 3SI team's research shows the importance of prior exposure – customers who have used toilets before in cities or at relatives' houses are more interested in purchasing toilets themselves. This makes trial and exposure important features of any demand creation activity.

²⁶ Based on customer research conducted in Bihar in 2012, under BMGF's 3SI grant. See Appendix 3 for more details

²⁷ However, they may be able to procure a toilet if given additional subsidy (of up to INR 4,500 or USD 90) under the National Rural Employment Guarantee Scheme (NREGS). See Box 5 for more details

Box 5: Government subsidy for toilet construction²⁸

The government provides a subsidy of INR 4,600 (USD 92) per household for individual household toilet construction under the NBA (the amount was recently increased from INR 3,500 or USD 70). Households from the lowest income groups (i.e., those who have a yellow ration card) are entitled to receive an additional INR 900 (USD 18). Moreover, under the new policy guidelines, the NBA has been linked with the National Rural Employment Guarantee Scheme (NREGS), allowing an additional subsidy of INR 4,500 (USD 90) for labor. However, the process for availing this additional subsidy is not yet clear in many states, and hence, the effective subsidy available is currently closer to the NBA subsidy amount.

Previously, in many states such as Bihar, the NBA was implemented primarily via intermediary CSOs, who would construct toilets for free or with a minimal contribution, and collect subsidy from the government. However, recognizing the ineffectiveness of the CSO approach, many states are now transitioning towards direct subsidy transfer to beneficiaries, post-construction of toilets. States such as Tamil Nadu are already disbursing subsidies through direct transfer. Moreover, the NBA now also gives customers flexibility to construct a toilet of their choice, improving the potential for superior, high-quality toilet designs to be introduced.

However, accessing subsidy has often proved difficult for households. In states where CSOs lead implementation, only households in their target areas can access subsidy. Moreover, it operates as a 'push' mechanism – CSOs identify households where toilets should be constructed. Even under the new direct subsidy transfer model, completing the necessary procedures and obtaining subsidy could be difficult.

²⁸ Government subsidy is offered based on income level, with higher income groups (Above Poverty Line or APL) getting lower or no subsidy, and lower income groups (Below Poverty Line or BPL) getting higher subsidy. Ration cards are supposed to be based on household income levels and are used to determine subsidy amounts; in Bihar, Green – APL; Red – BPL; Yellow – Ultra-Poor; White – Elderly (65 years and above) who are destitute

The buying process

Driving demand through key influencers

Household dynamics play a key role in determining demand for a toilet. Although the decision-makers with regard to toilet purchase are typically the male heads of families or chief wage earners (CWEs), the 3SI team's research into the 'buying process' shows that female members of households, who face the greatest difficulties in going outside for defecation, are critical to driving the decision to purchase a toilet. For example, in one household that has taken a loan from Guardian in Tamil Nadu, the CWE's wife went on a 'hunger strike' to persuade her husband to construct a toilet.

The needs for privacy and safety for women are among the most important household factors that influence the need for a toilet. Presence of other vulnerable groups such as children, adolescent girls, and the elderly can also drive a desire for toilets.

However, many households do not go beyond the 'need' stage due to lack of financing and / or space for a toilet. The households that do go forward find more information about toilet options and costs from their neighbors, friends and other community members who already own toilets. Word-of-mouth recommendations from friends and community members are critical in driving opinions about products. The local masons are also key influencers and sources of information regarding toilet construction materials and costs. Among women, local Self Help Groups (SHGs) act as important information sources. Local NGOs working in the field are also trusted sources, and can act as key marketing channels.

Thus, presence of affordable products notwithstanding, demand generation and awareness creation activities will be required, especially in the initial stages, to ensure effective information dissemination, and thereby translate demand to purchase. Customers and influencers such as masons, SHGs, and NGOs need education regarding product features such as pit depth and type. Shallow pits constructed with the government subsidy have earned a poor reputation owing to poor quality of construction in numerous cases, and customers have the impression that pits need to be very deep to have a long life (at least 8-10ft). Customers also need to be educated that septic tanks are not the only quality option, and that well-constructed circular leach pits of sufficient depth (5ft) can also serve the purpose of long usability (permanence).

An alternative approach to providing 'permanence' of pits may be to use a two-pit model. Customers may be willing to obtain two pits of 5ft depth each, instead of one 10ft deep pit²⁹. This also allows customers to postpone construction of the second pit until the first pit fills up, reducing the upfront cost of toilet construction.

²⁹ Experts do not feel a 10ft deep pit is required, but it is often difficult to change customer beliefs. Hence this two pit option is a pragmatic solution. In addition, the use of twin pits is usually recommended by public health engineers. Once the first pit fills up, switching to the second pit allows the contents of the first pit to decompose, improving the microbiological quality and making it safer to handle

Potential delivery models

DIY (Do-it-Yourself) and TSP (Turnkey Solution Provider)

Thus, while there is scope to introduce more affordable, quality and focused products to drive penetration of sanitation in rural India, execution is key, given the complexity of the rural environment.

There are multiple business models that can help achieve the objective of higher sanitation coverage in rural markets. These models can be broadly classified into two different categories. The first is the DIY (Do It Yourself) model, where the customer aggregates all the material from suppliers, and supervises construction. The second is the TSP (Turnkey Solution Provider) model, where an entrepreneur sells a toilet as a product, and delivers the chosen product at the promised price. While the TSP model has the advantage of hassle-free solution delivery within a guaranteed cost at certifiable

quality, the DIY model has the advantage of higher customizability and potential cost advantage to the customer. See Table 2 for more details of pros and cons of the two models from a programmatic perspective, and Figure 2 for a cost comparison.

One thing to note is that the margin for a TSP is quite small. This is because the customer is used to aggregating the material and supervising construction (in fact, this is the norm), and hence would not be willing to pay a significant premium for a 'delivered product'. Due to this limited margin and the challenge of serving a dispersed rural market, it is unlikely that a large player will take on the role of a TSP. A TSP is more likely to be a small entrepreneur.

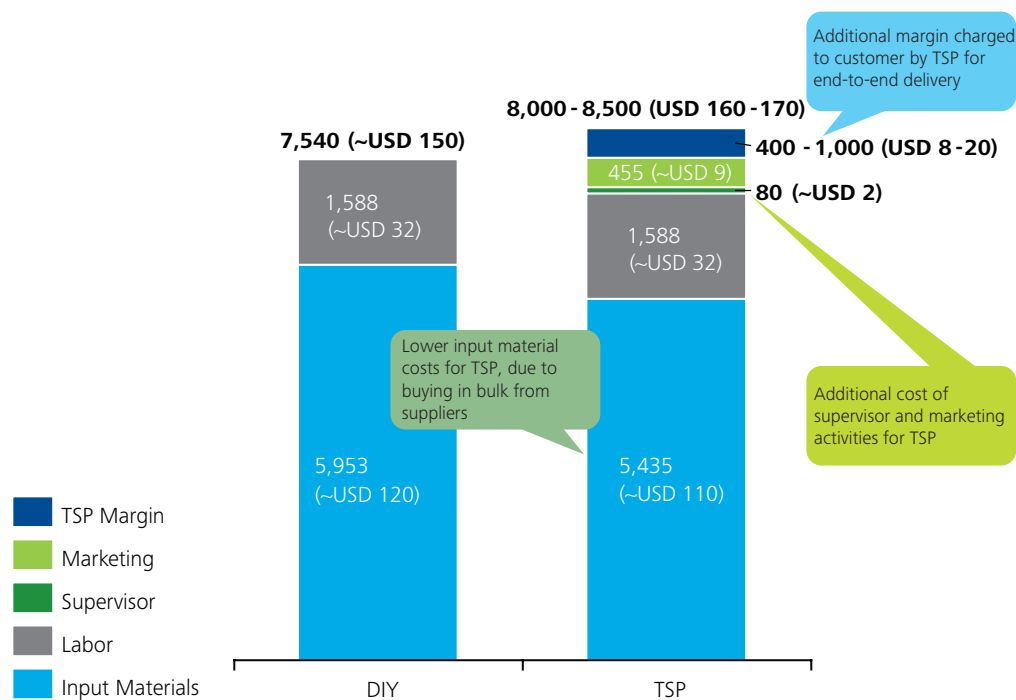
Table 2: DIY vs. TSP

	Do it Yourself (DIY) model	Turnkey Solution Provider (TSP) model
Overview	<ul style="list-style-type: none"> Customer aggregates input materials (pan, bricks, cement, etc.), and hires executor (usually mason) to construct a toilet; responsibility of quality and financing of construction lies with the customer Marketing and demand generation by NGOs, MFIs and the government <ul style="list-style-type: none"> However, this support may be required only in the initial stages, till the market reaches critical mass³⁰ Similar to existing business model for private home and toilet construction 	<ul style="list-style-type: none"> New business model, where one business entity provides a turnkey solution and has end-to-end delivery responsibility, from demand generation to demand fulfillment TSP proactively engages in marketing and demand generation; uses catalogs, prototypes, model toilets to help customers visualize the product <ul style="list-style-type: none"> Awareness generation may still be done by NGOs or by the government, especially in the initial stages
Advantages	<ul style="list-style-type: none"> Use of existing input material suppliers and executors, reducing time-to-market Delivery mechanism familiar to the customer Greater flexibility to customers to choose individual value chain actors; can also contribute labor and / or bricks, and thereby reduce toilet cost to them 	<ul style="list-style-type: none"> Market-based solution; organizes an otherwise unorganized and dispersed delivery mechanism Standardized, consistent quality products, delivered faster by established one-stop shops (i.e., TSPs); higher convenience for customers Redress for customers in case of issues (i.e., can come with a 'warranty')
Disadvantages	<ul style="list-style-type: none"> High dependence on NGOs and MFIs to engage at multiple stages of the value chain, from demand-building to training, monitoring <ul style="list-style-type: none"> NGOs' and MFIs' current capabilities may be limited in some of these areas High coordination needed between 'market maker', NGOs, MFIs and other value chain actors, in initial stages (unless the MFI is the lead actor) 	<ul style="list-style-type: none"> Need to identify, convince, and incubate large number of TSPs; could potentially be an intensive effort, resulting in higher ramp-up time and greater need for 'market maker' bandwidth Will require 1-2 TSPs per block³¹; high dependence on these TSPs' capabilities Available profit margins may not be attractive to large players; TSPs would predominantly need to be micro-entrepreneurs

³⁰ Expectation that support will be required only in initial stages is borne out by experience in similar markets, such as low-income housing

³¹ A block is an administrative division in India comprising a group of villages, while a group of blocks constitutes a district. For example, Samastipur district of Bihar has 20 blocks, with an average population of ~170,000 per block, based on the 2001 Census (although there is wide variation in this regard, with minimum block population of ~89,000 and maximum block population of ~287,000 in Samastipur. Such variation in block population is seen in other districts and states of India as well)

Figure 2: DIY vs. TSP – Cost Comparison (INR)³²



³² Includes approximate costs for a quality toilet at INR 7,500-8,000 (USD 150-160), based on field research in Bihar; costs may vary across locations

Financing options

SHG vs. MFI

Customer financing will be a critical success factor in both business models. SHGs and MFIs are two potential avenues for financing in rural areas. SHGs have better networks and presence, but in the Indian context, may lack sufficient funding to undertake sanitation financing. In many areas, MFIs have the local networks and the expertise required to provide and monitor loans. However, they would need to build an understanding of sanitation, and the capability to market, 'sell' and process sanitation loans.

Given that this is not a traditional income-generating loan area for MFIs, some of the larger NBFC (Non-Banking Financial Company)³³ MFIs may not be interested initially; moreover, RBI (Reserve Bank of India)³⁴ guidelines mandate that income-generating loans form at least 70% of the loan portfolio. However, smaller MFIs may be more interested, especially from the social impact and health perspective. Such MFIs may need some form of grant funding and / or soft loans to get started in this space, but the model could become self-sustaining in the longer term. Additionally, establishing the model with smaller MFIs initially could pave the way for interest from larger NBFC MFIs in future years, especially if policy guidelines become more conducive to such loan products – e.g., sanitation loans qualify as PSL (Priority Sector Loans³⁵), the allowed proportion of non-income-generating loans in MFI portfolios increases, etc.

Box 6 demonstrates the experience of Guardian and Grameen Koota, two MFIs that provide sanitation loans.

Box 6: MFIs in sanitation

Guardian is a water and sanitation-focused MFI set up in 2007, in the state of Tamil Nadu, India. It provides loans via Joint Liability Groups for installing new household water connections or toilets. Toilet loans range from INR 5,000 (USD 100) for renovating existing toilets, to INR 10,000 (USD 200) for constructing new toilets, and often finance the entire cost of the toilet (i.e., do not require the customer to make any financial contribution upfront). Since 2007, Guardian has expanded from 1 to 4 districts (in Tamil Nadu), and has given out ~25,000 loans for toilets. The current repayment rate is ~96%. Some borrowers have used the INR 10,000 (USD 200) loan to construct expensive septic tank toilets, demonstrating that financing can drive toilet purchase even by households that could have afforded one without financing.

Paul Sathianathan, Guardian's CEO, feels that the demand for toilet loans exists, as does R. R. Kalyan of CDOT, an MFI which has launched sanitation financing initiatives in rural Bihar.

Discussions with other MFIs such as Grameen Koota also indicate that providing sanitation loans could be a natural area of expansion for their activities. Grameen Koota, a large Indian MFI with focus on income-generating loans (IGLs), started working in sanitation in 2009 to serve high pent-up demand. Today, it has one of the largest water and sanitation portfolios in the country, having provided 50,000 toilet loans in rural and urban areas. Grameen Koota has found that sanitation loans are useful in extending its relationships with its existing borrowers. Synergies in customer acquisition, loan processing and repayment collection with its existing IGL portfolio help defray operational costs of providing sanitation loans.

Mainstream MFIs that offer sanitation loans have seen high repayment rates on these loans. Grameen Koota has seen 99% repayment on its sanitation loans. Water.org, which is working with 21 organizations in India (including Grameen Koota and Guardian) to facilitate credit for water and sanitation, has also seen consumer loan repayment of nearly 99% across its partner MFIs.

However, regulatory issues could prove a challenge. RBI guidelines mandate that at least 70% of an NBFC MFI's loans have to be income-generating in nature, constraining availability of funding for sanitation. Sanitation loans are also currently not classified as priority sector lending for banks, increasing borrowing costs and further reducing potential funding for the sector.

³³ Registered as a financial institution that provides certain banking services, but does not hold a banking license. However, it is covered under most banking regulations

³⁴ The Reserve Bank of India is India's Central Bank

³⁵ Banks in India have to allocate a certain part of their loan capital to provision of loans for certain 'priority sectors' as defined by the Government

Need for a ‘market maker’

Both the DIY and TSP models would require a central player or ‘market maker’ to conduct market-building activities – at least in the initial stages – to get the models started and create an enabling environment for the market to grow. This could include various activities, such as:

- Incubating value chain players such as TSPs and cement ring manufacturers
- Providing high-quality and cost-effective toilet designs
- Conducting awareness building and demand generation for these designs
- Facilitating financing by linking providers with MFIs or other financiers
- Training masons and TSP personnel
- Monitoring quality of toilet construction and endorsing good providers
- Helping customers access the NBA subsidy
- Facilitating working capital for TSPs, cement ring manufacturers, etc.
- Working with the Government to define policy, etc.

Such support would be required till the market reaches a critical mass, at which point it may be able to sustain itself without the market maker’s oversight.

The actual activities of the market maker will depend on the approach the market maker wants to use; e.g., in a ‘light touch’ approach, the market maker may only provide the toilet designs, do some basic awareness building activities and provide access to financing (in a DIY model). In a more intensive approach, the market maker may perform all the above activities and even undertake activities such as building a brand and creating new and improved products. The activities that market makers take on will also be determined by the model they choose. Different kinds of organizations can potentially play this market maker role, with implications for the kinds of activities they perform in the TSP and DIY business models.

Development sector organizations or NGOs

For NGOs working among rural communities, sanitation is an add-on activity with significant potential for social impact, and hence would be aligned with their broader social goals. These NGOs already have strong local presence and networks within the communities they

serve, and therefore, the additional investment required for adding sanitation to their portfolios will not be high. However, additional donor or government funding will be needed, as this intervention will not generate revenues.

The NGOs are likely to be especially good at awareness building and demand generation, training masons and TSP personnel on standardized toilet construction (though they would have to source the core mason training expertise), monitoring quality of construction and endorsing good providers. They may also be able to help customers access the NBA subsidy and work with the Government to define policy. A pre-launch role for NGOs with the relevant expertise could be development and testing of product designs, with customer input.

The Government’s NBA campaign puts aside a specific budget (15% of project outlay) for IEC (Information, Education & Communication) activities – NGOs could work with the Government to leverage these funds for awareness building and demand generation.

Micro Finance Institutions (MFIs)

Apart from provision and processing of loans, MFIs can even be the ‘market maker’.

This can be through a ‘light-touch’ approach, where MFIs offer customers some guidance on toilets that they can construct (e.g., via pamphlets – see example of Guardian in Appendix 4), apart from giving them loans. Alternatively, they can choose to take a more intensive approach, and play a stronger role in creating an enabling environment for toilet construction. In some ways it is in their interest to conduct some of these activities (e.g., quality control), because if toilets are not constructed satisfactorily, repayment rates on sanitation loans may fall. However, most MFIs do not have the inclination or capabilities to perform these activities. As some larger MFIs have ‘sister’ NGOs, one option here may be for the MFI to play the traditional financing role with a ‘light touch’ approach, and for the sister NGO to conduct activities such as mason training and helping get access to NBA funds. Grameen Koota is one example of an MFI that utilizes this model.

In the TSP model, MFIs can also consider financing TSPs, apart from customer financing.

Cement producers

Sanitation is a significant opportunity for cement producers. Addressing households that can afford a toilet at INR 7,000-10,000 (USD 140-200) with financing and part-subsidy (i.e., ~60% of households without toilets in rural areas) can translate into demand for over 9Mn tons³⁶ of cement, at the national level.

Cement producers are already well-penetrated in rural areas, supplying cement for construction purposes. Actively facilitating the sanitation space could lead to further business growth for established players, and act as a brand creation mechanism for new entrants. Some cement players already engage in mason training, and can easily extend into training for toilet construction. Cement producers are also well positioned to play a role in setting standards with regard to toilet design and construction. Entering sanitation could also be advantageous from a Corporate Social Responsibility (CSR) or social impact perspective.

³⁶ At current market rates of INR 320 (~USD 6) per 50 kg bag of cement, 9Mn tons of cement represents a market opportunity of INR 5,500-6,000Cr (~USD 1.2Bn). The overall market for cement in India is 223Mn tons annually (2012)

Best practices for business model rollout

Awareness building, demand generation, value chain coordination and product quality standardization are key elements of the proposed business models. The 3SI team's field research in Bihar, coupled with conversations with sector experts, highlighted a few potentially useful practices in these areas:

- Latent demand for toilets exists in many parts of India
 - basic awareness building and demand generation is not needed, as households already want pour-flush toilets; however, awareness and demand creation may be needed for specific product options and the means to obtain them
 - While underlying demand exists in many parts of India, this may not be the case in other geographies (e.g., some parts of Africa); in such locations, more intensive demand generation for improved toilets may be needed
- Households respond better to marketing using product catalogs and model toilets, as opposed to verbal communication. Seeing product catalogs, with material quantities and prices clearly marked, makes it easier for customers to believe both the product quality and price being quoted. The product catalogs also then become the 'standards' that masons have to follow
- Upfront discounting can be used to build word-of-mouth for the product. Initially, a few toilets can be provided in a community at discounted rates (clearly indicating that this is a limited period discount only), with the aim of providing exposure to the concept and model
 - However, price discipline after the initial discounting period is critical to ensure that the discounted price does not become a standard market expectation
- Mason training is a critical activity to ensure product standardization and quality, and ultimately, customer trust. However, this is not a trivial task – many organizations have faced challenges with regard to masons' acceptance of new techniques. A promise of work (either a clear sightline to demand or some level of 'guaranteed' work) could be a strong incentive to propagate training and utilization of the new techniques and models
- Ensuring coordination among value chain players is a key market maker responsibility. For example, mason training needs to be accomplished in time for the launch of the discounted toilet models and demand generation activities, to ensure that masons remain excited about the product
- Geographically, it might make sense to start in areas located closer to urban centers, as the supply chains are likely to be strongest there. Significantly increasing penetration in such areas would be easier, and would also help spread word-of-mouth farther into rural areas, before actual rollout to such areas

The above best practices are based on the 3SI team's initial thinking, and need to be refined through pilots and tests (a pilot is ongoing in Bihar, under 3SI).

Conclusions, including suggestions for government & open questions

Demand for toilets exists in rural India – a large majority of households indicate a desire to construct a toilet. This demand is currently not being met due to the fact that traditional solutions are very expensive. However, research indicates that quality toilets can be constructed in the sub-INR 10,000 (USD 200) range, by making judicious design choices.

Financing support can be a key enabler – only 6-8% of households without toilets would be able to afford an INR 7,000-10,000 (USD 140-200) toilet without financial support. Financing can drive conversion of another 10-12% of households, and financing combined with part-subsidy can help drive conversion for an additional 40-45% of households. Overall, this could represent demand for toilets worth INR 500-700Bn (USD 10-14Bn), with an INR 300-450Bn (USD 6-9Bn) financing opportunity (including bridge financing for part-subsidy).

The underlying approach here is to start with the “easiest” segment (the most affluent 16-20%), then quickly extend to the next 40-45% (using the current NBA subsidy), and subsequently reach the bottom 35-40% (with a full subsidy, leveraging the NREGS subsidy in addition to the NBA subsidy). The rationale for this approach is that once these low cost toilets start being used, others would see them and want them. Also, these initial toilets would help set the supply chain in place, and it would become easier to deliver and procure the toilets. And with the movement to direct subsidies, these too become easier, further helping increase penetration.

There are two broad business models that can be used – i.e., the TSP and the DIY models. Both have several advantages and disadvantages – while the TSP model promises hassle-free solution delivery within a guaranteed cost, the DIY model offers higher customizability and potential cost advantage to the customer, and shorter time-to-market from a market maker’s perspective.

Both models would need support in conducting market-building activities for a period of time, till a critical mass is reached and the market becomes self-sustaining.

Different organizations, such as NGOs, MFIs or cement manufacturers, can play this market-making role.

MFIs, in particular, can play a key role. Apart from customer financing, MFIs can act as enablers, helping raise awareness and drive demand for specific products (through pamphlets, etc.), and maybe even perform quality control and mason training, incubate new value chain players, etc.

Government can facilitate development of the sanitation market through three broad sets of activities:

- Overall facilitation of the market, e.g., by developing high-quality and cost-effective toilet designs with inputs from sanitation NGOs and customers, and funding awareness creation and demand generation for these toilets by local organizations involved in providing these toilets
- Subsidies for customers: the NBA is a major step forward, as it gives customers the choice of product model. However, clear guidelines on the integration of the NBA with the rural jobs guarantee program (i.e., the NREGS) would be helpful. Improving the efficiency of subsidy transfer to customers, especially in poorer economic strata, can further activate toilet demand – there are potential choke points in the current subsidy model, with opportunities for rent-seeking and delays in approving subsidies
- Facilitating private sector financing to the end customer, e.g., reducing the minimum limit for income-generating loans from NBFC MFIs could help in channeling greater funding towards sanitation financing. The RBI took steps in this direction in 2012, reducing the limit from 75% to 70%; however, a further reduction would be helpful. Classifying sanitation as ‘priority sector lending’ could increase availability and potentially lower cost of funds for both customer financing and value chain player financing. The Government can also provide low-cost funds for financiers to on-lend to customers, resulting in increased affordability for customers

However, a number of questions remain. While these product solutions and execution models are based on extensive research, their success will need to be proven

through execution. A number of organizations are utilizing such models – e.g., PSI, through the 3SI project, is piloting the DIY and TSP models in Bihar, including incubating cement ring manufacturers, TSPs, etc. in its focus districts. Guardian has taken an MFI-led approach in Tamil Nadu, and Grameen Koota is a large MFI that is using its ‘sister’ foundation to do ‘market-building’ activities while the main business does loans.

Water.org, which facilitated both Guardian and Grameen Koota in entering sanitation financing, is a key player in this space. Through its WaterCredit program, it offers subsidies to MFIs (or affiliated NGOs) for operational expenses (baseline surveys, awareness creation, personnel salaries, etc.) incurred in providing water and sanitation loans. Today, it is working with 21 organizations in India (and 30 globally), and ~207,000 water and sanitation loans have been disbursed through its partners globally so far, delivering WASH improvements to more than 1 million people. FWWB (Friends of Women’s World Banking) is another organization that is supporting water and sanitation financing in India, by providing loan funds to MFIs for on-lending and grants for operational expenses – since 2009, ~6,000 toilet loans and 1,000 water loans have been provided under FWWB’s Water and Sanitation Program, by 10 partner organizations in 7 states across India.

The experiences of these players will help in testing and refining these business models, and lead to scaling them up in the longer term.

There is also a need to improve products – from refining the current solution and developing new ones (e.g., a ‘modified’ rural pan with integrated footrests and better aesthetics, prefab or plastic superstructures, etc.), to developing better products for challenging environments.

The insights documented in this white paper, while applicable to many parts of India and, to some degree, in other parts of the world, represent one set of approaches to rural sanitation. There are other approaches being used in other countries such as Cambodia, Indonesia, etc., that are working in different contexts.³⁷

³⁷ The following reports provide detailed descriptions of interventions in these locations: WSP’s “Sanitation Marketing Lessons from Cambodia: A Market-Based Approach to Delivering Sanitation” (<http://bit.ly/16DELul>) covers the work being done in Cambodia, and “Factors Associated with Achieving and Sustaining Open Defecation Free Communities: Learning from East Java” (<http://bit.ly/1aOgCNI>) discusses the learnings from Indonesia. “Application of Total Sanitation and Sanitation Marketing (TSSM) Approaches to USAID” (<http://bit.ly/1cbASev>) documents USAID’s sanitation interventions across locations.

Appendix 1: Overview of 3SI project approach in the landscaping phase

(This appendix contains a high-level description of the approach used in the landscaping phase of the 3SI project. For more details, please refer to <http://goo.gl/GVrxOo> or <http://goo.gl/SmXBgm>)

The “Supporting Sustainable Sanitation Improvements” (3SI) project aims to increase penetration of sanitation in rural Bihar through supply-side improvements. The overall target is to increase rural toilet penetration in BMGF’s 8 focus districts (called ‘innovation districts’) by 10% over a 5 year time frame, using a scalable market-based model. This translates to construction of ~460,000 toilets over this period.

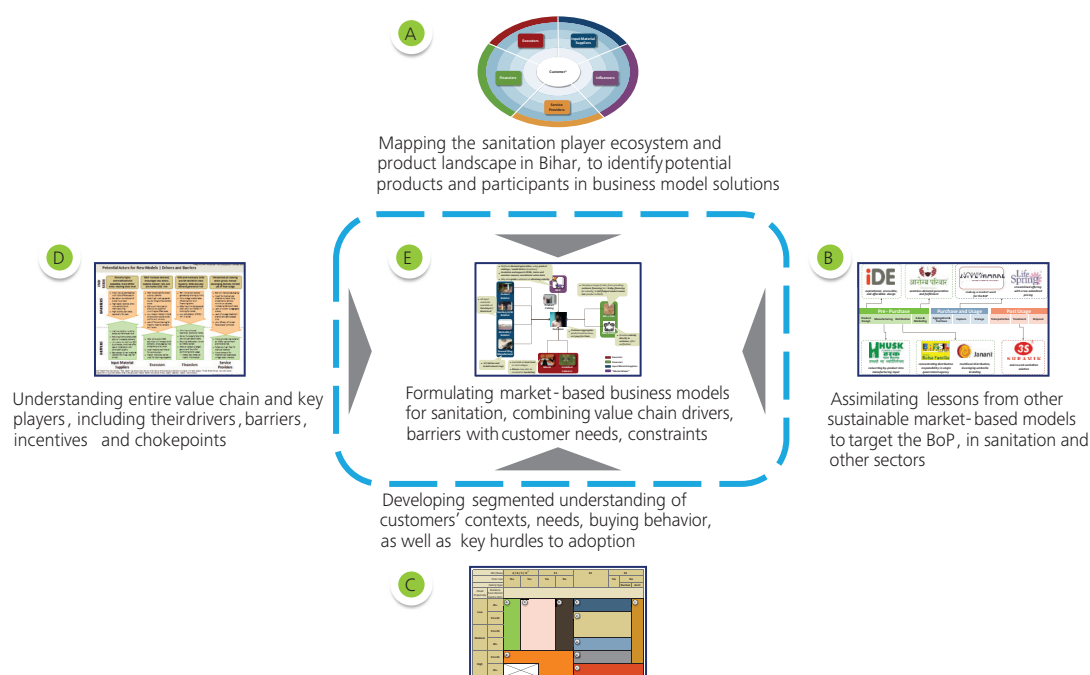
The overall project has been structured into three phases. The first phase (Year 1, concluded) was a landscaping study that developed scalable supply-side business models for the local market. The next phase (Year 2 to 5), which has begun, will involve piloting and refining selected business models, and scaling up the successful ones. The final phase (Year 5) will focus on

analyzing results and disseminating findings to a broader audience of stakeholders and practitioners, so that the most promising models can be replicated in other similar geographies.

Population Services International (PSI) leads the overall 3SI effort, while Monitor led the landscaping phase (i.e., Year 1) of the grant. Water for People provides technical support and aids in solution design.

The objective of the landscaping phase was to develop sustainable market-based business models for increasing penetration of sanitation in rural areas. It was structured as four interconnected modules of analysis (as shown in Figure 3), to inform development of such business models.

Figure 3: Project analytical construct



The analytical effort was preceded by an initial exploratory or dipstick phase, involving 24 conversations with households in rural areas, 30+ interviews with value chain players, and several interviews with sanitation

experts. This helped the 3SI team understand the local context and different perspectives, making the actual analytical effort much more effective.

A. Sanitation ecosystem & product landscape

This module mapped the current sanitation ecosystem in Bihar, through conversations with stakeholders and sector experts, as well as field visits and interviews in a few districts of Bihar.

The ecosystem was detailed primarily across two key dimensions:

- a. Entities involved in or influencing the construction of a toilet (private or through government) from the lens of a consumer, i.e., input material suppliers, executors, financiers, influencers, and service providers. This helped identify potential participants in the business models being developed
- b. Sanitation product landscape – types of toilets constructed at various price points, gaps in the product landscape, and potential product solutions for the business models being developed

B. Analogous sustainable models

This module studied various other interventions at the bottom of the pyramid (BoP) in sanitation and other sectors, to identify relevant lessons.

Numerous organizations were evaluated, and important analogs were identified by applying filters of relevance, impact, scalability and sustainability. The identified analogs were studied in detail through secondary case studies, field visits, and discussions with senior executives, to derive insights which could help in developing solutions for Bihar.

C. Customer behavior

This module aimed to develop a deeper and segmented understanding of customers' desired sanitation experience, toilet buying behavior and personal values, to help in developing targeted business models.

The team used Monitor Deloitte's Action Segmentation™ approach to segment customer households, based on a deep understanding of customers developed through ~860 quantitative interviews (through a third-party agency), ~100 qualitative interviews and 8 focus group discussions (FGDs) with both toilet user and non-user households.

D. Value chain

This module helped build a detailed understanding of value chain players, both existing and potential, who could play a role in the proposed business models. The project team understood overall system and player economics, along with role descriptions, incentives, chokepoints, drivers and barriers, etc. for each key actor. Based on this value chain assessment, the team identified high potential actors for new business models, along with a description of potential entrepreneur archetypes for last-mile actors.

These findings and analyses were based on nearly 150 interviews in Bihar. In addition, the team also conducted field visits to a number of sanitation projects in other geographies, to understand best practices and key lessons for implementation.

E. Formulating business models for sanitation

After completion of the above four landscaping modules, their findings and insights were tied together in a workshop setting, to formulate business models for different groups of customers. Workshop participants included executives from Monitor, PSI, BMGF and Water for People, apart from other global subject matter experts.³⁸

Preparing for pilots

After the business models were formulated, the project team began preparing to pilot these models on the ground. This involved detailing out the business models, assessing the system and player economics, and defining player roles for the selected models. The team prepared detailed value propositions for important players, and tested these with experts and in the field. The project team also helped the PSI team prepare for the pilots through onboarding sessions and initial field support.

³⁸ For further details on the project findings, please visit <http://goo.gl/GVrxOo> or <http://goo.gl/SmXBgm>

Appendix 2: Approach to understanding customers

The 3SI team undertook a detailed study of customers, to develop a strong understanding of their needs, desires and willingness to pay for sanitation solutions, to ensure that proposed business models and products effectively target customers.

The team also segmented customers, to provide more nuanced insights into behavior of different types of customers. This was done through a statistical exercise, which analyzed demographics, behavioral indicators, and attitudes of customers (based on ~860 quantitative interviews) to identify key drivers of sanitation adoption, and to classify the entire customer population into internally homogeneous segments that are meaningfully different from each other with regard to propensity for adopting toilets. This knowledge helped the team assess attractiveness of various customer groups, as well as the ease of conversion, to enable targeted interventions for different customer segments.

To identify the key drivers of toilet purchase, the team designed five 'meaningfulness tests', i.e., tests that helped identify the variables that most strongly predict rural households' propensity towards the desired behavior (i.e., construction of toilets). These tests evaluated the four key stages of a decision to construct a toilet, namely – awareness, involvement in the toilet buying process, ability to pay, and willingness to purchase. These tests were included as questions in a quantitative customer questionnaire (see Section C. of Appendix 1).

The meaningfulness tests used were:

1. **Awareness of health and hygiene:** The location of last childbirth in the family was used as an indicator of awareness of health issues; health-conscious rural families were more likely to get their children delivered at hospitals, as compared to relying on midwives or village clinics
2. **Awareness of open defecation-linked health issues:** People who think open defecation leads to health problems are more likely to invest in construction of a toilet
3. **Involvement in the toilet buying process:** The team tested whether households had considered toilet purchase, and how far they'd gone in the purchase process (i.e., research on specific products, identifying construction method, etc.) before deciding not to

purchase. A family that has considered toilet purchase and researched potential options has a higher involvement in the buying process as compared to one that has never considered purchasing a toilet

4. **Ability to pay:** The team assessed households' ability to purchase a toilet, based on previous asset purchase behavior. Household spend on mobile phones and home improvement was used to indicate ability to pay
5. **Propensity to purchase:** Respondents were asked whether they were willing to pay for a toilet, and if so, how much they were willing to pay. This helped the team assess propensity to purchase a toilet (divided into five levels, from 'unwilling to buy', to 'ready to pay over INR 10,000 or USD 200')

The key indicators of toilet purchase in rural areas, identified through this research, were the following:

1. **Socio-Economic Classification (SEC)**³⁹: An indicator of household affluence, based on asset ownership and education level of the chief wage earner (CWE). Along with the ability to pay for a toilet, SEC also reflects propensity to purchase a toilet, general hygiene awareness, etc.
2. **Family type:** Whether the household is a joint or a nuclear family (joint family defined as a household with more than one couple). Ability to pay varies across joint and nuclear families – while joint families have a slightly higher ability to pay in higher SECs, the reverse is true in lower SECs (especially E3), where a joint family implies a larger number of dependents
3. **Prior use:** Whether the respondent has ever used a toilet in the past. This variable indicates greater propensity to purchase a toilet
4. **Block flood propensity:** The risk of flooding, estimated based on the number of floods experienced by the particular block (administrative division within a district) over 2001-2010; blocks classified into three levels based on the number of floods – Low: 0-2; Medium – 3-5; High – 6+. Flood risk accentuates need for toilets and awareness of open defecation-linked issues, increasing willingness to purchase a toilet
5. **Block distance from district center:** The distance of the block from the district center (i.e., the administrative, and in most cases, economic hub). Blocks closer to district centers have higher sanitation penetration. Ability and propensity to purchase are

³⁹ SEC – Socio Economic Classification; rural households are divided into SEC classes (from A to E with subdivisions) based on the education of the chief wage earner and the household's asset ownership; this is done in accordance with the new SEC classification guidelines defined by the Market Research Society of India. These guidelines can be accessed at the following link: <http://imrbint.com/research/The-New-SEC-system-3rdMay2011.pdf> (as on Nov 10, 2013)

also higher, given greater economic activity and exposure to toilets. However, availability of space may be an issue in some cases, due to relatively crowded localities

The team refined the segmentation findings through ~100 qualitative interviews and 8 focus group discussions, to obtain a strong understanding of customer behavior and develop detailed customer profiles. The focus groups also helped in testing solution designs for specific segments.

Appendix 3: Customers' ability to purchase

3SI's research showed that while a strong desire to purchase toilets exists in rural areas, this does not necessarily translate into ability to pay. Customers can be broadly grouped into four categories, based on their ability to afford or pay INR 7,000-10,000 (USD 140-200) for a toilet with or without financial assistance. Customers' categories can be identified using household education levels, asset ownership and income sources as proxies.

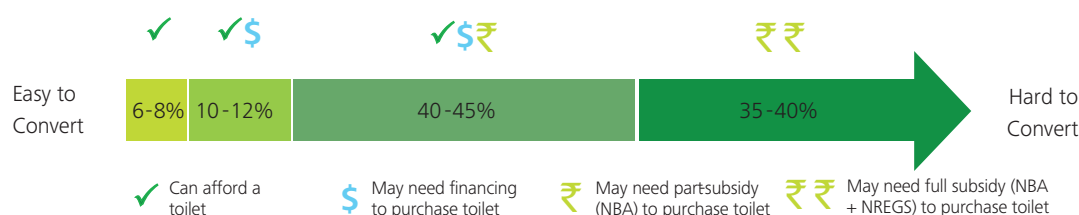
Figure 4 below shows this spectrum of customers' ability to pay and need for financing. The percentages on the arrow denote the percentage of households (that don't own toilets) across rural areas that fall in each category, based on the team's research in Bihar.

Customers have been classified into these four categories as below:

1. **Can afford a toilet** – Relatively affluent households, owning at least one asset from among TV, fridge, PC or laptop, 2-wheeler, 4-wheeler, tractor

2. **May need financing to purchase a toilet** – Other households in relatively affluent SECs (A, B, C, or D), or households in SEC E1 with relatively regular incomes (e.g., salaried employees, traders, shopkeepers, and skilled workers). While such households may not be able to pay INR 7,000-10,000 (USD 140-200) outright for a toilet, they would be able to make payments of INR 250-500 (USD 5-10) per month
3. **May need financing and part-subsidy to purchase a toilet** – Other households, that own at least one asset from among mobile phone, ceiling fan, landholding > 1 bigha⁴⁰. Apart from financing, these households may need an additional subsidy (i.e., INR 4,600 or USD 92, the NBA subsidy) to purchase a toilet
4. **Cannot afford a toilet (i.e. may need full subsidy to purchase a toilet)** – All households that do not fall into the above categories. These households would not be able to pay any significant amount for a toilet, even via monthly payments, and would need almost completely subsidized toilets

Figure 4: 'Ability to Pay' spectrum



The above classification assumes availability of financing of up to INR 5,000-7,000 (USD 100-140) per toilet (loan to value ratio of 70% for toilets priced at INR 7,000-10,000 or USD 140-200), at an interest rate of 24% and repayment period of 18-24 months, resulting in a monthly payment of INR 250-500 (USD 5-10), which may reduce if a subsidy is obtained.

The subsidy value has been taken as INR 4,600 (USD 92), the amount currently available under the NBA for toilet construction.

⁴⁰ A bigha is a non-standard unit of area, prevalent in India; different parts of the country use different sizes for a bigha. The most prevalent use of the unit in Bihar is 1 bigha = 0.6 acre, and this is the conversion assumed here

Apart from the ability to pay, customers in the four affordability groups above also differ from each other in terms of desired sanitation experience, personal values, etc. The following indicative ‘pen-sketches’ of customers in each of these groups can help illustrate these differences⁴¹.

1. Can afford a toilet:

Ram Prasad is 50 years old and lives with his wife in Dalsingsarai, Samastipur. He owns 2 bighas of land in the village, where he does farming. Ram has grown up in this village with his parents (now deceased) and brother (who now lives and works in Patna city). Both Ram and his brother studied up till Matric (Class 10)⁴², in the village school. Ram’s sons also studied in the same school but they are married now and live in Patna with their families. The last few seasons have been good for agriculture and Ram has been able to purchase a color television and paint his house. He already had a ceiling fan at home.

Ram and his wife start their day at 4 AM. He gets ready for the day and then heads out to the fields to work. He also uses his own field for open defecation. Ram has never used a toilet before and is satisfied with defecating in the open. However, he sometimes faces issues in going outside, such as when he’s unwell, or when it is raining. However, he doesn’t think that is reason enough to spend on a good-quality toilet, which would cost INR 50,000 (USD 1,000) according to his family. If he were able to save that much money, he would rather spend it on buying a motorcycle for himself. If he could obtain a good quality toilet within INR 15,000 (USD 300), he would purchase one. Ram has seen some government toilets constructed in his village but does not think they are of good quality.



⁴¹ Please note that the ‘pen-sketches’ shown here are representative of the contexts, behaviors and attitudes of customers in each of the four categories mentioned above, and are not descriptions of any specific customers or households. Images shown for each affordability group are illustrative of the kinds of households that belong to them

⁴² Matriculation or Class 10 in India roughly corresponds to Grade 10, i.e., the 10th year of study

2. May need financing to purchase a toilet:

Manoj Ravidas is 30 years old. He lives with his wife and 2 children at his village in Dhanarua, Patna. His parents and brother live in the same village, but Manoj moved into his own house when he got married. His new pucca house was constructed two years ago.

Manoj has studied till Matric (Class 10) and works as a skilled worker in Ludhiana, Punjab. He also owns a small piece of land where his wife does farming. He spends 8 months of the year in Punjab, and returns during the harvest season and Diwali. He has opened a bank account in his wife's name in the local SBI branch, into which he deposits his savings every month. Manoj and his wife have recently invested some of their savings in a mobile phone and a ceiling fan for the house.

One of the aspects that Manoj likes about Punjab is that he gets to use a clean toilet every day. The toilet is kept clean and is conveniently located close to his workplace. In the village, he dislikes having to defecate in the fields as he feels it is inconvenient and causes diseases. He is also concerned for his wife due to the lack of privacy in open defecation.

He has considered building a toilet, but can't afford it at present. He is currently saving to expand his house, after which he will start saving for a toilet. He would like to get a government subsidy, but is concerned about the poor quality of some of the TSC toilets he has seen. He is in two minds about getting a TSC toilet – why construct a poor-quality toilet when you are giving up the space anyway!

Manoj wants a good-quality toilet with pucca superstructure. However, he is unsure when he'll be able to save enough money to buy a toilet. He would like to obtain a loan for constructing a toilet – it would be difficult for him to come up with the entire toilet cost upfront.



3. May need financing and part-subsidy to purchase a toilet:

Satyendra Rai lives in a village in Mokamah, Patna. Satyendra is 21 years old, still unmarried. His parents (whom he lives with) are looking for a girl for him and he thinks he will get married in the next year or two. Satyendra works as a helper in a local shop which sells cement, bricks and iron rods. The owner is a landowner from the same village and pays him INR 2,000 / month (USD 40 / month) to help manage the shop and undertake necessary labor. Satyendra's father does odd jobs, but is finding it hard to obtain work on a regular basis.

Satyendra is educated till Class 5. He is considering moving out of the shop and going and working as a laborer in a city like Mumbai or Delhi, where he can make more money, and save enough to repair his house and install an electricity connection and a ceiling fan. But his parents want him to stay with them, and so far he has not moved out.

Satyendra wants to get a toilet constructed in the house because his mother faces privacy issues during open defecation. Safety is also a concern, especially at night. However, he does not think his family can afford a toilet. He has talked to the owner of his shop, who has constructed a septic tank toilet costing INR 70,000 (USD 1,400). Satyendra knows he will have to go for something a lot cheaper. He has heard that the government is constructing toilets in many villages, and would like one to be constructed for him too. However, he wants to make sure that the toilet is of high quality, and doesn't mind borrowing to invest additional funds in the toilet, if required.



4. Cannot afford a toilet (i.e. may need full subsidy to purchase a toilet):

Uday Kumar lives with his wife and 2 sons in his village in Motihari, East Champaran. His sons are 25 and 20 years old respectively. Uday himself is around 50 years old (he does not know his exact age). The elder son has been married for 4 years now and his wife and two sons (3 years and 6 months old) also live with them.

Uday has had a hard life. He used to be able to find work as a laborer with a mason for 20 days every month, for which he was paid a daily wage of INR 150-175 (USD 3-4). But over the last 2 years, he has not been able to work as much due to a recurring back problem. Healthcare costs for his treatment are putting a huge burden on his family. Being illiterate, Uday is also not qualified to take up another skilled, less physical job. The family had taken a loan for treatment from the local moneylender, and is facing difficulties in repaying it.

There are other financial burdens as well on the family. They had to spend on repairing their kuchha house when Uday's elder son got married. They also want to save for the younger son's wedding, but are barely able to cover basic living expenses. The sons, who have studied till the 4th grade, are finding it hard to obtain work as laborers.

Uday and his family use the nearby fields for open defecation. Uday thinks the fresh air and exercise are good for his health, but sometimes feels concerned because of lack of privacy for his wife and daughter-in-law. He has not considered constructing a toilet, because he knows he can't afford it. He wouldn't mind the government constructing a toilet for him; however, he feels the quality will probably not be good, and is resigned to open defecation going forward.



Appendix 4: Construction of high quality toilets in under INR 10,000 (USD 200)

Multiple organizations have demonstrated the potential to provide high-quality toilets in rural areas, at costs lower than INR 10,000 (USD 200) per toilet.

Example 1: Guardian

Guardian is the first water-and-sanitation-only microfinance institution in India, and offers water and sanitation loans to poor households, mostly in rural areas.

Since its inception in 2007, Guardian has shown impressive growth and has disbursed over 40,000 loans, including approximately 25,000 loans for toilets. Loans of INR 10,000 (USD 200) are provided for new toilet construction, while the loan amount for toilet renovation is INR 5,000 (USD 100). Guardian has developed designs for toilets that can be constructed within INR 9,000-11,000 (USD 180-220), and it provides borrowers with pamphlets (see Figure 5) that contain information and guidelines for constructing such toilets.

Figure 5: Guardian product brochure

Guardian - Tiruchirapalli

Cost wise Toilet Models

1

**Toilet with Roof
(Hollow Bricks)**

Size 4 x 4F,
(LB) 6.5 feet High

Toilet with Roof (Hollow Bricks)

2

**Toilet with Plastering
(Bricks)**

Size 4 x 4F,
(LB) 6.5 feet High

Toilet with Plastering (Bricks)

3

**Toilet attached bathroom
(Hollowbricks)**

Size 8 x 4F,
(LB) 6.5 feet High

Toilet attached bathroom (Hollowbricks)

Sl. No.	Material & Others	No's	Unit cost (In Rs)	Total (In Rs)	Sl. No.	Material & Others	No's	Unit cost (In Rs)	Total (In Rs)	Sl. No.	Material & Others	No's	Unit cost (In Rs)	Total (In Rs)
1	Bricks	5	4	20	1	Bricks	320	4	1280	1	Bricks	0	0	0
2	Hollow bricks	80	12	960	2	Hollow bricks	0	0	0	2	Hollow bricks	124	12	1488
3	Cement	2	325	650	3	Cement	3	325	975	3	Cement	2	325	650
4	(50 kg in Bag)	1	600	600	4	(50 kg in Bag)	1	750	750	4	(50 kg in Bag)	1	600	600
5	Sand (1/2 Unit)	3	300	900	5	Sand (1/2 Unit)	4	300	1200	5	Sand (1/2 Unit)	3	300	900
6	Mason	3	120	360	6	Mason	1	600	600	6	Mason	1	600	600
7	(Charge Per day)	1	400	400	7	(Charge Per day)	1	400	400	7	(Charge Per day)	1	400	400
8	Unskilled labour	3	120	360	8	Unskilled labour	4	120	480	8	Unskilled labour	3	120	360
9	(wages Per day)	1	600	600	9	(wages Per day)	1	600	600	9	(wages Per day)	1	600	600
10	Door (No's)	1	600	600	10	Door (No's)	1	600	600	10	Door (No's)	1	600	600
11	Rough Stone (Unit)	1	400	400	11	Rough Stone (unit)	1	400	400	11	Rough Stone (unit)	1	400	400
12	Concrete Ring (No's)	6	225	1350	12	Concrete Ring (No's)	6	225	1350	12	Concrete Ring (No's)	6	225	1350
13	Pre-cast cover	1	275	275	13	Pre-cast cover	1	275	275	13	Pre-cast cover	1	275	275
14	cement slab	1	275	275	14	cement slab	1	275	275	14	cement slab	1	275	275
15	Pre-cast Roof	2	275	550	15	Pre-cast Roof	2	275	550	15	Pre-cast Roof	2	275	550
16	Cement Slab	1	250	250	16	Cement Slab	1	250	250	16	Cement Slab	1	250	250
17	Closet (No's)	1	70	70	17	Closet (No's)	1	70	70	17	Closet (No's)	1	70	70
18	Connecting Pipe (In Feet)	1	400	400	18	Connecting Pipe (In Feet)	1	400	400	18	Connecting Pipe (In Feet)	1	400	400
19	Transport Charges (Materials)	1	400	400	19	Transport Charges (Materials)	1	400	400	19	Transport Charges (Materials)	1	400	400
20	Loading Unloading Charges	1	400	400	20	Loading Unloading Charges	1	400	400	20	Loading Unloading Charges	1	400	400
21	Others	1	457	457	21	Others	1	770	770	21	Others	1	457	457
Total				9000	Total				10500	Total				9500

Note: Rates are applicable to low cost toilet models subjects to change

Guardian Sanitation Product Brochure (as on Aug 17, 2013)

Example 2: Ambuja Cement Foundation

Ambuja Cement Foundation (ACF) works in over 160 villages in Chandrapur on a variety of interventions, including health, drinking water, sanitation and waste segregation, among other efforts. In the sanitation space, ACF conducts demand generation for toilets through awareness campaigns in villages. It also trains women in villages (called 'sakhis'), who can then further spread awareness of hygiene and sanitation. ACF also helps households access government subsidies for toilet construction, if available. Financing of toilets is typically a combination of government subsidy, ACF subsidy and contribution by the beneficiary.

Product designs are decided in consultation with the village panchayat as well as individual beneficiaries, and are customized as per the raw materials available in the village. Villages are encouraged to place bulk orders to get better rates on material and use local volunteers in place of unskilled labor for construction. Over 10,000 toilets have been constructed in ACF's target villages since 2003, with over 2,500 built in 2012 alone. Many of these toilets have been built at a price of ~INR 7,000 (USD 140).

Example 3: Hand in Hand

Hand in Hand India (HiH), an NGO headquartered in Tamil Nadu, has an MFI arm through which it has been lending for sanitation since 2005, with sanitation loans accounting for 6-7% of its loan portfolio. HiH has provided loans for ~8,000 toilets so far, including ~3,000 in rural areas and ~5,000 in urban areas.

HiH offers a variety of toilet models, but promotes a model which costs ~INR 9,500 (USD 190), as shown in Figure 7. Loans of INR 10,000 (USD 200) are typically given to finance construction, with a tenure of 18 months and an interest rate of 18%. HiH trains a panel of local masons to construct toilets for borrowers, and monitors construction once the loans have been given.

Figure 6: Low-cost toilet design from ACF

Cement rings



Rural pan

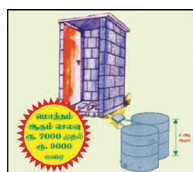


3 feet deep cement ring leach pit with rural pan and brick superstructure

Inputs	No	Price (INR)
Cement Rings	3	900
Labor (mason)		600
Labor (unskilled)	Costs 500, done for free with volunteer help	0
Pan (with pipe)	1	350
Superstructure (bricks)		2,040
Door		1,300
Cement, Sand		1,000
Ceiling		500
Total		6,690

Note: Toilet model depicted above is one of multiple toilet designs used in ACF interventions; Prices shown are approximate for the depicted model, and may vary across locations
Source: Ambuja Cement Foundation

Figure 7: Toilet design recommended by Hand in Hand



5 feet deep, 3 feet diameter cement ring leach pit (2nd pit optional), rural pan, and hollow brick superstructure

Inputs	Price (INR)
Materials for 1 Pit (cement rings, etc.)	1,700
Building Materials (hollow bricks, etc.)	3,750
Labor	1,600
Sanitary Ware (i.e. pan and pipes)	400
Door	1,500
Misc. Materials	500
Total	9,450

Note: Toilet model depicted above is one of multiple toilet designs used in Hand in Hand's interventions; Prices shown are approximate for the depicted model, and may vary across locations
Source: Hand in Hand

Example 4: Sanghamithra Rural Financial Services

Sanghamithra Rural Financial Services (SRFS) started sanitation financing in rural Ooty in 2010, with support from Rural Development Organization (RDO). It has since financed ~1,700 toilets⁴³ across several districts in Karnataka, providing loans of INR 10,000-15,000 (USD 200-300) at 18% interest.

SRFS also conducts awareness creation at the Gram Panchayat level through street plays and health awareness talks, among other activities. It also trains local SHG federations to generate further awareness. SRFS recommends a two-pit toilet solution which costs ~INR 10,000 (USD 200), as shown in Figure 8.

Example 5: Water for People

Water for People has interventions in many rural areas, including in South 24 Parganas, West Bengal (since 2007) and Sheohar, Bihar (since 2012). It has facilitated the construction of ~6,800 toilets so far across these two locations (including ~300 in the more recent Sheohar intervention), in the price range of INR 5,000–27,000 (USD 100–540).

Water for People's approach is to increase the penetration of sanitation via private sector involvement by incubating sanitation entrepreneurs. Such entrepreneurs aggregate various materials and services, and deliver the toilet to the customer.

One of the toilet designs that Water for People recommends is called the WOW Toilet (as shown in Figure 9), available at a price of ~INR 8,700 (USD 174).

Figure 8: Toilet design recommended by SRFS

2 pit toilet with 3 feet deep brick-lined leach pits, urban pan and brick superstructure

Inputs	No	Price (INR)
Bricks	650	2,275
Labor	Mason – 4 man days Laborer – 3 man days	1,200 375
Pan (with P-trap)	1	300
Sand	Cubic feet - 60	1,800
Cement	Cement - 4	1,200
Door - Steel	1	750
Tiled Roof	1	1,100
Others (steel, stones, pipe, wire etc.)		1,000
Total		10,000

Note: Toilet model depicted above is one of multiple toilet designs used in SRFS's interventions. Prices shown are approximate for the depicted model and may vary across locations depending on locally available materials and local prices; may rise up to INR 15,000 (USD 300) in some cases

Source: Sanghamithra Rural Financial Services

Figure 9: Water for People's WOW toilet



3 feet deep brick-lined leach pit with urban pan and brick superstructure

Inputs	No	Price (INR)
Bricks	700	4,238
Labor	Mason – 2 man days Laborer – 5 man days	1,500 962
Pan (with P-trap)	1	400
Door	1	1,000
Tiled	30	600
Others (sand filling, stoneware etc.)		962
Total		8,700

Note: Toilet model depicted above is one of multiple toilet designs used in Water for People interventions; Prices shown are approximate for the depicted model, and may vary across locations

Source: Water for People

⁴³ As of September 2013

Glossary

3SI	Supporting Sustainable Sanitation Improvements
ACF	Ambuja Cement Foundation
APL	Above Poverty Line
BMGF	The Bill & Melinda Gates Foundation
BoP	Bottom of the Pyramid
BPL	Below Poverty Line
CSO	Civil Society Organization
CSR	Corporate Social Responsibility
CWE	Chief Wage Earner
DIY	Do-It-Yourself
FGD	Focus Group Discussion
FWWB	Friends of Women's World Banking
HiH	Hand in Hand
IEC	Information, Education & Communication
IGL	Income-Generating Loans
MFI	Micro-Finance Institution
MIM	Monitor Inclusive Markets
NBA	Nirmal Bharat Abhiyan
NBFC	Non-Banking Financial Company
NGO	Non-Governmental Organization
NREGS	National Rural Employment Guarantee Scheme
PHED	Public Health Engineering Department
PSI	Population Services International
PSL	Priority Sector Lending
RBI	Reserve Bank of India
RCC	Reinforced Cement Concrete
SEC	Socio-Economic Classification
SHG	Self Help Group
SRFS	Sanghamithra Rural Financial Services
TSC	Total Sanitation Campaign
TSP	Turnkey Solution Provider
UNICEF	United Nations Children's Fund
WASH	Water, Sanitation and Hygiene

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Supporting Sustainable Sanitation Improvements in Bihar through Supply-Side Strengthening

To increase access to, and use of, improved sanitation in Bihar, India by strengthening the supply chain and developing a commercially viable business model.

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About the 3SI Project

The “Supporting Sustainable Sanitation Improvements” (3SI) project aims to increase penetration of sanitation in rural Bihar through supply-side improvements. The project was conceived of to supplement the work being done in sanitation demand generation in the Bill & Melinda Gates Foundation’s (BMGF) target districts in Bihar.

The overall target is to increase rural toilet penetration in BMGF’s 8 focus districts (called ‘innovation districts’) by 10% over a 5 year time frame, using a scalable market-based model. This translates to construction of ~460,000 toilets over this period.

The overall project has been structured into three phases. The first phase (Year 1, concluded) was a landscaping study that developed scalable supply-side business models for the local market. The next phase (Year 2 to 5), which has begun, involves piloting and refining selected business models, and scaling up the successful ones. The final phase (Year 5) will focus on analyzing results and disseminating findings to a broader audience of stakeholders and practitioners, so that the most promising models can be replicated in other similar geographies.

Population Services International (PSI) is the overall lead on the 3SI project. Monitor led the landscaping phase (i.e., Year 1) of the grant, while Water for People provides technical support and aids in solution design.

Detailed findings from the landscaping phase of the 3SI project and details on the approach used can be found online at: <http://goo.gl/GVrxOo> or <http://goo.gl/SmXBgm>

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