

# Human Development Report 2006

Human Development Report Office  
OCCASIONAL PAPER

## Rethinking Sanitation: Lessons and Innovation for Sustainability and Success in the New Millennium

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2006/27

# **Rethinking Sanitation – Lessons and Innovation for Sustainability and Success in the New Millennium**

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January 2006

## **Introduction**

Supply-led sanitation construction projects have for many decades been the standard approach used to address the lack of adequate sanitation among rural and urban households in developing countries. These typically were delivered through public provision by government or the donor community, using vertically isolated initiatives. A well-established pattern of poor progress of the supply-led model includes repeated failures to:

- generate demand for improved sanitation and behaviour change among project households,
- produce sanitation products and services that are sustainable beyond external support, or
- generate replication at scale

This has stimulated a gradual and growing shift in thinking about the sanitation sector over the last decade (Cairncross 1992; LaFond 1995; Wright 1997; Unicef 1997; DFID 1998, WSSCC 1998; Fang 1999; Kalbermatten et al. 1999).

When the Millennium Development Goal 10, Target 7 for sanitation was established in 2002, it raised international political stakes and generated real momentum for progress and new approaches to accelerate coverage (UN Millennium Project Task Force 2005). With much deeper attention and broadened interest in sanitation, a more realistic view of the complexity, time, resources and effort needed to meet the challenge of large-scale sustainable changes in sanitation at household level is now emerging. We review in this paper some of the key lessons learned from the past, new thinking emerging from consolidated learning and innovative experimentation on-the-ground (Table A-1 provides an overview and references for innovative strategies used in a variety of successful old and new sanitation projects and programmes), and some of the conditions necessary for success if real improvements in sanitation are to be achieved and sustained in rural and urban areas.

## **1 Problems and Lessons**

In this section, we begin by reviewing three central problems and some lessons about how to tackle these problems in the New Millennium in order to address the serious challenges posed by the wide-spread lack of basic sanitation in developing countries. The problems concern the question of enhancing demand for sanitation, of sustainability in its many forms and the use of subsidy, and of the institutional structures and arrangements necessary for sustainable, effective and large-scale action.

### The Question of Demand

The supply-led model paid little if any attention to understanding and stimulating demand for sanitation improvements before building sanitation infrastructure. A hardware subsidy was often used to induce sanitation changes at the household level, but rarely worked to create willingness to pay for, maintain, and use the new sanitation facilities. When the need to

motivate changes in sanitation behaviour at the household level was considered, health education programmes with messages about the public health benefits of having and using a toilet were hastily tacked on to construction projects.

Since then, overwhelming evidence and common sense have clearly shown that households decide to change their sanitation practices to gain a variety of different benefits, mostly having little to do with avoiding excreta-related diseases (see inventory of benefits in Table 1). There is a good reason for this. From the perspective of an individual household, changes in illness may be difficult to obtain and impossible to attribute with certainty to sanitation when other fecal-oral transmission routes both inside and outside the home are operating. Thus, the health benefits at the household level tend to be the least reliable to obtain amongst the private benefits of improved sanitation listed in Table 1.

Although improved public health and generating real economic returns to society (Evans et al. 2004) are the main societal reasons for investing in sanitation, they contrast greatly with the very different reasons that motivate private desires for better sanitation at home as seen in Table 1. Trying to motivate private behaviour using public interests usually doesn't work and may explain why health education campaigns achieve little permanent change in sanitation and hygiene behaviours. Cholera outbreaks are notorious for gaining short-term changes in household behaviour, but rarely seem to motivate sustained changes once the threat has passed. Moreover, many of the societal public benefits may be difficult to achieve without high levels of coverage which raises important programmatic and policy considerations we shall discuss later.

Another consequence of recognizing the private vs. public dimensions of sanitation is that both households and the public sector (government) clearly have good, but different reasons to want and pay for sanitation improvements. This expansion of benefits creates a real opportunity to expand resources to pay for improvements. Getting the balance right in how to share the costs will take trial and error through innovation and experimentation.

Table 1: Inventory of Stated Benefits of Improved Sanitation from the Private vs. Public Perspectives

Household Perspective <sup>a</sup>	Society-Public Perspective <sup>b</sup>
<ul style="list-style-type: none"> <li>- increased comfort</li> <li>- increased privacy</li> <li>- increased convenience</li> <li>- increased safety, for women, especially at night, and for children</li> <li>- dignity and social status</li> <li>- being modern or more urbanized</li> <li>- cleanliness</li> <li>- lack of smell and flies</li> <li>- less embarrassment with visitors</li> <li>- reduced illness and accidents</li> <li>- reduced conflict with neighbours</li> <li>- good health in a very broad cultural sense, often linked to disgust and avoidance of faeces</li> <li>- increased property value</li> <li>- increased rental income</li> <li>- eased restricted mobility due to illness, old age</li> <li>- reduced fertilizer costs (ecological sanitation)</li> </ul>	<ul style="list-style-type: none"> <li>- reduced excreta-related disease burden (morbidity and mortality) leading to: <ul style="list-style-type: none"> <li>▪ reduced public health care costs</li> <li>▪ increased economic productivity</li> </ul> </li> <li>- increased attendance by girls at school (for school sanitation) leading to broad development gains associated with female education</li> <li>- reduced contamination of ground water and surface water resources</li> <li>- reduced environmental damage to ecosystems</li> <li>- increased safety of agricultural and food products leading to more exports</li> <li>- increased nutrient recovery and reduced waste generation and disposal costs (for ecological sanitation)</li> <li>- cleaner neighbourhoods</li> <li>- less smell and flies in public places</li> <li>- more tourism</li> </ul>

- manure for crop production (ecological sanitation)	- national or community pride
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<sup>a</sup> Compiled from the following case studies and project reports based on household interviews, surveys and group discussions in many different settings: Jenkins 1999, 2004; Jenkins and Curtis 2005; Obika et al 2002; Mukherjee 2000; Allen 2003; Ellmendorf and Buckles 1980; D'Souza 2005; WSP-EAP 2002; WSP 2004.

<sup>b</sup> Reasons for public action stated in studies and documents but rarely quantified or ranked, for example, see Evans et al. (2004).

New demand for sanitation exists and shows up every day in the millions of households who acquire sanitation products and services from private suppliers in developing countries on their own, without subsidy. In fact, most new household sanitation in Africa and elsewhere in the developing world has been and continues to be privately acquired by households through the market. The contribution of public-sponsored construction actually represents a very small fraction of the gains in progress over the last decade as can be seen by comparing all public government and donor investment in sanitation in Asia, Africa and Latin America combined between 1990 to 2000, estimated at US\$ 3.1 billion, with the cost of providing the most basic on-site technologies to the 1 billion people who gained access during that period, estimated at a minimum of US\$ 26 up to 91 billion, depending on which of the most basic on-site technologies is assumed (Evans et al. 2004). For example, private action by households via the market place has accounted for all of the gain in coverage in Kampala, Uganda in the 1990s (Cairncross 2004), much of it in Bangladesh during and since the 1980s and 1990s (Loung 1994) and in rural Indonesia and Vietnam in the last decade (Mukerjee 2000; WSP-EAP 2002), and virtually all of it in rural Benin through 2000 (Jenkins 1999; Reiff and Clegbaza 1999). Clearly, demand is growing in many contexts and conditions as measured in Ghana where an estimated 140,000 households installed home sanitation for the first time on their own in 2003 (Jenkins and Scott 2005). We can learn from understanding this existing demand and the sanitation industry that supplies and services it, and identifying the barriers households and suppliers face in expanding demand. The sector has much to gain by recognizing the value of what is already going on in the market place and the significant contributions private households and commercial suppliers have made to improving global access.

Rethinking sanitation in terms of understanding the motivations and constraints of households in deciding to change their defecation practices and sanitation systems, and the delivery of sanitation as consumer products and services that households must want and pay for, in an on-going fashion, is an important paradigm shift for changing the way business has been done in sanitation. We take up these topics and ways to enhance demand and commercial supply in section 2.

### The Question of Sustainability

There have been many examples where supply driven projects have coerced, enticed or persuaded householders to build latrines and provided a subsidy, usually in the form of free hardware to facilitate and ensure construction targets are reached. The subsidy in itself is a double edged sword that is discussed below, but the problems created by the supply driven approach go beyond the use of subsidy. Donor supported sanitation projects implemented through government agencies or NGOs are always time limited. There are examples where projects have run longer than 10 years, but usually projects are limited to 2 to 5 years to fit the donor budgeting process. In most cases this is simply not long enough, especially if trying to target the poorest of poor and in settings where latrine usage is a completely new and culturally-foreign concept, and demand is weak. Core funding for sanitation really needs to be an integral part of public budgets, where realistic amounts of money are allocated

annually, such as with financing hospitals, schools, or a sewer system, towards the continuous management, repair and development of an area's excreta collection and treatment system. Currently excreta disposal is funded mainly on a short project basis as the solution is regarded simplistically as building of latrine.

Project implementers when faced with lack of demand and limited time look for short cuts to try and make the latrine building process as easy as possible for the householder. This usually means providing subsidy to reduce any financial constraints to encourage adoption, but it can also mean providing access to a mason, free delivery of latrine components and telling families the type of latrine they are going to be provided with.

When the project ends, these support mechanisms dissolve and the community members are left in the same position regarding lack of latrine component supply chains, few if any technology options and the same cost constraints as when the project started. For households who were lucky enough to have benefited from the project, this does not represent a problem as their latrine will probably serve them for around ten years. If the design allows reuse of components and they are willing to rebuild when the initial one is full, the family can be said to possess a 'sustainable latrine'. However sustainable excreta disposal has only been achieved at an individual household level and not within the broader community. Any expected public health benefits will only be partly achieved and, as the village grows, these benefits are likely to decline as the proportion of the community without access to safe sanitation increases. The households who have not benefited are likely to be poorer, less well educated, more risk adverse members of the community who are generally slower to take advantage of unfamiliar technologies and often disenfranchised in one way or another from access to such new opportunities.

In high density urban areas the problem of latrine sustainability is made more complicated by the lack of space needed to build a replacement latrine when the initial project-provided pit is full. In Dar es Salaam, householders have the following choices when this occurs:

- Abandon using a latrine and return to open defecation
- Use the neighbour's latrine which sooner or later results in arguments and family disputes
- Build a small temporary latrine made from old tyres or a drum (if space allows)
- Empty the pit - which can be achieved by
  - Hiring a vacuum tanker – access unlikely through narrow streets
  - Employ a person to manually empty the pit - expensive, unsafe and unattractive as waste usually dumped in a drain or buried on site.
  - Wait until it rains and wash the pit contents into the streets to the nearest drain or the neighbours plot

All these options are unattractive and therefore in high density urban areas, a project that simply provides latrines cannot be even said to be achieving sustainable toilets.

### The Question of Subsidy

The first question to ask is whether excreta management should be subsidised. Gregersen (1984; cited in Pardo 1990) pointed out that public incentives to private individuals or the private sector are justified in an economic sense when the social benefits go beyond the private benefits associated with a given private action. This occurs for sanitation and therefore subsidizing excreta management is justified on the grounds that the public health and development benefits of good sanitation go beyond the private benefits which the

individual gains by choosing latrine use over open defecation. This turns the subsidy question not into one of why, but one of how.

The negative effects of incorrectly applied subsidies are similar in the sanitation sector as they are in other sectors, namely:

- Dependency - If householders become reliant on subsidies for building latrines, it grows into an expectation and an unsubsidized replacement latrine is not built when the subsidised latrine reaches the end of its life. Householders have to consider latrine building and maintenance as their own responsibility and have to value its benefits.
- Buying participation – Where there is no real demand for using a latrine, organisations can entice householders to build a latrine by offering free latrine components. Householders, adopting an attitude of “Its free, it would be silly to refuse it”, obtain a slab even though they have no intention of using it or completing the latrine. The implementing organisations may recognise the problem, but find it difficult to make changes to their approach as the assumption that every distributed latrine slab is equivalent to a completed and fully used latrine is convenient for donor reporting.
- Costly – Providing long term support for latrine building is expensive and unsustainable. There is not enough public money to close the sanitation gap if the government had to provide every household with a toilet, even a very basic one (Methra and Knapp 2005). This makes the scaling up and replication of subsidy dependent sanitation projects prohibitive and impossible.
- Poor use of public money – When construction subsidy is given preferentially to one producer to supply households with toilets as it often the case with supply-led sanitation projects, this can lead to inefficient production and distort the behavior of the private supply market.
- Inattention to affordability and replication - If the subsidy cushions the price the consumer has to pay and makes say a \$250 ventilated improved pit latrine available to the householders for just \$50, when the subsidy is remove the VIP latrine becomes unaffordable to the intended customers and likelihood of replication without external support highly improbable.
- Does not reach the poor – Typical construction subsidies used for sanitation have tended to be captured by the wealthy and middle class, for many reasons, and do not reach the poor who need it most and are often the reason stated for using a subsidy in the first place. When subsidies are built into the production of a component or the construction of a facility, it is impossible to target and screen for those households within a community or those communities within a region who are truly in need of the subsidy. The “one-size” blanket subsidy does not fit the needs if it also is locked into one particular technology option and that option is not suited to the situation of the poor. It also ignores the issues of size or wealth of families that differ greatly even within poor areas, or how latrine construction costs vary from place to place within a country or area, depending on many factors (Mukherjee 2001).

- Slows rates of adoption – Households who can afford to and would have invested their own money in latrine building wait to adopt improvements in the hope of gaining subsidised support. Yet because there is never enough subsidy to go around, delay leads to no action at all.

Programme designers need to shift from solving sanitation problems as one-off toilet construction projects and start thinking about how to solve the long term on-going process of keeping large quantities of pathogenic excreta separate from human contact and rendering it safe. The starting point for thinking about subsidy is to first stop focusing on subsidizing the construction of private home sanitation facilities and start considering other ways to use public finance more effectively to encourage home owners to build and use latrines on their own, help them overcome the constraints they may face (which we discuss in more depth in section 2 (see Table 2), and address the public service problem of safely and efficiently managing excreta at the larger community and municipality scales, especially in dense urban slums, once it leaves the private domain of households (Methra and Knapp 2005; Evans et al. 2004).

### The Question of the Institutional Environment

#### *Weak political will and leadership.*

Sanitation (itself a euphemism for defecation) as a subject can be likened to sex; it is taboo to discuss it in polite society and is often a great source of humour. If anything, defecation is spoken about even less than sex because it is an individual activity and never occurs with a partner. At the same time poor defecation practices can be a source of great embarrassment and indignity, leading to strongly held feelings of discomfort and dissatisfaction. Problems relating to defecation remain hidden and rarely make it on to the community or political agenda. Without such bottom up pressure, excreta disposal has remained in the political backwater for many years. The elevation of sanitation to an MDG target has had a significant impact on political will for sanitation change in the global development sector and it is slowly beginning to gain political credence at national level, but it would be a brave (but astute) politician who would attempt to be elected on a “latrines for all” policy rather than “clean water for all”, or “free health care for all” policies.

#### *Poor institutional, policy and regulatory framework*

There are usually three or more ministries in any particular country which claim to have some form of mandate over sanitation:

- Ministry of Water – From a historic perspective water and sanitation have always been together. Where clean water is piped to the house and the dirty water is taken away by a sewer for centralized treatment, it is logical that the same public utility and Ministry are responsible for services provision and regulation. The logic begins to breakdown when on-site latrines are the main means of excreta disposal.
- Ministry of Health – Poor excreta disposal is a major public health concern and the MoH staff are usually at the forefront of disease control programmes. They are also the staff most likely to be blamed over the outbreak of another epidemic of cholera. Their role should primarily be one of regulation, hygiene and preventive health education, but they tend to get involved with implementation when setting policies or guidelines, yet don’t have the implementation budget, technical skills or experience with sanitation systems.

- Ministry of Local Government – Under government reform and the devolution of power, local governments can have a statutory duty to provide sanitation services. They are certainly closest to the people and in the best position to understand and meet their needs, however they tend to lack the capacity to undertake this role and it is unlikely to be a political issue or in high demand locally, especially when the unserved are the poorest segments of the population with little or no political voice.
- Ministry of Rural Development – Often are charged with development efforts, including infrastructure at household and community level in the rural areas.

Effective co-ordination within a single ministry can be a difficult process; across different ministries it can be impossible. Add to these four ministries, the layers of central, regional, district, and city responsibilities, and the Ministries of the Environment who are becoming increasingly aware of the pollution problems which on-site sanitation can cause to groundwater, coastal waters, and surface water, and the net result is a tangled web of overlapping uncoordinated, unworkable policies, low budget allocations, and low prioritisation and lack of accountability. Making progress in such an environment, particularly on a subject with no political importance or little expressed demand can be a very frustrating process requiring an inspirational and persistent leader.

Within this environment exist the masons and small scale providers who actually build the latrines and provide sanitation services. They usually form part of the informal sector and are ignored, and even sometimes considered illegal, in the policy development processes. The important services they provide go unrecognised, unregulated, unsupported, and underutilised. This is not unlike some of the issues in the urban solid waste sector that have emerged over the last two decades. As one septic tank emptier in Kampala recently complained:

“We give the sewage works over Sh8 million per month and it pays their wages, but they do not treat us well and one man in particular insults us and say that we are nobodies to them.”

#### *Integrated with water supply*

Starting in the 1990's there was a push to ensure that water supply, sanitation and hygiene promotion were always integrated within the same project. This has effectively ensured that more sanitation and hygiene work has been undertaken than would have otherwise been the case and in a way, sanitation and hygiene have piggy backed on the political and community demand for improved water supplies. The piggy backing has also brought some significant disadvantages which can be summarised as:

- Different time horizons - A new water supply can be installed and completed in a matter of weeks; both sanitation and hygiene are more complex forms of behaviour change which can require decades to achieve.
- Different decision-making processes - Water supply decision-making is based at community level, while sanitation is made at household level and most hygiene behaviour change at individual level. The promotion techniques needed are different for each level.
- Time to create demand - Demand for a water supply usually already exists in almost all cases, and often it is difficult for an organisation to meet the high levels of



demand. Demand for sanitation is hidden, weak, and needs to be created and vocalised before systems can be designed and constructed.

- Different skill sets required - The water sector has been dominated by engineers who feel comfortable with technical problems and tend to lean towards technical solutions. Sanitation requires softer, people-based skills and takes engineers into areas where they feel uncomfortable and unfamiliar. As a result, project staff in integrated projects naturally prefer water supply provision and tend to neglect sanitation.

The institutional fragmentation and lack of political will are real issues that block progress in the sanitation sector. The glib answer is better coordination, but this is hard to achieve in any meaningful manner. The following are possible ways to start to disentangle the sector.

- The term 'sanitation' is vague with multiple meanings. In Tanzania, the 2004 National Environmental Health and Sanitation Policy Guidelines use a broader definition of sanitation which includes water supply, food, waste management, control of chemicals, environmental pollution, human settlements, prevention and control of communicable diseases, HIV/AIDS, vector and vermin control, occupational health and safety, mining and quarrying, port health, disposal of the dead etc; a total of 25 subjects. Clearly the ministries are not equally interested in every aspect of "sanitation" and a good starting point is to give the subject under discussion a more precise definition.
- The terms sewage, wastewater treatment, and sanitation are often used in an interchangeable manner. Removing faecal waste from a community using a sewer system is undoubtedly a good technical option, but is it unrealistic to believe that anything but a small percentage of the world's urban poor will be served by sewer systems in the next 20 years. Most of the increases in access to safe excreta disposal over the last decade are due to on-site technologies, not through the expansion of sewer systems and household connections. In both Dar es Salaam in Tanzania and Kampala in Uganda, 70% of the populations are served by pit latrines and despite heavy investment in the sewer system, this proportion is unlikely to change over the coming years as the city is also growing rapidly. Ministries of Water are generally only interested in the construction and management of sewer systems and uninterested in on-site solutions. It is interesting to note that 50% of households in Japan are not sewer connected and there is little intention to get the remainder connected. On-site technology should not be regarded as being a sub-standard solution, just a different solution suitable for a different context.
- Housing density, housing arrangements (types and patterns of occupancy), land ownership, plot layouts, and local hydrogeology are critical factors for the viability of different excreta disposal options. Systems that provide sustainable solutions in low density rural areas of owner-occupied housing simply will not work in high density unplanned urban areas dominated by squatter housing.

If the issue being discussed can therefore be re-focused as "sustainable excreta management using low cost sanitation technologies in high density unplanned areas", rather than a vague notion of "city wide sanitation", then the problems and solutions become more specific and manageable. This will enable better demarcation of roles, responsibilities, and boundaries and an agreement between the different government bodies as to who should lead in each specific area. Through this it may be possible to de-fragment the sanitation sector and begin to make progress. Starting with local political will or progress-oriented action may be an issue of which comes first, the chicken or the egg. Politicians are vote and

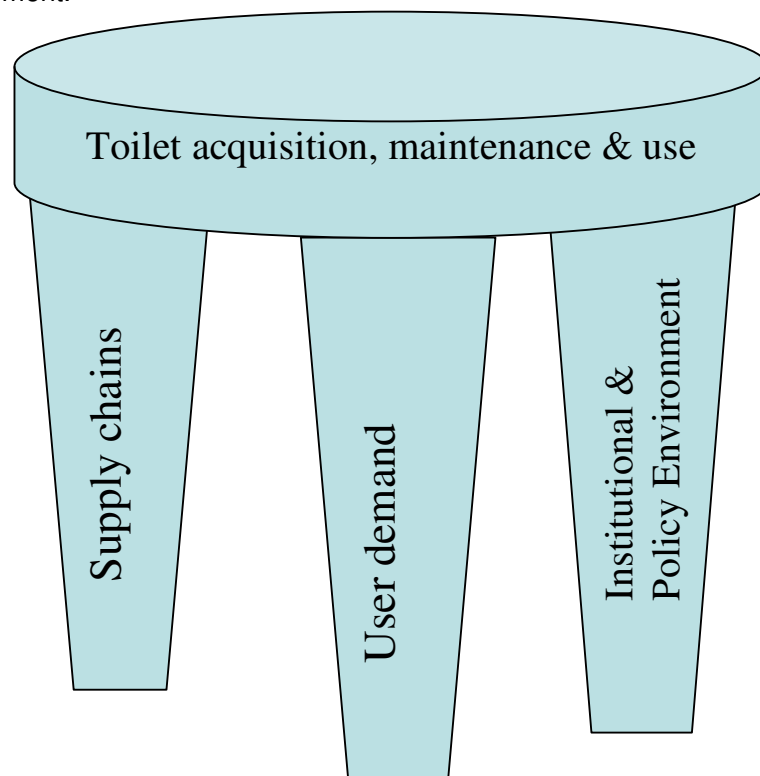
popularity conscious and may see no reward in investing effort in an issue which has no expressed demand and isn't regarded as being their responsibility. However they do like to be linked with success and if a successful pilot project can be developed in an area and the local politicians linked to that success, then this may be the opening for gaining political will to scale up the pilot project and secure longer term local government support.

## 2 Re-characterizing the Sanitation Challenge and How to Achieve Sustainable Improvements

Starting from the premise that 'business as usual' no longer is the way forward within the sanitation sector, this section outlines how some of the major characteristics and thinking within the sector need to change in order to accelerate sanitation coverage. It explains the way latrine uptake occurs, underlining the importance of understanding demand and the motivations and constraints of households in adopting improved sanitation, and introduces the concept of sanitation marketing as a promising approach to sanitation demand promotion and sustainable supply expansion. It goes on to define sustainable excreta disposal and gives an overview of urban and rural sanitation, the importance of partnerships, and the different roles of regulation, marketing and education in achieving sanitation behaviour change.

### The Stool of Stools - Three Legged Stool of Excreta Management

The stool of stools is a conceptual model that helps programme designers to understand excreta management.



Only when all three legs of the excreta management stool are in position and balanced will toilet acquisition and use be maintained. The outsider's role is to identify the nature and constraints each element faces and decide where and how to make changes or enhancements to make the process more effective. It is a process of building on existing rather than developing competing parallel systems. Before any enhancements are made, the programme designers first need to have a good understanding of the existing situation. For larger programmes, this broader and deeper knowledge may be gained through a series of specialists, i.e. market researchers, organisational developers, policy analysts, etc. For smaller projects, at a minimum, managers need to undertake a series of in-depth discussion with a range of community members, sanitation product and service providers, and policy makers. The whole process is iterative where the designer's knowledge and the methodologies gradually improve, and inputs over time become a case of on-going fine tuning as opposed to re-invention.

Working on just one of the stool's legs, and ignoring the others leaves too much to chance and is a recipe for failure. For example, creating demand is futile if the supply chains are incapable of delivering affordable well designed latrines that meet the aroused desires of the new potential customers.

The policy and regulatory environment will in most cases need to be changed to enhance the supply and demand creation processes, and stop obstructing them. This may involve the difficult reorientation of attitudes necessary when moving people out of their traditionally accepted roles.

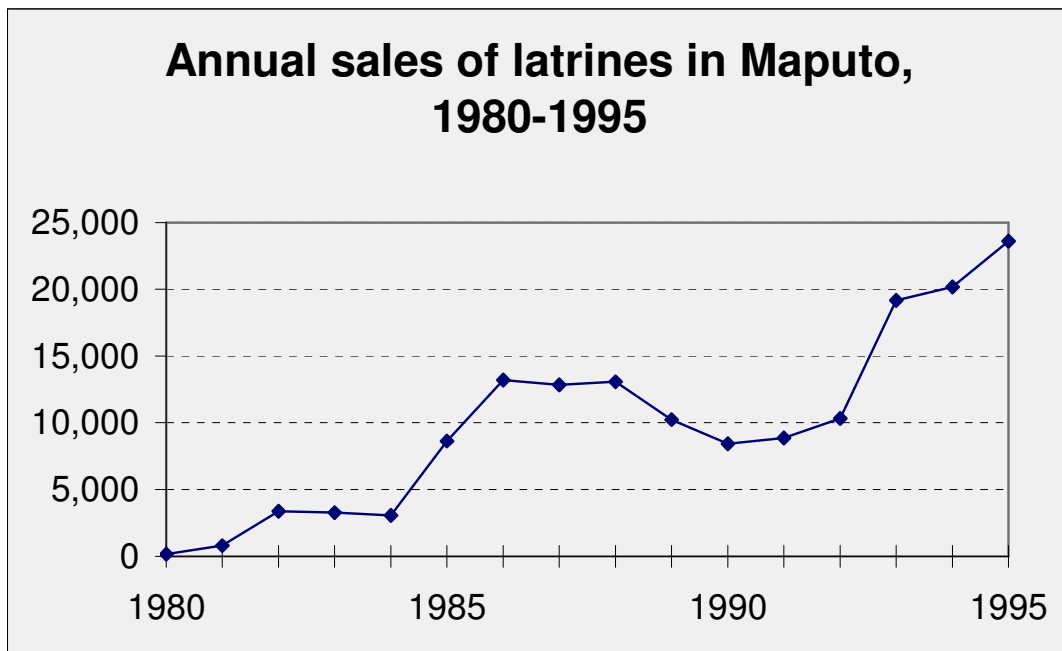
#### Understanding and Enhancing Demand for Sanitation

Accelerating coverage means generating new demand for sanitation improvements at household level. Where coverage is low and sanitation technologies are unfamiliar, primary demand for sanitation must be created from 'scratch' in households that have never before allocated money, time or effort to buying, building, and maintaining home sanitation systems. Much can be learned from the commercial sector which has successfully brought new product categories to market and generated such demand that they are now considered household necessities. Examples include the proliferation of home computers and mobile phones, where demand did not exist just 10-15 years ago, or the spread of TVs, CD players and, longer ago, radios. The commercial experience has clear and important lessons for sanitation promotion: one of the most significant being that it requires a much greater upfront investment in promotion and consumer education and a longer timeframe to launch a new product category and achieve successful sales growth, than when launching new product brands or "flavours" into an already well established product market, e.g., a mint and sage sausage into the sausage market. Latrine building and use is a new product category for which consumer product knowledge must be created from scratch in rural areas where sanitation coverage is low.

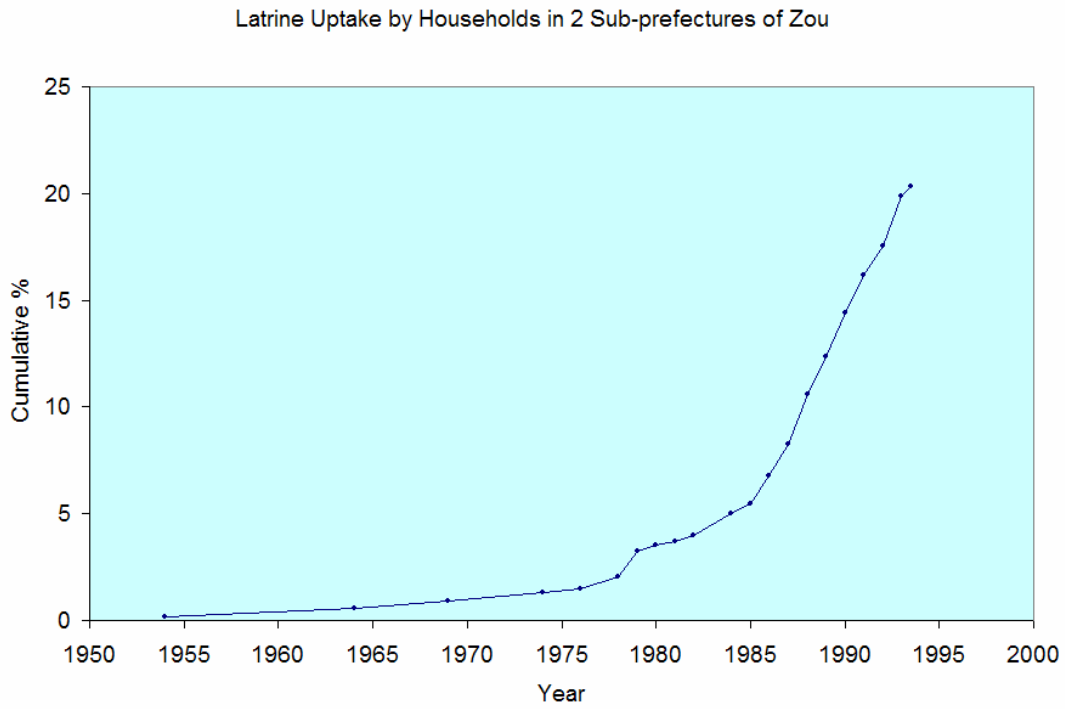
An analysis of new consumer durables introduced in the US in a wide range of different categories showed that it took newly introduced product categories in the market about 18 years to reach 'takeoff' (an elbow-shaped discontinuity in sales growth representing a sudden dramatic increase in early sales) before WWII (Golder and Tellis 1997). After World War II this has gradually reduced and now takes about 6 years. Shorter post-World War II takeoff times have been due to much faster technology-based communication which promotes much faster spread of information and awareness about new products, increased rates of travel which further enhance the rate of information dissemination, and the growth of large national and multinational retail networks that can make new products widely available across large regions right away. In many developing countries among the unserved

segments of society, communication, distribution networks and capacity to travel are at Northern pre-WWII levels, at best, so uptake of new products, services and behaviour will be slow without interventions specifically designed to stimulate demand and enhance uptake.

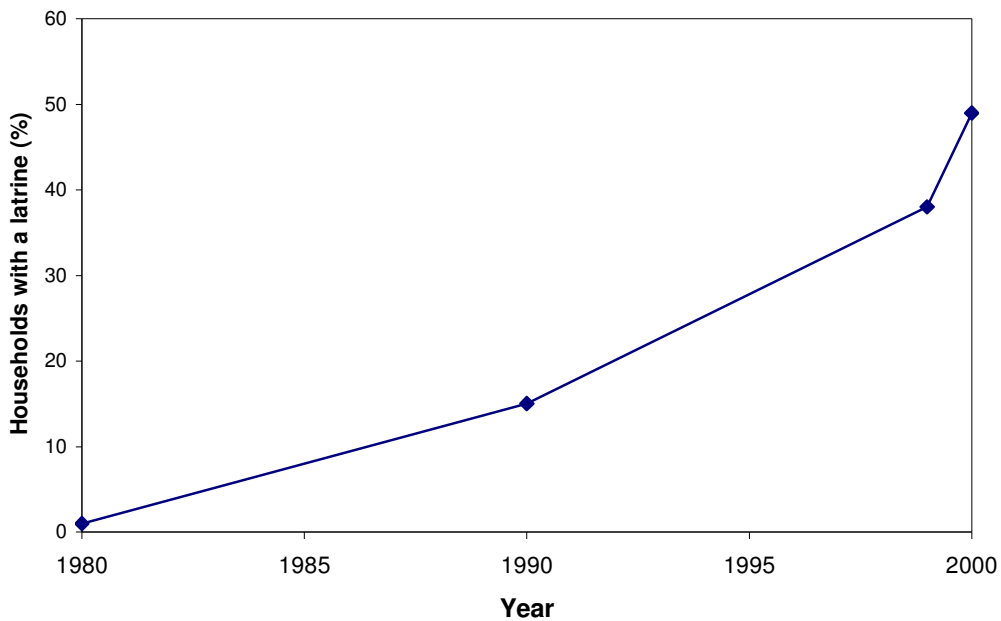
A similar phenomenon of new product uptake in sanitation can be seen in the sales growth of low cost dome slabs in Maputo, Mozambique under the National Sanitation Program (Fig 1), the spontaneous uptake of latrines in rural Benin well before any sanitation programme ever operated (Fig 2), and the steady acquisition of household toilets in Bangladesh since the 1980's (Fig 3). Uptake curves like the ones in Fig 2 and 3 show how adoption expands over time as information spreads slowly from adopters to non-adopters and through other channels if they exist, all of them face to face in a context such as rural Benin. It is important to recognize that improved sanitation is a technological and cultural innovation in defecation practices in these communities that must be understood, appreciated, valued and adopted for the first time. Diffusion of innovations, or the study of how innovations spread, has much to teach us in sanitation (Rogers 1984; Gatignon and Robertson 1985).



**Fig. 1. Sales of Latrine Slabs under the National Sanitation Program in Maputo, Mozambique (Table A-1, # 10)**



**Fig. 2. Latrine Uptake by Rural Households in Zou Department, Benin (Jenkins 2004).**



**Fig. 3. Latrine acquisition curve for Bangladesh where a national social mobilization and marketing approach was adopted in the early 1990s (Cairncross 2004)**

As with any innovation, households will not adopt in a uniform manner and the categories of innovator, early adopter, late adopter and laggard are as relevant to latrine building in developing countries as they are to the adoption of compact disc players or mobile phones in developed countries. The decision of a householder to build a latrine is what Rogers (1984) describes as an *'optional innovative decision'* where the choice to adopt or reject an innovation is made by an individual household independent of the decisions of other members of the community. Peer-pressure and social norms no doubt play a part in this decision-making process, but the decision itself is a private one.

An in-depth study of demand for latrines in rural Benin looked at the diffusion of household latrines by mapping latrine adoption rates over space and time, to investigate how and why people decide to change from open defecation and install a pit latrine at home, and why others do not (Jenkins 1999, 2004). Large differences in adoption existed across villages, and across households within villages, with much greater demand clustered in villages located around urban centres and along roads. Latrines were clearly seen to be spreading outwards from urban centres and along road networks and a significant spatial contagious aspect to latrine adoption was observed in the regional data. A key driver for adoption was the increasing dissatisfaction with traditional open defecation, created by a combination of awareness of sanitation alternatives, exposure to urban life, and the decreasing availability of 'good' defecation sites within reasonable distance of home. Here *good* meant clean, visually private, safe and socially appropriate.

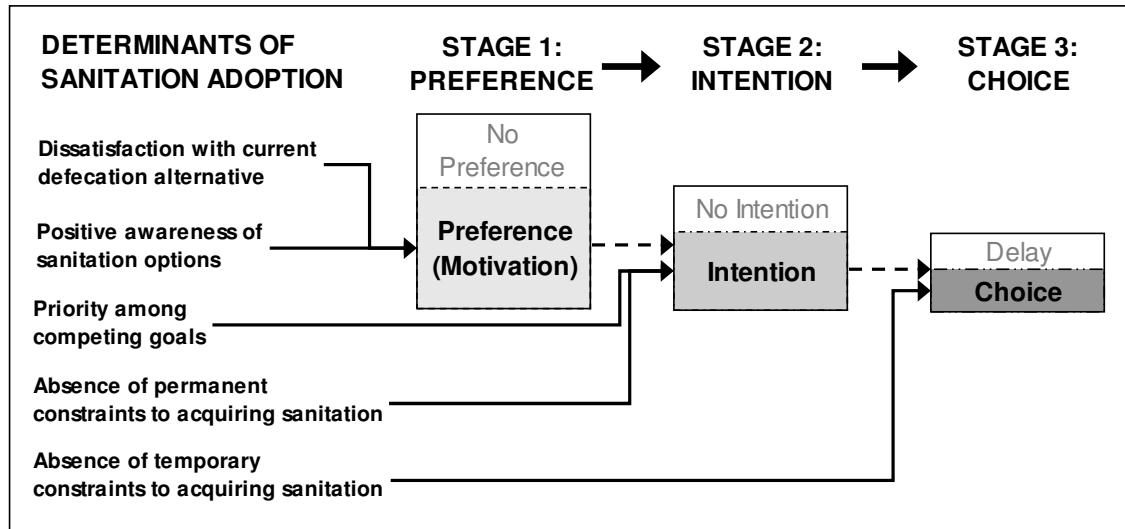
#### *Household motivations for adopting improved sanitation*

We saw in Table 1 the reasons why people value new facilities and change their sanitation behaviour. In different settings and in different households, the most important reason will vary so it is important to locally investigate what different groups want from sanitation and use this information to develop messages and promotional material to reflect the real felt needs for improvement of different groups. In every situation where careful attention has been given to understanding reasons for sanitation change, a important difference has been found between the motivations of men and women (Jenkins and Curtis 2005; Jackson 2004; Mukherjee 2001; Frias and Mukerjee 2005). Women consistently value sanitation more than men, in many cases for the increased convenience, privacy, dignity and safety it provides them. Men are often more concerned about sanitation to improve the comfort and modernity of their homes and to provide for the well-being of their family members. A key force behind each one of these private reasons for seeking sanitation improvements is dissatisfaction with existing defecation practices or facilities in one way or another (Jenkins and Curtis 2005). In urban areas, there is generally already a high level of appreciation for the private benefits of sanitation due to high levels of dissatisfaction with existing conditions and awareness of alternatives, so motivation can be rapidly mobilized. This often contrasts with rural areas where exposure to the private benefits of improved sanitation is low, dissatisfaction has not been stimulated, and there is very little awareness or experience of good alternatives to traditional practices.

#### *Opportunity and ability to adopt sanitation and constraints to demand*

Besides dissatisfaction with current conditions and desire for the benefits that change will bring, households also need access to opportunities and the ability to change sanitation. The decision to install home sanitation for the first time can be a big one and often involves changing household-related infrastructure as well as defecation and faeces handling practices. In making this decision, households need to progress through three stages of adoption (Fig 4) starting with motivation or preference for the change which is built on dissatisfaction with ones current practice combined with awareness of better options, followed by intention which reflects the process of beginning to make a plan to build, and ending in a final decision or choice stage of implementing the plan (Jenkins and Scott 2005).

Observed choices at the end of the adoption process are what create new demand. Households face many constraints on this journey, many of them insurmountable on their own (Jenkins 2004; Jenkins and Scott 2005). An examination of the barriers that block adoption in different settings (Table 2) reveals a number of common constraints to expressed demand for sanitation related to awareness and understanding, technical complexity and lack of technical information, perceived and real high costs, difficulty saving up money, lack of financing options, competing priorities for time and money, and few technically appropriate, attractive or feasible choices locally available to meet peoples' desires, housing situations, and geophysical settings. This last point has much to do with a lack of supply of appropriate, affordable and attractive products and services in the market place for households to purchase.



**Fig. 4. Model of Adoption Decision Stages and Determinants of New Demand for Sanitation (Jenkins and Scott 2005)**

In the Benin study and elsewhere, nearly always women-headed households experienced more of these constraints and at higher levels than male-headed households, especially with regard to accessing good technical information about latrines, their costs and their construction. The Benin study also revealed an important distinction between high cost and difficulty saving up money. While 85% of non-adopter households and 47% of adopter households cited difficulty saving sufficient money to build a latrine as a constraint, only 11% of non-adopter households said that the cost of a latrine was too high (Jenkins 1999, 2004). Households with little exposure to latrine information or to a range of alternatives, who may cite high cost as a barrier, often have an inflated perception of costs from lack of good information.

**Table 2. Constraints Faced by Households in Adopting Sanitation Improvements**

Rural Benin <sup>a</sup>	<ul style="list-style-type: none"> <li>▪ Lack of awareness and misunderstandings about latrines' function, safety issues, and cost</li> <li>▪ Technical complexity of construction, materials, expertise/advice, skilled labour, special tools, etc and difficulty accessing them.</li> <li>▪ Perceived poor design and performance of existing latrines (durability, child safety, accidents, pit collapse and bad smells)</li> <li>▪ Difficulty saving enough money</li> <li>▪ Unsuitable soil conditions</li> <li>▪ Limited space</li> </ul>
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	<ul style="list-style-type: none"> <li>▪ Extended family interaction problems, social norms and disapproval</li> <li>▪ Perceived benefits of open defecation for soil fertilization and privacy</li> </ul>
Nation-wide Ghana <sup>b</sup>	<ul style="list-style-type: none"> <li>▪ High costs</li> <li>▪ No one to build</li> <li>▪ Water table/soil conditions</li> <li>▪ Technical complexity</li> <li>▪ Savings, lack of credit availability</li> <li>▪ Competing priorities</li> <li>▪ Tenancy issues</li> <li>▪ Limited space</li> <li>▪ Permit problems</li> <li>▪ Satisfied with toilet</li> <li>▪ Lack decision-making capacity</li> <li>▪ Poor options</li> </ul>
Rural Vietnam <sup>c</sup>	<ul style="list-style-type: none"> <li>▪ Lack of reliable product information and technical services</li> <li>▪ Lack of desirable products</li> <li>▪ Lack of credible suppliers</li> <li>▪ Misperception of costs as higher than they were</li> <li>▪ Other competing priorities (e.g., TV, Karaoke set, furniture)</li> <li>▪ High transaction costs to access information and suppliers</li> </ul>
Kenya <sup>d</sup>	<ul style="list-style-type: none"> <li>▪ Inability to raise sufficient funds to construct facilities, competing needs for savings and cash</li> <li>▪ Lack of awareness of the value of sanitation and hygiene, access to information limited to those with higher literacy and education</li> <li>▪ Lack of knowledge on how to construct and maintain pit latrines</li> <li>▪ Adverse geo-hydrological conditions causing problems such as collapsing latrines, shallow pits due to high water table or hard rock, flooding that fills up and overflows pits and causes repeated collapse</li> <li>▪ Nomadic pastoralism where permanent facilities are of no use</li> <li>▪ Cultural factors that dictate restrictions that are not observed in the way facilities are designed</li> </ul>

Sources: <sup>a</sup>Jenkins 2004; <sup>b</sup>Jenkins and Scott 2005; <sup>c</sup>Frias and Mukherjee 2005; <sup>d</sup>Jackson 2004.

#### *Raising Priorities and Triggering Change*

In rural Bangladesh and elsewhere, the Total Sanitation Movement generates momentum for household adoption through participatory engagement focused on open defecation, using peer pressure, shame, disgust, and pride to create dissatisfaction with current practices (Kar 2003; Table A-1, # 2). These techniques help propel sanitation improvement to the top of the household's priority list, and are one way to provide the facilitation, advice, and expansion of options and choices that households need to overcome many of the constraints. None-the-less the benefits that motivate and sustain private household change, even in these villages, are similar to those listed in Table 1 (Allan 2003).

A critical challenge for sanitation programs is to find creative and meaningful ways to successfully raise the priority of sanitation at national, community and household level and trigger action. Cholera epidemics have been used to trigger action, but in the context of family and household, we are seeing increasing evidence from places as varied as India, Benin, and Ghana that events such as marriage, the birth of a child, and building a home, are important internal triggers for change, including deciding to build a latrine (UN Millennium Project Task Force 2005; Jenkins 1999; Obika et al. 2002). These life events can be harnessed in the design of outside interventions as opportune moments to channel information and opportunities in a way that triggers households to take action. Targeting



information and coupons to new mothers immediately after birth at maternal birthing clinics has been successfully applied in this way to trigger adoption of insecticide treated bed nets for children by new mothers. Laws and regulations that require every house to have sanitation or that attach a requirement for sanitation to gain land title or residency can be used as external triggers for change and have been in many places across the globe including Thailand in rural and urban areas, and Burkina Faso, Lesotho, and Jamaica, in urban cases (Jackson 2004; WSP 2004; Luong et al. 2002) (Table A-1, # 1,11,12,15 & 17). Examples of social mobilization used to raise priority and trigger change for sanitation include Bangladesh's national campaign in the mid-1990's (Table A-1, # 9) and the recent sanitation promotion campaign in Southern Nations in Ethiopia (Table A-1, # 4).

### The Case for Marketing Sanitation

Marketing is one of the most promising approaches to accelerate coverage that has emerged from reflection, debate, and experimentation about how to stimulate sanitation demand and accelerate coverage sustainably. In fact, marketing is at the core of the diffusion of innovations and the takeoff of new consumer products in the modern world (Gatingon and Robertson 1985). Cairncross (2004) discusses four arguments for the marketing approach for sanitation:

- It ensures that people choose to receive what they want and are willing to pay for.
- It is financially sustainable.
- It is cost-effective and can be taken to scale.
- Provision of hardware is not enough, and marketing (with its four component strategies) is proven and highly effective way to build demand.

Essentially, for sanitation managers in the public or NGO sector, marketing sanitation means:

- 1) using a commercial approach for production and delivery of sanitation products and services to expand the supply chain and market.
- 2) engaging and building up the private sector to do the production and delivery so that this is financially and institutionally sustainable. This includes understanding the constraints that prevent the supply side working effectively and working at removing these constraints
- 3) coupling this with the application of consumer science and the use of marketing techniques and promotion to generate new demand.

One thing that is important to appreciate about marketing is that it is a multi-component coordinated intervention that uses a variety of strategies simultaneously to address the four core P's of marketing (Cairncross 2004; Methra 1998):

- Product – “Latrine designs must respond to what people want, rather than what sanitation engineers believe they should have.” Selling products and services without subsidy is the most reliable way to know you have the right design. Market research and consumer testing of new designs before launching them is a critical part of the design process. Often a range of different products and service levels are needed to suit the budgets and circumstances of different households. Offering choice has been a core strategy of success in many innovative new project approaches to generating demand for sanitation (Table A-1, # 2,3,7,9,12, & 15).
- Price – Most of those who need sanitation are poor, and can least afford it. Thus, keeping costs down, reducing up-front costs, and marketing a range of products (and qualities) at different price tags is needed. Extreme low-cost product innovations can release demand among the poor (Kar 2003) (Table A-1, # 2,4,6,10,13 & 16).

- Place - Products must reach the right place, and the supply chain of products, information and services must reach potentially to every household. Programs that train local masons and use door-to-door sales and promotion techniques, and local centers or mobile services that offer information, products and services in one easy to reach location are examples of effective strategies to increase sanitation access and opportunity to act (Table A-1, # 3,4,6,7,8,11,12, & 15).
- Promotion – This includes communications, advertising and sales techniques about the product and service to get customers’ attention, disseminate product information, and convince consumers why they should buy the product. This task is exceptionally important for building primary demand for new sanitation products and services, as pointed out earlier. Consumer science and professional advertising and market communications skills can be very valuable in developing effective promotional materials, content, and strategies that work with consumers.

The private sector knows that to achieve takeoff in the pioneering stages of a new product category, there are four essential tasks of marketing and these are to:

- educate consumers about the new category
- encourage trial usage
- build the distribution channel
- segment the market to better serve specific needs (Haim 1997).

Thus, we need to rethink the way we use sanitation investments and focus a lot more money, effort and creativity on consumer promotion and product education coupled with developing and supporting the commercial distribution of improved and cheaper products to accelerate the rate of uptake of improved sanitation.

In-depth studies of households who adopt improved sanitation and those who do not, and the success of innovative demand stimulation and product delivery approaches tested in a variety of settings (Table A-1, #2,3,4, & 5) confirm the importance of at least four programme design features needed to stimulate adoption and new demand:

- 1) offering a choice of locally adapted sanitation products and different service levels to suit the budgets, lifestyles, and needs of different groups of households
- 2) coupling this with access to good consumer information about technical, functional, cost, and construction features of different options,
- 3) using creative promotional communications strategies to raise awareness, interest and motivation, and
- 4) using various door-to-door promotion techniques to directly engage individual households, one at a time.

Addressing the critical issue of cost without using subsidy for construction is another important element of successful demand stimulation in many of these project examples (Table A-1, # 2,3,4,7,8,11,12,13,14, & 16), and may be especially crucial in rural areas (Jenkins 2004; Kar 2003; Mukherjee 2000; Frias and Mukerjee 2005; WSP-Africa 2005).

Critics of the marketing process usually voice concerns about how it neglects the needs of the poor, but also ignore the fact that current practices are also failing to reach the poor. The simple message when beginning a sanitation marketing process is ‘don’t panic about the poor’. Marketing is an iterative on-going process which requires constant review and redesign. It is important during the monitoring and evaluation process to assess whether the poor, and other vulnerable groups, are actually acquiring and using latrines and if they are not, what constraints they are facing such as those identified in Table 2. If these can be recognised then positive action can be taken to target and support them, such as designs of extremely affordable latrines, savings and loan groups, or specially targeted informational efforts. If they are acquiring latrines and the market is meeting their needs then no action is necessary. One of the basic principles behind marketing is that of offering the consumer a

choice. Choice is the one thing that the poor lack, their behaviour being dictated by the circumstances in which they find themselves. By offering a choice directly to the poor, the marketing approach can become an empowering process.

### Sustainable Excreta Disposal

Sustainable excreta disposal can be said to have been achieved when:

- latrines are being consistently used by all members of the family
- the community / society is maintaining latrine coverage at 100% without external support
- there is no significant risk to community health from disposal techniques
- there is no significant degradation of the environment
- it can be maintained over a prolonged period i.e. 20 years

#### *Consistent use*

To have an impact on public health, latrines have to be used at all times by all members of the family. This is in fact more difficult to achieve than it may at first appear. Children are often scared of the monsters their brothers have told them live in the dark pit latrines; latrines can harbour snakes making use dangerous in the dark; and latrines sited a distance from the house are inconvenient, particularly when it is dark and open defecation nearer home is an easier option. Communal latrines which are locked at night, or unused because of fear of attack, do not allow for consistent use either, and are often not designed for children's use.

#### *Maintaining coverage at 100% without external support*

Villages and communities grow, either by increasing the area they occupy or their density. Populations can double in size within 10 years and a project achieving 100% latrine coverage in 1995 may only have 50% coverage in 2005. Any system developed for building latrines needs be able to continue building and repairing them after external funded has ended and has to ensure that community members do not become dependent on subsidies or outside organisation to achieve this.

#### *No significant risk to community health from disposal techniques*

The desired health impacts of latrine use are quickly lost if using the latrine results in pathogens entering into the community. This may occur from faecal contaminates entering into the water supply via the ground water or in a high density urban setting, by not using a pit emptying service and letting the pit contents flow to the street, a surface drain, or their neighbours' compounds.

#### *No significant degradation of the environment*

There is also a growing concern about the impact latrine building has on the environment. Designs requiring the use of local bricks needing firewood to make will have an environmental impact. Traditional latrines can have a local adaptation of using slow growing hard woods, such as mahogany, to support the platform. This has become necessary as the local softwood suffers from termite attack causing latrine collapse, but hardwood supplies in many areas are rapidly dwindling and latrine building can add to the depletion problem.

#### *Can be maintained over a prolonged period i.e. 20 years*

Behaviour change, latrine building and demand creation are slow processes that take time and other resources to stimulate, as can be seen by the uptake curves in Figs 1 and 2. Any delivery system developed has to meet the needs of households who are slow to adopt latrine usage and change their behaviour. The slowest tend to be the poorest, least

educated and most risk averse members of the community. The delivery system itself must be financially sustainable, be locally available and meet evolving needs over time.

There has been debate within the sector about widening the definition of sustainable sanitation to include the principle that waste should be considered a resource and that sustainable sanitation is only achieved when the nutrients in waste are returned to the land. It is argued that the western style of waste treatment, where the nutrients eventually end up as pollution in the world's rivers and oceans is globally unsustainable. This has resulted in the promotion of ecological sanitation which is based on composting human waste and using it as fertilizer. This is a persuasive argument in the right context. If a community is predominantly agriculture based, soil fertility is declining and the cost of artificial fertilizer is increasing, the adoption of ecological sanitation is rational and can have a large impact on the household economy (D'Souza 2005).

Achieving these five criteria is not an easy process and cannot be done by using a one-off, technically-led, supply-driven, hardware-based approach. It requires long term commitment and sustained management from the public bodies responsible for public health, but public bodies can not do this alone; effective partnerships with the private sector latrine builders / service providers are needed. Just as curative health is not considered to have been improved by the provision of a hospital; excreta disposal and the associated public health benefits cannot be considered to have been achieved with the simple provision of latrines.

#### An overview of sustainable excreta management in high density urban areas

In most high density urban areas in developing countries sewerage based excreta disposal systems are the rare exception. Even where sewers are present, high connection charges often exclude the poor. An on-site latrine is the most common form of sanitation, but often both the people who use them and the technology are ignored or marginalised within any plans to improve a city's sanitation.

Defecating in a plastic bag in the privacy of your own home and then dumping it on a waste pile or throwing it as far as possible (hence the name 'flying toilet') may sound a fairly basic form of behaviour, but it is cheap, does not take up a lot of space, is discrete, and is better than the alternative of defecating directly on to the waste pile in public. It is a behaviour most occupants of the high density slum areas would find disgusting and embarrassing, but it is a rational solution to a chronic problem. This same rationalism is demonstrated by the way an elderly lady in a Kampala slum described how she and her family used the communal latrine. The latrine is only 200m from her house and she was happy to use it in during the day, but at night in the dark the prospect of using three unstable plank bridges to cross over filthy drains, navigating around piles of vermin infested solid waste, and the high risk of robbery and rape means that using the communal latrine is irrational; "Where would *you* go at night?" she asked.

As a generalisation, demand for latrines in high density areas is high and the constraints relate to space, affordability, limited design choice, lack of a permanent solution (linked to lack of pit emptying services), land tenure and landlords not meeting their responsibilities. These vary in relevance from site to site and sanitation programmes should be aiming to assist house owners overcome these constraint and make latrine ownership the rational choice, possible and affordable.

The lacking of planning controls in 'unplanned' areas and the subsequent increasing housing density has two detrimental impacts to the development of sustainable excreta management:

- streets and passages become narrower making access for vacuum tankers that can empty full pits increasing difficult.
- average compound sizes decrease as plots are continually divided to build more and more houses. The space available to build an initial or replacement latrine eventually diminishes to such an extent that building the traditional style of latrine is impossible.

Projects aimed at building latrines, particularly ones with large standard designs ignore these constraints and are unlikely to have much long term impact. The key questions that need to be addressed are:

- How will householders empty their pit once it is full?
- What designs present good value for money and have the attributes desired by the residents?
- What can people afford or can credit in some form be provided to make purchasing a latrine suit their cash flow constraints?
- How can tenants be best served or how can pressure be placed on landlords to provide facilities?
- How can the commercial viability of the provision of services and products be maximised?
- How can the latrine designs be made more environmentally friendly?

These questions move the designer beyond simple product provision and on to sustainable service delivery which, like a sewage service, needs continuous management, institutionalized structures of responsibility, and on-going resources. The solutions lay in the development of product-service packages where the design of emptying services compliment the design of the latrine and vice-verse. A clear distinction needs to be made where private householders' responsibility stops and public responsibilities start. This is taken up in the next section on partnerships. In practice excreta management has more in common with solid waste management and brings into question why sanitation is always linked to water supply.

An important and sensitive question relating to urban public private partnerships is that of the divide between public and private responsibility. With sewered systems (that mainly serve the rich) public funds are used to install, manage and maintain public sewers and tariffs or taxation used to recover costs. No such publicly funded services are provided for the poor living in the unplanned high density areas, and excreta disposal is regarded as being the sole responsibility of the household. This is legally and morally incorrect and unfair and the poor should benefit from Government support as least as much as the rich. If the same principle was to be applied to high density areas, the pit emptying process would be established through public finance and waste would be collected from the threshold of the house. Cost recovery could occur through some form of volumetric tariff. Unfortunately excreta disposal for the poor is largely ignored and any service that has been established has been purely privately financed and informally organized, is mainly unregulated and has weak links with the public sector, even through it provides an important public service. It is arguable that the public health benefits from providing a pit emptying service could be so great that it warrants to be a totally public funded and provided free of charge to the poor. In practice such services are very rare because of the inability of the (often informal) small scale providers to make pit emptying a commercial viable process. From a legislative point of view, Government may also be failing to fulfil a statutory duty. For example in Dar es Salaam, Tanzania the Local Government (Urban Authorities) Act 1982 states in Section 53:

“It shall be the duty of every urban authority to discharge the function conferred upon it by this act .....

(g) to maintain in good order and repair all public latrines, urinals, cesspools, rubbish bins ... and **provide for the removal of night soil and the disposal of sewerage from all premises and houses in its area**, so as to prevent injury to health.

### An overview of sustainable excreta management in rural areas

Rural excreta management poses a different set of problems. Open defecation in a quiet secluded spot in a low density rural area can be a pleasant experience and has advantages over building and using a smelly latrine. The user-perceived disadvantages associated with open defecation relate to getting the bottom of your trousers wet in the wet season, being attacked by dangerous creatures, embarrassment caused by stumbling across your father-in-law when searching for a good site, etc., rather than being an un-healthy practice. The user-perceived advantages of a latrine become apparent as the housing density starts to increase when the need for privacy, convenience and maintaining dignity begin to increase. As a man in a rural village in Singida, Tanzania replied when asked why his village had latrines and their neighbours had none; "because there are no bushes...".

The general problem is that a population's defecation behaviour does not change at the same rate as the population grows. Communities become stuck in the routine of open defecation and sometimes require outside help to highlight the problem and find new solutions. This approach has been effectively identified and built upon by VERC in Bangladesh with their 'Total Sanitation' approach who found that after open defecation had been identified and vocalised as a problem, the private sector, local pride and peer pressure were excellent factors for helping to achieve 100% coverage (Kar 2003).

The following are some generalisation about rural excreta management

- Demand for latrines may be low (or non-existent) and needs to be built
- Community structures are stronger than in urban areas making peer pressure and complying with the social norm a more powerful motivating factor
- Locally grown, free construction materials are usually utilised in latrine construction (which is fortunate due to the cashless nature of many rural economies)
- Self-build is likely to be more common than in urban areas
- The space for initial building or replacement is not usually a problem

Given these generalisations the key questions that need to be addressed are:

- How to generate demand and increase uptake?
- Given the low density and larger distances between households how can:
  - Communication channels be best utilised?
  - Selling latrine components become a viable business?
  - Transport costs be reduced?
- How can loan and credit systems be effectively developed and operate or the designs made more affordable?

These questions move the designer into developing marketing based approaches using the 4Ps as outlined earlier. This can be a difficult process, as demand may be low and the costs of supplying the right product at the right price in the right place neither high enough to be commercially viable or low enough to meet user expectations and cash flows.

### Summary of the differences in urban and rural excreta management

<b>Unplanned Urban</b>	<b>Rural</b>
Services driven with the large public health externalities of safe excreta disposal justifying subsidy for waste removal and safe disposal.	Promotion, awareness and product driven; Expand supply chains to un-reached areas while using communications to motivate desire and new demand.
Service provider essential with resulting affordability and sustainability issues	Product provider essential for latrine components not locally available.
Communications mass media to create awareness of new services; Carrot and stick approach, coordinated with enforcement of by-laws.	Communications via word of mouth and direct consumer contact and innovative sales techniques
Local by-laws and regulatory mechanisms important and more likely to be used.	Local by-laws and regulatory mechanisms weak and unused.
Differentiation of tenants and landlords/owners in decision to build and maintain a latrine.	Household, owner occupier decision to build and maintain a latrine.
Traditional community-based approaches less successful due to lack of effective traditional social structure. New forms of political representation and participation by the urban poor must be developed first.	Traditional community-based promotion approaches feasible due to impact of peer pressure and desire to comply with well established social norms.
Assumption: there is already strong motivation and desire for household sanitation but the constraints related to geographic, institutional, regulatory, and local governance issues mean market cannot supply products and/or services to adequately fulfil this demand without significant public sector action to enable the market to work.	Assumption: there is a lack of awareness, understanding of and access to options. Undeveloped motivation for household sanitation due to combination of unquestioned satisfaction with existing defecation practice, lack of exposure to the benefits of home latrine, and of awareness of better, safer options.

### Partnerships are Crucial

Another lesson re-shaping thinking about how to promote sanitation for the poor is the critical need to forge partnerships to overcome the entrenched institutional reasons for slow progress and unsustainable of projects. Engaging sanitation stakeholders within different government sectors and at different levels of government, especially at local level, and working closely with the private sector are now recognized as critical organisational elements needed for large scale sustainable changes in sanitation. For partners to work together, the self-interests of each partner must be met. When working with the private sector, the ability to make a continuous profit from sanitation is crucial, whether it be a local mason, a pit emptying service company, a retailer, or a latrine component manufacturing operation. In the past, programs and projects have operated in isolation and vertically, failing to engage local government who are closest to households, and by-passing the private sector that, as we have seen, is already serving customers and meeting their sanitation needs in different ways. Public budgets and responsibilities for sanitation at the local level need to be mobilized and used for the long-term, not as a one-off activity, but as part of the on-going planning and management process of core government purposes and functions. This was at the core of success in the Lesotho and Thailand sanitation achievements (Table A-1, # 1,8, & 17). The savings and loan sector, including national banks, urban upgrading loan institutions, and micro-finance institutions have been

successfully engaged as partners in several innovative projects to overcome the financing and savings constraint of home sanitation construction (Table A-1, # 11,12,& 17).

There are examples of many different structures for the public sector to work with the private sector to deliver services of public value, and much more needs to be copied and taken from other sectors. Examples include franchising, regulated service contracts, standards and licensing (Tynan 2002). Different models for rural and urban sanitation partnerships will need to be developed, tested, adapted and refined. But only by doing will we learn what models work best.

### Policy and regulation

In situations where policy development occurs at central ministry level and regulation enforcement is based at district level, there is the likelihood of a disconnect between policy and regulation with regard to excreta disposal. In many ex-British colony countries the law relating to absent or poorly maintained latrines is based on nuisance abatement legislation first drafted in 1936. This 70 year old law is simply an inappropriate form of regulation for the slum areas of developing country cities in 2006 and the approach to enforcement is desperately in need of amendment. Some of the problems Environmental Health Officers face in enforcing the regulations are outlined box 1 below



### Box 1 - The Environmental Health Officers dilemma

Mr Mkuu Hanje, Environmental Health Officer for Temeke MC in Dar es Salaam, Tanzania. He is an experience EHO who is reflective of the work he performs and to some extent resigned to the position he finds himself professionally.

He is reluctant to enforce the law requiring all the households to own a latrine pointing out “income is low in these areas and a latrine would cost more than the house” and that “to many three meals a day is a problems, so how can you tell them to build a VIP latrine especially in squatter and unplanned areas?”

He also explained that formal enforcement procedures often run into difficulties as “landlords are hard to find or the house may be in multiple ownership making the serving of the notice on the correct people difficult. Just being a landlord does not make a person rich, many landlords are poor as they may have inherited the property and its rent may be spilt between several relatives”

In addition to the moralistic problems there are also political considerations. In theory the EHO are an independent authority that take action in accordance with their own judgement and taking into consideration public health risk and the likelihood of re-occurrence. In practice in Tanzania the EHOs are answerable to the Ward Executive Officers (WEO) and the Local Councillors who are acutely conscious of the wants and desires of their electorate and will usually side with private good over public good and do not support the decision of the EHO. This results in an interesting dynamic between the EHO, the Councillor and the WEO. Whilst the EHO does not need the WEO permission to serve notice or to take court action, the WEO and councillors can make a ‘recommendation’ to the Municipal Council Director that he does not want a particular EHO employed in his area. In such cases the EHO could be suspended and relocated, possible to a more isolated location.

Mr Hanje neatly summed up his dilemma when he stated  
“ EHOs are trapped as they need keep there political masters happy by not causing any problems and then are blamed if things go wrong such as a cholera outbreak and rubbish in the street”.

Temeke Municipal Councils Comprehensive Health Plans June 2004 – June 2005 provided an allocation of Tsh3,020,000 (\$3000) for on-site sanitation in the municipality (in addition to EHO staff salaries). This represents 0.15% of the health budget in a municipality where approximately 630,000 people are dependent on on-site sanitation (\$0.0043 per person).

On the other hand, policy development seems to occur in isolation of implementation practices and in many cases is simply unworkable at local level. A unified approach is needed where policy allows for flexibility at local level and the development of workable solutions based on improving health through incremental improvements in excreta disposal practices and is backed up by useful, appropriate and enforceable regulations. The three pronged “Carrots, Sticks and Promises” approach (Rothschild 1999) outlined in Box 2 needs to be adapted and adopted when designing sanitation programmes.

Gaining full compliance with socially beneficial behaviours related to excreta disposal will eventually require the law, regulation and enforcement. It is just a question to what extent. It is unrealistic to believe that education and marketing will induce all the community to change their behaviour and there will always be some with ample opportunity, resources and ability to change voluntarily, but who steadfastly refuse to do so. They see no self-interest in the change (Rothschild 1999). Keeping in mind the separate goals and self-interests for improving sanitation of different audiences is an important perspective needed for designing successful programmes and building the critical partnerships needed for their implementation

Box 2 - Carrots, sticks and promises - based on Rothschild (1999)

The promise – Education

Comprises of messages that attempt to inform and/or persuade a person to behave voluntarily in a particular manner but does not provide on its own, direct or immediate reward or punishment. Education makes promises of future rewards for changes in behaviour and these are often far in the future. They are often based on promoting a negative e.g. If you use a latrine you will not get diarrhoea .

The carrot - Marketing

The exchange of goods or services for money. It works for the mutual gratification of both parties involved and the transaction and the rewards are usually immediate. People get what they want and the key to successful marketing is understanding what they want and then providing it at a cost they can afford. Promotion techniques used in marketing serve to inform people of the 'carrot' for changing a particular behaviour.

The stick - the law

Uses force to change behaviour. It involves the use of coercion to achieve behaviour change in a non-voluntary manner or to threaten punishment for non-compliance or inappropriate behaviour. It is a particularly important strategy when there are large public externality costs associated with non-compliance and full voluntary compliance is difficult to obtain through marketing and education. Examples include seat belt and motorcycle helmet driving laws, and no-smoking policies.

### **3 Conditions for success**

The changing global political climate for development presents some important new opportunities for success in sanitation – decentralization and recognizing the private sector as a key participant in development creates new possibilities and synergies to put new lessons and thinking in sanitation to work. However, the enabling environment and political will to do so must first create the leadership to chart the way forward.

Create an enabling environment

This is a term that is lot easier to suggest than it is to achieve and one on which it is hard to generalise. The issues surroundings this are as follows:

*Creating cross ministerial consensus*

Creating consensus can be a difficult process, particularly when the approach being advocated represents a change from a subsidized supply-driven construction approach with which they are familiar and comfortable, to one that is untested in their specific location. Gaining consensus between three ministries will mean negotiating change to traditionally held beliefs and accepted roles within each of the ministries. The extent to which this is possible would seem to depend on the:

- Maturity of the decentralisation process and expectations that roles are changing
- Historical background of ministry involvement in the sector
- Degree they feel threatened by change

- Attitude and willingness of individuals with power to make changes
- Prospect of large contract being awarded in the sector
- Pressure coming from the politicians for sanitation improvements (political will)

One of the hardest situations is when a ministry is not willing to let go of its mandate whilst at the same time not willing to lead on improving the sector. If the ministry adopts an approach of "You tell us what you want and we'll tell you (usually after many months wait) if it is acceptable", negotiating change becomes very difficult and better progress may be achieved by agreeing to undertake a pilot scheme (for which the ministry are on the steering committee) and waiting until a successful approach can be demonstrated and changes appear less threatening. Using a knowledgeable, trusted third party can be helpful, if not essential, in brokering consensus.

#### *Establishing Political Will and Leadership*

Political Will has been and still is one of the most important factors behind successful programmes -- without it little real progress can be made (UN Millennium Project Task Force 2005). Here we mean the political leadership and government commitment to allocate sufficient public resources to the sector for the long-term and to undertake the necessary reforms within and outside government to improve performance. Every success story at scale reflects the critical importance of political will and leadership in government, whether national, regional, district, local or municipal. In Southern Nations, Ethiopia (Table A-1, # 4), rural sanitation coverage went from 15% to 50% in a matter of a year because one man decided to make it a government priority to shift staff time and budgetary resources to the purpose. In South Africa, great strides in sanitation are occurring because of a national decision and plan setting out targets, clear strategies, significant resources, and accountability (Muller 2002). During the 1980's the national government in Bangladesh made the decision to tackle sanitation as a priority and this leadership and political will was used to drive every level of government and engage all sectors of society in a massive social mobilization campaign coupled with development of a supply-chain of pour-flush toilets that reached some of the most remote areas of the country (Table A-1, # 9). Some core manifestations of political will are on-going long-term budget allocation to the sector at different levels of government (Lesotho, Thailand, South Africa, Ethiopia), time-bound government targets integrated into on-going national development plans (Thailand, Vietnam), and output-based incentives to hold civil servants to these performance targets tied to program activities (Ethiopia, Thailand). These were some of the key features of how political will works its way down to the lowest level of implementation. Often, a political champion leads the cause to get these changes adopted in government. In Ethiopia it was the head of a regional health bureau, in South Africa it was the Minister for Water, just two examples of the many champions of sanitation that have broken new ground in leading the way for change.

#### Partnering with Small Scale Private Sector Providers (SSPSP)

"In today's world, the private sector is the dominant engine of growth - the principal creator of value and managerial resources. If the private sector does not deliver economic growth and economic opportunity - equitable and sustainable - around the world, then peace will remain fragile and social justice a distant dream.[...] That is why I call today for a new partnership amongst governments, the private sector and the international community."

Kofi Annan, Secretary-General of the United Nations

The sanitation marketing process recognizes the need for a healthy and productive partnership to be formed between the public and the private sectors. In practice SSPSP are already active in latrine provision but their efforts are not being maximized and the following constraints are common:

*Becoming recognised*

- SSPSP usually form part of the informal sector and are not officially recognized
- They lack access to venture capital, partly due to lack of assets and lack of formal recognition
- Complicated, time consuming , expensive and corrupt systems to gain registration which are off putting to small businesses
- Possibly subject to onerous and bureaucratic system if registration achieved
- Lack of trade organisations to support and represent them collectively

*Lack of business capacity*

- Making a business out of human waste is not glamorous and usually attracts people who see it as “A temporary job until something better comes along”
- Inability to effectively promote services to increase customer base
- Lack of training in different latrine designs
- Work usually learnt on the job with no formal training opportunities
- Insufficient cash flow and lack of aptitude for proper pricing and keeping accounts
- Poor communication channels

*Commercial viability*

- In rural areas the large distance between customers and the infrequent need of their services means too long spent on unproductive traveling time
- Transport cost are high
- The demand for pit emptying is fragmented in time and space and the development of efficient emptying and transport systems is difficult.
- A subsidized programme can force operators out of the market.
- Customers are poor and the services have got to represent good value for money. Profit margins are being constantly squeezed.
- The customers are poor and demand credit or easy payment terms.

The sustainability of the small scale sanitation providers is always vulnerable making the need for a supportive, flexible and understanding relationships with the private sector an essential factor for success. It is imperative that they are represented in programme design decision making processes.

Partnering With Large Private Sector Companies

Large companies have begun to look at the long-neglected “bottom-of-the-economic pyramid” consumers in developing countries as a potentially large new market for growth. These poorer segments of the population have tended to be ignored in large companies business plans, but a new realization that they may represent a very significant new market for goods and services is emerging (Prahalad and Hammond 2002). Organizations like the UNDP and the World Business Council for Sustainable Development (WBCSD) have begun to seek out mutually beneficial partnerships to put the private sector’s efficiency, production, distribution, retail and marketing experience and capabilities to work for the poor (see UNDP’s Growing Sustainable Businesses program, at [www.undp.org/business/gsb/](http://www.undp.org/business/gsb/) and WBCSD’s Sustainable Livelihoods Project at [www.wbcsd.org](http://www.wbcsd.org)). Very creative examples of ways to adapt and extend access to the home construction industry, including construction

materials and technical building services, to reach remote and neglected markets of the informal and low income housing sector, typically an informal “do-it-yourself” market, in several developing countries across the globe have demonstrated how large companies can extend their supply chains into these new low-income markets to support low-cost access to home sanitation for the poor, for example, AMANCO in Argentina, CEMEX in Mexico and others (WBCSD 2004).

### Product innovation

The customer must sit at the top of the design process and products must be designed so that they meet their needs. In some households the constraint may not be financial but rather the lack of a design or technology that can meet their aspirations and situation. In many urban areas the aspiration is for a water closet, but this is not possible given the lack of a sewer or space. When an emptying service is provided, however a form of water closet becomes possible and the owner may be willing to invest in a serious up-grade. In most cases affordability is an issue and there is likely to be a niche in the market for good quality, but cheaper latrine designs.

### Latrine choices in unplanned areas of Dar es Salaam

There are two main types of latrine design, the traditional or passport latrine and the drum latrine.

The traditional passport latrine comprises of a 2.8m block lined pit, a large rough cast concrete slab and some form of superstructure. The superstructure can be made of a rough assembly of rice sacks or cement blocks and usually have no roof. When an occupant stands up in the latrine with an inadequate superstructure their head and shoulders are on view to the public as in a passport photograph (hence the name). It is not possible to lock such super structures and as if it is sited on a through fare any passer by can, and will use the latrine. Passport latrines are a major concern to the women who need greater privacy than men and complain that they can only really use the latrine under the cover of darkness. The services of a fundis (mason) are needed to construct such a latrine as digging a 2.8 metre pit in the collapsing sandy soils of Dar es Salaam is a skilled and risky business. Such latrine should have a life expectancy of 10 to 15 years, but because of poor construction practices many collapse after a few years and have to be abandoned. For this poorly designed, poor quality, limited life latrine a household will have to pay \$300, which is equivalent to 6 month unskilled daily wage. The surprising fact in Dar es Salaam is that so many households are willing to pay such a large amount for managing their households excreta. This is a true measure of the demand for safe, private, convenient place to defecate.

The alternative option is the drum latrine where tyres or old oil drums, instead of concrete blocks, are used to prevent the pit from collapsing. Their depth can vary with the amount of tyres and drums used and these latrines have the advantage of being self built, relatively cheap (\$30) and do not require a great deal of space. They are however regarded as a poorer option as they fill up and need replacing quickly, are smelly, and non permanent.

The chronic lack of affordable appropriate latrine designs is a major barrier to continued latrine ownership and use in Dar es Salaam. WaterAid are currently trying to tackle the problem by developing new permanent latrine designs with a target price of \$70.

Latrines are usually designed by engineers working to a technical specification and not to a target cost or the needs of the consumer. Further limitations can also be imposed by over zealous building standards and health regulations, e.g. Ghana and the KVIP. The net result is an over designed technically correct latrine which few can afford. The approach needs to be changed to that of risk limitation, extreme affordability and an appreciation that a latrine perceived to be sub-standard by health officials is still significantly better than no latrine at all. The biggest hurdle in many areas is actually getting families to start using a latrine and to stop open defecation. If this can be overcome by accepting a reduced building standard then that is part of the trade-off. Programme implementers should accept the health benefits that defecating in a pit bring by breaking the faecal-oral route and concentrate instead on promoting latrine up-grading in order to maximise the benefits. This was the principle total sanitation adopted in Bangladesh.

If building standards can be relaxed, a whole range of innovative solutions become possible which are capable of making acquiring a latrine much cheaper. International Development Enterprises (IDE) describe the three building blocks of cheapening designs as:

- Miniaturisation – are large 3m deep pits necessary? Will a 1m deep pit coupled with a reliable emptying service work just as well?
- Affordability to the rural poor price is always important. Are expensive concrete slabs absolutely necessary? Are there cheaper alternatives?
- Expandable – This enables households to build latrines in small affordable sections. House building processes in developing countries are incremental i.e. the owner first saves to buy the land, then saves to pay for the cement for the foundations, then for the bricks etc. Its not all done at once as in the Northern countries , and the house building is matched with the family income flows and avoids the need for banking services.

#### Practical steps to making a latrine design effective and cheap

1. Analyze what the technology does
2. Set specific cost targets
3. Identify key contributors to cost. Analyse each component and rank them
4. Design around each of the key contributors to cost before finding acceptable trade offs. These include
  - Capital for labour – rural poor usually have lots of time, but no cash
  - Quality vs. Affordability – if its really cheap then a design life of a few years could be acceptable.
5. Make changes based on field test experience
6. Always go through fields testing if you move to a new place

When the shackles of regulation and convention are removed, the local masons and artisans are often the best source of innovation and product development. They are aware of their customers' needs, and the availability of materials, and if successful, will have pride and stake in the use and further development of the innovation.

#### Allow time

One of the key essential factors in developing an excreta management programme is time. Three year programmes expected to achieve sustainable excreta disposal and build 5,000 latrines simply will not work.

Time is needed to

- Carry out research on the motivations and constraints regarding latrine use
- Create customer awareness, knowledge, experience and understanding of the product needed to increase uptake of latrine building and use
- Develop the capacity and profitability of the new sanitation industry
- Allow the private services sector to develop a customer base and develop a trusting relationship
- Develop meaningful public-private partnerships
- Develop effective mechanisms for cross-ministerial coordination
- Gain political will

### Use of Subsidy

Many developing countries have recognised that some form of subsidy is necessary, but are caught in the moral and political dilemma of believing on the one hand that the poor cannot afford good sanitation and that they should not be made to suffer any additional financial burden and on the other that subsidising latrine construction leads to dependency and unsustainable excreta disposal systems. The solution suggested is often a 'smart' or 'intelligent' subsidy and is taken as meaning one that

- is capable of being withdrawn without the final user noticing the impact.
- acts as a catalyst for commercial activities with them becoming a primary engine for change.
- allows for transitions from an unprofitable to a profitable business.
- is used as a temporary promotion tool to kick start demand, and should be time bound and well publicized, e.g. "Two for the price of one; offer ends Easter", "Half price special introductory offer for first twenty customers", "Chance to win a new bicycle for first 100 customer" etc.
- always has an exit strategy
- should not undermine the profitability and viability of the non-supported private sector and should not produce a disincentive for or prevent organisations outside the system from becoming involved and competing
- if possible, are output as opposed to lump sum based, where output-based subsidies (see for example <http://www.gpoba.org/>) allow contractors to be rewarded for achieving good results and good impacts (not just building things), maintaining good customer relations, improving the quality or efficiency of services and being innovative in adapting service delivery. With subsidies paying for the provision of some form of infrastructure the incentive for the contractor to improve the quality of service is diminished.

### The way forward

The list of problems, re-characterisation of thinking, and conditions for success together with complexity of improving sanitation may appear daunting to an organisation or government body who have recognised the problems and the importance of excreta management, but are unsure about where or how to start. This raises the question of what is the one key thing an organisation can do to improve sanitation? From the long list of possibilities, the key starting point is to employ a person whose only responsibility is to improve the excreta management of a target community. This person needs to be a dogmatic, persistent, self-driven 'doer' who is not easily put off when it gets difficult and is tactful and capable of brokering partnerships. He or she should preferably have some form of commercial

marketing background, have good people and conceptual skills and be a good communicator. They do not need to have a sanitation background or be an engineer as technical skills can be brought in on an as-needed basis, and in many ways somebody without such a background is preferable as they are less likely to carry pre-conceived ideas about how things have been done from the past. The person needs to be placed at a reasonable high level within the organisation and be paid accordingly. They should not have to report through, or work with, the water department / team and should be positioned at least as high as the highest water person so as to ensure that sanitation receives the emphasis and resources it needs. The post should not in any way be regarded as a backwater or a demotion.

Once such a person is in place the next pre-requisites are time, money and an organisational environment that allows experimentation, encourages risk taking and is willing to try innovative solutions. The role of the excreta disposal manager is to drive the process forward, broker the partnerships between the private sector and different ministries and layers of government and to champion the cause of sanitation.

If the principles of sustainable sanitation and sanitation marketing outlined above are adopted and a good understanding is developed of the consumer demand and the supply mechanisms, the organisation should be soon in a position to start putting together a pilot project (without a hardware subsidy and capable of being scaled up), building and encouraging political commitment in the process. Through persistence, trial and error and the support of organisations or services with specialised skills the organisation may lack, i.e. communications, market research, product innovation, etc., progress will be made. In the early days the number of latrines built should not be an indicator, but rather indicators should be used which show of how consumer awareness, and intention to build have changed or how effective an intervention has been at removing constraints.

The key factors after this are persistence, patience and most importantly TIME.



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**Table A-1. Projects Using Innovative Strategies to Stimulate Demand and Delivery Products & Services**

No	Project	Country	Sponsors	Period	Scale	Setting	Demand Stimulation Mechanisms & Strategies										Products, Services, Delivery & Supply Chains								Reference										
							Social Mobilization	Community Mobilization	Participatory Engagement	Political Mobilization	Social Marketing Communications	Explicit No Subsidy Policy	Door-to-door Promotion & Sales	Mobilization of Savings & Loan/Credit Mechanisms	Laws on Residency, Building, or Land Title Used	Development & Adaptation of New Product(s)	Extreme low-cost product innovation	Expanded range of products offered to households	Toilet Building Information Service or Center	Market-based private sector and/or DIY provision	Facilitated extension of supply chain of materials/products to unserved areas	Commercial approach used in production, sales, service delivery	Product or service quality assurances	Pit emptying services included		Functioning Partnership Structure	Local Gov't Involvement								
1	Rural Sanitation	Thailand	Govt	40 years, starting	National	Rural	Y	Y	Y																										Luong et al. 2002
2	Community-led Total Sanitation	Bangladesh	NGO	2000- on going	Multi-village	Rural		Y	Y																									Kar 2003; Allan 2003	
3	IDE Sanitation Marketing	Vietnam	NGO+Govt	2003-2004	2 Districts	Rural	Y			Y	Y	Y																						Frias and Mukherjee 2005	
4	Southern Nations	Ethiopia	Govt	2004	Regional	Rural	Y																											WSP-Africa 2005	
5	ZimAhead Health Clubs	Zimbabwe	NGO	1999-2001	3 Districts	Rural		Y	Y																									Waterkyn and Cairncross 2005	
6	WaterAid Embangweni Ecosan	Malawi	NGO	2002 onward	District	Rural																												D'Sousa 2005	
7	World Bank PADEAR	Benin	Govt & Donors	1996-1999	Regional	Rural			Y		Y	Y	Y																					Reiff and Clegbaza 1999	
8	Nat'l Rural San Program	Lesotho	Govt	1983 thru 1990's	National	Rural			Y	Y	Y																							UNDP-WB 1990, Dis. Paper No.3	
9	Rural WS & San Programme- UNICEF	Bangladesh	Govt & Donors	1978-1997	National	Both	Y				Y	Y																						Luong 1994; WSP 2004	
10	PNSBC	Mozambique	Donors	1979 thru 1990's	Multi-city	Urban				Y																								Colin 2002	
11	USIT	Lesotho	Govt	1980's & 1990's	Multi-city	Urban																												UNDP-WP WSP Discussion Paper No.10	
12	Urban Environmental Program for On-site Sanitation	Jamaica	NGO	1995-1997	1 Slum	Urban																												Daane et al. 1997 EHP Activity Report No.35	
13	Orangi Pilot Project - Sewerage	Pakistan	NGO & Govt	1980-1993	1 Slum, Karachi	Urban		Y	Y																									Methra and Knapp 2005; ESCAP 2003	
14	Sulabh Int'l Commercial Public Toilet Blocks	India	NGO & Govt	1980's onward	Slums, Multi-city	Urban		Y				Y	Y																					WSP 2004	
15	Ougadougou	Burkina Faso	Govt & Donors	1990s	City Multi-city	Urban				Y	Y																							WSP 2004	
16	Condominial Sewerage	Brazil	Govt	1980's onward	Initially Brasilia	Urban		Y	Y																										Neder and Nazareth 1998
17	Baan Mankong CODI Urban Slum Upgrading	Thailand	Govt	2003 onward	National	Urban	Y	Y	Y	Y																								Boonyabanacha 2005	