



SOIL - Building a Sustainable Citywide Sanitation Service

By building a circular economy sanitation business model, SOIL demonstrates that it is possible to provide a safe, dignified, and sustainable citywide sanitation service that is financially accessible to everyone, even to those living in the world's most resource-scarce communities.

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Abstract

SOIL is a non-profit research and development organization currently scaling up a transformative social business model for the sustainable provision of household sanitation and ecological waste treatment in Haiti. For a small monthly fee, SOIL's social business, EkoLakay, provides over 1,000 households with container-based sanitation (CBS) toilets and safely transforms all collected waste into agricultural-grade compost. Revenues from toilet user fees and compost sales support ongoing project costs and showcase the potential to affordably provide household sanitation in the world's most impoverished urban communities.

Over the past four years, SOIL has refined the EkoLakay service delivery model, improved the toilet and waste treatment technology, and implemented cost reduction strategies. SOIL's model is now one of just three household CBS services globally that has grown beyond the pilot stage and demonstrated progress towards creating a sustainable social business model for providing safe sanitation services to rapidly-growing urban settlements.

Problem statement

Despite growing international recognition that sanitation is the single most important health intervention of the past two centuries, 2.5 billion people, or 36% of the global population, still lack access to a toilet (WHO/ UNICEF 2015). This crisis is particularly evident in Haiti, which has the highest childhood diarrheal incidence rate in the world and one of the largest and most virulent cholera epidemics in recent global history (Walker, 2012; Paho, 2016).

Attempts to create a functional sanitation system to solve this sanitation crisis are often ineffective, focusing only on the provision of toilets and neglecting waste treatment. But a toilet without a waste treatment system

is just a means for displacing a problem, cleaning up one local environment while polluting another. As a result, the wastes of 4.2 billion people in the world are dumped directly into waterways or sit, untreated, in underground reservoirs where they often leach into groundwater (Baum and Bartam, 2013).

The majority of available sanitation technologies are dependent on scarce water resources, have prohibitively high start-up costs, and are financially unsustainable. In contrast, SOIL's holistic approach to sanitation links vulnerable rural and urban communities to one another through the simple biological process of nutrient recycling. The ecological sanitation process returns nutrients consumed in urban areas to the fields from which they came, creating livelihood opportunities at

Key facts:

SOIL's container-based city-wide sanitation service:

- Currently operating more than 1000 toilets serving 6000 users;
- A volume of 10 metric tonnes of human excreta is collected weekly;
- 100% of excreta collected is fully treated and transformed into agricultural-grade compost which restores depleted soils throughout Haiti;
- Initial cost is 30 USD per toilet which is recovered in monthly service fees of around 3.00 to 3.75 USD;
- Providing 84 full-time staff positions in the communities where EkoLakay operates in Haiti, with more hiring happening as service continues to grow.



Figure 1. SOIL is creating a model for an in-home sanitation service that can be run and operated by Haitian entrepreneurs, providing a sustained source of jobs and contributing to local economies (source: Bernard Chereus).

every step of the sanitation cycle and ensuring both economic and ecological sustainability.

Company description

SOIL works at the nexus of economic empowerment, sanitation access, and climate change mitigation. Our mission is to promote dignity, health, and sustainable livelihoods through the transformation of waste into resources. SOIL's social business, EkoLakay, simultaneously addresses the linked crises of poor sanitation and environmental degradation by using simple ecological sanitation technologies that provide affordable and sustainable household sanitation and waste treatment services. Customers rent a SOIL household EkoLakay toilet for a monthly fee of 200 to 250 HTG (~3.00 to 3.75 USD) per home.

The initial cost of the toilet, approximately 30 USD, is incorporated into the monthly maintenance fee so that it will be paid off over a period of several years. Every week SOIL sanitation workers visit each household to collect the toilet wastes and deliver a fresh supply of the carbon material that is used for „flushing“ composting toilets. The collected wastes are then transported to the SOIL composting waste treatment facility where they are transformed into organic, agricultural-grade compost through a carefully monitored process that exceeds the World Health Organization's standards for safe treatment of human waste (WHO, 2006). SOIL sells the compost for 300 USD per metric ton. To date, we have treated and transformed over 1,800 metric tons of human waste from our sanitation services in Haiti.

Building a viable business model

SOIL first piloted this social business model in 2013 and over the past four years have refined our service delivery model, improved the toilet and waste treatment technology, developed and finalized our logo and



Figure 2. SOIL provides full-cycle sanitation services from containment to reuse (source: SOIL).

branding, and implemented cost reduction strategies like the introduction of mobile payments. This work was done in collaboration with a range of partners and research institutions around the world, including but not limited to: Stanford University, Eawag, the US Centers for Disease Control and Prevention, Brown University, EY, University of Hawaii, Ashoka Foundation, Schwab Foundation, and Lawrence Berkeley National Laboratory.

Revenue from monthly toilet user fees, waste treatment fees, and compost sales supports ongoing project costs and showcases the private-sector potential to sustainably provide affordable and ecologically-beneficial sanitation services. SOIL is currently servicing over 1,000 EkoLakay toilets, which are providing over 6,000 people with sanitation access. The cost of the toilet, weekly collection, carbon “flushing” material, hygiene promotion, repairs, waste collection, and treatment is now approximately \$29 per person per year. Developed from a small grassroots effort, SOIL's initiative is now one of the most promising tests globally of the paradigm-shifting hypothesis that sanitation no longer needs to focus on waste disposal, but rather on the ecologically-beneficial and economically-profitable nutrient capture and agricultural reuse of human waste. The model SOIL is innovating in Haiti is gaining traction worldwide and is one of the few interventions for informal urban communities that meets the new standards for safely managed sanitation set by the Sustainable Development Goals.

SOIL is currently focused on researching and capturing economies of scale, operational efficiencies, and technological innovations to further refine the EkoLakay model and ensure the service is able to achieve financial sustainability. The global consulting firm Ernst and Young worked with SOIL in developing a projection for a future social business break-even point achieved by taking advantage of economies of scale while also making operational improvements and cost reductions.



Figure 3. A SOIL sanitation staff member returns after completing his weekly container collection in a neighborhood of Haiti's second largest city, Cap-Haitien. (source: Vic Hinterlang)

Working in the context of Haiti presents unique challenges however, and thanks to being selected as a finalist for the 2018 ReSource Award, SOIL is receiving coaching from cewas in Willisau, Switzerland. For five months, cewas has been supporting SOIL to develop a multi-stakeholder model for financial sustainability that combines earned revenues (or tariffs), corporate partnerships, results-based financing through international financial institutions, monthly donor support, public sector support, and carbon credit. In addition to supporting an evaluation of SOIL's best path to sustainable scale up, cewas coaches have helped analyze the risks and assumptions of the business model and productively plan for the future.

Challenges of starting/growing a business

As a research and development organization striving to build an innovative solution to the global sanitation crisis, SOIL is committed to transparently sharing outcomes, challenges, and lessons learned with the global community of practice. Some of the key challenges that SOIL has faced with EkoLakay and how we addressed them include:

- **Human Resources:** Throughout the past year there have been a few points in which we found our EkoLakay program understaffed. While it is exciting that SOIL's social business' growth allows for increasing livelihood opportunities in the neighborhoods we work, the back-end of recruitment and hiring is often time intensive. We've been investing more heavily in staff capacity development and recruitment efforts and are encouraged to see that we are now more proactively staying ahead of our staffing needs.
- **Data Management:** Our Excel-based data management system became strained as our sanitation service surpassed 500 customers. EkoLakay has since fully transitioned into using a new customer relationship management (CRM)



Figure 4. Transforming wastes into rich compost proactively heals Haiti's environment and helps to combat the effects of climate change. (source: Tony Marcelli)

system that utilizes a combination of Salesforce, Taroworks, and GPS data points. We are now able to easily collect customer data and location by using smartphones in the field, which has allowed us to increase operational efficiency and improve customer service.

- **Political and Economic Instability:** Over a period of less than 12 months, the value of the Haitian Gourde (HTG) decreased from 43 HTG/USD to 65 HTG/USD. The change in currency rates was devastating to many living in Haiti and presented an unanticipated challenge to SOIL, both as potential clients had less flexibility to spend money on our service, and because the devaluation caused SOIL to lose money each month as our revenue comes in HTG, but we pay our staff in USD. We have since made efforts to reduce our vulnerability to currency fluctuations by decreasing the number of contractual obligations we have in US dollars. Volatile political instability with delayed and contested elections has also created challenges for our operations, as it has been difficult to establish and maintain working relationships with government officials in the face of questions of legitimacy and high turnover rates.

Lessons learned as a start-up entrepreneur

Climate Resilient Design:

In addition to building resilience to climate-related disasters through creating soil amendments that sequester carbon and facilitate plant growth, SOIL has refined the EkoLakay toilet to itself be a disaster resilient sanitation solution. As one of the third most climate-vulnerable nations in the world, it is especially important that sanitation interventions in Haiti are durable and adaptive, particularly to the cases of flooding (Kreft et al., 2017). Although we were very lucky that the communities where we offer the EkoLakay service were not seriously impacted by



Figure 5. EkoLakay toilets have been intentionally designed to be disaster resilient and the collection service will go on rain or shine. (source: Tucker Cahill Chambers)

the two most recent hurricanes to come in contact with Haiti (Hurricane Matthew and Irma), we learned very important lessons during the preparation for, and aftermath of, both storms. Before each storm, we worked with Haiti's largest telecommunications provider, Digicel, to send an SMS blast to our clients informing them to seal the containers from their EkoLakay toilets in the event of flooding. Because EkoLakay toilets have sealable containers, they are more resilient than alternative sanitation solutions such as pit latrines and sewers which often overflow and malfunction during flooding events. In both the flooding that followed the hurricanes, as well as other flooding events that occur regularly throughout the country, SOIL has had no issues with waste contamination.

Inclusive Innovation:

SOIL operates in a country where far too many organizations have struggled to deliver on their goals and too many billions of dollars have been spent on failed projects. We believe that our successes in building EkoLakay into the growing social business that it is today are a result of our commitments to local collaboration. Over 90% of SOIL's staff are local to the neighbourhoods where we work, and we have consulted beneficiaries at every step from project design to implementation which has allowed us to build a globally renowned and locally loved sanitation service.

Responsible Growth:

The weekly transportation of household toilet wastes to our waste treatment sites has always been SOIL's biggest expense. We have realized in the past year that we could significantly decrease operational expenses by focusing on increasing service density in priority neighbourhoods before expanding to new zones of service. By concentrating on saturating service provision, SOIL has reduced transport-associated

costs by more than 30% and increased the public health impact of the EkoLakay service. This approach is also laying the groundwork for the potential private spin-off of local EkoLakay businesses in each target neighbourhood in the coming years.

Public Sector Engagement:

SOIL's waste treatment site is already one of the lowest cost waste treatment operations globally, and we are proud that we recover approximately 20% of our operational costs from compost sales. However, as is the norm with waste treatment services globally, we anticipate a need for ongoing government or donor financing at some level (through taxes, tariffs, subsidies and/or grants) in the long-term. We believe it is unreasonable to expect household clients living in vulnerable communities to support the full costs of waste treatment – a public good which is heavily subsidized in wealthier nations. The Haitian government agrees with this assessment, and they have expressed interest in working with SOIL to develop a sound financial plan for a public-private partnership (PPP) which would ensure the delivery of waste treatment services. SOIL believes the ultimate pathway to scale will require the ongoing participation of both the private and public sectors.



Figure 6. "Before there will toilets like this, the street was full of waste. Now our situation is changing as more and more people are signing up for EkoLakay," – Naderge, longtime EkoLakay user in Cap-Haitien, Haiti. (source: SOIL)



Figure 7. SOIL satisfaction survey results from SOIL's EkoLakay users in Port-au-Prince. (source: SOIL)

Entrepreneurial success stories

Growing EkoLakay's Citywide Sustainable Sanitation Service:

SOIL's EkoLakay service provides low-cost, dependable, and environmentally-sound household sanitation in informal urban settlements, where over three billion people are expected to reside by 2050 (UN, 2015), and this work represents an elegant public health and environmental intervention for resource-poor communities. Given the sheer number of people requiring access to these services, there is significant demand to drive large-scale replication globally. In Haiti, SOIL has already expanded EkoLakay to the two largest cities in the country, Cap-Haitien and Port-au-Prince, and demand for toilets continues to outpace installation. Demand for the end product of our service, Konpòs Lakay compost also remains high. To date we have earned nearly \$95,000 in compost revenue alone. In addition to a high rate of demand for EkoLakay toilets and Konpòs Lakay compost, we're proud of the fact that current EkoLakay users report extremely high rates of satisfaction with the service and share that EkoLakay allows them to save money, increases their sense of safety, and improves the quality of life for their family in regard to their health (SOIL, 2017) (see Figure 7.).

Strengthening the Global Sanitation Sector:

The innovative technology and implementation model SOIL uses leverages naturally efficient ecological systems, making it easy to scale and to replicate. Although SOIL's implementation efforts are focused solely on Haiti, our ultimate objective is to develop a globally replicable model for the delivery of ecological Container-Based Sanitation services in dense urban areas. All aspects of our service and design details are open source and we share outcomes and lessons learned widely in the hope of fomenting further innovation.

We always welcome people to learn more about our work at www.oursoil.org and join us in the conversation on Facebook and Twitter (@SOILHaiti).

References

Baum, R., Jeanne, L., and Bartram, J. (2013): Sanitation: A Global Estimate of Sewerage Connections without Treatment and the Resulting Impact on MDG Progress. *Environmental Science and Technology*, 47. pp. 1994 – 2000.

Fischer Walker, C.L. et al. (2012): Diarrhea incidence in low- and middle-income countries in 1990 and 2010: a systematic review. *BMC Public Health*, 12, pp. 220 – 227.

Kreft, S., Eckstein D., and Melchior, E., (2017): Global Climate Risk Index: Who Suffers the Most from Extreme Weather-related Loss Events in 2015 and 1996 to 2015. German Watch e.V., Berlin, Germany.

PAHO (2016): Epidemiological update, cholera, Pan American Health Organization, http://www.paho.org/hq/index.php?option=com_docman&task=doc_view&gid=34811+&Itemid=999999&lang=en (date of visit: 21 February 2018).

SOIL (2017): EkoLakay Customer Satisfaction Report: Improved Safety, Health, and Affordability, <https://www.oursoil.org/port-au-prince-ekolakay-customers-report-growing-satisfaction-with-in-home-toilet-service-1708/> (date of visit: 21 February 2018).

UNICEF (2013): At a Glance: Haiti, UNICEF, http://www.unicef.org/infobycountry/haiti_statistics.html (date of visit: 21 February 2018).

UNICEF/WHO (2015): Progress on Sanitation and Drinking Water: 2015 Update and MDG Assessment. WHO Press, Geneva, Switzerland

UN (2015): World Urbanization Prospects: The 2014 Revision, (ST/ESA/SER.A/366), United Nations, Department of Economic and Social Affairs, Population Division.

WHO (2006): Guidelines for the Safe Use of Wastewater, Excreta, and Greywater. Volume 4: Excreta and Greywater Use in Agriculture. World Health Organization., Geneva, Switzerland

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