Supply Chain Assessment for Sanitary Latrines in Rural and Peri-Urban Areas of Cambodia

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Abbreviations and Acronyms

ADB	Asian Development Bank
BCC	Behavior Change Communication
CLTS	Community Led Total Sanitation
CSES	Cambodia Socio-Economic Survey
CMDG	Cambodia Millennium Development Goals
DIY	Do It Yourself
DTW	Development Technology Workshop
GAA	German Agro Action (Welt Hunger Hilfe)
HH	Household
IDE	International Development Enterprise
IEC	Information Education Communications
LWS	Lutheran World Service
MDG	Millennium Development Goals
MFI	Micro-Finance Institution
MIME	Ministry of Industry Mines and Energy
MOE	Ministry of Environment
MOWRAM	Ministry of Water Resources and Meteorology
MRD	Ministry of Rural Development
NGO	Non Governmental Organization
NPL	National Poverty Line
ODF	Open-defecation free
POS	Point of Sale
PPWSA	Phnom Penh Water Supply Authority
PDRD	Provincial Department for Rural Development
RDI	Resource Development International
SP	Samaritans Purse
T1	Type 1 latrine: ceramic pour flush squat pan
T2	Type 2 latrine: western-style pour flush bowl
T3:	Type 3 latrine: western-style bowl with cistern
T4	Type 4 latrine: concrete pour flush squat pan
WATSAN	Water and Sanitation
WSP	Water and Sanitation Program (World Bank)

Executive Summary

Introduction

Only about 10% of Cambodian rural poor households have access to "safe" sanitation facilities (latrines which effectively separate human excreta from human contact). At current rates of delivery on the one hand, and population growth on the other, Cambodia's sanitation sector Millennium Development Goal for 2015 (30% coverage) will not be reached for more than 30 years, and full coverage for more than 100 years. This shortfall will have serious consequences in terms of health, economic opportunity, and human dignity. The impact on all these dimensions is felt particularly strongly by women, and women-headed poor households are among the most severely affected.

There is much hope for a demand driven approach to providing access to sanitation services, in which the private sector responds to market opportunities to deliver hardware, maintenance, and information. Clearly the private sector is able to deliver any services for which there is a market, that is a clientele willing and able to pay the costs. The challenge is to convert the needs of the poorer members of society for safe sanitation services into *effective demand* (informed willingness and ability to pay).

This report documents an assessment of the supply chains for sanitation facilities and services in rural and peri-urban areas of Cambodia. The study was commissioned by the World Bank's Water and Sanitation Program (WSP) in Cambodia, and field work was undertaken by International Development Enterprises (IDE) in January 2007.

This *supply chain* assessment builds on the results of an assessment of *demand* for latrines, carried out in Cambodia in 2006. Together, the demand assessment and the present supply chain assessment provide the foundation for developing a social marketing program to enhance access to improved sanitation for the poor in Cambodia.

Methodology

Four locations were studied: rural areas of Siem Reap and Svay Rieng provinces and peri-urban areas of Phnom Penh and Kandal (Annexes 1 and 2). The study areas were selected to match the provinces selected previously by IDE and WSP for the demand assessment (Roberts and Long, 2007). They encompass a range of socio-economic and environmental conditions that are broadly representative of rural and peri-urban areas in Cambodia.

The methodology for the study consisted of interviews and focus group discussions with market actors in the supply chain for latrine construction materials in selected rural, urban and peri-urban areas of Cambodia, using a semi-structured interview format. International and national organizations with activities in Cambodia's sanitation sector were also interviewed.

The research techniques used for this survey were designed for a rapid assessment of the state of the sanitation supply chain at one point in time. The emphasis was placed on developing a broad qualitative understanding of the market system. Quantitative data in this report is indicative of the conditions observed in the study areas at the time of the survey but should not be taken as having a high degree of precision.

Results

The survey identified and targeted four main categories of supply-chain actors: masons, producers of concrete rings and slabs, building supply retailers, and construction industry importers/wholesalers. Results from the surveys provide an overview of the latrine construction supply chain in Cambodia. Key constraints for each supply chain actor are discussed and potential interventions are identified for improving the delivery of effective and affordable latrine options through market channels. The potential interventions are not presented as final recommendations but as an overview of options for consideration.

Sales of latrines of 4 types were identified as a suitable proxy for latrine construction. Type 1 (T1) is a ceramic pour flush squat pan, Type 2 (T2) is a western-style pour flush bowl, Type 3 (T3) is a western-style bowl with cistern for flushing, and Type 4 (T4) is a locally made concrete pour flush squat pan.

The data from the interviews suggest an annual latrine construction in excess of 48,000 units nationwide. Some 35,000 of these are T2 and T3 associated mainly with high income groups and urban areas, especially Phnom Penh. T1 latrines are the preference in rural areas especially but not only among the poor. Sales of these reported to this survey suggest construction of just under 14,000 T1 latrine units annually in the country. T4 latrines made up a negligible proportion of latrine sales.

Conclusions

a. Desire for latrines

The previous sanitation demand assessment indicated that the poorest to middle quintiles (Q1 to Q3) had achieved between 8% and 18% latrine coverage and that, in all cases, the majority of those households had managed to pay for those latrines themselves without assistance from NGOs or other agencies. In the same study, 95% of respondents who did not own latrines gave “too expensive/ don’t have enough money” as the reason for not owning, and only 4% said they were satisfied with their current practice. Also, 77% of rural non-latrine owners said that they had considered or were currently considering purchasing a latrine. It is also true, however, that two-thirds of the wealthiest quintile (Q5) have not yet purchased a latrine and that most people expressed a reluctance to invest in any latrine short of the commonly perceived “ideal” (but expensive) design. The conclusion is that most people (including poor people) want latrines and are willing to invest their own funds if presented with the right product at the right price and at the right time.

b. The private sector is already delivering most of the latrines in Cambodia.

The second conclusion is that the private sector has responded to un-subsidized market forces to provide the majority of the latrines which are installed in the country. In a market economy, where there is *effective* demand (willingness and ability to pay) for a product or service, entrepreneurs will take steps to make profits by serving the demand. The study interviewed many entrepreneurs who are doing just that, but in a fragmented and inefficient way.

c. Latrine costs relative to income for the poor.

Data on latrine prices show that installed costs for the commonly perceived “ideal” form of improved latrine substructure costs about $35, including a basic superstructure cost and assuming that un-costed family labor is used to do the construction. A five-person household at the national poverty line (NPL) earns about,

$900 per year, some of which is cash income. If a NPL household were able to save the cash equivalent of 5% of its annual income ($45) toward latrine purchase, there would be enough to pay for a basic unit in only one year, including interest costs if any. This simple analysis suggests that, even with current technology at current prices, a good quality latrine is not beyond the financial means of many poor households. What is needed is a way to spread the costs over a reasonable period of time. Thus, loan or installment programs that are sustainable and accessible would be an effective strategy to enable poor households to acquire improved latrines. Effective application of a loan system, however, would require careful design to limit increases in transaction costs for market players that extend loans to consumer and to avoid the potential of further impoverishing already poor customers by encouraging them to take loans that they cannot repay (especially given that a latrine is not an income generating investment).

d. Private sector margins on latrine and component sales are appropriate

Data from this study suggest that all private sector actors in the latrine supply chain are making appropriate profits for their investment, up to double digit percentages in some cases. These are in line with profit margins received for comparable products in other rural supply chains. The survey did not distinguish profits from returns to labor (wages) among ring producers and masons, but in any case it is clear that people are making a reasonable and sustainable living from their participation in the latrine supply chain.

e. Supply side interventions to improve sanitation access

Social marketing interventions to improve sanitation access should include measures to support both the supply side and the demand side of the latrine business. On the supply side, the following interventions should be considered:

Capacity building of supply chain members. Training in business and technical skills for masons, concrete producers, and retailers to improve quality, reduce costs, expand the product offerings, and increase sales volumes.

Supply chain coordination. Improved coordination and information flow within the supply chain can improve efficiencies and allow for more concerted efforts at market development. Coordination could be improved by enabling "lead enterprises" to play a central role in coordinating the inputs of other actors. By developing a broader understanding of the whole supply chain, a lead enterprise could: facilitate communication of consumer needs up the supply chains; improve the flow of price information up and down the supply chain; identify geographic areas or market segments with greater or faster-growing demand; innovate products or service combinations to better meet consumer requirements; identify and correct inefficiencies in the supply chain; and encourage grouping of latrine projects through linkages with Commune Councils, Village Development Committees, NGOs, PDRDs, community groups, etc.

Key candidates for the lead enterprise role in a given region may include: importers/wholesalers because of their apex position in the supply chain; provincial or district retailers because of their proximity to local markets; or concrete producers because of the high proportion of their business that depends on latrine sales. Masons are unlikely to fill a lead enterprise role because of their low level of business sophistication, credibility/trust issues within the supply chains and with consumers,

and the fact that a significant proportion of latrines are built without using masons services.

Technology development and innovation. The introduction and/or development of low-cost latrine designs, components, or materials is needed to increase the range of attractive and affordable latrine options on the market. This may include alternative technologies for the substructure, slab and pan (e.g., PVC pans), and superstructure. The ability to start simple and upgrade over time would also help to make latrines more accessible to poorer households. The challenge is to break the cultural perception of one "ideal" latrine design and make other lower-cost options equally functional and attractive to consumers. The Informed Choice Manual produced by WSP and MRD is an important step in this direction. Another useful tool would be a design selection matrix to provide guidance on appropriate latrine designs for various site conditions (e.g., flood risk, soil characteristics) and consumer preferences.

Financial services. Lack of capital is a significant constraint for all supply chain actors. Improved linkages with MFIs or other financing schemes would improve supply chain functioning.

f. Demand side interventions to improve sanitation access

On the demand side, the following interventions should be considered:

Promotion and advertising. Strategies can be developed for promotional campaigns aimed at raising awareness and stimulating demand for latrines. These should be based on an understanding of the decision drivers and emotional triggers of potential latrine purchasers.

Consumer financing. Credit linkages or an option to purchase in installments would increase affordability and effective demand for latrines among poorer households who cannot save enough cash to make a one-time purchase.

Group purchases. Facilitating group purchasing of latrines can encourage more latrine purchases through social pressure (and social support) and through the economies of scale that result from reduced transaction and mobilization costs for masons, concrete producers, and retailers. Group purchases could be organized in coordination with CLTS or other NGO projects. Alternatively, a lead enterprise could provide incentives for such purchases through connections with Commune Councils, savings groups, farmer associations, women's groups, etc.

Policy influence. The policies of government and aid agencies can have a significant impact—positive or negative—on latrine demand:

- A high level of subsidy for latrine construction has the effect of depressing the market for privately purchased latrines.
- Minimum design standards for sanitary latrines could improve the quality of latrines but, if rigorously enforced, could reduce overall demand by discouraging households from starting with a simple (and possibly sub-standard) design and upgrading over time.
- In Thailand, laws requiring latrines for all residences has been a key factor in achieving near total latrine coverage. Such an approach would not likely be successful in Cambodia, however, until the supply chain is able to effectively deliver a range of suitable and affordable latrine designs.

- South Asian experience with certification and rewards for Open Defecation Free (ODF) villages has been a successful motivator for widespread latrine installation.

g. Reaching the poorest households

No matter how inexpensive latrines are made, a pure market approach will exclude a certain percentage of the population that cannot afford the full purchase price. Affordability is a function of two main factors: (a) cost of the product relative to net income and (b) the perceived value of the product in the eyes of the consumer. Two things that can be influenced, therefore, to improve latrine affordability are the product cost and its perceived value.

The perceived value of latrines can be increased through effective promotional activities, as mentioned above, and through exposure to neighbors who own latrines and experience its benefits. Over time, many people with low incomes, who initially consider latrines unaffordable, will be convinced to purchase one as their level of awareness and confidence in the product increases.

Latrine costs can be influenced through improvements in technology (increasing the range of available options and prices) and financing (helping the poor to overcome cash constraints). Cost barriers can also be reduced with subsidies applied in a way that does not undermine the private supply chain. "Smart" subsidies, in this sense, are those that:

- effectively target the poorest households with minimal leakage to households that could afford a latrine on their own (difficult to achieve in practice),
- require a co-payment or other contribution from the receiving household,
- do not bypass the local private supply chain but use it to deliver the latrine products/services, and
- do not distort perceptions of the real value of latrines

Finally, it has been shown that if a majority of households in a community stop open defecation, the whole community experiences health benefits. Thus, even if the poorest households in a village are not able to access latrines themselves, they will still receive indirect health benefits from the improved public sanitation that results from other households using latrines. By the same argument, the entire community benefits if all households stop open defecation. Where only a small proportion of (better off) community members invest in a latrine, they will reap the convenience and status benefits of latrine ownership, but health benefits are unlikely to accrue to them as long as many others continue to practice open defecation. Thus it is in the community's interest to provide support to the poorest households to obtain latrines. The incentive to support the poorest community members in this way is magnified if publicly-funded rewards are available for villages that achieve ODF status.

1 Introduction

Only about 10% of Cambodian rural poor households have access to "safe" sanitation facilities (latrines which effectively separate human excreta from human contact). At current rates of delivery on the one hand, and population growth on the other, Cambodia's sanitation sector Millennium Development Goal for 2015 (30% coverage) will not be reached for more than 30 years, and full coverage for more than 150 years[1]. This shortfall will have serious consequences in terms of health, economic opportunity, and human dignity. The impact on all these dimensions is felt particularly strongly by women, and women-headed poor households are among the most severely affected.

There is much hope for a demand driven approach to providing access to sanitation services, in which the private sector responds to market opportunities to deliver hardware, maintenance, and information. Clearly the private sector is able to deliver whatever services for which there is a market, that is, a clientele willing and able to pay the costs. The challenge is to convert the needs of the poorer members of society for safe sanitation services into effective demand (informed willingness and ability to pay).

This report documents the rationale, methodology, results and conclusions from an assessment of the supply chains for sanitation facilities and services in rural and peri-urban areas of Cambodia. The study was commissioned by the World Bank's Water and Sanitation Program (WSP) in Cambodia, and was undertaken by International Development Enterprises (IDE) in January 2007.

This supply chain assessment builds on the results of an assessment of demand for latrines, carried out in Cambodia in 2006[2] Together, the demand assessment and the present supply chain assessment provide the foundation for developing a social marketing program to enhance access to improved sanitation for the poor in Cambodia. A proposed pilot project based on these results is presented in a separate report.[3]

2 Background

2.1 *Basic Concepts*

Throughout this report, ***sanitation*** is defined narrowly as the disposal of human fecal waste, especially through the use of latrines. Broader sanitation issues related to water supply, hygiene, and solid waste disposal are not specifically addressed. "Improved sanitation" is defined by the WHO/UNICEF Joint Monitoring Program (JMP) as including the following technologies: 'connection to a public sewer, connection to a

[1] Robinson, A. Strategic actions to improve rural hygiene and sanitation in Cambodia. Rural Sanitation and Hygiene in Cambodia: The Way Forward?, WSP, March 2007

[2] Roberts, M., Long, A. March 2007. Demand assessment for sanitary latrines in rural and urban areas of Cambodia. IDE/WSP.

[3] IDE. 2007. Social Marketing of Rural Sanitation in Cambodia, a pilot project proposal, IDE, in preparation.

septic system, pour-flush latrine, simple pit latrine, and ventilated improved pit latrine'[4].

Latrine components refer to hardware and materials typically associated with the construction of a structure (usually small, accommodating a single person) for defecation, including ceramic squat pans, toilet bowls, concrete tank rings and floor slabs, etc. Other general building materials such as PVC pipe, thatch, wood, and/or corrugated metal sheets are also often used.

Latrine types are categorized in the study according to the type of pan or bowl used (ceramic squat pan, western-style bowl, bowl with cistern, and concrete squat pan), as described in the following table.

Table 1: Wet type Latrine Styles in Cambodia

Type 1 (T1)	Type 2 (T2)	Type 3 (T3)	Type 4 (T4)
Ceramic pour flush squat pan. 	A western style raised toilet bowl with pour flush 	A Western style raised toilet bowl with cistern 	A concrete pour flush squat pan 
Retail price: $4 - $12 Availability: all markets and areas surveyed (5 brands available) Source: Vietnam, China, or Thailand	Retail price: $16 - $18. Availability: mainly urban markets but also present in some rural retailers Source: Thailand, China	Retail price: >$30 Availability: only Urban with access to piped water supply Source: Vietnam, Thailand, or China	Retail Price: $4 Availability: Phnom Penh area Source: Cambodia

Hygiene behavior refers to behavioral habits of the population that increase or decrease their exposure to faecal-oral contamination (e.g. hand washing).

A ***supply chain*** is the combination of organizations, people, activities, information and resources required to create a product or service and move it from supplier to customer. Supply chain actors typically include input suppliers, producers, transporters, wholesalers, retailers, and consumers. To persist, commercial supply chains require, at a minimum, a flow of revenues up the chain which allows each actor to make enough profit to justify their participation. Participants in the supply chain for sanitation services in Cambodia include: importer/wholesaler, retailer (sometimes also wholesaler and also contractor), concrete product producer, mason, and the consumer. Other stakeholders include government officials, community groups, and other civil society organizations.

Social marketing is a systematic approach for applying commercial marketing principles to achieve social objectives—in this case, improved public health. Social

[4] The JMP website accessed June 07, http://www.wssinfo.org/en/122_definitions.html

marketing may sometimes refer narrowly to the use of advertising campaigns to influence behaviour. In this report, however, a broader definition is adopted that includes both promotional activities aimed at behaviour change (e.g., cessation of open defecation) and supply chain strengthening for distribution of beneficial products and services (e.g., latrine components and construction services).

Social marketing is primarily concerned with achieving a social objective. It goes beyond sales alone as it is also concerned with how the product is used after the sale has been made. The aim, for example, is not only to sell latrines but to encourage their correct use and maintenance in order to achieve a positive health outcome. Key elements of a social marketing process will include:

a. collection and analysis of consumer data to develop appropriate strategies;
b. identifying or designing products, services, or behaviors that fit the needs of different consumer groups, including affordability and acceptability;
c. design and implementation of promotional strategies to raise awareness and stimulate demand for the products, services or behaviors;
d. developing effective distribution channels so that, as demand is created, consumers know where and how to obtain the products and/or services;
e. developing effective pricing strategies, including potential subsidy strategies, to make the product or service accessible to a wide range of consumers.

Behavior Change Communication (BCC) materials may include brochures, videos, posters, displays and other materials aimed at increasing awareness and motivation for behaviour changes in relation to hygiene practice.

2.2 *Sanitation in Cambodia*

2.2.1 Sanitation Coverage

Estimates of sanitation coverage in Cambodia vary widely and range from 8% to 18% for rural households and from 53% to 79% in urban households, as summarized in Table 2. The data reveal little consistent growth in coverage rates over time.

Table 2: Sanitation coverage in Cambodia (multiple sources)

Source	Year	Rural	Urban
Cambodia Inter-Censual Population Survey	2004	16 %	55 %
Cambodia Socio-Economic Survey	2004	18.1 %	62.5 %
UNICEF/WHO Joint Monitoring Program	2004	8 %	53 %
Demographic and Health Survey	2005	15.7 %	56.1 %
IDE Sanitation Demand Survey	2006	13 %	79 %

Government and donor investment in the sanitation sector has been low in past decades. Recently, however, there is increased recognition that sanitation coverage is lagging behind water supply, making achievement of Cambodia Millennium Development Goals for sanitation (30% rural coverage by 2015) unlikely. Significant sanitation initiatives by the ADB, UNICEF, Plan International, WSP, and DFID are now planned or underway in collaboration with the Ministry of Rural Development (MRD).

2.2.2 Policy, Regulatory, and Institutional Environment

The roles and responsibilities of Cambodian government agencies for water supply and sanitation are fragmented, as outlined in Table 3 below. Rural sanitation falls under the jurisdiction of MRD. Urban sanitation outside of Phnom Penh falls to the Ministry of Industry, Mines and Energy (MIME). Sanitation inside the capital is the responsibility of the Ministry of Public Works and Transport (MPWT) although the Phnom Penh Municipal Authority also claims a role. Urban drainage is the responsibility of the MPWT, which by default includes sewerage since there is no separation between sewerage and storm drainage systems. A number of external agencies play significant roles in support of these institutions, especially UNICEF, WSP, and several NGOs.

Table 3: Government roles and responsibilities in water supply and sanitation

Agency	Roles and Responsibilities
Ministry of Industry Mines and Energy (MIME)	Urban water supply in all provincial towns, sanitation outside of Phnom Penh. Currently the *de facto* regulator of public as well as private water utilities.
Ministry of Rural Development (MRD)	Water and sanitation in rural areas, where water is provided by NGOs, cooperatives, private operators or public authorities not capable of full cost recovery
Ministry of Public Works and Transport (MPWT)	Urban drainage and sewerage in Phnom Penh
Ministry of Environment (MOE)	Environmental protection and regulation. Pollution control. (with a focus on industrial effluents)
Phnom Penh Water Supply Authority (PPWSA)	Semi-autonomous utility providing Phnom Penh's drinking water supply
Provincial Department of Rural Development (PDRD)	The provincial implementing arm of MRD

A draft "Water and Sanitation Law of the Kingdom of Cambodia" was released in 2004 and a "National Policy on Water and Sanitation" in 2003. The policy lays out the vision for the sector, and specifies roles for different agencies. The proposed law (supported by MIME) will establish an independent regulator and licensing body for piped water supplies and sewerage operated by private suppliers.

Two priorities indicated in the Policy have important implications for sanitation interventions:

1. Communities are to choose the type and level of service, based on information about the technical and financial aspects of service options.
2. Prioritizing services to the poor

Appropriately, neither the Water and Sanitation Law nor the National Policy set out minimum technical or operating standards for household sanitation. Both MIME and the MRD have indicated that there are no sanitation regulations for household sanitation to date. The MRD is currently working on 'Guiding Principles of Sanitation', which will deal with implementation approaches, especially subsidies, but will not provide technical standards. The MRD and WSP 2006 publication 'Informed Choice Manual on Rural Household Latrine Selection' provides provisional guidance on latrine design and selection.

2.2.3 Key conclusions from the Demand Assessment for Sanitary Latrines

The Demand Assessment for Sanitary Latrines (Roberts and Long, 2006) was undertaken in March 2006 to understand perceptions, desires, and practices regarding latrine use in urban and peri-urban areas of Cambodia. In total, 41 villages and 939 households were surveyed, including both latrine owners and non-owners, and six focus group discussions were conducted.

Among the survey population, 13% of rural households and 79% of urban households own a latrine. Latrine coverage varied widely among villages, ranging from 0% to 100%, depending on environmental conditions, socio-economic factors, and the influence of NGO programs.

Unsurprisingly, latrine ownership was found to be more common among better-off households than in poorer households. Income and cost are key factors in a household's decision to purchase a latrine, but they are not the only factors. A reluctance to build low-end latrines, a lack of attractive low-cost alternatives in the market, and the low rank of sanitation in household priorities are also important obstacles. There is a strong perception of an "ideal" latrine consisting of an offset tank, pour-flush pan, and solid walls and roof (i.e., a relatively expensive latrine design). High-end expectations appear to be clashing with low ability to pay resulting in delayed purchase decisions. The study suggested that it may be possible to overcome this obstacle through introduction and demonstration of lower cost but acceptable design alternatives.

The study also indicated a generally high level of awareness of hygiene issues. The majority of respondents could name basic sanitation messages, and health/hygiene were in the top three perceived benefits of latrine ownership and top two motivations for latrine purchase.

3 Objectives and Scope of the Supply Assessment

The purpose of this study is to develop a picture of the existing supply chain for latrine components and construction services in rural and peri-urban areas, with special regard to:

- supply chain actors and the relationships between them;
- supply chain actors' knowledge, practice and attitudes to hygiene behavior;
- supply chain actors' service quality standards and promotional activities;
- supply chain economics (margins, profits, costs, and credit terms);
- range of latrine components currently available;
- promotional strategies used by supply-chain actors
- scale of market activity; and
- impact of regulation and infrastructure on market access.

This study investigates constraints and opportunities within the sanitation supply chain and potential interventions to improve access to latrines for the rural and peri-urban poor. These are examined in the context of the broader sanitation sector environment, and major sector initiatives such as Community Led Total Sanitation (CLTS).

4 Methodology

4.1 *Research Tools*

4.1.1 Stakeholder Organization Interviews

Development organizations with activities in Cambodia's sanitation sector were interviewed to gather relevant information on their activities, perspectives, and potential areas for program synergies. The list of agencies interviewed is in Annex 5 and the interview guideline is in Annex 6. A summary of organization activities and geographic focus areas is included in Annex 7.

4.1.2 Market Actor Interviews

An interview guideline was developed to facilitate interviews of supply chain actors. The interviews were semi-structured to increase flexibility and develop a fuller qualitative understanding of the market actors' conditions. Quantitative data were also gathered during the interview process, to capture typical or indicative values on the profits, expenses and margin expectations through the supply chain.

Each interviewer was trained on the survey purpose and objectives as well as the specific purpose and desired information from each question. Interviewers were encouraged to record as much surplus information as possible to help develop a broad understanding. At the end of each day the survey team reviewed the results gathered to date, identified information gaps, and determined the survey plan for the following day. The interview guideline (English version) is included as Annex 3.

Field work for the survey took six days, over a two week period from January 5-15, 2007. Interviews were conducted by two survey teams, each consisting of a lead surveyor and three surveyors. Both teams were supervised by the survey coordinator (Annex 4). Data from the completed questionnaire forms were entered into spreadsheets by the survey coordinator, and cleaned by the technical advisor.

4.1.3 Focus Group Discussions

Focus group discussions were used to verify and probe, in a more qualitative way, a number of topics touched by the interviews of individual market actors. During each discussion, the lead surveyor acted as facilitator and was assisted by the survey team members who took notes. Discussions were also tape recorded where possible.

4.2 *Sample Selection*

4.2.1 Selection of Study Provinces

Four locations were studied: rural areas of Siem Reap and Svay Rieng provinces and peri-urban areas of Phnom Penh and Kandal (Annexes 1 and 2). The study areas were selected to match the provinces selected previously by IDE and WSP for the demand assessment (Roberts and Long, 2007). They encompass a range of socio-economic

and environmental conditions that are broadly representative of rural and peri-urban areas in Cambodia.

4.2.2 Selection of Market Areas

Within each study area, three market types were targeted:

- Large scale urban market (typically the province capital)
- Medium scale town market (located between rural and urban market area)
- Rural market (village/commune building supply retailer or concrete producer)

Rural market areas selected for this survey corresponded to the villages surveyed in the aforementioned Sanitation Demand Assessment. Those sites were originally selected using a random Probability Proportional to Size (PPS) methodology.

4.2.3 Selection of Market Actors for Interviews

A total of 131 actors in the sanitation supply chain were interviewed. The survey identified and targeted four main actor groups:

- masons (38),
- producers of concrete rings and slabs (and some concrete toilet pans) (53),
- building supply retailers (toilet pans/bowls, cement, hardware) (22), and
- construction material importers/wholesalers (12).

These respondents were identified by convenience sampling. Retailers and concrete ring producers were approached first as they are easily identifiable. These actors were asked to identify both competitors and relevant stakeholders up and down the supply chain. This process enabled rapid identification of appropriate respondents, and improved the surveyors' understanding of supply chain relationships. The importers/wholesalers of construction materials were interviewed by telephone.

4.2.4 Selection of Focus Group Participants

A total of 28 people participated in four focus group discussions—one group in each of the four study areas. Table 4 below summarizes the number of participants in each focus group and a full list is included in Annex 8. Participants were selected according to the following procedure:

- After interviews were completed in each survey area, the survey team invited eight of the questionnaire respondents to participate in a focus group discussion on the following day.
- The eight invitees were selected based on the survey team's assessment of their interest, knowledge and ability to contribute to a group discussion, and were considered to be representative of their specific actor group.
- Invitees were encouraged to participate by the offer of $12, to compensate for loss of earnings and to cover travel expenses.

Table 4: Number of focus group participants

Province	Mason	Retailers	Producers	Total
Siem Reap	2	2	2	6(0)
Kandal	3	1	2	6(0)
Svay Rieng	2	2(1)	2	8(1)
Phnom Penh	3	2(1)	3(1)	8(2)

(x) Number of female participants given in parentheses

4.3 *Study Limitations*

The research techniques used for this survey were designed for a rapid assessment of the state of the sanitation supply chain at one point in time. Emphasis was placed on developing a broad qualitative understanding of the market system. The use of convenience sampling, small sample sizes, limited geographic coverage, and reliance on respondent recall, while facilitating the rapid collection of information, also led to sacrifices in statistical rigor.

There are also potential biases inherent in the collection of information from commercial enterprises. Although the study purpose was explained and verbal consent for the interviews was received, some respondents may still have withheld or distorted information if they suspected that it would be used to their disadvantage. In general, this was more of a problem with the larger-sized market players.

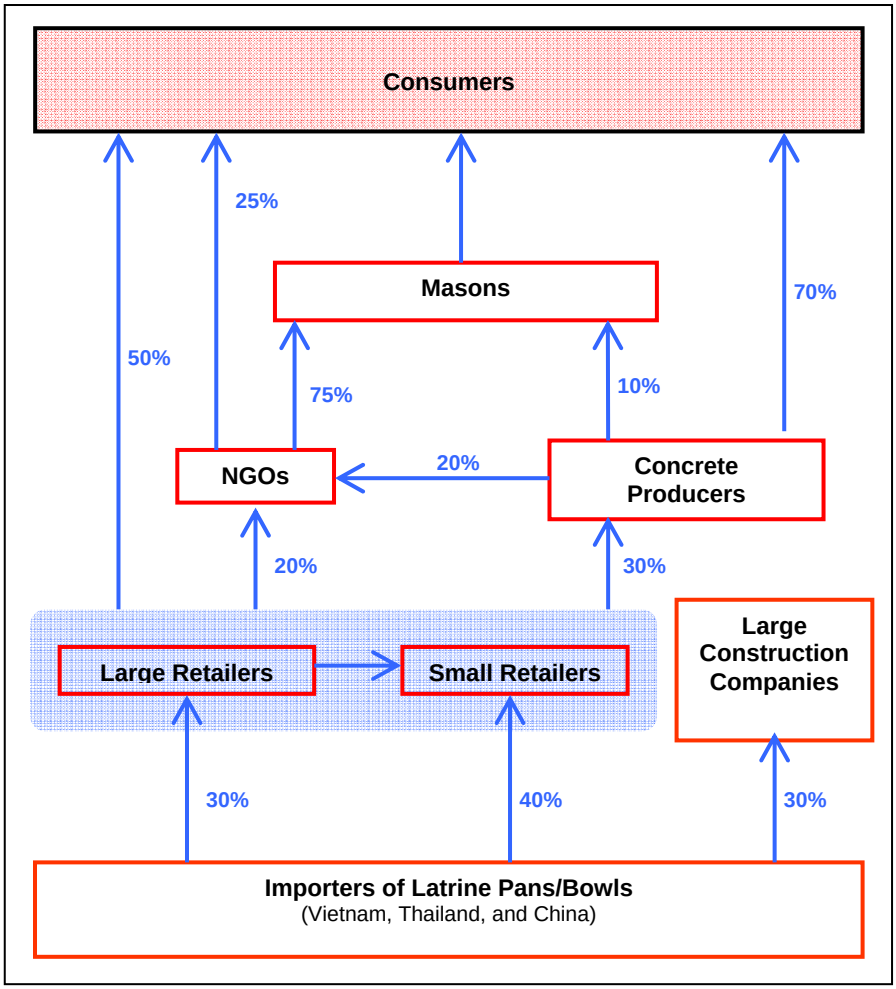
For these reasons, quantitative data in this report should be taken as representative only of the conditions observed in the study areas at the time of the survey. All percentages in the report, for instance, are given to the nearest ten or 25 percent (except where otherwise justified) and should be considered indicative only.

5 Market Actors, Constraints, and Opportunities

This section describes the results obtained from the interviews and focus group discussions with importers, retailers, concrete producers, and masons. The results provide an overview of the latrine supply chain in Cambodia, and identify key constraints for each supply chain member and potential interventions for improving the delivery of effective and affordable latrine options through market channels. ***The potential interventions presented in the following tables are not intended as final recommendations but merely an overview of options for consideration.***

Figure 1 below, presents a schematic summary of the latrine supply chain. In particular, the map follows the flow of latrine pans/bowls since this is the one component that is unique to latrine construction. Other components, such as cement, gravel, sand, brick, PVC pipe, etc., are commonly available construction materials, only a small proportion of which are used for latrine construction. The number of pans/bowls sold is also a close proxy for the total number of latrines installed since the number of "dry" latrines (i.e., latrines without a pour-flush pan or bowl) accounted for only 12% of all latrines reported in the demand assessment (Roberts and Long, 2007).

Figure 1: Latrine supply chain map



In rural locations the latrine supply chain is made up of small independent enterprises, all of which earn the majority of their income from products or services outside of the latrine market. Importers and large retailers were larger enterprises based in urban centers and also earned most of their income from non-latrine related products.

Little coordination and limited information flow was apparent through the supply chain. Some supply chain actors had collaborated when bidding on potential latrine construction contracts but there was no evidence of more formal long-term collaboration (e.g., retailers and masons partnering to provide a complete materials and installation service for customers). No one actor appeared to see beyond his/her immediate customer to the end consumer or the supply chain as a whole. This lack of a "whole market" view of the supply chain results in:

- lack of awareness/understanding of consumer requirements,
- lack of ability to target specific market segments or regions,
- lack of ability to innovate, package, and set prices for products/services that address consumer needs, and
- lack of ability to find and correct inefficiencies in the supply chain.

Little evidence of latrine promotional activity was observed among supply chain actors. Rather than supply chain members actively seeking to promote latrines among potential customers, it is the households that typically seek services and drive purchasing of latrine construction materials from retailers and producers.

The following sections give a more detailed look at each of the supply chain actors.

5.1 *Importer/Wholesalers*

Definition: Importer/Wholesalers are enterprises that import construction materials (e.g.: cement, ceramic pans, PVC tubing, galvanized steel sheet, tiles, etc.) from outside Cambodia.

Importer/Wholesalers sell to retailers, construction projects, and may also sell small amounts directly to consumers. Latrine components are generally a minor part of their product range. Most of the Importer/Wholesalers identified were not willing to be interviewed face to face. This is a common problem in doing research on Cambodian businesses (especially importers), whose managers fear the official and unofficial consequences of disclosure of details of their activity. Telephone interviews enabled the Team to obtain some information, but one may expect under-reporting of volumes, revenues, and margins.

Nearly all construction materials used in Cambodia (cement, steel, fiber cement, ceramic floor and wall tiles, ceramic roof tiles, latrine accessories, insulation products, paint, gypsum board, PVC pipe, etc.) come from China, Thailand and Vietnam. This dependence on imports is due primarily to the limited manufacturing capacity within Cambodia for similar products. Latrine accessories are in the lowest import tax bracket (7%). Other imported materials, e.g., concrete, are taxed at 15%.

T1 latrine pans (pour flush ceramic pans) are closely associated with the construction of latrines in rural areas, as this study found no evidence of rural retailers supplying T2 or T3 latrines. Also, the demand assessment (Roberts and Long, 2007) indicated a strong preference for T1 as the prevalent desired latrine model, although this preference is likely driven primarily by the lack of alternatives in a comparable price range.

The data from the Importer/Wholesaler interviews, summarized in Table 5, below, suggest an annual latrine construction in excess of 48,000 units nationwide. Some 35,000 of these are T2 and T3 toilets associated mainly with high income groups and urban areas. The reported T1 latrine pan sales suggest construction of just under 14,000 T1 units per year in the country[5]. T4 latrines made up a negligible proportion of total latrine sales.

[5] This estimate compares well with the WSP report cited above (Robinson, 2007), which estimates average annual rural latrine installations between 1998 and 2004 at 3,500 through public interventions (government, NGO, etc.) and more than 15,000 through private channels.

Table 5: Imports of ceramic latrine hardware

Importer	Source Country	Monthly Unit Sales			Total
		T1	T2	T3	
Phnom Penh					
1	VN, China	100	230	200	530
2	China	180	250	360	790
3	Thai	40	150	200	390
4	China	80	100	100	280
5	China	180	150	150	480
6	Thai, China	150	200	280	630
Battambang					
7	Thai	80	40	40	160
8	Thai	75	50	50	175
9	Thai	70	45	50	165
Siem Reap					
10	Thai	50	30	30	110
11	Thai	80	70	70	220
Poi Pet					
12	Thai	70	40	30	140
Total monthly	-	1155	1355	1560	4070
Total annual	**-**	**13,860**	**16,260**	**18,720**	**48,840**

These figures indicate that the wholesalers and importers are successfully (profitably) targeting urban high-income consumers with large volumes of latrine products. However, they do not currently import latrine components appropriate for poorer households (e.g. T1 ceramic squat plate) at the scale required to meet the MDG targets for rural sanitation.

Interview responses indicated that ceramic pans for T1 latrines ranged from 10% to 40% of the total latrine sales of the major importers in Phnom Penh, and 40% to 50% of latrine sales for importers in smaller centers. Margins earned by these vendors were reported to range from 2% to a high of 10% when there are economies of scale in the transaction, such as sales to large construction projects.

Business development constraints identified during the interviews with Importer/ Wholesalers are summarized in Table 6 along with potential interventions to improve supply chain functioning.

Table 6: Importer/wholesaler constraints and interventions

Area	Importer/Wholesaler Constraints	Potential Interventions
Technology	• Little product diversity in imported pan/bowl types. Especially, no low-cost options such PVC pans.	• Introduce importers to producers of low cost pan alternatives.
	• Market dominated by imports	• Stimulate local production of latrine components (e.g., Concrete Producers and/or other manufacturers)
Market Access	• Lack of market information (e.g., regional demand/sales, customer requirements, alternative technology options)	• Improve information collection and flow
	• Lack of coordination in the supply chain	• Establish "interest group" among supply chain actors to encourage communication, coordination, and trust. • Encourage coordination and integration of actors in the supply chain for effective latrine delivery • Work with one key enterprise in each region to coordinate along his/her supply chain
	• Passive sales approach. No proactive identification and development of potential customers	• Training in sales and marketing skills • Encourage wholesalers to provide sales training to retailers. • Introduce promotional material for importers to provide to retailers to help them promote latrines in rural areas. • Wholesalers encourage retailers to use pan sales as a hook for associated superstructure sales (i.e., selling a pan leads to additional construction material sales).
	• Poor infrastructure (rail, roads, etc.) resulting in increased transport costs and less opportunity for centralized manufacturing.	• Technology development to improve storability and transportability of latrine components (e.g., PVC pans, segmented ring designs).
Finance	• Lack of capital for daily operations and enterprise growth.	• Develop linkages with existing credit sources (Banks, MFIs, suppliers, etc.). • Training in credit management

5.2 *Retailers*

Definition: Retailers are shop-keepers in urban or rural markets who sell construction materials, including latrine components, usually directly to consumer households.

Detailed results from the retailer survey are included in Annexes 10 and 11.

The retail market for rural latrines is dominated by T1 units (ceramic squat pans) which range in value from $4 to $12, depending on brand and retailer location. In rural retail outlets, the T1 pan accounts for 97% of latrine sales. The rural retail value of these pans starts at about $6 and rural retailers will typically stock just one or occasionally two varieties. In contrast, in the urban environment T2 and T3 account for 50% of the urban market and T1 prices start at as low as $4.

Retailers, especially those in the provincial towns, are typically family-owned small enterprises. There is usually more than one retailer in each local market, creating a competitive retail environment, especially in the provincial town markets. About 60% of the retailers' latrine pan sales occur in the dry season. This coincides with the post-harvest availability of cash and labor among the local population. About 50% of sales are direct to households, about 30% to concrete ring and slab producers, and about 20% to NGO sanitation programs.

Sales figures for latrine pans average about seven units per month for rural retailers. Urban retailers' sales averaged 30 units per month (24 units per month excluding Phnom Penh). Reported profit margins for both urban and rural retailers averaged between 5-6%. Typically latrine sales represent between 3-5% of retailers' total sales.

Credit is sometimes extended to retailers who have strong relationships with their wholesaler. Credit periods ranged from two weeks to one month. There was little evidence of credit being extended by retailers to masons or households on latrine related products.

No examples were found of retailers having standing service contracts with masons to install latrines for their customers. However, when retailers acted as suppliers on contracts tendered by Commune Councils, NGOs, and government and private contractors, some retailers subcontracted or partnered with masons for executing the contract services.

A system to allow retailers to provide payment by installment for customers may help low-income consumers to overcome the affordability constraint, which was the most common reason for not owning a latrine reported in the sanitation demand assessment (Roberts and Long, 2007). Credit provision, however, involves significant costs for record keeping, payment collection, and defaults. Credit is also more risky for an investment like a latrine, which does not generate cash income (although it will likely result in medical expense savings).

Selected retailers could be encouraged to develop a specialty in latrines, offering a wider range of products and prices, competent technical advice, and contact with a qualified installer. Currently, retailers' comprehension of sanitation and latrine design is similar to that of the general population. In India and Bangladesh, local 'Sanitation Marts' and social marketing were combined for the dissemination of sanitation advice and components. This model was successful in improving sanitation demand and

supply, and could be implemented among selected Cambodian retailers at provincial or district level.

Table 7 provides a summary of business constraints and potential interventions at the retail level.

Table 7: Retailer constraints and interventions

Area	Retailer Constraints	Potential Interventions
Technology	• Ceramic pans are bulky heavy, fragile do not store well	• Technology development to improve storability and transportability of latrine components (e.g., PVC pans, segmented ring designs).
	• Limited product range, especially in rural areas	• Introduce importers to producers of low-cost pan alternatives. Encourage dissemination of information and products to retailers.
Market Access	• Low proportion of sales from latrine-related products	• Increase demand for latrines through social marketing campaigns • Develop and promote the concept of sanitation specialty shops
	• Passive sales approach. Minimal proactive identification and development of potential customers	• Training in sales and marketing skills • Introduce promotional material for importers to provide to retailers to help them promote latrines in rural areas.
Finance	• Late or non-repayment of credit (e.g., credit supplied to masons) • Lack of capital for daily operations and enterprise growth.	• Training in credit management • Develop linkages with existing credit sources (MFIs, suppliers, etc.).

5.3 *Concrete Producers*

Definition: **Producers** manufacture and sell concrete products including pre-fabricated concrete rings for wells, water tanks and latrines; and slabs for use in latrine construction.

Detailed results from the concrete producer survey are included in Annex 12.

Concrete rings are produced using mild steel moulds that typically cost from $80-$100 depending on ring diameter. Each mould will manufacture between 700-1000 concrete rings, depending on the care and maintenance. Latrine slabs are constructed using wood or steel forms. Some of the larger producers situated closer to urban areas also sell a tiled concrete slab with embedded ceramic pan.

A relatively low capital requirement for entry (about $300) and simple skill requirements has permitted many micro-enterprises to set up concrete production. As many as 6-8 concrete producers may be located in a provincial town and 2-3 in a rural district centre. Competition appears to be on price alone (i.e., no product differentiation based on quality, etc. was observed) which encourages production of lower grade products. For higher grade products, special prices are negotiated with customers.

The range of latrine components produced varies somewhat by region but typically includes: concrete rings, concrete covers for rings, and latrine slabs (with or without

installed pans). The quality of production is highly variable as proportions of inputs (sand, cement, gravel, and reinforcing steel) change from producer to producer.

The prices of concrete latrine components also varied significantly from area to area (Table 8). This is assumed to be due to the variations in costs of inputs. In particular, well graded sand and gravel varies in cost proportionally to accessibility. Transportation costs over a 5-6 km radius to the user's site are embedded in the product price. For customers living at distances greater than 6 km, the producer will renegotiate the price.

Table 8: Concrete ring cost by province

Province	**Consumer price of concrete ring**		**Producer's margin**
	Size Ø 80 cm	Size Ø 100 cm	
Svay Rieng	$4.00	$4.50	$0.50 (12%)
Kandal	$2.50	$3.00	$0.50 (20%)
Siem Reap	$5.50	$6.00	$0.50 (10%)
Phnom Penh	$2.50	$3.00	$0.50 (20%)

Concrete producers in urban areas were typically full time businesses with less pronounced seasonality of demand (about 60% dry season versus 40% wet season). In rural areas, sales are more seasonally variable, with the dry season accounting for about 80% of sales. This leads to a seasonal turnover of labor and a less experienced workforce, which may also affect quality.

Rural producers' annual gross revenue ranged from $150 to $3,000 with margins commonly accounting for 12% to 20% of total sales (this is at the low end of the normal range for small manufacturing enterprises in Cambodia). Producers' latrine related activity is proportionately the highest among all supply chain members, with about 40% of turnover attributable to latrine related sales in rural locations and 65% in urban locations. This makes producers income highly dependent on demand for latrines, giving them a strong incentive to develop increased demand.

Concrete rings and slabs made by producers are all of the same basic type, and there have been limited attempts to innovate simpler and cheaper approaches (ferro-cement, bamboo-reinforced concrete, etc.) under Cambodian conditions. Improved designs and production techniques could increase producer profits and improve the range of product price/quality choices available to consumers.

The following table lists business development constraints as reported by producers and potential areas for intervention.

Table 9: Producer constraints and interventions

Area	Producer Constraints	Potential Interventions
Technology	• Locally produced concrete pan is only marginally less expensive than imports and so not cost competitive • Low profit margins relative to other rural manufacturing enterprises • Production cost sensitive to input prices (poor access to quality inputs in some locations)	• Technology development to reduce cost and improve desirability (e.g., design changes to reduce material costs, options for staged construction, etc.).
	• Lack of knowledge in construction skills • Poor quality control	• Technical training to improve production skills (e.g., improved designs, concrete mixes and curing, finishing, production efficiency, quality control)
Market Access	• Demand in rural areas is highly seasonal (high staff turnover, difficulty managing peak demands)	• Demand creation through social marketing campaigns
	• Passive sales approach. Minimal proactive identification and development of potential customers	• Training in sales and marketing skills
	• High cost of transport for goods	• Technology development to improve storability and transportability of latrine components (e.g., PVC pans, segmented ring designs, on-site ring production, mould rental).
Finance	• Lack of capital for daily operations and enterprise growth.	• Training in credit management • Develop linkages with existing credit sources (MFIs, suppliers, etc.).

5.4 *Masons*

Definition: Masons are construction workers contracted to build latrines

Detailed results from the mason survey are included in Annex 13.

There were no specialized latrine masons identified during the survey, only general construction workers who built latrines as part of their construction activities. Masons could be categorized into three groups:

- *Skilled masons* are experienced workers with advanced masonry and construction skills and will typically lead a team in construction (daily rate of $5-$10),
- *Simple masons* have basic masonry and construction skills and are able to construct simple structures but will typically work under a skilled mason (daily rate of $3-$4),
- *Laborers* are unskilled workers performing simple manual tasks like digging, mixing, carrying, etc. (daily rate of $1.50-$2).

Interviewing masons was difficult, especially near urban centers where the high level of construction activity kept them busy with little time to talk to the surveyors. Rural masons and laborers all received lower incomes than those in the urban areas due to the higher demand for construction services in urban areas.

Rural demand for masons' latrine-building services is mostly in the dry season (about 75%). Dry season work is easier as the ground is dryer and pits are less likely to collapse or be flooded by water. The dry season accounts for about 60% of latrine construction in urban areas.

Masons will typically be approached and contracted by households for labor services with materials purchased by the households themselves. In only about 20% of cases did masons purchase materials on behalf of the household. Masons generally had a limited knowledge of latrine designs, and played a limited role in design decisions for latrine construction. Masons in urban areas or nearby are able to construct western style latrines in houses, but awareness of technical requirements for properly functioning latrines is low.

The labor cost of latrine construction can be divided into two parts: the substructure which includes digging the pit and installing the concrete rings, slab, and pan; and the superstructure including the shelter walls, roof, and door. Labor cost for the substructure typically ranges from $25 to $50 and for the superstructure, $50 to $150. The percentage of masons' income from latrine activity is relatively high, with latrines accounting for about 30% of annual income on average for rural masons.

The masons surveyed were the least likely actors in the supply chain to own a latrine themselves, with only about 60% having invested in a latrine. When compared to the retailers and wholesalers, of whom 100% owned their own toilet, and the producers, 95% of whom owned toilets despite earning significantly less. This suggests that, as a group, masons may be less able than other actors to speak from experience when selling a latrine.

The sanitation demand assessment (Roberts and Long, 2007) indicated that the general population's trust in masons as a potential source of information about latrines is very low. This lack of trust was also apparent in the supply chain with retailers citing masons as a common source of bad debt. The level of trust may be influenced by the fact that masonry is considered a low status occupation, often undertaken by poorer people. Masons are also highly mobile and may be hard to track down for loan repayments.

Latrine construction is a relatively short job taking 5 to 12 days. For a mason it requires good time and work management to ensure that many small jobs do not result in income free days (days lost to finding work or moving from one job to another). The current high levels of construction activity in urban areas tends to attract masons from rural locations because the employment periods are longer and, as a result, give better financial security. Efforts to group latrine construction projects to improve economies of scale and reduce lost time may raise masons' motivation to actively develop latrine demand.

Skilled masons earn $5-10/day. At this daily rate, their service is expensive for much of the target population. Additionally, masons' current level of specialized knowledge of latrine technologies is limited. However, highly skilled masons are not strictly necessary for latrine construction and many households opt to construct latrines on their own. Training members of the community to become 'latrine masons' to

provide the same or better latrine building service than those offered by a less specialized mason, but at a lower cost, may help to increase access to latrine construction services.

The following table summarizes the constraints of masons in the latrine supply chain and potential areas of intervention.

Table 10: Mason constraints and interventions

Area	Mason Constraints	Potential Intervention
Technology	• Lack knowledge regarding consumer-accepted low-cost latrine designs • Unable to offer a range of latrine designs and prices to consumers	• Technology development to reduce cost and improve desirability (e.g., design changes to reduce material costs, options for staged construction, etc.). • Training of masons in construction of a range of low-cost latrine designs. • Masons use "Informed Choice Manual" to assist consumers in latrine design selection • Masons have "how-to" manuals for constructing a range of low-cost latrine designs
	• Rural masons tend to have lower skill level (due to high demand for skilled labor in urban areas)	• Training of less-skilled laborers to become latrine masons (reduce cost of mason services)
Market Access	• Mason service is expensive for most potential consumers • Consumers do not always make use of masons' services, some chose to build latrines on their own	• Linkage with CLTS to promote services • Assist mason in adding value to the services that they offer (quality guarantee, follow-up maintenance, pit-emptying, technical advice on latrine selection and O&M, lower material costs, accreditation of masons)
	• Passive sales approach. Minimal proactive identification and development of potential customers	• Training in sales and marketing skills
	• Other jobs are larger and more profit (small one-off latrine jobs are more costly due to mobilization costs, gaps between jobs, uncertain job security)	• Increase demand through social marketing campaigns • Training in business management • Grouping of latrine jobs through coordination with VDCs, CCs, CLTS, NGOs, etc.
	• Seasonality of demand	• Increase dry season demand through social marketing campaign.
Finance	• Lack of capital for daily operations and enterprise growth. • Lack of ability to offer credit to customers • Suppliers do not provide loans due to lack of trust	• Training in credit management • Develop linkages with existing credit sources (MFIs, suppliers, etc.). • Establish "interest group" among supply chain actors to encourage communication, coordination, and trust.

5.5 *Consumers*

The sanitation demand assessment (Roberts and Long, 2007) took an in-depth look at consumers. The table below summarizes key constraints and potential interventions at the consumer level.

Table 11: Consumer constraints and interventions

Area	Consumer Constraints	Potential Interventions
	• Strong concept of an "ideal" latrine design that is relatively expensive. • Low population density in rural areas • Low literacy levels • Low purchasing power	• Technology development to reduce cost and improve desirability of latrines (e.g., design changes to reduce material costs, options for staged construction, etc.). • Attitude change and demand creation through social marketing campaigns • Communication materials designed to reach illiterate people through use of images, sound, etc. • Develop credit or installment options for consumers (provided through the supply chain or through linkages with MFIs)

5.6 *Policy and Institutional Environment*

The following table lists a number of constraints and potential interventions related to the policy and institutional environment.

Table 12: Policy and Institutional constraints and interventions

Area	Policy and Institutional Constraints	Potential Interventions
	• Lack of latrine construction standards • Unclear roles and responsibilities for rural sanitation • Lack of incentives to improve coverage • Low government and donor priority • Limited reach of existing hygiene Behavior Change Communication education (BCC) programs	• Advocate for increased institutional awareness, resource allocation, and action to promote improved sanitation • Target relevant institutions for capacity building and training. • Establish incentives for local sanitation development (e.g., 'open defecation free' awards for villages) • Direct hygiene campaigns toward supply chain actors to a) influence their hygiene behavior, b) increase their awareness of potential market for latrines, and c) equip them to influence customers to improve hygiene behavior and invest in a latrine.

6 Potential synergies with ongoing sanitation programs

6.1.1 NGO Programs

There are a number of international development organizations with active sanitation programs in Cambodia as outlined in Annex 7. Most interventions of these organizations are subsidy based, offering a high material subsidy to the beneficiaries. Choice is often limited to one or two prescribed latrine designs.

Subsidized latrine programs in social marketing target areas may undermine willingness to pay for latrines, as beneficiaries wait for a subsidy based intervention. Also the limited technology promoted may undermine attempts to alter the consumer perception of latrines, if the technology promoted is expensive. On the other hand, a large latrine supply program may offer the opportunity to innovate in technology and delivery mechanisms.

Therefore, in the investigation for the potential for a social marketing program, it is helpful to identify possible synergies with the sanitation intervention programs recognized by the government as key projects to sanitation development in the country and likely to be scaled to a national level.

Two priority sanitation programs were identified by MRD staff: i) the ADB-funded Tonle Sap Rural Water Supply and Sanitation Project (TSWSS), and ii) the Community Led Total Sanitation Project (CLTS).

6.1.2 Tonle Sap Rural Water Supply and Sanitation Project

The project is active around the Tonle Sap basin and directs activities through Water and Sanitation User Groups with a 100% material subsidy on latrine substructure. TSWSS promotes four types of latrine technology to its beneficiaries:

- Dry pit latrine (concrete rings)
- VIP latrine
- Water seal (ventilation pipe)
- Offset water seal pit latrine

TSWSS aims to supply between 150,000- 300,000 subsidized toilets around the Tonle Sap basin. At present, two of the proposed designs use a ceramic pour flush pan that costs on average $6. The introduction of a plastic latrine pan at $1 - $2 could reduce their expenditure and simultaneously creates the opportunity to enter a new low cost latrine pan into the market and the potential to limit producers risk through contracts with TSWSS.

6.1.3 Community-Led Total Sanitation

Plan International and UNICEF are both promoting and implementing CLTS in seven provinces through both the MRD and the Provincial Departments for Rural Development (PDRD). The CLTS projects are implemented by trained PDRD employees with village leaders. The process encourages village level actions to improve its own sanitation coverage to ultimately become Open Defecation Free (ODF). The only promotional materials supplied with CLTS are posters distributed in

village commune points, using designs taken from the MRD '*Informed Choice Manual on Rural Household Latrine Selection'*, 2006.

This program has been implemented by UNICEF in 56 villages with 16 having achieved the level of ODF. There have been requests from village leaders to be trained in latrine design and construction. These requests are presently being reviewed by the PDRDs.

The latrine designs commonly taken up during the CLTS process are a simple dry pit latrine with vent pipes, running contrary to the common assumption that sanitation uptake can only be successfully increased through the use of pour flush latrines. The widely held perception that pit latrines are necessarily smelly and attract flies was demonstrated to be wrong within target communities, by showing examples of dry pits within the village and promoting the use of ash or soil on top of stools to further reduce smell and flies.

CLTS works to motivate people to end open defecation in their communities. This creates a demand for latrine components and construction services, which benefits local private dealers and masons. Similarly, the availability of a range of price and quality options for latrine products in local markets serves the needs of communities that are motivated to end open defecation. Many households in CLTS communities choose to construct very simple, low- or no-cost latrine designs (e.g., open pits) that are subject to collapse over time. The availability of upgrading options in local markets would help these households to improve the quality and durability of their latrines over time as their financial resources allow.

6.1.4 Other MRD Initiatives

In response to the need for latrine upgrading, a booklet for instruction in latrine construction is planned by the MRD to support the previously published '*Informed Choice Manual on Rural Household Latrine Selection'*. The booklet will give details on cost, quantities, and techniques for latrine construction. The objective is to use the manual to support construction by trained masons or by community members. This booklet could also be used to support future social marketing programs.

The MRD also plans to develop a national sanitation campaign using TV or radio. It is looking for collaboration with the Ministry of Health and for donor support. This would present obvious synergies with a social marketing program aimed at increasing sanitation supply through the private sector.

7 Discussion and Conclusions

a. Desire for latrines

The sanitation demand assessment (Roberts and Long, 2007, Table 8) indicated that the poorest to middle quintiles (Q1 to Q3) had achieved between 8% and 18% latrine coverage and that, in all cases, the majority of those households (58% to 94%) had managed to pay for those latrines themselves without assistance from NGOs or other agencies. This was true even in Q1, which had 8% latrine coverage with 87% of the latrines having been purchased by the households themselves. In the same study, 95% of respondents who did not own latrines gave "too expensive/ don't have enough money" as the reason for not owning, and only 4% said they were satisfied with their current practice. Also, 77% of rural non-latrine owners said that they had considered

or were currently considering purchasing a latrine. It is also true, however, that two-thirds of the wealthiest quintile (Q5) have not yet purchased a latrine and that most people expressed a reluctance to invest in any latrine short of the commonly perceived "ideal" (but expensive) design. The conclusion is that most people (including poor people) want latrines and are willing to invest their own funds if presented with the right product at the right price and at the right time.

b. The private sector is already delivering most of the latrines in Cambodia.

The second conclusion is that the private sector has responded to un-subsidized market forces to provide the majority of the latrines which are installed in the country. In a market economy, where there is *effective* demand (willingness and ability to pay) for a product or service, entrepreneurs will take steps to make profits by serving the demand. The study interviewed many entrepreneurs who are doing just that, but in a fragmented and inefficient way.

c. Latrine costs relative to income for the poor.

Data on latrine prices (Annex 14) show that installed costs for the commonly perceived "ideal" form of improved latrine substructures (concrete lined pit, concrete slab, ceramic pan) range from about $25 up to $45, depending on the number of rings required and whether a water tank is included. These figures do not include the super-structure cost and assume that "unskilled" labor is hired to do the construction. If un-costed family labor is used, the costs range from $15 to $30. Basic superstructures (poles, thatch roof, plastic sheet walls) will add a few dollars to the total. For discussion purposes, let us assume that a basic latrine unit built by family labor costs $35.

The national poverty line (NPL) is defined as the income equivalent of 2000 riel per person per day. For an average household of five persons that is 10,000 riel or $2.50 per day, or just over $900 per year. Some of this is cash income. The 2004 national census indicated that 34% of Cambodian households are below the NPL. Roughly speaking, households that are living at the NPL are toward the top of the second quintile (Q2) of the population income distribution.

If a NPL household were able to save the cash equivalent of 5% of its annual income ($45) toward latrine purchase, there would be enough to pay for a basic unit in only one year, including interest costs if any. A Q3 household, better off but still poor by most standards, could pay faster or build better. The main challenge that poor households face is to come up with that kind of cash at any particular time.

This simple analysis suggests that, even with current technology at current prices, a good quality latrine is not beyond the financial means of many poor households (e.g., Q2 and Q3). What is needed is a way to spread the costs over a reasonable period of time, say one year. Thus, loan or installment programs that are sustainable and accessible would be an effective strategy to enable poor households to acquire improved latrines. Effective application of a loan system, however, would require careful design to limit increases in transaction costs for market players that extend loans to consumer and to avoid the potential of further impoverishing already poor customers by encouraging them to take loans that they cannot repay (especially given that a latrine is not an income generating investment).

d. Private sector margins on latrine and component sales are appropriate

Data from this study suggest that all private sector actors in the latrine supply chain are making appropriate profits for their investment, up to double digit percentages in some cases. These are in line with profit margins received for comparable products in other rural supply chains. The survey did not distinguish profits from returns to labor (wages) among ring producers and masons, but in any case it is clear that people are making a reasonable and sustainable living from their participation in the latrine supply chain.

e. Supply side interventions to improve sanitation access

Social marketing interventions to improve sanitation access should include measures to support both the supply side and the demand side of the latrine business. On the supply side, the following interventions should be considered:

Capacity building of supply chain members. Training in business and technical skills for masons, concrete producers, and retailers to improve quality, reduce costs, expand the product offerings, and increase sales volumes.

Supply chain coordination. Improved coordination and information flow within the supply chain can improve efficiencies and allow for more concerted efforts at market development. Coordination could be improved by enabling "lead enterprises" to play a central role in coordinating the inputs of other actors. By developing a broader understanding of the whole supply chain, a lead enterprise could: facilitate communication of consumer needs up the supply chains; improve the flow of price information up and down the supply chain; identify geographic areas or market segments with greater or faster-growing demand; innovate products or service combinations to better meet consumer requirements; identify and correct inefficiencies in the supply chain; and encourage grouping of latrine projects through linkages with Commune Councils, Village Development Committees, NGOs, PDRDs, community groups, etc.

Key candidates for the lead enterprise role in a given region may include: importers/wholesalers because of their apex position in the supply chain; provincial or district retailers because of their proximity to local markets; or concrete producers because of the high proportion of their business that depends on latrine sales. Masons are unlikely to fill a lead enterprise role because of their low level of business sophistication, credibility/trust issues within the supply chains and with consumers, and the fact that a significant proportion of latrines are built without using masons services.

Technology development and innovation. The introduction and/or development of low-cost latrine designs, components, or materials is needed to increase the range of attractive and affordable latrine options on the market. This may include alternative technologies for the substructure, slab and pan (e.g., PVC pans), and superstructure. The ability to start simple and upgrade over time would also help to make latrines more accessible to poorer households. The challenge is to break the cultural perception of one "ideal" latrine design and make other lower-cost options equally functional and attractive to consumers. The Informed Choice Manual produced by WSP and MRD is an important step in this direction. Another useful tool would be a design selection matrix to provide guidance on appropriate latrine designs for various site conditions (e.g., flood risk, soil characteristics) and consumer preferences.

Financial services. Lack of capital is a significant constraint for all supply chain actors. Improved linkages with MFIs or other financing schemes would improve supply chain functioning.

f. Demand side interventions to improve sanitation access

On the demand side, the following interventions should be considered:

Promotion and advertising. Strategies can be developed for promotional campaigns aimed at raising awareness and stimulating demand for latrines. These should be based on an understanding of the decision drivers and emotional triggers of potential latrine purchasers.

Consumer financing. Credit linkages or an option to purchase in installments would increase affordability and effective demand for latrines among poorer households who cannot save enough cash to make a one-time purchase.

Group purchases. Facilitating group purchasing of latrines can encourage more latrine purchases through social pressure (and social support) and through the economies of scale that result from reduced transaction and mobilization costs for masons, concrete producers, and retailers. Group purchases could be organized in coordination with CLTS or other NGO projects. Alternatively, a lead enterprise could provide incentives for such purchases through connections with Commune Councils, savings groups, farmer associations, women's groups, etc.

Policy influence. The policies of government and aid agencies can have a significant impact—positive or negative—on latrine demand:

- A high level of subsidy for latrine construction has the effect of depressing the market for privately purchased latrines.
- Minimum design standards for sanitary latrines could improve the quality of latrines but, if rigorously enforced, could reduce overall demand by discouraging households from starting with a simple (and possibly sub-standard) design and upgrading over time.
- In Thailand, laws requiring latrines for all residences has been a key factor in achieving near total latrine coverage. Such an approach would not likely be successful in Cambodia, however, until the supply chain is able to effectively deliver a range of suitable and affordable latrine designs.
- South Asian experience with certification and rewards for Open Defecation Free (ODF) villages has been a successful motivator for widespread latrine installation.

g. Reaching the poorest households

No matter how inexpensive latrines are made, a pure market approach will exclude a certain percentage of the population that cannot afford the full purchase price. Affordability is a function of two main factors: (a) cost of the product relative to net income and (b) the perceived value of the product in the eyes of the consumer. Two things that can be influenced, therefore, to improve latrine affordability are the product cost and its perceived value.

The perceived value of latrines can be increased through effective promotional activities, as mentioned above, and through exposure to neighbors who own latrines

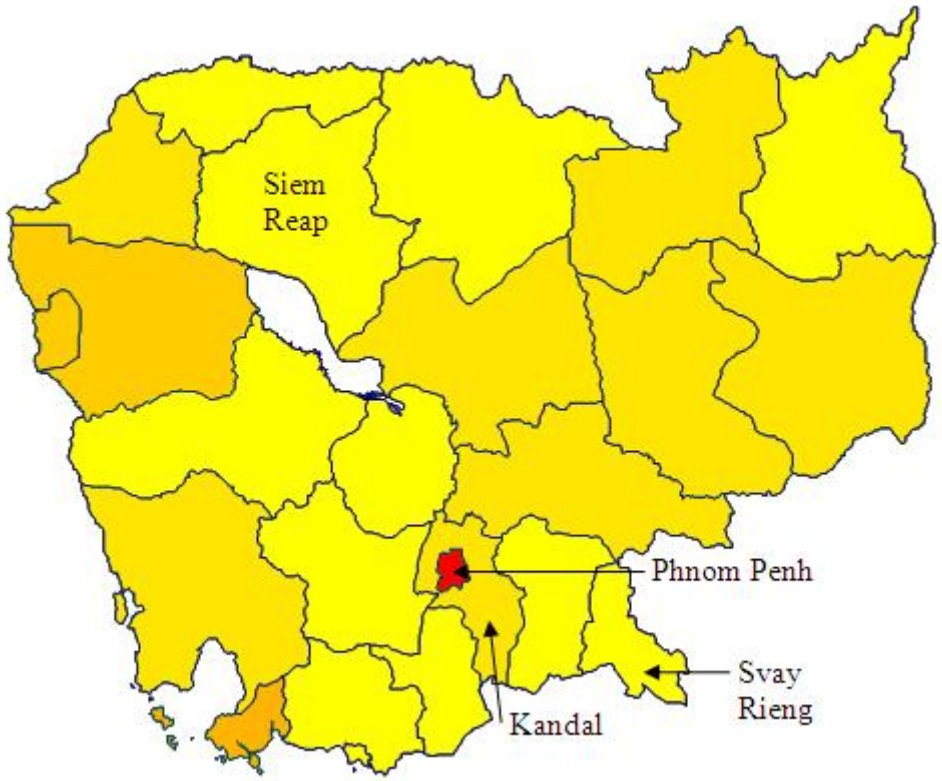
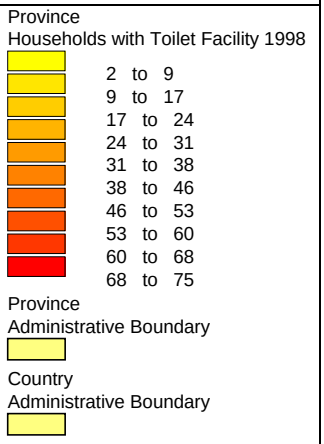
and experience its benefits. Over time, many people with low incomes, who initially consider latrines unaffordable, will be convinced to purchase one as their level of awareness and confidence in the product increases.

Latrine costs can be influenced through improvements in technology (increasing the range of available options and prices) and financing (helping the poor to overcome cash constraints). Cost barriers can also be reduced with subsidies applied in a way that does not undermine the private supply chain. "Smart" subsidies, in this sense, are those that:

- effectively target the poorest households with minimal leakage to households that could afford a latrine on their own (difficult to achieve in practice),
- require a co-payment or other contribution from the receiving household,
- do not bypass the local private supply chain but use it to deliver the latrine products/services, and
- do not distort perceptions of the real value of latrines

Finally, it has been shown that if a majority of households in a community stop open defecation, the whole community experiences health benefits. Thus, even if the poorest households in a village are not able to access latrines themselves, they will still receive indirect health benefits from the improved public sanitation that results from other households using latrines. By the same argument, the entire community benefits if all households stop open defecation. Where only a small proportion of (better off) community members invest in a latrine, they will reap the convenience and status benefits of latrine ownership, but health benefits are unlikely to accrue to them as long as many others continue to practice open defecation. Thus it is in the community's interest to provide support to the poorest households to obtain latrines. The incentive to support the poorest community members in this way is magnified if publicly-funded rewards are available for villages that achieve ODF status.

ANNEX 1: STUDY PROVINCES

Map of Cambodia	Legend
	

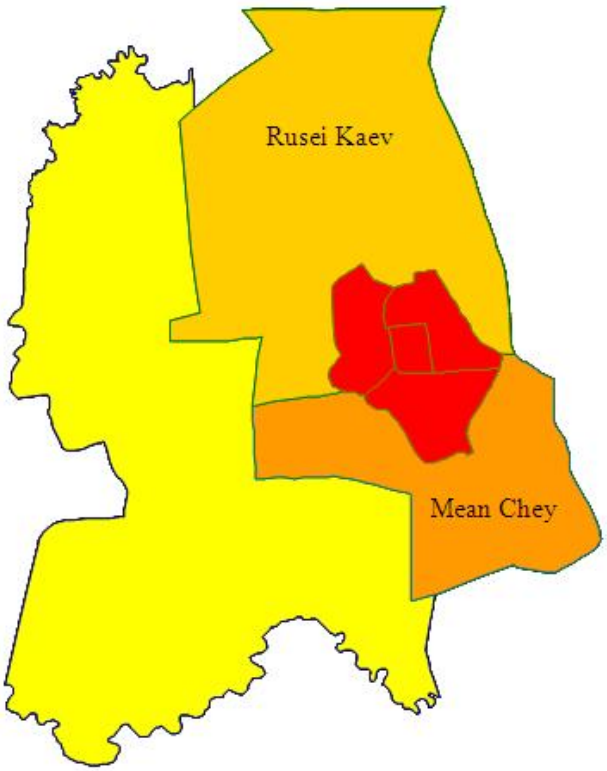
Source: *Cambodia Socio Economic Census 1998*

ANNEX 2: SELECTED MARKET AREAS

Svay Rieng Province	Legend
	District Households with Toilet Facility 1998 2 to 12 12 to 22 22 to 32 32 to 41 41 to 51 District Administrative Boundary Province Administrative Boundary Source: *Cambodia Socio Economic Census 1998*

Map of Siem Reap Province	Legend
	District Households with Toilet Facility 1998 0 to 6 6 to 11 11 to 17 17 to 23 23 to 28 District Administrative Boundary Province Administrative Boundary Source: *Cambodia Socio Economic Census 1998*

Kandal Province	Legend
	District Households with Toilet Facility 1998 6 to 15 15 to 24 24 to 33 33 to 41 41 to 50 District Administrative Boundary Province Administrative Boundary Source: *Cambodia Socio Economic Census 1998*

Phnom Penh Area	Legend
	District Households with Toilet Facility 1998 34 to 46 46 to 58 58 to 70 70 to 82 82 to 94 District Administrative Boundary Province Administrative Boundary Source: *Cambodia Socio Economic Census 1998*

ANNEX 3: SEMI-STRUCTURED INTERVIEW GUIDELINE FOR SUPPLY CHAIN ACTORS

INTERVIEW GUIDE FOR SANITARY LATRINE VALUE CHAIN ANALYSIS

I. Contact/General Information

1. Interview date:
2. Market / location name:
3. Market actor/respondent name: Sex:
4. Market actor type:
5. Number of employees / laborers:
6. Year started business activities:
7. Investment capital for business:
8. Number of market actors in same type of business:
9. Contact address/Telephone:

II. Market Access

1. Market relationships between actors – to whom do you sell your product / service, (producers, retailers, dealers, constructor etc.)? What percentage goes to each? What are the terms of sale / purchase? Where do you purchase from?
2. What are the sale volumes (month or year) through each market actor?
3. Seasonal effects on sale volumes – when do you sell more or less and why? What the volumes are?
4. What are the expenses, income and profit for each market actor (buy-in costs and sellout prices)?
5. Do you purchase inputs / sell products on credit *(for craftsmen/ Mason)*?
6. If yes, what are the terms of credit?
7. Promotional activities that they do (if nay)?
8. Who are your major competitors?
9. The means of communication and transport/delivery of products?
10. What do you see as your main needs / opportunities / constraints in accessing markets?

III. Quality standard

1. How many different quality product range available to customers that you actually sell and why?
2. Who determine the quality requirements and how do you identify the quality?
3. What type of clients for the best quality products or low quality of product?
4. Do you have any problems in this regard?

IV. Technology / Product development *(for Craftsmen and Mason)*

1. What is your wastage in term of your production?
2. How do you store your products in terms of selling and transporting?
3. What have you done to improve your products range?
4. Where/how do you get the skills on your business?
5. What additional skills/training do you need to develop technology/product?

V. Management

1. How do you manage your business ? (monitoring profit margins, construction costs, quotes...)
2. Who does most of the work in general supervision/management (purchasing, production, transporting, accounting, marketing etc.)?
3. What are major needs / opportunities / constraints (general supervision/management)?
4. What management skills would you like to strengthen in order to grow your business?

VI. Input supply *(for Craftsmen and Mason)*

1. What are your major needs / opportunities / constraints in input supply (input cost, quality and availability)?
2. Are there problems in obtaining some important inputs? Please explain.

VII. Finance

1. Where do you go when you need more money for your business?
2. Do you get credit from input suppliers? What are the terms of credit?
3. Do you have need for additional financing at the moment? If so what would it be used for?
4. What sources have you approached for loans and what have been the key problems, if any?
5. What are the general problems in accessing to the loans?
6. Loan history – what is loan useful for your business?
   - How can poor people afford your services?
   - Do you have any credit mechanisms for your customer?
   - Expand more details on these mechanisms
   - If you cannot provide credit mechanisms is there another means for the customers?

VIII. Policy / regulation

What government policies / regulations benefit your business (registrations, inspections, subsidies, incentives, etc.)?

What government policies / regulations are obstacles to growing your business?

IX. Infrastructure

What are the most important infrastructure constraints affecting your business' growth and profitability (road, transport conditions, telephone service, electric supply, storage, etc.)?

X. Sanitation knowledge:

1. Do you have your own latrine?
2. What kind of your latrine? How much is it cost?
3. How can you avoid of diarrhea?

XI. Final open ended question

1. What are main strengths of your business?
2. What are the main weaknesses of your business?
3. How did you get into your business?
4. Would you suggest other person who do the same business with you? (or other informant who know this system well ?)
5. Thank you for your time, we have no more question but may be you can tell us if there are some ways we can help you to make your business more profitable?

ADDITIONAL QUESTION FOR INTERVIEWING MASONS:

XII. Latrine Knowledge and Construction

1. What kind of latrines do you know of? how do you know of them?
2. How would you describe a good latrine?
3. What about a hygienic latrine?
4. How much these cost? how do you know?
5. Which latrines are present in your commune?
6. Do you know if there have been any sanitation programs in this area? please describe.
7. Did this help or hinder your business?
8. Are the latrines built in the past program still maintained? what problems are experienced?
9. Which latrine do you think is the best? why?
10. Have you ever build any of these?
11. How did you come to build it?
12. How did you learn to build latrine?

13. Who did you build the latrine for? how did they come to ask you?
14. What type was it, why?
15. What difficulties did you encounter in building the latrine(s)? [probe for: technical problems, materials, high water table, rocky soil...]
16. How did you know how much to charge, did you make profit? was payment/purchasing power a problem?
17. Even if there is little profit will you still build latrines if asked? why?
18. Has there been any change in rates of latrine construction in recent years? why do you think this is?
19. Why do you think some people in your commune have built latrines, but not others?
20. Even if you did not build a latrine have you taken any part in the construction of one?
21. Do you think it would be possible to have business just from latrine building? [probe potential role of promotional activities, better cost-calculations, role of credit...]

ANNEX 4: INTERVIEW SCHEDULE AND SURVEY TEAMS

Survey Coordinator: Kim Veasna

Survey team 1
Team leader: Kim Veasna (survey coordinator)
Surveyors: Prak Sokha, Hang Sovanarith, Bottom Srey Neang

1. Svay Rieng province: from 5 Jan to 8 Jan 2007

Actors	Date and Places			
	5 Jan 2007	6 Jan 2007	7 Jan 2007	8 Jan 2007
	Svay Rieng market	Chi Pou market	Krol Ko market	Work shop at Hotel Svay Rieng
Producers/craftsmen	6	3	1	2
Retailers	5	3	3	2
Masons	6	64	4	2
Total	17	10	8	
	35			

2. Kandal province: from 11 Jan to 15 Jan 2007

Actors	Date and Places			
	11 Jan 2007	12 Jan 2007	13 Jan 2007	15 Jan 2007
	Takhmao market	Saang market	Kan tout market	Work shop at Hotel Takhmao
Producers/craftsmen	1	2	3	2
Retailers	3	3	2	1
Masons	2	0	1	3
Total	7	7	6	
	20			

Survey Team 2
Team leader: Lem Sothavaridh
Surveyors: Ou Sonheang, Mar Sameth, Chay Sotheary

1. Siem Reap province: from 5 Jan to 8 Jan 2007

Actors	Date and Places			
	5 Jan 2007	6 Jan 2007	7 Jan 2007	8 Jan 2007
	Phsar Loeu market	Kg Kdey market	Pouk market	Work shop at Hotel Siem Reap
Producers/craftsmen	13	4	5	2
Retailers	4	3	2	2
Masons	0	2	12	2
Total	17	9	19	
	45			

2. Phnom Penh (urban): from 11 Jan to 15 Jan 2007

Actors	Date and Places			
	11 Jan 2007	12 Jan 2007	13 Jan 2007	15 Jan 2007
	Chak Ang Rea	Toeuk Thlar	Stoeung Meanchey	Work shop at Hotel Royal Palace
Producers/craftsmen	1	3	4	3
2. Distributors	4 (0)	4 (0)	4 (0)	1 (0)
Retailers	5	6	12	2
Masons	0	0	0	2
Total	6	9	16	
	31			

ANNEX 5: STAKEHOLDERS INTERVIEWED IN PHNOM PENH

Date	Name	Position	Institution
09/01/2007	Unrecorded	Communications team member	World Vision
12/01/2007	Hilda Winarta	Project Officer	Unicef
16/01/2007	Dr Chea Samnang Chreay Pom	Director Deputy Director	MRD Rural Health Care MRD Rural Health Care
16/01/2007	Lor Bunnat	Project Manager	Lutheran World Federation
18/01/2007	Oun Syvibola	W & E Sanitation advisor	Plan International
18/01/2007	Mr Wan Maung	Team Leader	ADB Tonle Sap RWSSP
18/01/2007	Sothera	Director	MIME Ministry Industry Mines and Energy
18/01/2007	Viriya Kampane	Project Officer Deputy Project Officer	Hagar
21/2/2007	Anne Stickle	Associate Director	ADRA
21/2/2007	Willi Kohlmus	Director	GAA
21/2/2007	Chea Vannak	Executive Director	DEEP

ANNEX 6: SEMI STRUCTURED INTERVIEW GUIDELINE FOR NGOS

Organization		Contact		
Telephone		Email		
1. Which provinces do you have sanitation programs in?				
2. Is your implementation Standardized across these provinces				Yes / No
3. Can you summarize your Sanitation program activities				
Can you describe the subsidies you use: Materials/ Credit schemes				
How much does house hold pay	$	Over what duration		
4. How many types of latrine designs does your program promote			No:	Cost
Do some these specifically address annual Flooding or Low water access				Yes / No
Describe				
What IEC Materials do you use				
Can you send me examples of marketing materials and your latrine designs?				Yes / No

ANNEX 7: OVERVIEW OF SELECTED SANITATION PROGRAMS IN CAMBODIA

Province	Sanitation Programs
Banteay Meanchey	EcoSorn, DEEP
Battambang	LWS, EcoSorn
Kampong Cham	Plan
Kampong Chhanng	
Kampong Speu	UNICEF, SP, DEEP
Kampong Thom	Hagar, LWS, UNICEF, ADRA
Kampot	
Kandal	RDI, LWF, Hagar
Koh Kong	
Kratie	Hagar
Mondulkiri	

Province	Sanitation programs
Pailin	DEEP
Preah Vihear	ADRA
Prey Veng	UNICEF, Hagar
Pursat	DTW, Hagar, ADRA
Ratanakiri	GAA
Siem Reap	Plan, Hagar, ADRA, EcoSorn
Stung Treng	UNICEF
Svay Rieng	UNICEF, Hagar
Takeo	LWF
Oddar Meanchey	CARE , UNICEF

Brief Description of Programs

- **ADRA:** $70 concrete latrine prefabricated super structures, community asked to pay $25 and construct themselves**.**
- **DEEP**: Providing Material subsidy for Pour flush off set single Pit latrine
- **EcoSorn** 100% material Subsidized 3 ring sealed pour flush pit latrine
- **GAA:** 20 Demonstration latrines for pilot, materials subsidy (but low cost, design replacing rings for cement and wire clad walls)
- **GRET:** Pilot project for the reconditioning of old sewerage networks, small bore connections and proposed service extension.
- **Hagar**: Subsidized latrine offered as reward for good hygiene and biosand filter care, 100% subsidized
- **LWF:** extended village time and pushing towards village development council, using 100% material subsidy
- **Maryknoll** implementing CLTS urban pilot
- **Plan International** implementing CLTS, primary uptake dry latrines DIY, zero subsidy. (partnerships with MRD)
- **RDI**: Village level presence, zero subsidy, Promoting 3 latrine designs $8, 15$, $30. Promoting composting latrines.
- **Tonle Sap ADB**: Heavily subsidized latrines around Tonle Sap Basin
- **UNICEF** implementing CLTS, primary uptake Dry Latrines DIY, zero subsidy, partnership with MRD
- **World Vision:** Using developing School Sanitation, Pour flush twin pit latrines 100% subsidized.

ANNEX 8: LIST OF FOCUS GROUP PARTICIPANTS

N	Name	Sex	Supply chain role	Address
	Svay Rieng			
1	Some Beng	M	Retailer	Svay Rieng market
2	Neang Savoeun	M	Mason	Svay Teab district
3	Neang Samoeun	M	Producer	Svay Teab district
4	Ouk Sothy	F	Retailer	Svay Rieng market
5	Sok Chansith	M	Mason	Svay Rieng market
6	Hem Savath	M	Mason	Svay Chrom district
7	Phar Srey Mom	F	Producer	Prosot market
8	Teb Chear	M	Producer	Svay Rieng market
9	Khon Siroeun	F	Retailer	Chipoo market
10	Chea Sarin	M	Mason	Krol Kor market
	Kandal			
11	Ouk Pheang	M	Retailer	Ta khmav market
12	Pa Hong	M	Mason	Kandal Stoeung district
13	Kan Som Im	M	Producer	Kandal Stoeung district
14	Seng Chan	M	Producer	Saang district
15	Mean Sopal	M	Mason	Ta khmav market
16	Chan Hort	M	Mason	Saang district
	Siem Reap			
17	Ngov San	M	Retailer	Phsa leu market
18	Phim Chheurn	M	Retailer	Phsaleu market
19	Toun Chi	F	Producer	Dam Dek district
20	Chhay Rorn	M	Mason	Dam Dek district
21	Teurk Phoeur	M	Mason	Pouk district
22	Seng Lin	M	Producer	Siem Rap district
	Phnom Penh			
23	Soy Neourn	M	Producer	Stueng Meanchey district
24	Choun Sarueong	M	Mason	Dang Kov district
25	Yon Tha	M	Producer	Dang Kov district
26	Kheourn Say	F	Producer	Stueng Meanchey district
27	Sophea Phal	M	Mason	Chak Angre district
28	Rik Vanna	M	Mason	Dang Kov district
29	Kem Sokheng	F	Retailer	Dem Thkov market
30	Vy Nei	M	Retailer	Dem Thkov market

ANNEX 9: CONCRETE LATRINE PAN PRODUCTS

ANNEX 10: RESULTS OF RETAILER SURVEY

Retailers that show latrine turnover above Retailer Survey Results										
Province	**Sex**	**Years Trading**	**Investment capital**	**No. Market actors**	**Latrine Units sold/month**	**latrine Volumes/mnth ($)**	**% profit**	**Total monthly income ($)**	**Latrine % turnover**	**No. of latrine product range**
Siem Reap	Male	9	$2,000.00	4	25	$2,400.00	12.50	$2,200.00	13.64	1
	Male	1	$10,000.00	4	12	$159.00	5.96	$3,000.00	0.32	2
	Male	6	$50,000.00	5	10	$277.00	5.92	$1,700.00	0.96	3
	Female	17	$3,000.00	2	2	$15.00	6.67	$300.00	0.33	1
	Male	2	$10,000.00	6	7	$224.00	1.86	$650.00	0.64	2
	Male	1	$5,000.00	6	3	$24.00	7.75	$800.00	0.23	1
	Male	10	$8,000.00	6	5	$37.50	3.33	$450.00	0.28	1
	Male	1.5	$38,000.00	4	5	$35.00	14.29	$1,000.00	0.50	1
	Male	10	$50,000.00	4	6	$99.00	9.11	$1,500.00	0.60	2
Sample Area avg		***6***	***$19,556.00***	***5***	***8***	***$363.39***	***7.49***	***$1,288.89***	***1.94***	***2***
Phnom Penh	Male	6	$200,000.00	5	14	$632.50	3.16	$5,000.00	0.40	4
	Male	5	$10,000.00	3	11	$88.00	3.53	$800.00	0.39	2
	Male	6	$10,000.00	8	5	$47.50	5.26	$1,000.00	0.25	2
	Female	5	$50,000.00	8	6	$60.00	5.00	$5,000.00	0.06	2
	Female	5	$50,000.00	10	25	$399.00	5.08	$7,000.00	0.29	2
	Male	3	$10,000.00	4	3	$22.50	6.67	$500.00	0.30	1
	Male	2	$5,000.00	10	2	$16.00	6.25	$500.00	0.20	1
	Male	3	$3,000.00	5	105	$3,100.00	5.02	$1,500.00	10.37	3
	Male	12	$6,000.00	5	60	$1,725.00	3.37	$1,500.00	3.88	3
	Female	5	$40,000.00	4	90	$2,390.00	3.65	$1,300.00	6.72	3
	Male	5	$50,000.00	13	180	$5,620.00	5.32	$1,500.00	19.94	2
	Female	10	$100,000.00	6	5	$70.00	7.14	$2,000.00	0.25	1
	Male	2	$30,000.00	13	20	$307.50	4.72	$800.00	1.82	2
	Female	2	$5,000.00	5	5	$37.50	6.67	$600.00	0.50	1
	Male	17	$5,000.00	5	5	$37.50	6.67	$500.00	0.31	1

Retailer Survey Results cont..										
Province	**Sex**	**Years Trading**	**Investment capital**	**No. Market actors**	**Latrine Units sold/month**	**Latrine Volumes/mnth ($)**	**% profit**	**Total monthly income ($)**	**Latrine % turnover**	**No. of latrine product range**
Phnom Penh	Male	27	$100,000.00	10	7	$87.50	4.00	$800.00	0.44	3
	Male	12	$45,000.00	10	43	$340.50	9.62	$900.00	3.64	3
	Male	2	$5,000.00	10	5	$45.00	11.11	$500.00	1.00	1
	Male	5	$15,000.00	6	90	$740.00	8.65	$1,100.00	5.82	3
	Male	3	$20,000.00	6	45	$837.50	5.83	$3,000.00	1.63	2
	Female	9	$600.00	6	5	$30.00	8.33	$300.00	0.83	1
	Male	5	$700.00	6	3	$22.50	6.67	$400.00	0.38	1
	Female	10	$500.00	6	12	$90.00	9.33	$350.00	2.40	1
	Male	6	$700.00	6	12	$90.00	10.67	$500.00	1.92	1
	Female	2	$6,000.00	6	10	$175.00	2.86	$800.00	0.63	1
	Male	6	$50,000.00	8	24	$180.00	10.67	$1,000.00	1.92	1
	Male	4	$60,000.00	7	10	$67.50	10.17	$700.00	0.98	2
	Male	6	$60,000.00	8	30	$202.50	9.17	$900.00	2.06	2
	Male	3	$7,000.00	4	60	$410.00	5.95	$700.00	3.49	2
	Male	5	$150,000.00	8	50	$345.00	9.17	$1,000.00	3.16	2
Sample Area Avg		***6.43***	***$36,483.33***	***7.03***	***31.40***	***$607.20***	***6.66***	***$1,415.00***	***2.53***	***1.87***
Svay Rieng	Male	10	$50,000.00	6	40	$519.00	4.31	$1,500.00	1.49	3
	Male	13	$70,000.00	6	45	$463.00	5.42	$800.00	3.14	3
	Male	17	$200,000.00	6	55	$715.00	5.27	$3,000.00	1.26	
	Female	4	$30,000.00	5	20	$282.00	3.89	$1,000.00	1.10	3
	Female	5	$15,000.00	6	30	$360.00	5.00	$1,000.00	1.80	3
	Female	10	$4,000.00	3	3	$21.00	5.00		-	
	Female	3	$6,000.00	3	5	$37.50	5.00	$500.00	0.38	1
	Female	3	$15,000.00	3	5	$48.00	5.00	$600.00	0.40	1
	Male	15	$2,000.00	3	3	$18.00	5.00	$300.00	0.30	1
	Female	20	$30,000.00	3	3	$21.00	5.00	$600.00	0.18	1

Retailer Survey Results cont.										
Province	**Sex**	**Years Trading**	**Investment capital**	**No. Market actors**	**Latrine Units sold/month**	**Latrine Volumes/mnth ($)**	**% profit**	**Total monthly income ($)**	**Latrine % turnover**	**No. of latrine product range**
Svay Rieng	Female	2	$25,000.00	3	10	$65.00	5.00	$700.00	0.46	1
Sample Area Avg		**9.27**	**$40,636.36**	**4.27**	**19.91**	**$231.77**	**4.90**	**$1,000.00**	**0.95**	**1.89**
Kandal	Male	5	$10,000.00	5	10	$90.00	5.00	$1,200.00	0.38	1
	Female	3	$4,000.00	5	20	$340.00	5.00	$1,000.00	1.70	1
	Male	15	$30,000.00	4	30	$195.00	5.00	$2,000.00	0.49	1
	Male	12	$40,000.00	3	5	$42.50	5.00	$1,500.00	0.14	2
	Female	10	$50,000.00	4	30	$180.00	5.00	$2,000.00	0.45	1
	Male	3	$10,000.00	2	3	$22.50	5.00	$1,200.00	0.09	1
	Male	3	$5,000.00	2	8	$64.00	5.00	$250.00	1.28	1
	Male	9	$3,000.00	3	10	$65.00	5.00	$300.00	1.08	1
Sample Area avg		**7.5**	**$19,000**	**3.5**	**14.5**	**$124.88**	**5.00**	**$1,181.25**	**0.70**	**1.125**
Total Sampling area avg		***7.11***	***32,232.76***	***5.64***	***23.31***	***$431.64***	***6.22***	***$1,289.47***	***1.89***	***1.71***

ANNEX 11: RESULTS OF RETAILER SURVEY: LATRINE TYPES SOLD

Latrine Bowl Sellers in Svay Rieng									
Location	# of actors	Latrine bowl			Sale by season		Total	Avg sale	***Total sale/Y***
		T1	**T2**	**T3**	**Dry**	**wet**			
Svay Rieng Market	**11**	350	100	50	350	150	500	*460*	5060
		385	110	55	385	165	550		
		455	130	65	455	195	650		
		168	48	24	168	72	240		
		252	72	36	252	108	360		
Prosot	**3**	150	0	0	105	45	150	105	315
		60	0	0	42	18	60		
Chi Pou	**3**	40	0	0	28	12	40	74	222
		108	0	0	76	32	108		
Krol Kor	**3**	24	0	0	17	7	24	27	81
		30	0	0	21	9	30		
Avg total sale/year of latrine pan in 4 markets								*5678*	

Kandal province									
Location	**# of actors**	**Latrine bowl**			**Avg sale/Y**		**Total**	**Avg sale**	***Total sale/Y***
		T1	**T2**	**T3**	**Dry**	**wet**			
Takhmav	**5**	120	30		120	30	150	*258*	1290
		90	72	0	126	36	162		
		252	84	84	252	168	420		
		210	75	15	180	120	300		
Saang	**5**	50	0	0	45	5	50	*122*	610
		70	30		80	20	100		
		96	24	0	96	24	120		
		40	0	0	35	5	40		
		300	0	0	240	60	300		

Kantout		80	0	0	70	10	80	*100*	200
	2	120	0	0	100	20	120		
Avg total sale/year of latrine pan in 3 markets								***2100***	

Siem Reap province

Location	**# of actors**	**Latrine bowl**			**Sale by season**		**Total**	**Avg sale**	***Total sale/Y***
		T1	**T2**	**T3**	**Dry**	**wet**			
Chikreng District		80	3	0	58	25	83		
	8	30	0	0	21	9	30		
		90	0	0	63	27	90	68	541
Pouk District		50	0	0	35	15	50		
	3	72	2	0	52	22	74	62	186
Sieam Reap District		20	0	0	14	6	20		
		300	0	0	210	90	300		
		72	60	0	92	40	132		
	19	84	72	60	151	65	216	167	3173
Avg total sale/year of latrine pan in 3 markets								***3900***	

Phnom Penh

Location	**# of actors**	**Latrine bowl**			**Sale by season**		**Total**	**Avg sale**	***Total sale/Y***
		T1	**T2**	**T3**	**Dry**	**wet**			
Khan Mean Chey	***43***	120	36	12	101	67	168	393	16,909
		120	12	0	79	53	132		
		270	30	0	180	120	300		
		30	0	0	18	12	30		
		18	0	0	11	7	18		
		360	480	420	756	504	1260		
		240	300	180	432	288	720		
		240	480	360	648	432	1080		
		600	840	720	1296	864	2160		
		60	0	0	36	24	60		
		60	180	0	144	96	240		
		60	0	0	36	24	60		
		70	0	0	42	28	70		
		60	0	0	36	24	60		

		60	0	0	36	24	60		
		84	0	0	50	34	84		
		60	120	336	310	206	516		
		60	0	0	36	24	60		
Khan Rusey Keo	***11***	480	120	480	648	432	1080	355	3,902
		60	0	480	324	216	540		
		300	0	420	432	288	720		
		0	0	60	36	24	60		
		30	0	0	18	12	30		
		144	0	0	86	58	144		
		144	0	0	86	58	144		
		120	0	0	72	48	120		
Khan Dangkor	***14***	288	0	0	173	115	288	317	4,435
		60	0	60	72	48	120		
		180	0	180	216	144	360		
		60	72	84	130	86	216		
		360	0	240	360	240	600		
Avg total sale/year of latrine pan in 3 markets									**25,246**

ANNEX 12: RESULTS OF CONCRETE PRODUCER SURVEY

Producers Survey Results											
Province	**Sex**	**Years Trading**	**Investment capital**	**No. Market actors**	**Latrine Units sold/ mnth**	**Latrine Volumes/ mnth ($)**	**Profit Margin on latrine sales**	**Total Turnover mnth ($)**	**Latrine profit as % turnover**	**Latrine sales as % turnover**	**No. of variations identified**
Siem Reap	Male	4	$5,000.00	4	45	$270.00	21.25	$1,000.00	5.74	27.00	2
	Male	5	$10,000.00	5	70	$672.00	7.92	$2,000.00	2.66	33.60	4
	Female	5	$8,000.00	4	67	$666.50	8.01	$900.00	5.93	74.06	3
	Male	20	$20,000.00	1	10	$104.00	7.86	$700.00	1.17	14.86	2
	Male	3	$5,000.00	6	15	$100.00	9.17	$500.00	1.83	20.00	2
	Male	4	$10,000.00	8	8	$61.50	10.05	$1,000.00	0.62	6.15	3
	Female	15	$5,000.00	5	42	$235.00	9.17	$600.00	3.59	39.17	2
	Female	3	$3,000.00	2	150	$885.00	10.38	$800.00	11.49	*100.00	2
	Male	4	$3,000.00	3	10	$38.00	18.33	$700.00	1.00	5.43	4
	Male	5	$2,500.00	3	13	$57.50	15.32	$800.00	1.10	7.19	4
	Male	2	$10,000.00	4	200	$850.00	7.13	$1,000.00	6.06	85.00	3
	Male	3	$5,000.00	4	160	$575.00	9.64	$700.00	7.92	82.14	2
	Male	5	$5,000.00	6	200	$1,200.00	7.25	$900.00	9.67	*100.00	2
	Male	47	$20,000.00	5	10	$95.00	12.92	$3,000.00	0.41	3.17	4
	Male	21	$300.00	1	10	$89.00	8.26	$1,000.00	0.74	8.90	4
	Male	3	$4,000.00	4	7	$65.00	12.50	$1,500.00	0.54	4.33	4
	Female	6	$5,000.00	2	25	$230.00	11.67	$1,000.00	2.68	23.00	4
	Male	18	$8,000.00	3	108	$1,631.50	10.29	$2,500.00	6.72	65.26	4
	Male	27	$600.00	1	18	$165.00	10.50	$1,000.00	1.73	16.50	4
	Male	25	$500.00	5	63	$581.00	11.88	$1,200.00	5.75	48.42	4
Sample Area avg		***11.25***	***$6,495.00***	***3.8***	***62***	***$428.55***	***10.97***	***$1,140.00***	***3.87***	***38.21***	***3.15***

* The monthly latrine sales volume ($) in these cases was reported as being higher than the total monthly turnover ($) for the whole business, thus leading to latrine sales accounting for more than 100% of total sales. As this is an impossible situation, the percentages have been artificially capped at 100. These data anomalies likely result from (a) data collection error, (b) latrine sales in the month of data collection (January 2007) being higher than the respondents estimated monthly turnover, and/or (c) the potential tendency for respondents to underestimate their turnover.

Producers Survey Results Cont…											
Province	**Sex**	**Years Trading**	**Investment capital**	**No. Market actors**	**Latrine Units sold/mo.**	**latrine Volumes/mnth ($)**	**Profit Margin on latrine sales**	**Total Turnover mnth ($)**	**Latrine profit as % turnover**	**Latrine sales as % turnover**	**No. of variations identified**
Phnom Penh	Female	10	$50,000.00	8	1000	$6,425.00	15.71	$2,000.00	50.48	*100.00	6
	Male	5	$15,000.00	10	60	$720.00	6.5	$1,500.00	3.12	48.00	4
	Female	10	$100,000.00	6	450	$1,125.00	25	$2,000.00	14.06	56.25	6
	Male	16	$10,000.00	10	180	$2,700.00	5	$900.00	15.00	*100.00	3
	Male	5	$15,000.00	6	133	$481.50	24.23	$2,000.00	5.83	24.08	5
	Male	6	$60,000.00	8	150	$465.00	24.29	$2,000.00	5.65	23.25	6
	Male	5	$150,000.00	8	160	$545.00	25.89	$1,500.00	9.41	36.33	7
	Male	5	$20,000.00	6	140	$580.00	15.71	$1,000.00	9.11	58.00	4
Sample Area avg		***7.75***	***$52,500.00***	***7.75***	***284***	***$1,630.19***	***17.8***	***$1,612.50***	**14.08**	**55.74**	***5***
Svay Rieng	Male	10	$5,000.00	6	200	$550.00	18	$1,000.00	10.00	55.00	6
	Male	15	$10,000.00	6	100	$400.00	20	$1,000.00	8.00	40.00	5
	Male	5	$3,000.00	6	40	$200.00	20	$800.00	5.00	25.00	4
	Male	3	$3,000.00	6	50	$250.00	20	$1,000.00	5.00	25.00	4
	Male	12	$4,000.00	2	150	$690.00	15	$1,500.00	6.90	46.00	5
	Male	18	$8,000.00	5	100	$260.00	19	$600.00	8.33	43.33	5
Sample Area avg		**10.50**	**$5,500.00**	**5.17**	**106**	**$391.67**	**18.7**	**$983.33**	**7.21**	**39.06**	**4**
Kandal	Male	8	$30,000.00		300	$750.00	10	$1,500.00	5.00	50.00	5
	Male	4	$2,000.00	5	40	$130.00	15	$150.00	13.33	86.67	2
	Male	3	$1,500.00	5	40	$110.00	15	$150.00	10.67	73.33	2
	Male	10	$10,000.00	3	100	$375.00	13	$2,000.00	2.50	18.75	7
	Male	4	$3,000.00	3	70	$175.00	10	$250.00	7.00	70.00	2
	Male	2	$1,000.00	3	10	$25.00	10	$50.00	5.00	50.00	2
Sample Area avg		**4.60**	**$3,500.00**	**3.80**	**52**	**$163.00**	**12.65**	**$520.00**	**7.70**	**59.75**	**3**
Total Sampling area avg *(excluding Phnom Penh)*		***9.53***	***$15,760***	***4.82***	***118***	***$638.19***	***13.69***	***$1,142.50***	***6.92***	***44.83***	***3.83***

ANNEX 13: RESULTS OF MASON SURVEY

Mason Survey Results										
Province	**Sex**	**Years Trading**	**No. Market actors**	**Latrine Units sold/Y**	**latrine Volumes/Y ($)**	**Avg income/m**	**Total Turnover Year ($)**	**Latrine % turnover**	**No. of latrine product range**	**No. of variations identified**
Siem Reap	Male	10	6	5	$62.50	$100.00	$1,200.00	5	2	5
	Male	3		25	$375.00	$300.00	$3,600.00	10	2	8
	Male	5	13	4	$78.00	$250.00	$3,000.00	3	3	5
	Male	3	10	7	$262.50	$300.00	$3,600.00	7	2	4
	Male	5	6	10	$375.00	$250.00	$3,000.00	13	2	5
	Male	10	7	50	$1,875.00	$400.00	$4,800.00	39	3	6
	Male	10	10	30	$900.00	$800.00	$9,600.00	9	2	7
	Male	10	10	10	$350.00	$250.00	$3,000.00	12	3	5
	Male	40	4	10	$125.00	$250.00	$3,000.00	4	3	4
	Male	7	5	15	$525.00	$300.00	$3,600.00	15	3	8
	Male	10	20	10	$250.00	$ 200.00	$2,400.00	10	3	5
	Male	8	4	6	$168.00	$150.00	$1,800.00	9	2	5
	Male	9		6	$180.00	$200.00	$2,400.00	8	3	7
	Male	19	8	32	$1,200.00	$250.00	$3,000.00	40	3	5
Sample Area Avg		***10.64***	***8.58***	***15.71***	***$480.43***	***$285.71***	***$3,428.57***	***13.15***	***2.57***	***5***
Svay Rieng town	Male	3	2	5	$75.00	$80.00	$960.00	8	2	5
	Male	17	2	5	$150.00	$150.00	$1,800.00	8	1	4
	Male	14	5	4	$50.00	$70.00	$840.00	6	1	3
	Male	13	10	15	$225.00	$150.00	$1,800.00	13	2	4
	Male	7	10	6	$150.00	$150.00	$1,800.00	8	1	5
	Male		6	7	$70.00	$100.00	$1,200.00	6	1	3
Sample Area Avg		***10.8***	***5.83***	***7***	***$120.00***	***$116.67***	***$1,400.00***	***8.13***	***1.33***	***4***
Svay Rieng rural	Male	6	5	40	$800.00	$400.00	$4,800.00	17	1	6
	Male	8	8	20	$350.00	$150.00	$1,800.00	19	1	4
	Male	17	20	30	$300.00	$130.00	$1,560.00	19	2	5

Mason Survey Results Cont.										
Province	**Sex**	**Years Trading**	**No. Market actors**	**Latrine Units sold/Y**	**latrine Volumes/Y ($)**	**Avg income/m**	**Total Turnover Year ($)**	**Latrine % turnover**	**No. of latrine product range**	**No. of variations identified**
Svay Rieng rural	Male	20	3	15	$225.00	$100.00	$1,200.00	19	1	5
	Male	15	2	7	$105.00	$120.00	$1,440.00	7	1	5
	Male	10	3	27	$540.00	$180.00	$2,160.00	25	1	4
	Male	8	4	5	$250.00	$80.00	$960.00	26	1	6
	Male	10	7	39	$682.50	$150.00	$1,800.00	38	1	4
Sample Area Avg		**11.75**	**6.50**	**22.88**	**$406.56**	**$163.75**	**$1,965.00**	**21.29**	**1.13**	**4**
Kandal	Male	17	5	5	$87.50	$120.00	$1,440.00	6	1	4
	Male	7	10	12	$210.00	$80.00	$960.00	22	1	5
	Male	4	2	7	$122.50	$150.00	$1,800.00	7	1	4
Sample Area Avg		**9.33**	**5.67**	**8.00**	**$140.00**	**$116.67**	**$1,400.00**	**11.59**	**1.00**	**4.33**
Total Sampling area avg		***10.83***	***7.14***	***15.13***	***$358.66***	***$205.16***	***2,461.94***	***14.13***	***1.81***	***5.00***

ANNEX 14: LATRINE PRICE MATRIX

Latrine Price Matrix (substructure only; no shelter; transport <5km included) **CASE 1: Household provides labor (no mason)**

Pit Structure	Slab and Pan									
	pit only	reclaimed platform	bamboo clay	wooden platform	concrete slab	slab & plastic pan	slab and local pan	slab and ceramic pan	pan and slab and tank	slab & seated pour flush
simple dug pit	$0.00	$0.00	$2.00	$3.50	$6.50	$6.50	$8.50	$11.00	$15.00	$24.00
1 ring lined pit	$4.50	$4.50	$6.50	$8.00	$11.00	$11.00	$13.00	$15.50	$19.50	$28.50
2 ring lined pit	$9.00	$9.00	$11.00	$12.50	$15.50	$15.50	$17.50	$20.00	$24.00	$33.00
3 ring lined	$13.50	$13.50	$15.50	$17.00	$20.00	$20.00	$22.00	$24.50	$28.50	$37.50
4 ring lined	$18.00	$18.00	$20.00	$21.50	$24.50	$24.50	$26.50	**$29.00**	$33.00	$42.00
5 ring lined	$22.50	$22.50	$24.50	$26.00	$29.00	$29.00	$31.00	$33.50	$37.50	$46.50
double lined pits	$27.00	$27.00	$29.00	$30.50	$33.50	$33.50	$35.50	$38.00	$42.00	$51.00
3x3 twin pit offset	$31.50	$31.50	$33.50	$35.00	$38.00	$38.00	$40.00	$42.50	$46.50	$55.50

Legend:	Latrines costing up to $20	Latrines costing $20-$30	Latrines costing $30-$50	Latrines costing more than $50

Bold = commonly perceived "ideal" latrine design

Latrine Price Matrix (Substructure only; no shelter; transport <5km included) **CASE 2: Unskilled labor at $2.50 per day**

Pit structure	Slab and Pan									
	pit only	reclaimed platform	bamboo Clay	wooden platform	concrete slab	slab & plastic pan	slab and local pan	slab and ceramic pan	pan and slab and tank	slab & seated pour flush
simple dug pit	$2.50	$2.50	$4.50	$6.00	$9.00	$9.00	$11.00	$13.50	$17.50	$26.50
1 ring lined pit	$9.50	$9.50	$11.50	$13.00	$16.00	$16.00	$18.00	$20.50	$24.50	$33.50
2 ring lined pit	$16.50	$16.50	$18.50	$20.00	$23.00	$23.00	$25.00	$27.50	$31.50	$40.50
3 ring lined	$23.50	$23.50	$25.50	$27.00	$30.00	$30.00	$32.00	$34.50	$38.50	$47.50
4 ring lined	$30.50	$30.50	$32.50	$34.00	$37.00	$37.00	$39.00	**$41.50**	$45.50	$54.50
5 ring lined	$37.50	$37.50	$39.50	$41.00	$44.00	$44.00	$46.00	$48.50	$52.50	$61.50
double lined pits	$44.50	$44.50	$46.50	$48.00	$51.00	$51.00	$53.00	$55.50	$59.50	$68.50
3x3 twin pit offset	$51.50	$51.50	$53.50	$55.00	$58.00	$58.00	$60.00	$62.50	$66.50	$75.50

Legend:	Latrines costing up to $20	Latrines costing $20-$30	Latrines costing $30-$50	Latrines costing more than $50

Bold = commonly perceived “ideal” latrine design

Latrine Price Matrix (Substructure only; no shelter; transport <5km included) **CASE 3: Skilled labor at $7.50 per day**

Pit Structure	Slab and Pan									
	pit only	reclaimed platform	bamboo Clay	wooden platform	concrete slab	slab & plastic pan	slab and local pan	slab and ceramic pan	pan and slab and tank	slab & seated pour flush
simple dug pit	$7.50	$7.50	$9.50	$11.00	$14.00	$14.00	$16.00	$18.50	$22.50	$31.50
1 ring lined pit	$22.00	$22.00	$24.00	$25.50	$28.50	$28.50	$30.50	$33.00	$37.00	$46.00
2 ring lined pit	$36.50	$36.50	$38.50	$40.00	$43.00	$43.00	$45.00	$47.50	$51.50	$60.50
3 ring lined	$51.00	$51.00	$53.00	$54.50	$57.50	$57.50	$59.50	$62.00	$66.00	$75.00
4 ring lined	$65.50	$65.50	$67.50	$69.00	$72.00	$72.00	$74.00	**$76.50**	$80.50	$89.50
5 ring lined	$80.00	$80.00	$82.00	$83.50	$86.50	$86.50	$88.50	$91.00	$95.00	$104.00
double lined pits	$94.50	$94.50	$96.50	$98.00	$101.00	$101.00	$103.00	$105.50	$109.50	$118.50
3x3 twin pit offset	$109.00	$109.00	$111.00	$112.50	$115.50	$115.50	$117.50	$120.00	$124.00	$133.00

Legend:	Latrines costing up to $20	Latrines costing $20-$30	Latrines costing $30-$50	Latrines costing more than $50

Bold = commonly perceived “ideal” latrine design