

Sustainable Sanitation Provision in Urban Slums – The Sanergy Way

The paper describes Sanergy's approach to deal with sanitation in informal settlements.

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Abstract

Sanergy, a Nairobi-based social enterprise, builds healthy prosperous communities by making hygienic sanitation accessible and affordable in urban informal settlements. We take an innovative, systems-based approach that addresses the entire sanitation value chain. We build high-quality, low-cost sanitation units, known as Fresh Life Toilets, which we franchise to community members, who run them as businesses. We collect the waste on a regular basis, removing it from the community. We then convert the waste into valuable by-products, including organic fertilizer and insect-based animal feed, which we sell to regional farmers. Through this model, we are making it profitable – and thus sustainable – to provide hygienic sanitation in urban slums.

Introduction

More than four billion people in the developing world lack access to total hygienic sanitation. The consequences are staggering: 760,000 children die each year from diarrheal diseases due to poor sanitation. Globally, \$260 billion is lost in diminished productivity and healthcare costs.

Millennium Development Goal 7(c), which aims to halve the number of people without sustainable access to sanitation by the end of 2015, will not be reached. It represents one of the greatest failures of the MDGs. The Sustainable Development Goals, which the United Nations have recently approved, build on the MDGs to commit member countries to achieve further progress by 2030. The SDGs have revised the MDG commitment to “achieve access to adequate and equitable sanitation and hygiene for all and end open defecation” by 2030. In order to achieve this, there is still much work to do.

A lack of basic infrastructure makes the sanitation crisis particularly acute in urban slums, where populations will double to two billion in the next 15 years. In Kenya,

where my company Sanergy has worked since 2011, eight million slum residents still have to resort to unhygienic and undignified sanitation solutions, such as “flying toilets” (defecating into plastic bags that are then tossed onto the streets) and pay-per-use pit latrines that release untreated human waste into the environment.

In total, four million tons of human waste from Kenya's slums are dumped untreated into waterways each year – polluting the environment, spreading disease, and harming community health. At current rates, reaching complete sanitation coverage will take 150 years. The loss of productivity due to sanitation-related illness costs Kenya's GDP a million dollars a day.

In the case of Sanergy, solving the sanitation crisis requires more than just building toilets. Sanergy's innovation is to take a systems-based approach that engages the community at every step and, in doing so, guarantees that residents of slums gain access to the hygienic sanitation services they both need and want.

Key messages:

- Sanergy takes a systems-based approach to addressing the sanitation crisis in urban slums.
- Through a franchise model, Sanergy empowers community residents to earn an income while providing a needed service to their neighbours.
- Sanergy removes the waste from the Fresh Life Toilets on a regular basis, converting it into valuable by-products, such as organic fertilizer.



Figure 1: The Fresh Life Toilet has a unique urine-diverting squat plate and cartridge collection system.

First, we build high-quality, low-cost “Fresh Life Toilets.” They are designed with qualities users desire: they are easy to keep clean and maintain; their small footprint (1 meter by 1.5 meters) allows them to be installed close to homes; and they include hand-washing stations to promote good hygiene practices. Underneath the toilet, easy-to-remove cartridges capture the waste, ensuring it does not pollute the soil and waterways.

Then, we franchise Fresh Life Toilets to local residents in Nairobi’s informal settlements through three models: commercial, residential, and in community institutions, such as schools. The owners – Fresh Life Operators –

invest to become franchise partners, putting skin in the game and creating accountability for both the operator and Sanergy.

We provide Fresh Life Operators with access to interest-free financing, help in securing land access, business training, aspirational marketing, ongoing operational support, and guaranteed waste collection service. The operator commits to cleaning the toilets, keeping them consistently open, and generating demand using his or her local credibility and influence. Through frequent field visits and spot inspections, we ensure that Fresh Life Toilets across the network are maintained to the



Figure 2: Sanergy builds high-quality, low-cost sanitation centers, known as Fresh Life Toilets.



Figure 3: Sanergy collects the waste from Fresh Life Toilets on a regular basis, removing it from the community.

same standards of cleanliness and hygiene. In this way, community members contribute to the health of their neighbors – a responsibility they take very seriously. At quarterly forums, Fresh Life Operators discuss successes and obstacles in providing their communities with hygienic sanitation. FLOs learn from one another, sharing best practices and advice for improved service delivery.

The Sanergy waste collection team then collects the waste from each toilet on a regular basis, replacing the full collection cartridges with clean, empty ones. Once the waste has been removed from the community, we convert the waste into a variety of saleable by-products, including organic fertilizer, called Evergrow, and insect-based animal feed. These by-products are then sold to Kenyan farmers, who see a 30% increase in their crop yields and restored soil health when they use Evergrow.

Making Sanitation Provision Profitable

Incentivizing Fresh Life Operators

In order to help ensure community buy-in for its model, Sanergy distributes the majority of Fresh Life Toilets (FLT) through a franchise model, in which local community members run and maintain the toilets, charging customers a nominal fee per use. The value proposition for potential Fresh Life Operators (FLOs) is two-fold: earn a steady income and improve the health of community residents.

For the last three years, we have had a partnership with Kiva, an online micro-lending platform, to help potential FLOs gain access to interest-free loans with which to purchase an FLT, which costs around 500 USD. Once approved for a loan, FLOs are able to choose between either a 12-month or a 24-month loan. After paying an initial down payment of about 20%, they use revenue generated from running the toilet to pay down the balance of the loan. Our credit team services the loans, ensuring timely payments and low default rates.

The costs of running a Fresh Life Toilet are fairly low; operators are responsible for buying toilet paper and sawdust and ensuring the handwashing station has water and soap for all customers. With an average of 50 users per day, a Fresh Life Operator can earn 80,000 Kenyan shillings per toilet per year – a solid income for residents of Nairobi’s informal settlements. Most Fresh Life Operators run at least two toilets, which increases their income even more.

Many Fresh Life Operators also run other businesses. Hannah Muthoni, for example, has two Fresh Life Toilets and two showers next to a small shop, where she offers a variety of goods for her neighbors. The income she earned from her first Fresh Life Toilet helped finance this expansion, which means she no longer has to travel a long distance to the local market to sell her goods, and she can now take care of her grandchildren while her daughters – who have more education and therefore



Figure 4: Sanergy converts the waste into valuable by-products, including organic fertilizer.



Figure 5: Evergrow has been shown to improve soil health and increase crop yields by 30%.

have higher earning potential than Hannah does – are at work.

Incentivizing Sanergy

To make sanitation provision profitable, and thus sustainable, Sanergy has three main revenue streams. The first is selling toilets we manufacture with local materials and labor. Our customers include corporates, NGOs, and government entities looking for a hygienic sanitation solution. Our unique urine-diverting dry toilet is a waterless hygiene solution adaptable to many locations and circumstances and does not require investment in additional infrastructure, making it an appealing solution for customers, especially in areas where there is no sewerage coverage.

We have also built a robust and efficient waste-collection network, which currently removes 9-10 tons of waste per week that works in complement with our infrastructure distribution network. In addition to the cost of the toilet, Fresh Life Operators pay an annual renewal fee of about 90 USD for our waste collection services. This renewal fee is less expensive and more convenient than hiring a vacuum truck or other exhaustion service, as pit latrine owners have to do.

At a centralized facility, Sanergy converts the waste into by-products for which there is high demand in the region. Through a co-composting process, Sanergy’s processing team converts most of the waste into Evergrow, a nutrient-rich, pathogen-free organic fertilizer.

The Kenyan Ministry of Agriculture has identified soil degradation — due to a lack of crop rotation and the use of harsh chemical fertilizers — as the number one threat to food security in East Africa. To restore soil health, they have recommended Kenyan farmers use organic fertilizer on their crops. This recommendation is difficult for farmers to follow: there is currently little domestically produced organic fertilizer, and imports of fertilizer are

prohibitively expensive. Sanergy’s leadership saw a market opportunity for valuable by-products, specifically Evergrow.

Using waste as a fertilizer is a common practice throughout the developed world — including England (<http://www.theguardian.com/environment/2008/aug/29/waste.recycling>) and the United States (<http://www.radiolab.org/story/poop-train/>). In fact, about 60% of all treated sewage sludge in the U.S. is applied to fields, where the nitrogen and phosphorous in the sludge helps crops grow. Evergrow has been shown to restore soil health and increase crop yields by 30%.

In addition, Sanergy has been trialing the development of insect-based animal feed derived from Black Soldier Flies (BSF), the larvae of which feed on organic waste. Once the larvae stop feeding, they are boiled and dried, resulting in a high-protein animal feed, suitable for a variety of livestock. The East African animal feed market is growing steadily at about 7% per year, and livestock farmers are dissatisfied with the currently available options, both because of quality and inconsistent supply. Sanergy’s trials have gone well thus far, and the BSF operations are expanding rapidly.

In partnership with a variety of organizations, including the Bill & Melinda Gates Foundation and Reinvent The Toilet, Sanergy is also trialing several other by-products, including biogas, liquid fertilizer made through urine valorization, and biochar to be used as a soil amendment. This diversification of by-products enables Sanergy to cater to a wide customer base and address the wide array of needs East African farmers have. Sanergy’s R&D is primarily funded through grant capital, allowing for experimentation to ensure we can develop by-products that efficiently convert waste into something of value for our customers.

The production of Evergrow fertilizer and other by-products relies on the waste collected from Fresh Life Toilets each day. The more sanitation services we offer, the more by-products we can make. The more by-products we sell, the easier and more widespread it becomes to provide sanitation affordably. This is how, in working to address the sanitation challenge, we are also tackling East Africa's agricultural productivity crisis.

As a young company, Sanergy is not yet profitable; however, we are confident we have developed an economically viable model that will allow the sustainable provision of hygienic sanitation in urban informal settlements. We are working to scale the model to reach profitability, in addition to achieving maximum impact.

Conclusion

The results of the Sanergy model so far are promising. In just four years, we have launched 750 Fresh Life Toilets in Nairobi's slums, run by 350 operators. The network of Fresh Life Toilets is used over 33,000 times per day. Sanergy ensures the removal of 60 tons of waste from the toilets per week, and the waste is converted into by-products that help Kenyan farmers increase their crop yields and keep their animals well-fed.

Looking forward, we are committed to achieving 100% coverage in the areas we serve. We have already learned many lessons from our recent expansion into the slum of Mathare, especially about the parts of our model that need to adapt to hyperlocal contexts. The Sanergy model relies on community buy-in, and residents need to understand why this is the best way to ensure the health and prosperity of their families and friends. We work closely with residents to tailor our offerings to the needs and desires of our customers, so that we can be confident that people are willing to pay for Sanergy's services.

Commercial operators running two Fresh Life Toilets generate about USD 2000 per year in profit from charging a minimal usage fee to customers. Schools have seen significant increases in attendance and enrolment after installing Fresh Life Toilets, and in residential compounds, plot owners have seen occupancy go up by 60 percent, and more timely rent payments. The message is clear: if we can provide the services they demand, residents of slums will invest in hygienic sanitation.

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