Product Scan Findings from Benin, Côte d'Ivoire, and Ghana

A summary of gaps identified along the sanitation service chain

BACKGROUND

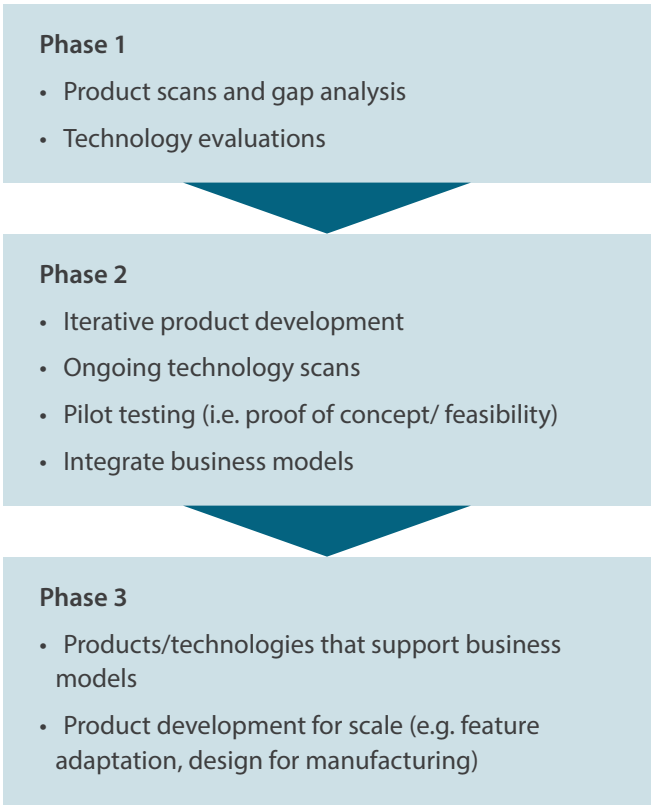
The Sanitation Service Delivery (SSD) Program in West Africa is a USAID-funded five-year cooperative agreement with Population Services International (PSI), PATH, and Water & Sanitation for the Urban Poor (WSUP). The goal of the project is to improve sanitation outcomes through developing and testing scalable, market-based models in Benin, Côte d'Ivoire, and Ghana that increase access to improved sanitation and fecal sludge management (FSM) and contribute to structural change within West Africa's sanitation sector.

PATH's role in the SSD project is to apply its expertise in product development as well as financing to accelerate market-based solutions and build partner capacity in these two technical areas across the project countries. PATH's product development activities are designed to support the development of new business models and the scaling of appropriate and affordable sanitation solutions in Benin, Côte d'Ivoire, and Ghana.

The product development work is separated into three phases (see Figure 1 on page 2). The first phase included the completion of product scans, a gap analysis, and technology evaluations. The second phase builds on the recommendations from the product scans and is focused on an iterative product development process, which includes

pilot testing of products and concepts, ongoing technology evaluations, and the integration of business models for promising products and services. The third, and final, phase of the project will focus on activities that support the scale up of technologies in line with the selected business models.

Figure 1: Review of SSD phase priorities.



FRAMEWORK

PATH used the sanitation service chain framework developed by the Swiss Federal Institute of Aquatic Science and Technology (Eawag) to visualize the different elements of the sanitation service chain and identify gaps in each country's product scan. According to the Eawag model, the sanitation system consists of input and output products that are organized in five functional groups (user interface, collection and storage/treatment, conveyance, [semi-] centralized treatment, and use and/or disposal). Eawag's model provides a holistic framework for considering the logical combination of technologies within the sanitation system.

METHODS

Product development activities

To understand the sanitation and FSM product landscape in Côte d'Ivoire and Benin, the product scan included five primary activities: sanitation facility interviews and site visits, landlord interviews and site visits, FSM interviews and site visits, key informant interviews, and market visits. The study team also conducted a product scan in Ghana, with a focus on learning about existing sanitation technologies, products, and services.

Product scan: site selection and sampling

In Côte d'Ivoire, research activities were conducted in Abidjan, the largest city in the country. A total of 34 site visits and interviews were completed in collaboration with the PSI project team, which included 22 compound and household sanitation facility visits for technology assessment inventory.

In Benin, research activities were conducted primarily in Cotonou, the largest city and the seat of government of Benin, and in nearby Abomey-Calavi, a suburb of Cotonou. There was a total of 36 site visits and interviews completed in collaboration with the PSI project team based in Cotonou, which included 18 compound and household sanitation facility visits for technology assessment inventory.

In Ghana, research activities were conducted in Accra and Kumasi, two cities where WSUP already has project activities. These locations were identified by WSUP as being of interest to the SSD project. There were a total of 16 site visits and interviews completed.

OBJECTIVES

The product scan activities in Côte d'Ivoire and Benin focused on understanding sanitation and FSM products and technologies and their context of use. The study team used the sanitation service chain to organize results, including mapping existing products and technologies, documenting end-user needs and aspirations, identifying gaps, and developing recommendations.

In Ghana, the activities focused on the identification of existing sanitation technologies, products, and services that could potentially be replicated in and/or adapted in Côte d'Ivoire and Benin to address gaps identified during the product scan and other project activities (additional information is available upon request).

FINDINGS

User interface

A user interface, or the type of toilet used (such as pit latrine or urine diverting dry toilet), is referred to as a sanitation facility.

All of the compound and household sanitation facilities visited in both Benin and Côte d'Ivoire were generally made

from similar types of materials. Both locations used cement as their primary superstructure material and a combination of metal sheet and/or wood for the door. Additionally, we found that the sanitation facilities were often not ventilated, or that a window or pipes were the only systems of ventilation available. We also noticed several differences between the sanitation facilities in Benin and Côte d'Ivoire, notably in the age of the sanitation facilities, user density, maintenance, and user satisfaction.

In Côte d'Ivoire, all of the compound and household sanitation facilities were over five years old. The platforms of the sanitation facilities were commonly a squat plate with some use of Western-style (seated) pedestals. This influenced water storage and flushing techniques. Most sanitation facilities were pour flush and almost all users were wet cleansers except for one household that used a mix of water and paper. Respondents with individual latrines reported between five and 15 users, while respondents with compound latrines reported between four and 24 users. Users reported that insufficient funds and lack of responsibility made it difficult to regularly clean the toilet, thus the sanitation facilities could remain uncleaned for up to three weeks.

In Benin, most of the interviewees from private households reported that their latrines had been constructed relatively recently (within the past five years), as additions to their residences. In contrast, landlords reported that the latrines in their rental units were installed within the past ten years. Prior to the construction of the latrines, respondents reported using hanging latrines (see phone on page 4) or open defecation. In general, the density of users per latrine was lower in Benin than in Côte d'Ivoire. Respondents with individual latrines reported between one to 15 users, while respondents with shared latrines reported between three to 15 users. Many end users stated that their latrines were cleaned weekly, and an irregular cleaning service would be a barrier to use.

PATH interviewed four individuals, in both Côte d'Ivoire and Benin, regarding the use of public latrines in markets and over lagoons (i.e., hanging latrines). All four respondents stated that these public latrines are used by hundreds of people. In Côte d'Ivoire, the market user said that the public latrines are good, but not well maintained. In Benin, both respondents shared that they prefer using hanging latrines over others. One interviewee, a latrine manager at the local church, said that she prefers hanging latrines since she is more familiar with them and because when she uses the hanging latrine the fecal waste is submerged below water. Similarly, a respondent in Côte d'Ivoire stated the same thing and also added that when feces are submerged below water it limits unpleasant odors experienced when using other facilities, such as pit latrines. A lagoon user in Côte d'Ivoire also said while he is aware hanging latrines are not hygienic or good for the environment, his family is compelled to use them. See Table 1 for a comparison of sanitation facilities in Côte d'Ivoire and Benin.

Table 1: Comparison of user interfaces in Côte d'Ivoire and Benin.

	Côte d'Ivoire	Benin
Primary interface	Squat plate	Seated and/or squat plate
Age of household facility	Greater than 5 years	Less than 5 years
Number of users for household facility	5 to 15 users	1 to 15 users
Age of compound (i.e. shared) facility	Greater than 5 years	3 to 15 years
Number of users for compound facility	4 to 24 users	3 to 15 households
Regular cleaning for household and compound facilities	Every 1 to 3 weeks	Every week
Common dislikes	Unclean, odor, leaks, no light, too many users, poor quality, lack of privacy	Unclean, odor, poor maintenance, lack of privacy

Storage and containment

Storage and containment describes the infrastructure and methods used to collect and store the waste products generated at the user interface.

In Côte d'Ivoire, the majority of the respondents reported using underground containment structures. Although they usually referred to these structures as septic tanks, we noticed that they were essentially holding tanks. User reports of the frequency of tanks being emptied varied, but the majority reported emptying two to four times per year depending on time of year. For example, during the rainy season, one respondent noted that tanks are emptied more frequently. The remaining respondents (both end users and landlords) reported using direct discharge as their method of storage and containment.

PATH/Kelly Ebels

Public hanging latrine in Cotonou, Benin.

In Benin, almost all end users and landlords said that their waste was contained in cement-lined, reinforced tanks. One owner constructed a leach pit and two respondents were uncertain of their type of containment. When asked about frequency of pit emptying, one respondent did not know how often it was emptied, four respondents said that their latrine was emptied once a year, and six respondents said their latrine was emptied every two to three years. The remaining respondents said that their pits had not been emptied since the latrines were built (ranging from two to seven years prior), or since they moved in (four to five years prior).

Conveyance

Conveyance is the transportation process, system, or technology that is used to transport waste product from one functional group to another (usually from storage/containment to treatment or disposal).

The interviews indicated that the most common emptying method in Côte d'Ivoire and Benin was vidange trucks (i.e., vacuum pump trucks pictured on the right). These trucks are used to transport the fecal sludge to treatment centers or transfer stations. Vidange trucks are common in communities that are not connected to sewer lines. However, the interviews revealed in both Côte d'Ivoire and Benin key challenges associated with the use of vidange trucks including poor emptying frequency, failure to empty the tanks completely, lack of transparency, and cost. It was also cited in both countries that accessibility and functionality of the treatment and transfer stations posed a challenge for vacuum truck operators (VTOs).

In Côte d'Ivoire, almost half of the respondents from compounds and household facilities mentioned vidange truck services as the most common method of emptying. While vidange trucks can be used for both liquid and solid waste (sludge), two respondents noted that they still use mixed methods of emptying (vidange trucks for liquid waste and manual emptying for solid waste) and one respondent stated that the vidange truck only empties the liquids. This is likely due to suction capacity of the trucks and it is unclear whether or not the vidange trucks were able to fully empty the tanks of the other respondents. Two of the four transfer stations were recently rehabilitated, however, it is still unclear whether these transfer stations have the capacity to accept solid waste.

Other emptying methods reported in Côte d'Ivoire include manual emptying or pipes leading to a sewer network, ravines, or an unknown location. There are several challenges related to each of these methods. Most respondents were using a septic/holding tank, while the remaining respondents were using latrines where waste would go directly into the environment, such as a ravine (which generally is full of trash) or the lagoon.

In Benin, all the respondents reported using vacuum truck emptying services as their method of emptying, and they were satisfied with their vacuum truck emptying services. However, VTO representatives noted that while there is a significant market for used trucks in-country, finding parts for repairs was challenging. Therefore, mechanics are often required to look in Ghana and Nigeria to obtain the parts needed increasing cost and downtime. Additionally, during an interview with a VTO, it was shared that users are often not willing to pay the full cost for emptying, which

PATH/Kelly Ebels

Vindage truck in Cotonou, Benin.

Table 2: Gaps identified in Côte d'Ivoire and Benin mapped to the sanitation service chain.

	User interface	Collection and storage/treament	Conveyance	(Semi-) centralized treatment	Use and/org disposal
Benin	Facilities are not clean nor hygienic Latrines do not meet aspirational desires of end-users* Improper disposal of used, dry cleansing materials (as per Ministry of Health guidelines)	Facilities are not clean nor hygienic Latrines do not meet aspirational desires of end-users* Unavailable appropriate, affordable and durable products Minimal safe, onsite containment and treatment options, especially for flood-prone/high water table areas*	Pricing for fecal sludge services is perceived as unaffordable	Lack of sustainable infrastructure for treatment and/or disposal*	Lack of sustainable infrastructure for treatment and/or disposal* Minimal experience with reuse technologies and by-products
Côte d'Ivoire	Facilities are not clean nor hygienic Latrines do not meet aspirational desires of end-users* Unavailable appropriate, affordable and durable products	Facilities are not clean nor hygienic Latrines do not meet aspirational desires of end-users* Unavailable appropriate, affordable and durable products Lack of access for fecal sludge service delivery Lack of affordable, safe servicing of tanks/pits Fecal sludge service providers do not remove all liquids and solids from tanks/pits	Lack of access for fecal sludge service delivery Lack of affordable, safe servicing of tanks/pits Fecal sludge service providers do not remove all liquids and solids from tanks/pits	Limited locations and capacity for treatment or disposal Failure to treat fecal sludge sufficiently Limited experience with alternative technologies	Limited locations and capacity for treatment or disposal Failure to treat fecal sludge sufficiently Limited experience with alternative technologies

*Initial gaps identified in the product scans that are currently being addressed by the SSD Project.

cuts profit for the operator. Some users, however, reported discrimination against non-French speakers regarding lack of equitable service.

[Semi-] centralized treatment and use and/or disposal

Treatment and disposal is the method by which waste products are returned to the environment with or without treatment processing.

In Côte d'Ivoire, the study team visited a treatment facility in Abidjan, Côte d'Ivoire, managed by the Societe de Distribution d'Eau de la Côte d'Ivoire (SODECI) through a contract with ONAD. This fecal sludge facility is only a primary treatment facility, which focuses on the removal of solids, sand, and grease. The effluent (i.e. liquid leaving the treatment facility) is piped into the sea.

In Cotonou, Benin, the team visited two treatment facilities: the Developpement Communautaire et Assainissement du Milieu Bethesda (DCAM Bethesa) greywater treatment site and Takon Waste Management site. The Société Industrielle d'équipment et Assainissement Urbain (SIBEAU) site is the only operational treatment facility in Cotonou where vidange trucks are legally allowed to dump fecal sludge. However, this treatment site is a lagoon based system that directly discharges into the environment and has already exceeded capacity. Other sites are non-operational. These limited options for treatment hinders the ability of fecal sludge service providers to expand their businesses. The absence of an urban sanitation strategy, results in informal dumping and a fragmented approach to the sanitation chain.

GAPS

The country-specific product scans were used to identify challenges related to the current SSD in Abidjan, Côte d'Ivoire and Cotonou, Benin, and to identify the gaps in the sanitation service chain. Using the EAWAG sanitation service chain framework, product and service gaps were mapped and analyzed (see Table 2 on page 5). The PATH and PSI teams analyzed the data and gaps to create initial recommendations for the product development team to prioritize sanitation areas with the greatest need.

NEXT STEPS

Based on the findings from the product scan and the results of the market landscape completed by PSI (results available in a separate report), the SSD team identified priority areas for activities in Year Two, including initial business models to test as well as product development priorities and activities to support the business models.

Using iterative learning, the product development activities in the second phase of the project are focused on the development and testing of products and associated services (as relevant). PATH is currently developing concepts and designs for the following product development priority areas: improved toilet superstructure and user interface, shared containment for hygiene and efficient servicing, decentralized treatment options, improved tenant toilets, and improved landlord toilets. Upon successful validation of appropriate technologies and associated business models, the focus will turn to supporting scale-up, including design for manufacturing and any final design modifications. See a review of SSD product development priorities in Figure 1.

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