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Sanergy:
Sustainable Sanitation

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Sanergy: Sustainable Sanitation

ABSTRACT

The global sanitation crisis attracted the attention of several regional, national, and international organizations which tried to address the issue in their own way. Still about 2.6 billion people lacked access to decent sanitation facilities across the globe.

Kenya had become a hub of slums with more than 8 million living in the urban slums in the country. Since there were no affordable toilets in these slums, people in these areas relieved themselves either by using pit latrines or by defecating in plastic bags. The result was environment pollution. The communal toilets that existed were often the scenes of crime. The pit latrines were a source of danger to children. To address the sanitation crisis in Kenya, three MIT graduates developed a business which had a non-profit wing to address the issue of inadequate sanitation and a for-profit arm to generate revenues. The company, Sanergy, picked two slums of Nairobi, Kibera and Mukuru, to start with and applied its business model, which included a vertically integrated waste management system - build, franchise, collect, convert, and transfer. The company manufactured toilets which were franchised to the local entrepreneurs of the slums. It then collected the waste from all the toilets to convert it into fertilizers and electricity. The company earned profits by selling the pay-per-use toilets to local entrepreneurs, and then by selling the collected waste after converting it into fertilizers and renewable energy. The local micro-entrepreneurs collected money from the local people for use of the toilets.

These toilets improved hygiene in the slums while providing employment to several local people. People's health improved and so did the quality of life among slum dwellers. For the founders a few challenges remained – The model needed to be scaled up and expanded to other countries to address the global sanitation crisis.

In 2012, a three-year-old boy, a resident of a sprawling slum in the western Kenyan city of Kisumu, died after falling into an open pit toilet in the area while playing with other kids. His inconsolable mother, Nancy Anyango, said, "The waste produces a pungent smell, and when it rains, it floods our houses, and we are forced to move out. The lives of our children, too, are in danger because they play inside the filth."[1] Slums like the one in Kenya, with its deteriorating sanitation facilities, existed in most of the developing and underdeveloped countries and were home to a huge population comprising the poorer sections of society.

While to most people, such abysmal sanitation facilities were an indication of a human-rights crisis, to David Auerbach (Auerbach), a Massachusetts Institute of Technology[2] (MIT) graduate, they also appeared to be a social entrepreneurial gold mine. The scale of the sanitation problem prompted this young social entrepreneur to start a social enterprise, Sanergy, along with some of his fellow students. In January 2010, with support from an award they won at MIT, Auerbach and his founding team arrived at the Kenyan capital of Nairobi to address the dangerous and intractable problem of sanitation plaguing urban slums. The move raised several questions: Is sparking entrepreneurialism a way to combat the sanitation crisis? What should the business model of a company addressing this issue be? And can such businesses remain sustainable in the long run?

SANITATION CRISIS IN KENYA

As of 2015, around 2.6 billion people across the globe lacked access to adequate sanitation and waste management services.[3] These people relieved themselves near water bodies, the roadside, and poorly built toilets and this resulted in the spread of various diseases. Inadequate and unhygienic sanitation led to life- threatening infections like diarrhea and cholera. Moreover, improper sanitation was the second largest cause of deadly diseases in the world. In developing countries, the economic costs of poor sanitation and hygiene amounted to 2% of the total GDP. According to the World Bank's Water Sanitation Program, 18 African countries lost around US$ 5.5 billion every year due to poor sanitation. Of this, open defecation accounted for losses of US$ 2 billion.

The condition was worse in slums which housed over 1 billion people across the globe. In underdeveloped and developing countries, there were numerous sprawling slums with worsening hygienic facilities. Lack of physical space, infrastructure, and adequate resources combined with the high density population in slums led to the sanitation crisis.

One of the nations which had a large slum population was Kenya. *(Refer to Exhibit I for more about Kenya and Exhibit II for the map of Kenya)* In 2015, the total slum population in the country was nearly 8 million. The people in slums were forced to rely on unsanitary options. About 60-80 percent of the country's urban population lived in slums. The urban population was growing rapidly and many of the urban areas did not have proper planning. For example, in Nairobi, 60 percent of the population lived in informal areas, which, occupied only 6 percent of the total area. Almost two-thirds of the city's 3.5 million people had their dwellings in its 200 informal settlements.[4]

The poor condition of these slums had led to a sanitation crisis in many parts of Kenya. *(Refer to Exhibit III for Sanitation Facilities in Kenya)* To use the few toilets that were available, the slum dwellers were charged a fee, which most of them could not afford. They therefore, opted to defecate in the open. A slum resident, Walter Opicha, said, "I can't use 10 Kenya shillings (US$0.12) to pay for a toilet every day when that can buy me a jerrycan of water for bathing and washing my clothes." In Kenya, people followed a practice known as

[1] "KENYA: Human Waste Woes in Slums," www.irinnews.org, December 27, 2012

[2] The Massachusetts Institute of Technology (MIT) is a private research university in Cambridge, Massachusetts, founded in 1861.

[3] Elmira Bayrasli, "Who Gives A Crap? Sanitation, Energy and Entrepreneurship in Kenya," www.forbes.com, May 23, 2011.

[4] Katrina Manson, "Sanergy's Fresh Life Squat Toilets Tackle Kenyan Poverty," www.ft.com, December 11, 2013

'flying toilet' — they defecated into plastic bags which they then tossed onto the streets as far away as possible from their homes. In addition, there were pit latrines which were usually just a hole in the ground; these latrines released overflowing buckets of untreated human wastes into the nearest waterways or fields, inviting further health hazards. Though these pit latrines were cleaned every few months by service employees, there was not a single toilet that hooked up to any sewage infrastructure. Between 50 and 150 people shared each pit latrine in Nairobi's slums.

From Kenyan slums, an estimated 4 million tons of fecal sludge was discharged into the environment (waterways and fields) each year.[5] There were several hazards with the flying bags — they could burst open and clog drainage. Besides, the waste could end up leaking into the houses, into the soil, and ultimately into water sources. The dumped waste permeated into the soil, polluting much wider areas. Such practices led to water, soil and air pollution. Apart from causing environmental damage, improper sanitation facilities raised security issues as well. The existing communal toilets faced the risk of crime. Women using the toilets late in the evening and at night were vulnerable to rape and attack. In addition, the open pits were a source of physical risk for children; many of them often fell into these pits, suffered serious injuries, and in extreme conditions, died.

Grieved over the sanitation crisis in the Kenyan slums, Auerbach said, "When it comes to sanitation it's no longer a question of, 'Can you bring someone a good toilet?' If that's the answer we would have already solved it....You need to address the entire sanitation value chain to solve the challenge."[6] Auerbach believed that the slums in Kenya required a solution which would benefit both the residents and the environment. These thoughts gave birth to an initiative called Sanergy, which, through its innovative and breakthrough business model, aimed at turning a public health crisis into an economic opportunity.

SANERGY – THE INCEPTION

In the fall of 2009, three students — Auerbach, Lindsay Stradley, and Ani Vallabhaneni of MIT Sloan School of Management, met while taking a course, Development Ventures.[7] The course dealt with solving a challenge affecting the lives of a billion people and focused on building entrepreneurial ventures in developing countries. After coming to know that more than 8 million people in the slums in Kenya lacked access to proper sanitation, the three classmates teamed up. They conceived of the idea of providing hygienic sanitation through a franchise model in the slums of Nairobi. While detailing the idea, Auerbach said, "We would franchise these toilets, and people would run them as small businesses. We would collect the waste, then take it out of the community and recycle it into useful byproducts."[8] For Auerbach and Vallabhaneni, these stats were not new; they had experience of the challenges of no sewage or sanitation during their work in rural China and India respectively.[9] The concept developed by the trio was appreciated in class. Finally, MIT's Public Service Center and the Legatum Center funded their trip to Kenya to conduct a feasibility study and explore the possibilities in greater depth.[10] Later on, Nathan Cooke (Cooke), who was a Designer at the MIT D-Lab[11] and had developed a program that fostered sustainable solutions for low-income communities, also joined the trio.

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5 Katrina Manson, "Sanergy's Fresh Life Squat Toilets Tackle Kenyan Poverty," www.ft.com, December 11, 2013

6 Rob Matheson, "The Surprising Value of Waste," https://news.mit.edu, February 14, 2014.

7 Patrick Clark, "Cleaning Up: David Auerbach's Sanergy," www.bloomberg.com, October 13, 2011.

8 "Waste Not: Sanergy's Hygienic Sanitation Solutions Changing Kenyan Slums," www.lemelson.org, April 02, 2015

9 Elmira Bayrasli, "Who Gives A Crap? Sanitation, Energy and Entrepreneurship in Kenya," www.forbes.com, May 23, 2011.

10 Rob Matheson, "The Surprising Value of Waste," https://news.mit.edu, February 14, 2014.

11 MIT D-Lab is involved in building a global network of innovators to design and disseminate technologies that meaningfully improve the lives of people living in poverty.

In January 2010, in collaboration with the University of Nairobi, the team (of Auerbach, Cooke, Stradley, and Vallabhaneni) conducted a user survey among Kenya's urban poor to inquire about their lives.[12] They found that the pay toilets system was already in use in Kenyan slums but was so poorly designed and maintained that regular waste-collection was impossible. Moreover, these units were run by local people who struggled hard to turn a profit. Finding an opportunity in the problem, Auerbach said, "We saw so much entrepreneur spirit from people looking to change their community and earn a living. That's the moment when I started really thinking about turning Sanergy's model from a project into a massive opportunity."[13]

The team returned, with a clarity about their next step. Taking into account the demand and constraints of Kenya's communities, Auerbach and team needed to design and develop the product (toilet). A non-profit higher education network - VentureWell[14] came forward with a grant of $50,000, helping them to develop their product called as Fresh Life Toilet (FLT). Through fund of $25,000 raised from MIT Public Service Center[15], they traveled back to Nairobi and built two toilets — one in the world's largest slum, Kibera, and the other in Mukuru, a smaller slum. The team established a rudimentary system for collecting the waste and processing it into fertilizer.

In 2010, Auerback and his partners established a social enterprise called Sanergy, derived from the fusion of two words — **san**itation and en**ergy**.[16] The long-term objective of the company was to build and scale commercially and sustainably a viable sanitation infrastructure in the slums of Nairobi. In May 2011, the team entered MIT's 21st annual $100K business plan competition[17]. Armed with a feasible business plan, it went on to win US$ 120,000 in the competition, including the audience-choice award, beating 280 other teams. The same year, Auerbach and his team raised additional funds through a startup accelerator, MassChallenge.[18]

In May 2011, after graduating from MIT, the team moved to Kenya full time and started working to streamline their model.[19] Auerbach knew it would not be an easy ride to establish their businss in Kenya. He said, "There were all kinds of bumps in the road that didn't materialize until we were on the ground. How do you find people? How do you build trust? What happens when it rains and it's impossible to get to the community?"[20]

Since moving to Nairobi, the Sanergy team did not have a single normal day. Everyday, they met for the daily morning meetings and after that, they dispersed to either work with thier newly recruited sales team or to visit microfinance instituitions in order to build partnership with them. They worked with local experts, such as professors at the University of Nairobi, to

12 Elmira Bayrasli, "Who Gives A Crap? Sanitation, Energy and Entrepreneurship in Kenya," www.forbes.com, May 23, 2011.

13 Rob Matheson, "The Surprising Value of Waste," https://news.mit.edu, February 14, 2014.

14 VentureWell is a non-profit higher education network with a mission to help an emerging generation of young scientists launch ventures that improve life for people and the planet.

15 MIT Public Service Center sends thousands of students into communities locally, across the nation, and around the globe to apply their skills and knowledge for the betterment of humankind.

16 Jason Margolis, Aaron Schachter, "Sanitation Solution Wins MIT Innovation Prize," www.pri.org, June 03, 2011.

17 The MIT $100K business plan competition: It is the largest student-run business plan competition in the world and is considered a highly competitive and prestigious forum that attracts the attention of Silicon Valley venture capitalists to see the latest technological feats developed by MIT's student body.

18 "Waste Not: Sanergy's Hygienic Sanitation Solutions Changing Kenyan Slums," www.lemelson.org, April 02, 2015.

19 Patrick Clark, "Cleaning Up: David Auerbach's Sanergy," www.bloomberg.com, October 13, 2011.

20 "Unstuck Hero: Because Everyone Deserves to Live with Dignity, " http://unstuckcommunity. tumblr.com, August 21, 2014.

fit their model to Kenyan needs and sensibilities.[21] Despite their busy schedule, the team made a ritual of getting together for dinner by the end of the day. Recalling the initial struggling days, Auerbach said, “We try to keep the atmosphere light in the evening, watching the NFL or Modern Family together. But even still, the evening in Nairobi is the beginning of the day in the U.S., so we end up having calls with potential partners in New York City, Boston and San Francisco. ”[22]

Co-founder Vallabhaneni also pointed out that during the initial days, salaries were not market rate but the team managed with the basic resources they had.[23] He believed that one of the biggest challenges for a market-based solution providers like Sanergy was to respond to the market. If the consumers did not purchase their product, they had to change their business model because if they could not have profits, there would be no business.

Though the Sanergy team worked hard to setup the venture in Kenya, the entrepreneurs believed that the entire entrepreneurial ecosystem at MIT had played a role in helping Sanergy grow. After winning $100K from MIT business plan competition, the entrepreneurs hoped that the innovation prize would pump for other investors funding for the start-up.

Finally, on November 19, 2011, World Toilet Day, the company’s first toilets were open for business.[24]

A SUSTAINABLE BUSINESS MODEL

According to the founders of the Sanergy, the startup demonstrated value chains which provided potential solutions to the sanitation crisis spread across the globe. Sanergy had a multi-purpose business plan which started with sanitation and ended with fertilizer and energy; it offered an affordable, accessible, and hygienic sanitation solution by creating a dense network of low-cost sanitation centers for the underprivileged sections of society living in places without sewage or electricity.

In Sanergy’s sanitation value chain, human waste was converted into valuable byproducts through various steps including collecting, storing, and recycling. In 2011, the company’s business was divided into two wings — a nonprofit and a for-profit. These two arms were interdependent and interrelated for its sustained existence. Such a business model was considered a hybrid as the for-profit arm developed capital intensive sanitation technology and infrastructure while the nonprofit branch supported such infrastructure and services in low-income communities. Further, the model helped the entrepreneurs to meet the three dimensions of responsibilities- social, environmental, and economic. The non profit arm helped to improve the lives of people of Kenya, and minimized water and soil pollution. The for-profit arm generated revenues in business.

About this unique hybrid business model, Auerbach opined, “We’ve found that grant funders are comfortable with the social mission priorities in the nonprofit, and that investors like the fact that we cannot fulfill our financial goal without actually providing hygienic sanitation. Both are inextricably linked.”[25] Sanergy’s business was a vertically integrated waste management system based on major three steps: setting up sanitation facilities, waste transport and

[21] “Unstuck Hero: Because Everyone Deserves to Live with Dignity, ” http://unstuckcommunity. tumblr.com, August 21, 2014.

[22] Lauren Landy, “Sanergy To Be Awarded $100K from USAID's Development Innovation Ventures to “Turn Shit Into Gold”” http://bostinno.streetwise.co, November 29, 2011.

[23] Jason Margolis, Aaron Schachter, “Sanitation Solution Wins MIT Innovation Prize,” www.pri.org, June 03, 2011.

[24] “Sanergy: Turning Waste into Wealth in Kenya’s Slums,” http://venturewell.org, December 09, 2014.

[25] Julie Battilana, Matthew Lee, John Walker, & Cheryl Dorsey, “In Search of the Hybrid Ideal,” http://ssir.org, 2012.

removal, and waste treatment and reuse. (*Refer to Exhibit IV for Integrated Sanitation Value Chain)*. The process started with manufacturing toilets, franchising them to local micro-entreprenuers, and ended with collecting and coverting the waste into useful by-products.

BUILD

The company manufactured low-cost but high quality sanitation facilities. Sanergy built concrete bathrooms called Fresh Life Toilets (FLTs). These toilets were pre-fabricated at the local workshops of the company. It took one day to assemble each sanitation center. High quality materials were used to manufacture the bright blue colored 3-ft wide by 5-ft long FLTs so that cleaning and maintenance became easier. These toilets had urine-diverting squat slabs to separate solid waste from liquid; each FLT was equipped with two removable, airtight waste cartridges: one for liquid and other for solid waste.

The FLTs were made cost-effective to ensure they were more affordable to the poor. The owners were franchisees and were responsible for supplying toilet paper, soap, and a hand-washing stands.[26] The per unit cost of FLT was about $600 (or $1,100 for two), including construction, painting, and waste collection, coupled with business and other support from Sanergy. Each clean toilet contained a waste bin, sanitary bin for women, a mirror, coat hook, and a solar lantern for early morning and night time usage. The toilets were designed for about 100 uses per day.[27]

FRANCHISE

Sanergy built a network of local residents throughout informal settlements. The company's partner organizations introduced it to community leaders and youth groups having a lot of influence in Nairobi. This helped Sanergy develop connections with the slum dwellers.[28] The FLTS were franchised to local micro entrepreneurs called Fresh Life Operators (FLOs) to run.[29] The local entrepreneurs became the franchise partners and they purchased and operated the sanitation facilities.[30] Although it was up to operators to decide how much to charge customers in the pay-per-use system, the normal charge was between 3 and 5 Kenyan shillings.[31] The per-use charge of FLTs was slightly lower than the other facilities available in the area.[32] People could use the FLTs on an unlimited basis by purchasing a membership for roughly $1 a month.

A complete franchise package included installation of FLTs, marketing, training, and business support, and a daily waste collection service. The company supported the FLOs by training them to use and maintain the toilets. Moreover, Sanergy's partnerships with some financial organizations also helped them provide zero-interest loans to vetted FLOs. For example, one of the Sanergy-recommended micro lenders was a web-based non-profit group, Kiva[33], which removed the middleman and facilitated micro-lending to help the would-be operators buy toilets.[34] Sanergy also provided operational and marketing support. The FLOs could also derive extra income from selling hygiene-related products, such as sanitary pads.

[26] Eilene Zimmerman, "Sanergy Turns Poop into Profit in Kenya's Slums," http://money.cnn.com, December 03, 2012.

[27] Kirsty Tuxford, "A New Sanitation Scheme for Nairobi's Slums," http://cities-today.com, April 09, 2014.

[28] "Sanergy, Social Entrepreneurship, and the Sanitation Crisis," https://pennsem.wordpress.com, April 26, 2015.

[29] Rob Matheson, "The Surprising Value of Waste," https://news.mit.edu, February 14, 2014.

[30] Hilary Fischer-Groban, "Turning Waste into Wealth: Sanergy's Vision for Toilets, Jobs, and Energy," http://rise.mahindra.com, September 17, 2012.

[31] Kelly Bluth, "The Business of Waste," www.usaid.gov, September 16, 2015.

[32] Jen Richman, "Startup Competition Fuels Sanergy's Efforts in Kenya," www.indianewengland.com, June 06, 2011

[33] Kiva is a US-based non-profit organization allowing people to lend money via the Internet to low-income / underserved entrepreneurs and students in 86 countries across the globe.

[34] Gary Goldman, "Sanergy is Breathing 'Fresh Life' into the Sanitation Loop," http://nextbillion.net, October 15, 2012.

Being official partners of Sanergy, the FLOs offered constant feedback and advice on everything, from toilet design to marketing campaigns to engaging the government.

COLLECT

Sanergy was responsible for collecting waste from all the FLTs on a daily basis. A separate and dedicated department was established, where employees — called Fresh Life Frontline — were trained to collect waste from the FLTs. Instead of the waste having to be flushed with water, it was piled on sawdust. This resulted in the saving of as much as 150,000 liters of water per year per stall. The trained Fresh Life Frontline employees were equipped with tools to remove the filled cartridges. The removed waste was safely taken away from the community by wheelbarrows, handcarts, and/or trucks and the FLTs were again fitted with clean empty cartridges. The company charged its franchisee $6.25 a month to take the waste to the processing facility.

The Frontline team had to weigh each container at Sanergy's central processing site. In order to track its business performance, Sanergy employees had to record the amount of waste collected each day. The data was collected on paper, which was then digitized and checked by software provided by Captricity[35].

CONVERT

The founders of Sanergy recognized that the messy human waste could be used to produce fertilizer or electricity through anaerobic digestion. It also became one of the revenue generation points for the company. The waste collected by the Fresh Life Frontline employees was transferred to the company's centralized facility where it was converted into useful by-products — fertilizer, biogas, and electricity. In order to produce fertilizer from the waste, it was co-composted with sawdust, carbon sources, and pathogen eliminating micro-organisms. The compost was left to mature in windrows. On an average, it took four to six months to convert raw human waste into fertilizer.[36]

Apart from solid waste, the urine was also re-used. The company developed methods to capture the biogas — primarily methane and carbon dioxide, released by the waste after decomposition.

TRANSFER

Each batch of the matured fertilizer was tested to ensure compliance with the World Health Organization standards. The organic fertilizer thus produced was sold to a variety of Kenyan farms, especially to those belonging to the country's $300 million-a-year horticulture industry,[37] whereas electricity was sold to the national grid of Kenya.[38]

The company collected about 1.5 tons of waste each day. In July 2012, Sanergy sold its first batch of fertilizer of two tons at market price (at a rate of between $300 and $600 per metric ton). It offered organic fertilizers at a reasonable price, which was a relief for the farmers in East Africa who had previously relied on more expensive imported fertilizer.[39] On using the organic fertilizer provided by Sanergy, the farmers reported a 30% increase in crop yields, resulting in an increase in their profits.[40] Every batch of fertilizer provided was pathogen-free and certified as complying with WHO standards.

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[35] Captricity provides non-disruptive access to data generated by paper documents—including handwritten forms. Its learning algorithm has ensured increasingly fewer data entry errors and saved staff hours of time each week.

[36] Eilene Zimmerman, "Sanergy Turns Poop into Profit in Kenya's Slums," http://money.cnn.com, December 03, 2012.

[37] Patrick Clark, "Cleaning Up: David Auerbach's Sanergy," www.bloomberg.com, October 13, 2011.

[38] Gary Goldman, "Sanergy is Breathing 'Fresh Life' into the Sanitation Loop," http://nextbillion.net, October 15, 2012.

[39] Kareya Saleh, "MIT Spinout Sanergy Targeting Clean Sanitation for all of Kenya (and beyond)," www.betaboston.com, July 16, 2014.

[40] "Sanergy, Social Entrepreneurship, and the Sanitation Crisis," https://pennsem.wordpress.com, April 26, 2015.

A WIN-WIN VENTURE

Though Sanergy was working for the downtrodden section of Kenya's urban slums, it was driven by the profit motive also. The company discovered a way to maximize its own revenues while solving global problems of improper sanitation and improving lives. It adopted a systematic approach to the entire urban slum sanitation value chain and offered an innovative, profitable way to address this acute need in densely populated slum communities like those in Nairobi. According to Sanergy, being an untapped market, Kenya's 10 million slums had the potential of developing into a multi-million market. Industry experts also viewed the urban slums as a profitable market. The estimated revenue from each toilet for Sanergy was US $1,250 per year.[41] Further, the company hoped to break even by the end of 2017.[42]

The founders of Sanergy hatched its business plan for profiting at both ends of the problem of improper sanitation facilities. They earned profits while selling pay-per-use toilets to local entrepreneurs, and also while selling the collected waste after converting it into fertilizers and renewable energy. Moreover, given the fact that fertilizer prices in Kenya were almost twice the global average price because of lack of domestic production and an ever-growing demand for energy, Sanergy knew it would always find customers for its secondary products (fertilizers).[43] Auerbach said that profit had also been one of the drivers of the project but that it was not the only motive for them to start Sanergy. He said, "If we were in it to make money there is a ton of other things we could do. We are in it to solve a massive social problem."[44] The company kept reinvesting the profit earned at each step into expanding its infrastructure.

Sanergy had targeted local residents and approached them to create a sustainable distribution network. Through this initiative, the urban slums of Nairobi were provided with hygienic sanitation solutions. The poor living in the Nairobi slums got access to proper sanitation facilities on paying a nominal charge. Apart from addressing the sanitation crisis, Sanergy enabled urban slum occupants to become financially stable. For example, Bob Orengo, a franchisee in Mukuru, who had about 47 customers a day, charged around $.05 per use and was able to earn U.S. $19 a week. Orengo said, "It's a good way to start your own business and be self-employed."[45] Similarly, another FLO in Mukuru, Esther Muniyiva, had 96 customers a day and made around $40 a week.

Where the community was concerned, Sanergy gave a sense of security and protection to the women for using the toilets during the late evenings and nights. Also, many women became financially independent through the Sanergy business. By May 2013, 50% of the company's FLOs were women. Local toilet operator Agnes Kwamboka of Nairobi, who had sold illicit beer (called chang'aa) for 16 years to support her family, believed that Sanergy had changed her life. Recalling her previous way of life, Kwamboka said, "When I used to sell chang'aa, many men used to enter my stall. They thought they could just use me like a broom. Policemen used to demand a bribe of 500 shillings each day....The Fresh Life Toilet has given me peace of mind. My children used to steal, but now they don't have to. I keep all my profits, and I'm able to provide for my family and also pay off my debts."[46] Another section of the

41 Elmira Bayrasli, "Who Gives A Crap? Sanitation, Energy and Entrepreneurship in Kenya," www.forbes.com, May 23, 2011.

42 Ben Schiller, "How A Toilet Franchise Business Is Cleaning Up Kenya's Slums, " www.fastcoexist.com, November 08, 2015

43 Jonathan Kalan, "The Silicon Valley of Shit: Nairobi Is Ground Zero for Sanitation Innovation," http://magazine.good.is, November 19, 2011.

44 Katrina Manson, "Kenya's Slums Turn Waste into Gold," www.ft.com, July 23, 2013.

45 Eilene Zimmerman, "Sanergy Turns Poop into Profit in Kenya's Slums," http://money.cnn.com, December 03, 2012.

46 Marie von Hafften, "In Kenya, Selling Human Waste could Revolutionize Sanitation," www.csmonitor.com, March 17, 2014.

society felt that Sanergy was a way to give back to the community. Alexander Waweru of a Kenyan slum allowed the students of the nearby Faith Montessori School to use his Fresh Life Toilets for free.[47]

In addition, the Fresh Life waste collectors felt more protected after being connected to Sanergy. The company took proper safety measures for the Fresh Life Frontline; these employees were provided with up-do-date equipment to collect human waste from FLTs. One of the Fresh Life waste collectors, Victor Omondi, shared his experience of working with Sanergy and said, "I used to work for a UDDT [urine diverting dry toilet] toilet with a biodigester attached. It was big and complicated to use. It was also difficult to remove the waste without spilling. Also, Fresh Life Toilets use sawdust instead of ash [to reduce smell] – it makes a big difference! Finally, I feel more protected [because of Sanergy's equipment and safety measures] than before."[48]

THE IMPACT

By September 2012, Sanergy was employing 42 full-time staff and 10 part-time staff. Half of its total number of employees came from the local community including masons, sales agents, and waste collectors. Commenting on the benefits extended its employees, cofounder Vallabhaneni said, "All the jobs we are creating are all in the formal sector. Pension and health coverage; it's important to be able to provide these social safety nets."[49]

Sanergy created more than 350 jobs in Mukuru.[50] Thus, apart from providing hygienic sanitation solutions, the business model created jobs and other opportunities at each step. The impact of Sanergy was enormous: bringing in jobs, sanitation, and a new sense of pride in the community. Further, it helped the people of Kenya to have better life by availing right to privacy, and development right. On the energy front, in Kenya, the demand for electricity was growing at a rate of 7-10 percent every year, and therefore, the country's government deregulated the power industry encouraging independent power producers (IPP).[51] Sanergy was the first IPP which entered into a 15 year contract to generate electricity using human waste. The company also met the third dimension of sustainability - economic - as the business model of the company helped the entrepreneurs attain good amount of profit while creating a positive economic impact on the society.

Auerbach believed that affordable sanitation facilities would transform the lives of the slum occupants. He said, "A clean, safe, hygienic sanitation experience can have a transformative effect as residents enjoy the benefits of a higher quality of life. They begin to expect an improved community, a cleaner surrounding environment, better health services, and find the means to send their kids to school."[52] In 2014, as per a report, just by providing 15 schools of Nairobi with access to sanitation, the enrollment and attendance at the schools increased by 20 percent by the following semester.[53] Auerbach felt that the sanitation facilities had gained the confidence of the parents and encouraged them to send their kids to schools.

[47] "Towards Cleaner and Prosperous Communities – Alexander's Story," http://saner.gy, Accessed on October 27, 2015.

[48] "From the field: Waste Collection, Fresh Life Style," http://saner.gy, Accessed on October 27, 2015.

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[51] https://www.ashoka.org/fellow/david-auerbach, Accessed on February 17, 2016

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In addition, the flying toilets — the plastic bags full of urine and feces were nowhere in sight in Nairobi's urban slums.[54] The startup succeeded in opening hundreds of toilets in informal settlements (slums), thus providing access to affordable and hygienic sanitation. *(Refer to Table I)*

Table I:

Impact of Sanergy

Work done by Sanergy	Number	Impact
Fresh Life Toilets opened	734	They provided customers with a dignified, hygienic, and enjoyable sanitation experience.
Number of people using FLTs	33,000 daily uses	Customers paid by the visit, week, or month and children paid less than adult customers. Parents could buy monthly memberships for children who attended schools with inadequate sanitation facilities.
Waste removed and treated	6,028 metric tons	The Fresh Life Frontline team emptied each Fresh Life Toilet 365 days a year. From there, the waste was treated in accordance with WHO, industry, and Kenyan government standards.
Jobs created	763	Sanergy helped 362 informal settlement residents to open and start Fresh Life businesses.

Source: http://saner.gy/

Moreover, Edith Karimi, Sanergy's head of communications, also believed, "The project has great potential for lighting up the slum and providing affordable fuel for cooking."[55]

The project was highly appreciated and received several awards. In 2012, under the LAUNCH program — a joint effort by USAID, NASA, and Nike to find sustainable solutions to development challenges, Sanergy was selected as a 'Beyond Waste' innovator.[56] In 2013, for its work in Africa and the Middle East, Sanergy was named as the winner of the '2013 FT/Citi Ingenuity Awards: Urban Ideas in Action program' — sponsored by Citi in collaboration with INSEAD.[57] Additionally, Sanergy received the Sarphati Sanitation Award[58] in 2013 for its outstanding contribution to the global sanitation challenge through entrepreneurship. *(Refer to Exhibit V for Awards and Fellowships earned by Sanergy)*

SCALING UP

By 2013, Sanergy had scaled up its model in Kenya through public and private partnerships such as Government of Kenya, Unilever, Kiva, and Oxfam.[59]Joshua Boger, former CEO of Vertex Pharmaceuticals, believed that the biggest challenge for Sanergy would be to speed up its expansion work.[60] Industry experts opined that for achieving a real scale comparable to

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54 "Sanergy Turns Poop into Profit in Kenya's Slums," http://en.twwtn.com, August 11, 2014.

55 "Biogas Investors Defy Stigma to Pull Energy from Faeces," www.businessdailyafrica.com, November 25, 2014.

56 Kelly Bluth, "The Business of Waste," www.usaid.gov, September 16, 2015.

57 "Sanergy is Named Global Winner at 2013 FT/Citi Ingenuity Awards," http://aboutus.ft.com, December 10, 2013.

58 Sarphati Sanitation Award is a biennial international award which honors the outstanding contribution of an organization to the global sanitation and public health challenge through entrepreneurship.

59 "IWW/Aquatech: Sanergy Wins 50.000 Euro Sarphati Award for Establishing Sanitation Business in Nairobi," www.dutchwatersector.com, November 06, 2013.

60 Eilene Zimmerman, "Sanergy Turns Poop into Profit in Kenya's Slums," http://money.cnn.com, December 03, 2012.

the market need, Sanergy still had a long distance to cover. Given the fact that there were still millions of people who lacked access to clean and safe toilets, there was vast scope for Sanergy to scale up. Auerbach himself opined that in order to guarantee consistent supply to its customers, the company was required to grow at least three or four times of its existing capacity and network of toilets.[61]

In addition, Sanergy received a grant of USD 1,499,984 from USAID to scale up and fulfill primary long-term outcomes. *(Refer to Table II for the Primary Long-Term Outcomes of USAID Funding)*

Table II:

Primary Long-Term Outcomes of USAID Funding

- Access to and usage of hygienic sanitation will be increased for slum residents in Kenya.
- Local capacity to provide hygienic sanitation services will be increased.
- Environmental pollution in slums will be reduced by increasing the capacity of safe fecal sludge collection and removal in the target areas.
- Availability of products for safe reuse will increase by processing the fecal sludge into useful products.

Source: http://www.africanwaterfacility.org

Further, Auerbach aimed to enter West Africa to replicate Sanergy model and had started conversations with its partners in Nigeria and Ghana.

THE CHALLENGES

Despite being successful in many areas, Sanergy's growing popularity came with its share of challenges. While experts appreciated Sanergy's efforts to provide affordable sanitation facilities to underprivileged communities in developing countries and also its business model, they felt that to move forward, the company would have to address various challenges. Industry experts were concerned that investors might question whether the Sanergy model was sustainable.

Experts pointed out that while urban slums offered the scope for scalability of the Sanergy model, establishing the network in rural areas would be a cumbersome task, making it difficult for the objectives of the business to be achieved. According to Jenny Aker (Aker), an assistant professor of development economics at the Fletcher School at Tufts University working on West Africa, "If sanitation services aren't commonly used or culturally appropriate, would the community be willing to pay for it? If Sanergy expands into rural areas, the impact will probably be much lower than in urban zones simply because there are fewer potential customers."[62] It was believed that the business model followed by Sanergy was feasible and sustainable only for urban slums but considering the constraints of rural areas the model might not be feasible and could fail to remain sustainable. Another major concern raised by Aker was regarding the acceptability of human waste as fertilizer. She opined that using human waste as manure was good enough only for the flower industry but it would be difficult for people to accept it in other sectors like food. "What would people think about using human manure as part of growing their food? That's something to consider long-term," Aker said.

[61] Mike Miesen, "Toilet Made for Densely Populated Settlements Turns Waste Into Dollars," www.thedailybeast.com, April 05, 2014.

[62] "Sanergy Turns Poop into Profit in Kenya's Slums," http://en.twwtn.com/Bignews/72260.html, August 11, 2014.

Another hurdle for Sanergy in Kenya was getting support from the Kenyan government. For meeting the long-term objectives of the company, it was necessary to establish collaborative relationships with all levels of the Kenyan government.[63] In early 2013, Sanergy hired Alex Manyasi as its Government Relations Manager. His job was to strategically meet with representatives at the national and country government levels and to understand Kenya's new constitution that drastically altered traditional power structures. In addition, since many of the slums were illegally built, it gave the country's government an excuse to ignore the multi-faceted sanitation problem. Aggrey Nyange, an urban planning lecturer at the University of Nairobi, believed, "Slums spring up without any approval from the government, and they will tell you they can't provide services in a place that doesn't exist. That is the paradox." [64] Though Kenya had made a commitment to the UN millennium development goals (MDGs) of halving the proportion of people without sustainable access to sanitation between 1990 and 2015,[65] it was likely that it would not be able to fulfill the commitment as the government had certainly failed to address the needs of people in informal settlements. Moreover, the landlords in these slums also neglected the sanitary needs of their tenants. They preferred to maximize their income by building more homes rather than spending money on building toilets or bathrooms. Thus, the issue remained unattended by the government and the landowners.

In addition, the problem of land rights was an ongoing challenge faced by many business owners in Kenya. As Auerbach said, "One good problem we have is we are collecting so much waste now. We are running out of space and so we need to move to bigger space....The uncertainty around land in informal settlements is always a challenge. We are building our toilets on land and our entrepreneurs need to have access to that land to buy a toilet."[66] In many locations, land rights were often not clearly defined that could pose problems for Sanergy to set up its facilities.

A TOUGH ROAD AHEAD?

Given the challenges facing Sanergy, analysts opined that though it had made a good start and the progress of the initiative was commendable, it still had a very tough road ahead. Sanergy team over time had realized that there was a lack of sites to scale company's operation as desired.[67] Though the entrepreneurs started to contact landlords and schools, many domain experts were of the view that it could be very difficult to scale up its operations in coming years. Arranging finance to expand its operations in other parts of Kenya and world would be challenging for the company, according to a few of the experts.

Despite the challenges, Sanergy aimed to serve as many as 300,000 residents of informal settlements of Kenya and create over 2,000 jobs by 2020.[68] Moreover, Sanergy's infrastructure for collecting waste could help ease Kenya's sanitation problems. But industry observers voiced concerns over the long-term sustainability and growth of Sanergy. Further, Sanergy needed to build trust among local micro-entrepreneurs and slum dwellers to break down taboos associated with sanitation. In addition, living up to the expectations of slum dwellers could by no means be considered an easy task for Sanergy. How should the entrepreneurs mould their approach to win confidence of Kenyan slum population – both rural and urban?

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[63] "Building The Sanitation Ecosystem: Our Approach With The Kenyan Government," http://saner.gy, Accessed on October 27, 2015.

[64] "KENYA: Human Waste Woes in Slums," www.irinnews.org, December 27, 2012.

[65] Clar Ni Chonghaile, "From Flying Toilets to Fertiliser, Slum Sanitation in Nairobi is Changing," www.theguardian.com, November 19, 2012.

[66] Dinfin Mulupi, "Fresh Life toilets: A Small Business Project and Social Initiative," www.howwemadeitinafrica.com, October 23, 2013.

[67] Ben Schiller, "How A Toilet Franchise Business Is Cleaning Up Kenya's Slums," http://www.fastcoexist.com, November 08, 2015

[68] "Sanergy Brings Sanitation to the Forefront," www.undp.org, October 31, 2014.

Exhibit I:

About Kenya

Kenya is located in Eastern Africa, bordering the Indian Ocean, between Somalia and Tanzania with a total area of 580,367 sq km (land: 569,140 sq km + water: 11,227 sq km). The size of the country is five times the size of Ohio or 1.6 times the size of Germany. Kenya gained independence on December 12, 1963, from Britain. Its capital, Nairobi, has a population of 3.915 million as of 2014. Kenya's border countries are Ethiopia, Somalia, South Sudan, Tanzania, and Uganda. As of 2015, the country had a total population of 45,925,301. Apart from numerous indigenous languages, English is also widely spoken. Kiswahili is the official language in Kenya.

Kenya is rich in natural resources like limestone, soda ash, salt, gemstones, fluorspar, zinc, diatomite, gypsum, and wildlife. However, the country suffers from natural hazards like droughts and floods (caused due to heavy rains). Various issues in Kenya require immediate attention — the water pollution from urban and industrial wastes; degradation of water quality from increased use of pesticides and fertilizers; deforestation; soil erosion; desertification; poaching, etc.

Kenya is a largely a low middle income country with per capita income of $ 1,300 (as of 2013).

www.cia.gov and other sources

Exhibit II:

Map of Kenya

Source: www.nationsonline.org

Exhibit III:

Sanitation Facilities

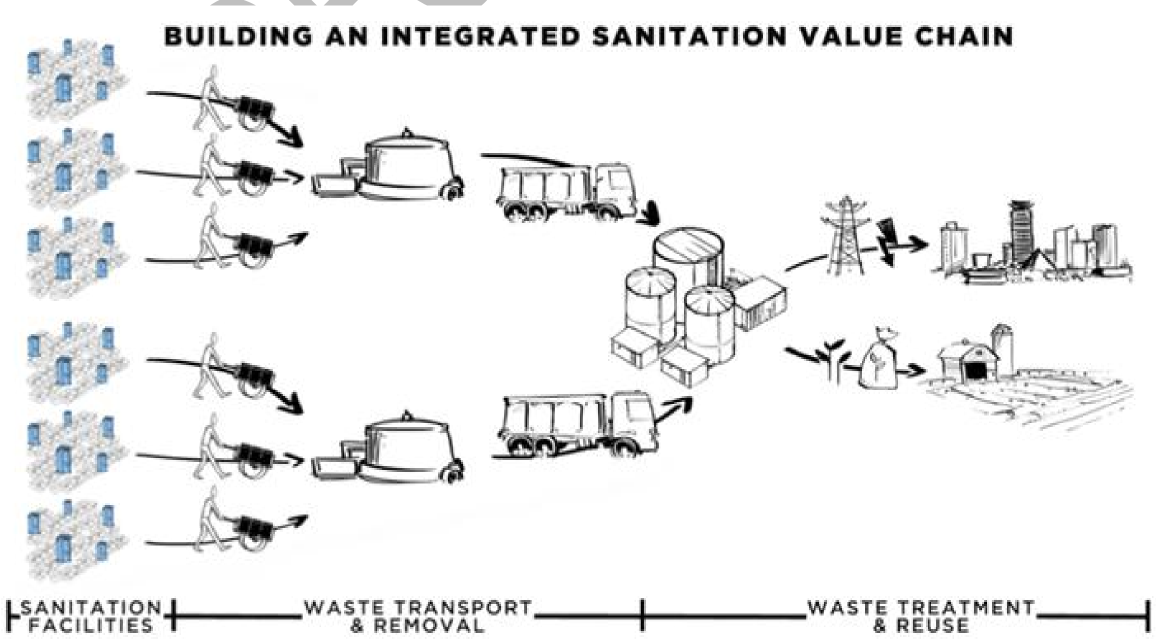
Country	Year	Population (*1000)	Percentage of urban population	Use of sanitation facilities (percentage of population)					
				Urban		Rural		Total	
				Improved	Unimproved	Improved	Unimproved	Improved	Unimproved
Kenya	1990	23446	17	29	74	24	76	25	75
	2000	31285	20	29	71	26	74	27	73
	2012	43178	24	31	69	29	71	30	70
	2015*	45925	25.6	31.2	68.8	29.7	70.3	30.1	69.9

** Data for 2015 is taken from https://www.cia.gov*

www.unicef.org and other sources

Exhibit IV:

Integrated Sanitation Value Chain (A)



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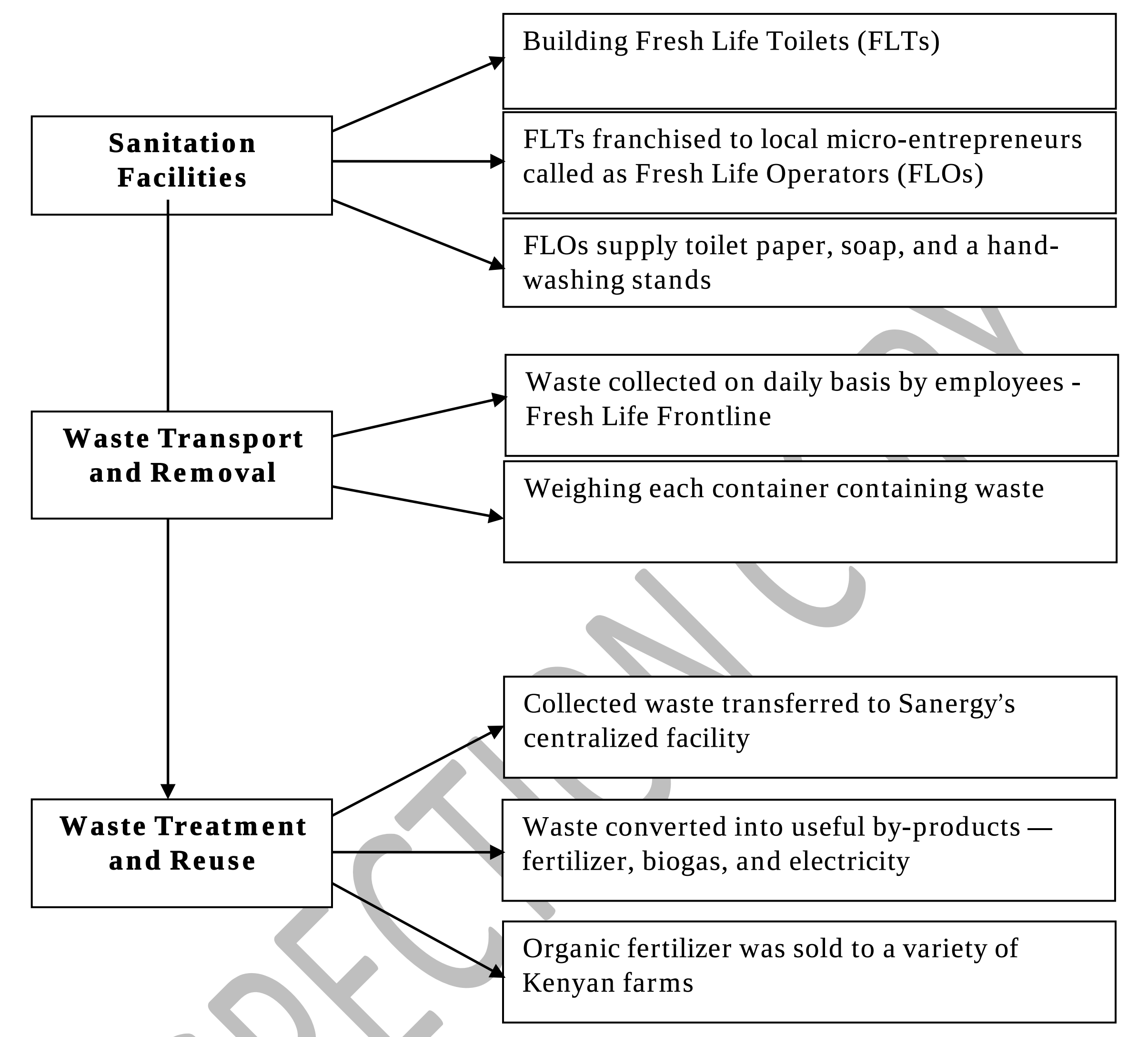
Contd...

Integrated Sanitation Value Chain (B)



Source: http://saner.gy/

Exhibit V:

Sanergy: Awards and Fellowships

Year	Awards and Fellowships
2011	MIT100K Business Plan Winner
	Mass Challenge Winner
	Echoing Green
	Seibel Scholars
	African Leadership Network
	Rainer Arnhold / Mulago Foundation
	Legatum Center at MIT
	Clinton Global Initiative
2012	Draper Richards Kaplan Fellow
	USAID Frontiers in Development
	Swedish International Development Cooperation Agency (SIDA) Innovator of the Year
	Cartier Women's Initiative
2013	Lemelson Foundation Sustainability Prize
	FT-Citi Ingenuity Award Global Winner
	Sarphati Sanitation Award
2014	Grinnell Prize
	Tech Awards Laureate
	Fonds Suez Environnement Initiatives – Institut de France Prize
2015	Genesis Generation Prize
	FT/IFC Transformational Business Awards – Award in Urban Transformation

Source: http://saner.gy/about-us/awards-and-accolades

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Suggested Videos:

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3. https://www.youtube.com/watch?v=unTc-rlD9LI
4. https://www.youtube.com/user/sanergy
5. https://www.youtube.com/watch?v=r65S_CHTTMA