**INCLUSIVE INNOVATIONS**

# Business Models for Integrated Waste Management

*Integrated solutions address environmental and health issues by reducing, reusing, and recycling household and industrial waste*

**HIGHLIGHTS**

- Integrated waste management enterprises serve the dual goal of poverty alleviation and prevention of environmental degradation across the waste management value chain.
- Some enterprises leverage partnerships with government to minimize their initial investment in infrastructure and support public sector efforts to manage waste.
- A few enterprises deploy technology to connect various stakeholders across the value chain and improve efficiency of operations.

## Summary

Waste management is a common challenge in most developing countries. While a number of solutions have been developed, pilot-tested and even implemented, they operate mostly in silos, which decreases their effectiveness. This is because effective and sustainable waste management requires seamless transition and hand-offs across the various stages—from generation to collection, treatment, and reuse. This leads to the need for integrated waste management solutions.

Social enterprises have recognized this need and have adopted models that work across the 3Rs—reduce, reuse, and recycle, bringing together collection, treatment, reuse, and inclusivity of user and service provider. Enterprises classified under this business model encourage reduction of waste before generation, provide efficient end-to-end waste management services and aim to minimize the burden on landfills. Such enterprises also recover value from waste in the process. Some of the integrated waste management enterprises leverage information and communication technology (ICT) to improve productivity and efficiency of their services.

## Development Challenge

Integrated waste management enterprises primarily address the challenges posed by waste that is unattended by public authorities, and therefore result in a number of environmental and health issues. They also address other challenges including the informal nature of the sector across the value chain, inadequate interaction and engagement between various waste management service providers, and lack of data to support the required policy decisions.

Nearly 50 percent of the world's population does not have access to regular waste collection[1], while over 3 billion people lack access to controlled waste disposal facilities[2]. Inadequate waste management has direct

[1] World Bank news article, http://www.worldbank.org/en/news/feature/2016/03/03/waste-not-want-not---solid-waste-at-the-heart-of-sustainable-development

[2] Global Waste Management Outlook, UNEP https://www.iswa.org/fileadmin/galleries/Publications/ISWA_Reports/GWMO_summary_web.pdf

implications on the environment and public health. The sections of society that face serious health risks include waste workers and people residing near dump yards; most of these communities belong to low income groups; poor health directly impacts their livelihood and productivity.[3]

One of the key challenges in ensuring efficiency in waste management processes is the informality across all activities from collection to segregation and disposal, and across stakeholders such as waste pickers and middlemen. This informality also perpetrates the lack of awareness related to safe waste management practices in most developing countries.[4] Unregulated and illegal dump sites serve about 4 billion people and contain over 40 percent of the world's waste.[5]

Inefficiencies also creep in as different players manage different components of the waste value chain. Poor transition and hand-offs build up at each stage of waste management because of the limited interaction and engagement amongst the different stakeholders. Waste generators dump unsegregated waste at street corners or open dumps, as public waste management authorities are expected to take over and manage the waste from that point. In the absence of adequate public waste management infrastructure, the waste remains there before it is collected by informal waste pickers, who do preliminary sorting, taking only what they find of value. The waste pickers sell the saleable items to informal recyclers, and dump the rest in the landfills without appropriate treatment. Integrated waste management solves this issue because of a continuous formalized process flow, free of inefficiencies.

**Municipalities in developing countries can spend 20-50 percent of their budget on solid waste management.**

Across a number of developing countries, governments and policymakers often do not have an accurate assessment of ground-level realities due to lack of data and information on the amount of waste generated, types of waste generated and amount of waste reaching landfills. Resulting policies are therefore less effective than they could be. The cost of managing waste, however, remains high. In many developing countries, solid waste management could consume around 20-50 percent of the municipal body's budget.[6]

## Business Model

### Components of the Model

A number of innovative enterprises have emerged in the recent past to address the gaps in the waste management system and build sustainability through efficiencies. The integrated waste management business model focuses on undertaking activities across the waste value chain, including collection of waste, sorting and segregation, treatment or recycling and disposal of waste. This model also relates to facilitating forward and backward linkages across the waste management value chain (Figure 1). Some of these enterprises leverage ICT to effectively deliver their services. In addition to providing end-to-end waste management solutions, some of these enterprises also assist the governments in providing information and data through online platforms and information analytics.

Integrated waste management enterprises are broadly classified into two categories (Figure 1):

***ICT-enabled integrated waste management enterprises***

Social enterprises leverage ICT to provide services or facilitate connections between service providers and customers across the waste value chain. Technology facilitates tracking and monitoring the waste situation for faster responses. ICT also enables real-time data capture and analysis to inform decision-making. Kenya-based

[3] Nearly 76 percent workers in informal recycling operations in India suffer from respiratory ailments like asthma, bronchitis, choking, coughing, irritation, breathing difficulties and tremors among others
[4] India generates over 3 million tons of e-waste every year, and 90 percent is handled by the unorganized sector.
[5] World Bank news article, http://www.worldbank.org/en/news/feature/2016/03/03/waste-not-want-not---solid-waste-at-the-heart-of-sustainable-development
[6] Financial sustainability in municipal solid waste management – costs and revenues in Bahir Dar, Ethiopia, 2014

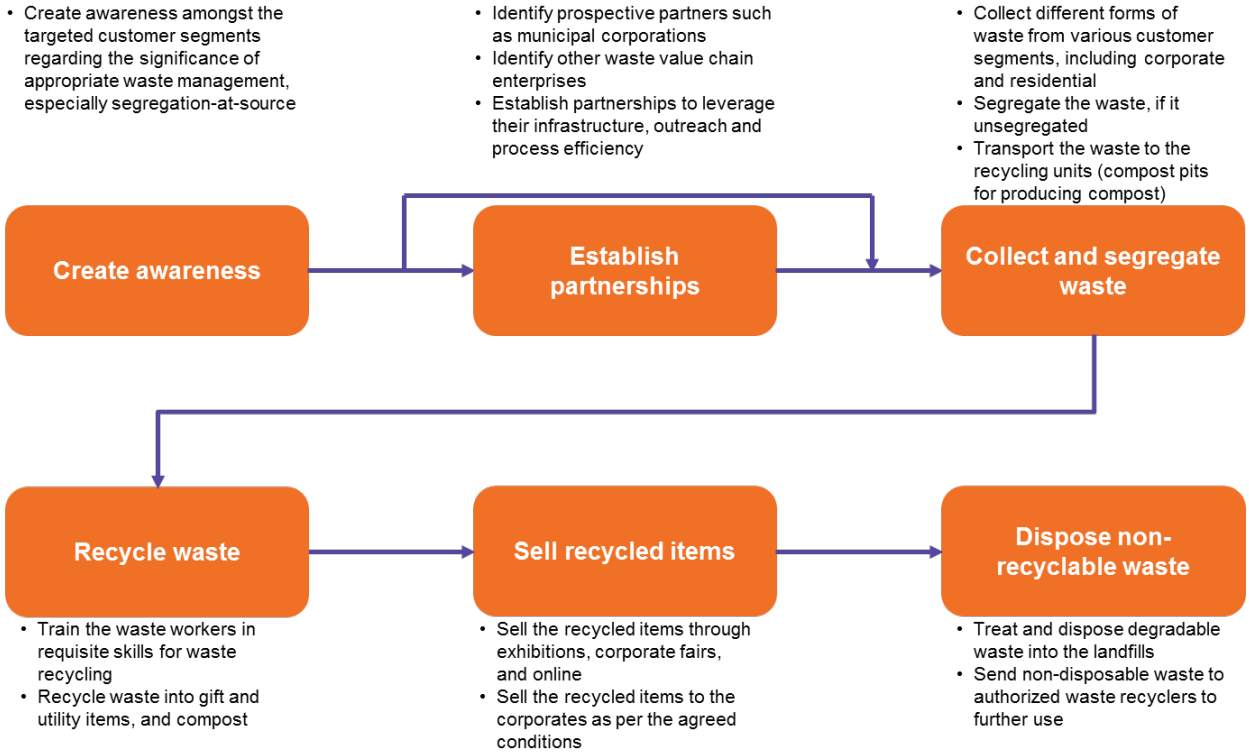
GoRecycler, for instance connects different stakeholders in waste management, besides providing waste management services such as collection, sorting, treatment and recycling. India-based Gain Waste offers an on-call waste collection service called "Kabadi on call". Another Indian enterprise Banyan Nation develops analytics-based reports on amount of waste collected and disposed at landfills to support the government and enable better landfill management. Some enterprises deploy GPS technology and provide mobile-phone-enabled tracking of waste collected and recycled. For instance, Let's Recycle - an initiative of Nepra Resource Management - an India-based enterprise also utilizes GPS technology to monitor their fleet of the waste trucks. Another Indian enterprise, Green Nerds deploys innovative technologies such as PECK kiosk to recycle and compress solid waste for effective landfill disposal.

***Non-ICT integrated waste management enterprises***

Non-ICT enabled enterprises adopt the more traditional model of providing a wide range of services to their customers. They also engage in public-private partnerships with government departments and provide consulting services. Uganda-based Aquila Recycling, for instance, provide efficient end-to-end services including collection, sorting/ segregation, transportation and disposal, thereby minimizing landfill pressure. The enterprise is licensed by National Environment Management Authority (NEMA), the principal agency for coordinating, monitoring, regulating and supervising environmental management in Uganda, to provide transportation of solid waste. Enterprises such as India-based Sampurn(e)arth Environment Solutions also offer other services such as waste audit and consultancy services. A few enterprises focus specifically on integrated waste management services for e-waste. For instance, Indian enterprises Attero Recycling and Ecoreco offer integrated waste management solutions for e-waste recovery, data security and electronics reverse logistics along with repair, refurbishment and retailing of electronics. A few enterprises such as Indian Green Services (IGS) provide zero waste management (ZWM) services, including capacity building and treatment and recycling solutions for waste.

**Figure 1. ICT and non-ICT integrated waste management**

**Figure 2. Features of model for integrated waste management**




## Cost Factors

Integrated waste management enterprises incur a majority of their cost in salaries of employees and contract workers (Table 1). A few enterprises that partner with waste picker organizations for collection incur additional labor costs in sourcing waste. They also incur material cost and transportation cost for sourced waste. Other cost factors include premise rentals and cost of recycling machines.

**Major cost factors of interviewed enterprises**

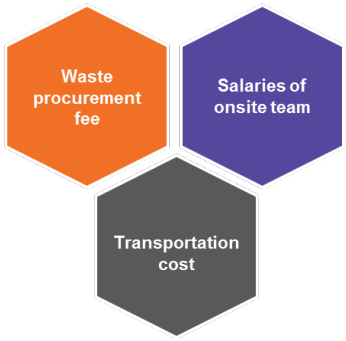



**Table 1. Typical costs incurred by an integrated waste management enterprise in India**

| Particulars | Type of expense | Cost incurred (USD) |
|---|---|---|
| Establishment of biogas plant | One-time capital expense | 9,000 – 900,000[7] |
| Recycling machines | One-time capital expense | 4,500 |
| Waste collection trucks | Monthly rental | 750 |

A few enterprises reported additional miscellaneous expenditure on account of local conditions. For instance, Bali Fokus pays 'tipping fee' to waste workers to dump the unrecyclable waste into landfills.

As a case in point, a report refers to a private integrated waste management enterprise in Ethiopia which raised a total debt of about USD 200,000. The enterprise incurred major capital expenditure in purchase of waste collection trucks[8]. The enterprise partners with the local city administration and an NGO, Forum for

[7] Cost varies depending on the size of the plant; for instance, it costs USD 9000 for a biogas plant of 100 kg capacity and USD 90000 for a biogas plant of 50000 kg

[8] Financial sustainability in municipal solid waste management – Costs and revenues in Bahir Dar, Ethiopia, Science Direct, February 2014 http://www.sciencedirect.com/science/article/pii/S0956053X1300500X

Environment, which support with awareness building activities. The enterprise incurs operational expenses in terms of salaries, maintenance of motor vehicles and purchase of office equipment. The operational cost break-up in the three categories is approximately 47 percent, 41 percent and 10 percent respectively.

### Revenue Streams

Integrated waste management enterprises typically have multiple revenue streams as they offer a range of services. These include waste collection fees from households, commercial enterprises and institutions, and proceeds from the sale of recycled products such as gift and utility items, biogas, and compost. Sampurn(e)arth earns revenues from its collection services, the sale of biogas plants[9], sale of biogas[10], and operation and maintenance services. Bali Fokus earns revenues through sale of recyclables such as plastic bottles and cans to scrap dealers, in addition to fees for collection services to hotels. A number of integrated waste management enterprises dealing in e-waste such as Attero Recycling and Ecoreco earn revenues through the sale of refurbished electronic items, and recovered precious materials.

As the efficiency of fee collection from households is only around 50 percent, integrated waste management enterprises cannot cover all running costs of primary waste collection, overall administration and support through this source alone.[11] The cost of transportation, disposal and recycling is covered by the other revenue streams. Local municipal corporations also support integrated waste management enterprises by providing them requisite infrastructure such as sorting facilities and equipment including waste collection trucks and waste disposal equipment.

### Financial Viability

The financial sustainability of integrated waste management enterprises depends on the efficiency of waste collection fees, increased sale of recycled and refurbished items across the value chain, and diversifying the revenue streams and financing mechanisms. Most of the interviewed enterprises have not achieved break-even; however a few of them are operationally sustainable.

Some enterprises have attempted to improve collection efficiency of waste management fees by linking it to other utility services, such as water supply. Such strategies are usually implemented by establishing partnerships with the municipal corporations and other such local bodies and are more prevalent in developed countries. For example, In Toronto, Canada, waste collection fee is linked to the water supply.[12] Other enterprises, such as Sampurn(e)arth, plan to make their processes more efficient by leveraging technology to improve performance of business activities, such as developing a mobile application to track routes.

Enterprises have increased the sale of recycled and refurbished items across the value chain by improving the recycling infrastructure, leveraging their own work-streams and contacts with processors and recyclers to assess and adopt technical and commercial options to optimize the resource recovery process across the value chain.[13] For example, India-based Ecoreco has developed its own technology that combines high-tech

[9] Small plants
[10] Large plants
[11] Financial sustainability in municipal solid waste management – Costs and revenues in Bahir Dar, Ethiopia, Science Direct, February 2014 http://www.sciencedirect.com/science/article/pii/S0956053X1300500X
[12] Toward Sustainable Municipal Organic Waste Management in South Asia, Asian Development Bank, 2011 https://books.google.co.in/books?id=PCoJBgAAQBAJ&pg=PT62&lpg=PT62&dq=waste+management+fees+linked+to+water+supply&source=bl&ots=D0iR9ewS6-&sig=25koMrqMscNswX8dt95l49QFt3E&hl=en&sa=X&ved=0ahUKEwiPrYWjhNXPAhXCO48KHcXTD_sQ6AEILTAD#v=onepage&q=waste percent20management percent20fees percent20linked percent20to percent20water percent20supply&f=false
[13] Example - WEEE 2020 Raw Material Partnership – Delivering advancements across the WEEE value chain to improve the environment will help meet EU material demand and drive a resource efficient, green economy. The partnership will help avoid tons of CO2 emissions and will set new cost effective and environmentally sound exemplars for collection, recycling and recovery https://ec.europa.eu/growth/tools-databases/eip-raw-materials/en/content/weee-2020-raw-material-partnership- percentE2 percent80 percent93-delivering-advancements-across-weee-value-chain-improve

automation and manual processing methods to sort, dismantle and shred e-waste. This results in precious metal recovery including copper, aluminum, silver, and gold from complicated e-waste.[14]

Some other measures adopted by integrated waste management enterprises to maintain financial viability include choice of in-house and outsourced activities, and obtaining finances from different sources. Gain Waste conducts in-house recycling as well as sends waste to scrap dealers, depending on the financial viability of the specific recycling process. Bali Fokus maintains its financial viability by appropriately balancing its costs and revenues, and obtaining different types of finances. Initially, it had taken a soft loan of USD 150,000[15] from Kreditanstalt für Wiederaufbau (KfW). Bali Fokus also receives carbon credit funding from the voluntary carbon market[16], and funds from individual donors[17] that add to its financial viability.

Enterprises also adopt several strategies to diversify their revenue streams and financing mechanisms such as polluter-pays-principle, and cross-subsidy. This is usually achieved in the presence of supportive government policies and mechanisms, where the government charges the polluters and passes on the fee to the waste management enterprises. A co-operative in India, Solid Waste Collection Handling (SWaCH) that provides integrated waste management services in Pune City with the support from Pune Municipal Corporation (PMC) follows a fee-based model that relies on the polluter pays principle. The additional revenue earned through this model not only supports the financial viability of the enterprise, it also helps in social good. It passes on the benefits to the waste workers, who primarily are low income. It also provides waste management services to slow and low income communities.[18]

A critical challenge faced by a few of the integrated waste management enterprises is that 60 to 70 percent of the waste collected is organic, and the compost generated out of it attracts quite low prices, thereby impacting the financial viability of such enterprises.

### Partnerships

Integrated waste management enterprises partner with municipal corporations, international bodies, and other waste management enterprises at various levels in the value chain. These partnerships help the enterprises to increase their outreach, access financing, leverage infrastructure for their own benefit and of the partners and stakeholders at large.

Several enterprises partner with municipal corporations for various purposes such as resource optimization, outreach and financing. For instance, Sampurn(e)arth partners with local municipal corporation and uses its warehouse facility to sort waste[19]. It also leverages the partnership to organize waste pickers into co-operatives[20], in association with the municipal corporation. Likewise, in Ethiopia, one of the municipal corporations entered into a public private partnership (PPP) with an integrated waste management company and outsourced the solid waste management activities to the enterprise. The enterprise performed waste collection, transport and disposal. Both the partners gained in the process - the municipality improved its reach and services through the private enterprise, and the enterprise gained by increased outreach to a large number of customers that needed to be served by the municipality. The enterprise also received funding from the municipality.[21]

[14] Ecoreco http://ecoreco.com/services-weee-recycling.aspx
[15] @ 14 percent interest rate
[16] Self-reported
[17] Bali Fokus website http://www.balifokus.asia/partners
[18] Integrating waste pickers into municipal solid waste management in Pune, India, Women in informal employment globalizing and organizing (WEIGO), July 2012 http://wiego.org/sites/wiego.org/files/publications/files/Chikarmane_WIEGO_PB8.pdf
[19] MOU is signed between the enterprise and the municipal corporation
[20] Provides them facilities such as provident fund and health insurance
[21] Financial sustainability in municipal solid waste management – Costs and revenues in Bahir Dar, Ethiopia, Science Direct, February 2014 http://www.sciencedirect.com/science/article/pii/S0956053X1300500X

A few enterprises partner with international waste management organizations and universities to leverage their network and marketing influence to champion the cause of basic waste management services, and market their own enterprise. For instance, Indonesia based Bali Fokus partners with various stakeholders such as International POPs Elimination Network (IPEN), Women in Europe for a Common Future (WECF), Global Alliance for Incinerator Alternatives/ Global Anti-Incinerator Alliance (GAIA), Health Care Without Harm—Asia, Environmental Engineering Department - Bandung Institute of Technology, and Centre for International Health—Ludwig-Maximilians-Universität München.[22] to spread awareness about significance of appropriate waste management services.

Some enterprises leverage partnerships with government entities to leverage their infrastructure. For instance, India based Sampurn(e)arth engages with the municipal corporation in Mumbai, and uses their warehouse facility to sort waste[23]. The enterprise organizes waste pickers into co-operatives[24], in association with the municipal corporation. Its partnerships with municipal corporations provide the enterprise wide access to the customers. Another India based enterprise Indian Green Services (IGS) enters into public-private partnerships with local authorities to create a holistic and large network of waste management experts to guide general public and waste workers regarding adequate waste management practices.

Integrated waste management enterprises also partner with the local artisans and volunteers to recycle the waste into valuable items. Brazil based non-governmental organization (NGO) Association of Paper, Carton and Recyclable Material Pickers (ASMARE) partners with the local artisans and volunteers to transform the waste into valuable objects such as furniture, jewelry or works of art. The money obtained by sale of these items is passed on to the waste workers and artisans involved in the process.

## Implementation: Delivering Value to the Poor

### Awareness

Generally, across socio-economic strata, there is a lack of awareness about the importance and processes of waste management, starting at source. In most households, there is disgust and apathy towards safe disposal and limited curiosity about what happens to waste once it leaves their homes. The attitude-behavior gap regarding appropriate waste management is seen amongst both groups - waste generators and waste managers. This gap is further influenced by a number of factors such as convenience, social norms, lack of public participation, and lack of general awareness regarding effective waste management techniques.[25]

Apart from traditional awareness building initiatives, integrated waste management enterprises adopt technology to provide information and make the process convenient to all. India based Banyan Nation leverages technology to map and connect with informal recyclers through its tools such as “informal sector lead generator” app and an SMS based trading platform to give them leads on type and amount of waste collected. The enterprise uses a data analytics engine to oversee operations to optimize, iterate and improve performance on a daily basis. Banyan Nation uses the data it collects at every touch point in the value chain to periodically generate waste analytics reports to build awareness among citizens and businesses and provide insights to urban local bodies to inform policy changes.

### Acceptance

A major constraint observed across most developing countries is the lack of education and awareness of effective waste-management practices, which eventually results in low acceptance. Other reasons for low acceptance of waste management solutions and strategies include age-old habits and lack of responsibility

[22] Bali Fokus website http://www.balifokus.asia/partners
[23] MOU is signed between the enterprise and the municipal corporation
[24] Provides them facilities such as provident fund and health insurance
[25] Factors influencing solid waste management in the developing world, Utah State University, 2015 http://digitalcommons.usu.edu/cgi/viewcontent.cgi?article=1537&context=gradreports

towards the environment. Waste generators focus on removing waste from their vicinity; they are often reluctant to take responsibility or ownership beyond their homes or businesses. The implicit assumption is that it is someone else's job to manage the waste and hence the environment at large.

Enterprises present customized solutions and user-friendly strategies to increase acceptance of their waste management solutions. For instance, India based Green Nerds leverages technology to provide innovative techniques of waste disposal and management. Its PECK machine offers individuals a disposal unit that collects and treats plastic and E-waste. It also allows users extra benefits for disposing waste in the machine.

### Accessibility

Enterprises increase accessibility of their solutions to the prospective customer segments in a number of ways. A few enterprises leverage local networks to increase accessibility of their services. For instance, Sampurn(e)arth partners with volunteers from the housing societies where it provides its services. The volunteers have a local influence and help the enterprise in increasing the accessibility of its services. Besides, some enterprises also adopt online medium to increase accessibility of waste-to-value products and services to targeted customers. Daily Dump has its own online portal through which it sells its products and services. GoRecycler leverages its online platform to increase accessibility to several stakeholders, including waste generators, waste pickers, and recyclers. Its flexibility and easy-to-access feature adds to its convenience and increased usage of the solution in Sub-Saharan Africa.

### Affordability

Enterprises leverage their partnerships with municipal corporations and other government bodies to provide integrated waste management services to customers in various categories, especially households. A number of integrated waste management enterprises avail of government premises for storing waste, sorting and recycling waste, which not only reduces their costs, but also ties in their efforts to that of the local government. Enterprises that enter into public private partnerships (PPP) also enjoy stability in revenue streams as well as increased outreach. Some enterprises adopt efficient processes to collect, sort, and recycle waste materials to bring down their costs, and pass on the benefits to the customers in terms of affordable services. For instance, Banyan Nation sorts and grades the plastic waste by its resin composition and treats the material using high performance polymers[26] to increase the durability and recyclability of the plastic. This mitigates supply variability and helps the enterprise keep it costs low, which in turn ensures affordable prices to the customers.[27]

## Results and Cost-Effectiveness

### Scale and Reach

Ever-increasing amounts of waste accompanied with rapid economic and population growth in developing countries, challenges the public sector's ability to sustainably manage the same. Private sector enterprises that offer effective waste management solutions have the potential to expand their scale and reach (Table 2).

Some of the reach indicators include number of customers served—be it individual customers, households, and corporates. Reach indicators also include the number of jobs created, facilitation of housing facilities, and establishment of networks for people belonging to informal waste management streams. Scale of the waste-to-value business model can be measured in terms of amount of waste diverted from landfills, amount of greenhouse gases and carbon emissions prevented from disturbing the environmental balance. Most enterprises that were contacted for this research shared that they took a minimum of three years to create considerable impact.

[26] High Performance polymers have a thermal resistance >150°C. Examples of hard wearing high performance polymers are Polyetheretherketon (PEEK), Polyethersulfon (PES), and Polyimide (PI) http://www.tribology-abc.com/abc/polymers.htm
[27] IIX, Shujog and KKR Partner with Banyan Nation to Increase the Sustainability of Indian Recycling, BusinessWire, March 2016 http://www.businesswire.com/news/home/20160301007214/en/IIX-Shujog-KKR-Partner-Banyan-Nation-Increase

**Table 2. Scale and reach of selected companies**

| Company | Country of operation | Years of operation | Scale & Reach |
|---|---|---|---|
| Aquila Recycling | Uganda | 3 | • Impacted 100+ waste pickers<br>• Helped in increase in income of waste pickers by over 100 percent<br>• Facilitated in improving literacy levels amongst the waste picker communities[28] |
| Banyan Nation | India | 3 | • Integrated 1000+ informal recyclers<br>• Diverted ~1000 tons of plastic from landfills<br>• Recycled 500+ tons of plastic<br>• Reduced 750+ tons of CO2 emissions |
| Let's Recycle | India | 4 | • Reached 500+ customers<br>• Impacted lives of 5000+ people from low income communities |
| Waste Ventures India | India | 7 | • Diverted 1,300+ tons of waste from dumpsites<br>• Reduced 790+ tons of CO2 emissions<br>• Produced 110+ tons of organic compost<br>• Served 200,000+ customers |

A number of enterprises report that they plan to expand geographically. For instance, Sampurn(e)arth which is currently working with a team of nearly 80 members[29], plans to expand its services and capacity in different cities, as a profitable business model. [30] It plans to expand its reach in Mumbai, and serve at least 10 percent of the city in the next couple of years. Thunk in India plans to initially expand its retail stores coverage from 15 at present to 50 across India by 2019.[31] It also plans to export its products to other countries.

Some enterprises plan to expand their product portfolio and offer different services. Thunk in India plans to develop a new range of furniture from automobile waste; it also plans to develop a new range of lifestyle accessory products. The enterprise intends to source and recycle non-biodegradable waste from various corporates in return of customized corporate utility and gift products such as stationary, and conference bags. Likewise, Aquila Recycling plans to foray into wet scrubbing process[32] and offer related services.

A few enterprises have specific environmental targets, which they plan to achieve by using a combination of expansion strategies. For instance, Let's Recycle plans to divert 30000 metric tons (MT) of waste from the landfill by 2020.[33] A part of this will be accomplished by expanding the business footprint in other cities in India and the remaining by increasing the business portfolio.

### Improving Outcomes

Integrated waste management enterprises have several direct and indirect environmental and social impacts. They reduce the amount of waste reaching the landfills; prevent greenhouse gases and hence environmental

[28] Almost all waste pickers are now sending their children to school, unlike earlier
[29] 60 under the payroll and 100 more in the cooperatives in and around Mumbai
[30] SAMPURN(E)ARTH – A Mumbai based Start-up which is converting Waste into Wealth, The Optimist Citizen, April 2016 http://www.theoptimistcitizen.com/sampurnearth-a-mumbai-based-start-up-which-is-converting-waste-into-wealth/
[31] Self-reported
[32] In wet scrubbing processes for gaseous control, a liquid is used to remove pollutants from an exhaust stream. The removal of pollutants in the gaseous stream is done by absorption. Wet scrubbers used for this type of pollutant control are often referred to as absorbers. Most absorbers have removal efficiencies in excess of 90 percent, depending on pollutant absorbed. The scrubbing liquid, usually water, is used to absorb the pollutant. Other liquids, such as dimethylaniline or amines, may be used as the absorbent for gases with low water solubility (i.e., hydrocarbons or hydrogen sulfide). https://cfpub.epa.gov/oarweb/mkb/contechnique.cfm?ControlID=29
[33] Up from 373 MT in 2012, when it started the operations. Self-reported

degradation. For instance, Thunk in India up-cycles the waste, thereby diverting huge amount of waste from the landfills and dump yards. The upcycling process also reduces the amount of virgin materials to produce new materials.

The enterprises engage with low income communities mostly as employers, and help them through improved aspects of income generation, health and better dignity at workplace. A few enterprises train informal waste workers, provide them skills for life, and help them become a part of the formal waste management system. Brazil based ASMARE employs the homeless and ex-convicts in Brazil and trains them for operating the recycling process. It shares the profits obtained by sale of recycled items with the waste workers. A waste worker affiliated with ASMARE earns around USD 800 per month. Likewise another enterprise, Conserve India employs and trains hundreds of people from Delhi's most disadvantaged communities to collect plastics from all across the city. The enterprise pays the waste pickers thrice the amount that they would receive elsewhere. Profits generated by the sale of recycled items are reinvested into education, health clinics and welfare programs for families of the waste pickers. Conserve India also provides skills training and loans to waste pickers to establish their own start-ups. Another Indian enterprise, Thunk in India serves underprivileged communities, thereby empowering livelihoods of the underprivileged including slum families, Human Immunodeficiency Virus (HIV) patients, and tribal communities by engaging them in the various aspects of its upcycling process.

**ASMARE facilitated the creation of waste picker residential places in nearly 33 cities in Brazil. It also helped form a national network of Brazilian waste picker organizations.**

### Cost-Effectiveness

In most developing countries, waste management is primarily a responsibility of public authorities that are increasingly finding it difficult to provide cost-effective waste management services. The authorities are often compelled to concentrate on urgent needs that result in high costs while achieving poor performance and outcomes. Global production of municipal solid waste will increase by almost 100 percent by 2030[34], primarily driven by rapid urban growth and economic development. The negative impacts of increasing waste and sub-standard waste management practices in these countries will harm nearly 15 million informal waste workers, who process almost 15 percent-20 percent of the waste produced.[35] Ironically, even poor waste management comes at a high cost—developing countries spend nearly USD 46 billion per year in waste management activities. The amount could triple and exceed USD 150 billion per year by 2025.[36]

Private enterprises are often better equipped to deliver a quality service at a low price, while creating the same impact. As a result, several public authorities engage with private enterprises to improve waste management in terms of costs and outcomes. Since they leverage public infrastructure (warehouse, trucks, recycling plants) for sorting and recycling waste, these enterprises require limited capital investment. Their largest cost is employee salaries, which is not significant as they employ people from marginalized communities and informal sectors who earn little or no incomes. Despite paying them higher than alternate employment opportunities, the enterprises are cost-effective. This is even more impactful since they essentially work with unskilled labor and provide them useful skills on the job.

[34] Sustainable Waste Management Challenges in the South, Ideas4development, January 2013 http://ideas4development.org/en/sustainable-waste-management-challenges-in-developing-countries-charlotte-durand/
[35] Sustainable Waste Management Challenges in the South, Ideas4development, January 2013 http://ideas4development.org/en/sustainable-waste-management-challenges-in-developing-countries-charlotte-durand/
[36] Sustainable Waste Management Challenges in the South, Ideas4development, January 2013 http://ideas4development.org/en/sustainable-waste-management-challenges-in-developing-countries-charlotte-durand/

## Scaling Up

### Challenges

A common challenge shared by the interviewed enterprises is low customer awareness (across households, businesses and hotels) coupled with unwillingness to segregate waste-at-source or pay for waste management services.

Another critical and common challenge encountered by most enterprises is the stiff competition given by the informal and illegal waste operaters or waste *mafias.* Enterprises such as Sampurn(e)arth and Bali Fokus find it difficult to popularize their formal approach towards integrated waste management in the presence of competing informal waste-workers and scrap-dealers.

Some enterprises call out human resource issue as a major challenge because the enterprises find it difficult to hire and retain skilled human resources including workers and managers. A few enterprises also refer to corruption at various points in the waste management value chain as a critical challenge.

### Role of Government and Policy

Governments across developing countries are cognizant of waste management challenges. Some of them have come up with supporting policies and implementation measures, while others have partnered with private sector enterprises to provide integrated waste management services.

According to the World Bank and USAID, it is common for municipalities in developing countries to spend 20 to 50 percent of their available municipal budget on solid waste management (SWM) which often can only stretch to serve less than 50 percent of the population. Public sector inefficiencies and continuously increasing cost has led local authorities to analyze if this service can better be provided by the private sector. Increasingly public–private partnerships (PPP) have emerged as an alternative to improve municipal solid waste service performance at lower costs.[37] For instance, Cameroon's municipal SWM policy is based on PPPs which ensure regular collection and processing service for domestic waste in the major cities. The model has proved successful in Africa, where many countries struggle to provide daily waste collection services.[38]

A few countries have developed and initiated facilitative policies and implementation measures. According to the Environment and Forestry Ministry, Indonesia, the country generates 0.7 kg of waste per person per day, eventually resulting in 175,000 tons of waste per day, and 64 million tons per year.[39] The government has introduced the concept of 3Rs - reuse, reduce and recycle through the country's first solid waste management regulation in 2008. The Indonesian government promotes the concept of recycling, and plans to improve the existing garbage bank system[40] to reduce the volume of waste at the household level. The government has also established limits and permissions for private sector enterprises that conduct various activities across the value chain. Bali Fokus is the first company in Indonesia to get a permit for waste collection and recycling. For other industries that are major sources of industrial pollutants, the Indonesian government has drafted stricter regulations that will obligate companies to provide a guarantee of their compliance in the form of a bank deposit that would be used to mitigate pollution if a company's waste management system fails to meet environmental standards.[41]

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[37] Financial sustainability in municipal solid waste management – Costs and revenues in Bahir Dar, Ethiopia, Science Direct, February 2014 http://www.sciencedirect.com/science/article/pii/S0956053X1300500X

[38] Cameroon own path towards municipal solid waste management http://www.proparco.fr/webdav/site/proparco/shared/PORTAILS/Secteur_prive_developpement/PDF/SPD15/SPD15_jean_pierre_ymele_uk.pdf

[39] Indonesia in state of waste emergency, The Jakarta Post, October 2015 http://www.thejakartapost.com/news/2015/10/09/indonesia-state-waste-emergency.html

[40] first introduced in 2011

[41] Sweeping Opportunities in Indonesia's Waste Management Industry, Global Business Guide Indonesia http://www.gbgindonesia.com/en/main/business_updates/2014/upd_sweeping_opportunities_in_indonesia_s_waste_management_industry.php

Likewise, in India, the government recognized the need to update existing waste management regulations and present a more holistic regulation for integrated waste management in the country. The Union Ministry of Environment, Forests and Climate Change (MOEFCC) has announced the new Solid Waste Management Rules (SWM) in April 2016. The new rules have mandated at-source segregation of waste in order to channel the waste to value by recovery, reuse and recycle. The rules integrated waste management in several ways. There are specific requirements for waste collection and disposal, user fee for collection, collect back schemes for packaging waste, processing and treatment of waste, promotion of compost and promotion of waste-to-energy.[42] Some governments have enacted laws to reduce waste generation. For instance, the Brazilian government has enforced a policy to use reusable bags in lieu of plastic shopping bags while shopping. As per this mandate, retail establishments are prohibited of providing plastic bags to its customers.[43] Several state governments in India have also either banned plastic bag use or levy a charge to reduce its usage.

Enterprises interviewed for this study mentioned specific government regulations that promote or inhibit their business operations. For instance, Uganda based Aquila Recycling specifies the regulation on plastic waste management in Uganda, according to which manufacturers of plastic should collect the waste generated that will promote reuse and recycling of the plastic. The enterprise also mentions that Value Added Tax (VAT) does not apply to waste equipment imported in the country, which is again a promotional policy to help the integrated waste management enterprises conduct their operations in a more financially viable manner. The enterprise is licensed by National Environment Management Authority (NEMA) to provide transportation services for solid waste.

## Conclusion

With the low efficiency of collecting waste management fees, which is an important source of revenue for integrated waste management enterprises[44], the financial viability of integrated waste management enterprises is dependent on other revenue streams as well as low costs. The profitability of the business model depends on partnerships with the government to leverage their infrastructure and outreach. Policy mandates related to segregation-at-source, waste management fee, and penalties for violation will have a marked impact on the viability of the integrated waste management business model.

Considering the positive environmental and social impacts created by the enterprises in this business model, especially for the neglected and marginalized sections of the society, there is a huge scope to further enhance the scale and reach of such a business model to achieve the dual goals of poverty elimination and prevention of environmental degradation.

**Table 3. Social enterprises in integrated waste management**

| Company | Country | Description |
|---|---|---|
| Aquila Recycling Industries | Uganda, South Sudan, Rwanda and DR Congo | Aquila Recycling engages in reuse, recycling and disposal of plastic. Aquila also offers training in solid waste management and handling of waste, and transportation of solid waste |
| Association of Paper, Carton and Recyclable Material Pickers - Asmare | Brazil | ASMARE recycles waste into furniture, jewelry and art work. The enterprise trains and employs homeless people, ex-convicts and people with alternative sentences in this process. |

[42] India generates 62 million tons of waste, of which 5.6 million tons is plastic waste, 0.17 million tons is biomedical waste, 7.90 million tons hazardous waste, and 15 lakh tons is e-waste. Only about 75 percent-80 percent of the municipal waste gets collected and only 22 percent-28 percent of this waste is processed and treated. The new rules are now applicable beyond municipal areas and have included urban agglomerations, census towns, notified industrial townships, areas under the control of Indian Railways, airports, special economic zones, places of pilgrimage, religious and historical importance, and State and Central Government organizations in their ambit. Government notifies new solid waste management rules, Down to Earth, April 2016 http://www.downtoearth.org.in/news/solid-waste-management-rules-2016-53443

[43] Recycling of Waste in Brazil, The Brazil Business, May 2015 http://thebrazilbusiness.com/article/recycling-of-waste-in-brazil

[44] Besides the revenue earned from sale of recycled and refurbished products

| | | |
|---|---|---|
| Attero Recyling | India | Attero offers customized end to end solutions for e-waste management, electronics asset recovery, data security and electronics reverse logistics along with repair, refurbishment and retailing of electronics. |
| Bali Fokus -Jimbaran Lestari | Indonesia | Bali Fokus is an Indonesia based NGO that provides affordable integrated waste management services to small-scale industries, communities and smallholder farmers in Bali and Nusa Tenggara Barat (NTB). |
| Banyan Nation | India | Banyan Nation sources waste materials directly and from aggregators, sorts and grades the plastic waste, and manages a treatment and recycling process that produces high-quality plastic pellets. It also generates waste analytics reports leveraging the data it collects at different points of the waste value chain. |
| Conserve India | India | Conserve India recycles plastic bags into high fashion goods. The enterprise performs upcycling by washing, drying, and pressing the plastic bags into sheets, which could be used to make for handbags, wallets, shoes and belts. |
| Eco Recycling (Ecoreco) | India | Ecoreco engages in end to end processing of e-waste, including collection, sorting, grading, dismantling, recycling, recovery and disposal of e-waste. It also conducts lamp recycling, refurbishing of electronic equipment, and data destruction of IT equipment that are to be disposed. |
| Gain Waste | India | Gain waste provides integrated waste management services along with waste consultancy, farming and gardening consultancy, and. |
| GoRecycler | Kenya | GoRecycler connects several stakeholders in the waste management value chain through an online platform. A unique feature of the enterprise' platform is the gamification of the SWM process by awarding specific point systems for role-specific accomplishments. |
| GreenNerds Solutions | India | Green Nerds integrates the waste value chain activities through technology for waste collection, waste recycling and compressing for landfill disposal. Its machines such as PECK kiosk and other compost processors use innovative technological appliances to recycle and compress solid waste for efficient disposal and management. |
| Indian Green Service | India | Indian Green Service (IGS) provides education and training support, treatment solutions such as vermicomposting, bamboo baskets and dry leave compost pits. IGS engages in public-private partnerships with local authorities and camps to create a large network of practitioners using its Zero Waste Management strategy. |
| Let's Recyle | India | Let's Recycle, which is an initiative of Nepra Resource Management collects and processes a range of materials. The enterprise also provides other waste management services including waste pick up along with customized waste management plan, disposal services, and fleet monitoring to provide the shortest route to Let's Recycle fleet to prevent CO2 emissions. |
| Saahas Waste Management | India | Saahas Zero Waste (SZW) builds, process-manages and directs resource recovery from waste. It executes a reverse logistics channel where post-consumer waste is aggregated and dispatched to recyclers by organizing collection and recycling of e-Waste from the Business to Consumer (B2C) sector. |
| Sampurn(e)arth Environment Solutions | India | Sampurn(e)arth Environment Solutions provides end-to-end decentralized waste management solutions for housing societies, corporate houses, townships, school and college campuses. Some of the major offerings of the enterprise include waste audits, designing of waste-management system, collection of dry waste from clients premises in exchange of customized recycled paper stationery, design, |

| | | |
|---|---|---|
| | | implementation, operation and maintenance of biogas plants and composting/ vermicomposting pits. |
| Thunk In India | India | Thunk in India recycles waste into daily utility products. The enterprise collects waste from commercial spaces, hotels, residential and industrial areas. The wasteis processed and sent for 'up cycling'. |
| Waste Ventures India | India | Waste Ventures India engages in door-to-door collection, composting and recycling. It also incubates wholly owned and operated waste picker cooperatives and household collection franchisees in tier II/II cities. The enterprise also provides urban waste management and municipal waste management services. |

## Additional Reading


Global Waste Management Outlook, UNEP
https://www.iswa.org/fileadmin/galleries/Publications/ISWA_Reports/GWMO_summary_web.pdf

World Bank news article, http://www.worldbank.org/en/news/feature/2016/03/03/waste-not-want-not---solid-waste-at-the-heart-of-sustainable-development

Recycling of Waste in Brazil, The Brazil Business, May 2015 http://thebrazilbusiness.com/article/recycling-of-waste-in-brazil

Financial sustainability in municipal solid waste management – Costs and revenues in Bahir Dar, Ethiopia, Science Direct, February 2014 http://www.sciencedirect.com/science/article/pii/S0956053X1300500X

Factors influencing solid waste management in the developing world, Utah State University, 2015
http://digitalcommons.usu.edu/cgi/viewcontent.cgi?article=1537&context=gradreports


** INR to USD rate conversion: 1 INR = 0.015 USD*

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*This series on Inclusive Innovations explores business models that improve the lives of those living in extreme poverty. Editors are Elaine Tinsley and Natalia Agapitova. Researched and developed by Intellecap.*

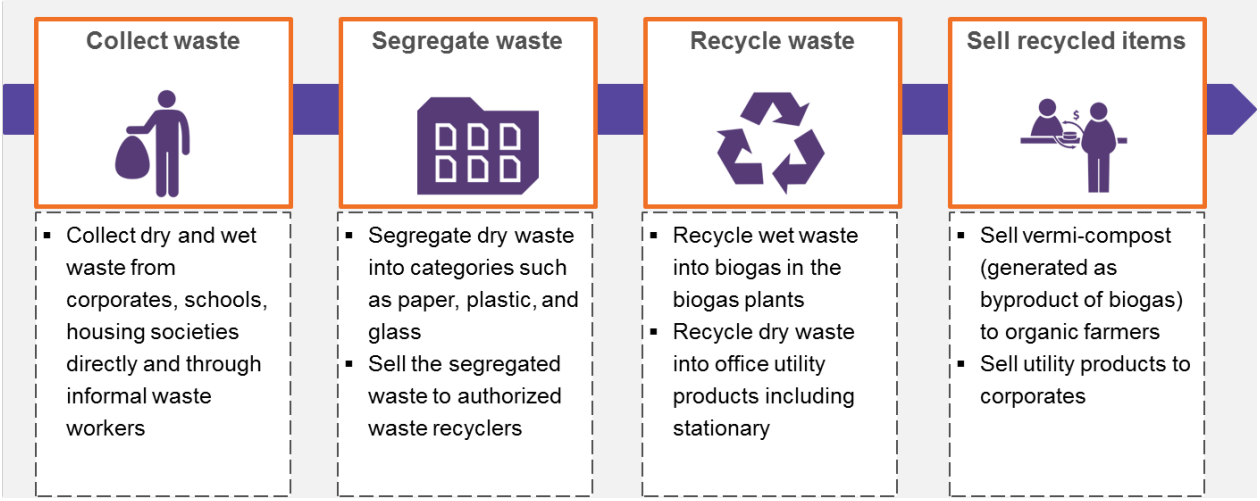
## CASE STUDY: Sampurn(e)arth Environmental Solutions

**Founding year:** 2012
**HQ**: Mumbai, India
**Countries of operation :** India
**Orientation:** For-profit
**Employees:** 80
**Turnover:** USD 500,000

There are rising concerns on the issue of efficient waste management in India. The city of Mumbai alone generates around 7000 tons of waste every day.

Sampurn(e)arth provides end-to-end decentralized waste management solutions to schools, colleges, townships, housing societies and corporate offices ranging from waste audits and to a waste management unit. The unit can either be a biogas plant or a composting solution to handle bio-degradable waste. It can also be a dry-waste solution for non-biodegradable waste, which is sold to or processed by its recycling partners. The enterprise monetizes the value from waste and after retaining a proportion to cover its costs, it returns the rest back to the company in the form of paper stationary or where the units have bio-gas plants, the fuel.

The enterprise helps increase the income of informal waste workers by 20%.




### Operating Model

Sampurn(e)arth Environmental Solutions is an integrated waste management enterprise based in India. The enterprise works in partnership with the Municipal Corporation of Mumbai and is in charge of 3 municipal wards in the city. It operates under three business lines: product manufacturing, services segment, and market place for dry waste.

Some of the major offerings of the enterprise include waste audits, design and set-up of biogas plants, and operation and maintenance of waste handling systems. The enterprise provides decentralized waste management services to multiple customer segments, including housing societies, hotels, restaurants, hospitals, educational institutions and corporate offices. The enterprise also provides complete waste management services of collecting, processing, and recycling waste for corporate parks like The Capital (Bandra Kurla Complex, Mumbai) and Adlabs Imagica (on Mumbai-Pune Expressway).[45]
The enterprise undertakes door step collection of dry waste and organic waste generated by its customers. The dry waste is transported to the sorting center (owned by municipal corporations), where Sampurn(e)arth's employees manually segregate the waste. Post segregation of the waste, the enterprise recycles certain types of waste and sells other types of recyclable fractions to recyclers. Sampurn(e)arth installs biogas plants of varying sizes and capacities, in different parts of the city. The enterprise sells biogas to several large customers

[45] How Debartha, Ritwik, and Jayant are revolutionising waste collection systems in India, YourStory, March 2015 https://yourstory.com/2015/03/sampurnearth-waste-management/

including hotels and canteens. In addition, waste pickers appointed by the enterprise collect organic waste from various customer locations and establish mini biogas plants at the respective sites, biogas from which is used by the consumers at the respective sites. The biogas that is generated is packaged in bags and sold to hotels who wish to reduce their commercial Liquefied Petroleum Gas (LPG) consumption. The slurry is converted into vermin-compost and sold to organic farmers.[46]

Sampurn(e)arth manufactures a broad range of biogas plants in varied capacities (20 to 5000 kilo per day). These small biogas plants serve customers such as institutional campuses, and canteens. The enterprise designs and manufactures biogas plants, and then installs and treats waste using different types of composting methods including pit composting and biogas plants.

**Sampurn(e)arth segregates dry waste into 40 different categories, and then sells to authorized waste recyclers.**

The enterprise provides services such as door-to-door collection, sorting, composting of wet waste and sale of dry waste to recyclers, to ensure zero waste management[47]. Sampurn(e)arth has a network of scrap dealers and recyclers who collect dry waste. Waste pickers and informal waste handlers are hired directly by the enterprise or through waste picker groups and non-governmental organizations (NGOs). The enterprise is authorized by the Central Pollution Control Board (CPCB), India to collect the waste. Sampurn(e)arth collects and segregates waste through a network of directly engaged scrap dealers. The enterprise segregates into dry waste (40 different categories) and sells it to authorized recyclers. Nearly 100 local waste pickers associated with Sampurn(e)arth also have access to the market place. The enterprise has also created a network of fair price scrap shops connected to different recycling units, spread across the city of Mumbai. Local waste pickers sell the scrap at fair prices in these shops. Once the waste reaches the center, owned by municipal corporations, it is segregated for further processing. Sampurn(e)arth partners with local municipal corporations and uses their warehouse facility to sort waste[48]. The enterprise organizes waste pickers into co-operatives[49], in association with the municipal corporation. It has signed a memorandum of understanding (MOU) with the municipal corporation.

Sampurn(e)arth uses several direct marketing strategies including door-to-door awareness strategies, awareness campaigns in corporate and residential complexes to reach out to its customers. Its partnerships with municipal corporations provide the enterprise a wide access to the customers. The enterprise is also exploring other options such as outreach partners, and dealers. Itconducts awareness campaigns to educate the customers about the significance of waste management, while advertising about its own products and services. It offers customized recycled products such as office stationary and services such as biogas to different clients. The enterprise has served over 50 customers till date.

**Almost 60 local waste pickers have access to Sampurn(e)arth's "marketplace".**

Sampurn(e)arth offers waste pickup services to nearly 80 establishments including housing societies, corporate parks and institutes. It has around 20 operational and maintenance (O&M) contracts currently. The enterprise also runs extended producers responsibility (EPR) programs for product manufacturers. It is currently associated with Tetra Pak, Coca Cola and Reliance. It has several community projects running in Govandi Station, agricultural produce market committee (APMC) market in Vashi, to drive awareness programs, collection of segregated waste, processing and recycling. The enterprise manages around 300 MT of waste per month. It has around 100 waste pickers

[46] SAMPURN(E)ARTH – A Mumbai based Start-up which is converting Waste into Wealth, The Optimist Citizen, April 2016 http://www.theoptimistcitizen.com/sampurnearth-a-mumbai-based-start-up-which-is-converting-waste-into-wealth/
[47] Zero Waste is a philosophy that encourages the redesign of resource life cycles so that all products are reused. No trash is sent to landfills or incinerators.
[48] MOU is signed between the enterprise and the municipal corporation
[49] Provides them facilities such as provident fund and health insurance

linked with its dry waste centers/fair price scrap shops. It engages and employs additional 40 people from informal setups in various activities.

### Financial Sustainability

Sampurn(e)arth received initial funding from incubation centers including UnLtd and DBS incubation program. It has also received funding from Intellecap Impact Investment Network (I3N). During the initial incubation period, DBS Bank India assisted the enterprise in acquiring seed fund and supported it in business plan strategy, execution and revenue management.[50] I3N and Artha Private Equity covered the operational losses last year which are currently around 10 percent.

**Sampurn(e)arth buys paper from informal waste workers at USD 0.12-USD 0.15 per kg, plastic bags at USD 0.15 per kg, and plastic bottles at USD 0.23 per kg.**

The enterprise has adopted a comprehensive approach towards waste management and engages with local municipal corporations, large corporate groups, biogas plant manufacturers, and local scrap dealers as part of its business model. The partners help the enterprise reduce its investment in logistics, facilitate greater outreach and in the collection process.

It pays nearly INR 3-4 lakhs (USD 4500-USD 6000) per month for waste procured from very large corporate parks such as Reliance Corporate Park. The enterprise follows a barter system for the waste management of mid-size corporates, where it provides recycled product in exchange for dry waste. Sampurn(e)arth has also developed a program for waste collection from individual shops. The program is being financed by Apollo Tyre Foundation.[51]

Some of the major cost components include overhead costs, which exclusively account for 30 percent of the total costs. Salaries to the management staff for business development, finance and human resource management are the biggest contributors to the overhead costs.

**Sampurn(e)arth charges USD 4500-USD 6000 per month to provide waste management services to large corporates.**

The cost incurred by the enterprise in manufacturing biogas plants is a factor of the size of the plant. For instance, the costs incurred for 100 kg, 500 kg, 5000 kg, and 50,000 kg capacity biogas plants are around INR 600,000 (USD 9,000), INR 1,800,000 (USD 27,000), INR 8,000,000 (USD 120,000), and 60,000,000 (USD 900,000). The cost incurred in purchasing baling/ compacting machines is around INR 300,000 (USD 4,500).

Other major cost components include payment to corporate houses to collect waste, and salaries of employees. The enterprise does not invest in purchasing collection. It takes them on rent at a monthly rental of around INR 50,000 (USD 750).

Sampurn(e)arth earns revenues by sale of small biogas plants, sale of biogas from large biogas plants, fees for providing collection services, and operation and maintenance services of biogas plants. The enterprise follows a fixed price structure which does not fluctuate even if the market fluctuates. According to the structure which paper is bought at INR 8-INR 10 (USD 0.12-USD 0.15) per kg, plastic bags at INR 10 (USD 0.15) per kg, plastic bottles at INR 15 (USD 0.23) per kg, and hard plastic at INR 17-INR 18 (USD 0.25-USD 0.27) per kg. The enterprise pays informal workers higher than market prices. Sampurn(e)arth earned 1.5 crores (USD 225,000) in revenues in 2015-16. The enterprise is yet to achieve break-even, however it is operationally sustainable.

[50] How Debartha, Ritwik, and Jayant are revolutionising waste collection systems in India, YourStory, March 2015 https://yourstory.com/2015/03/sampurnearth-waste-management/
[51] Self-reported

## Impact

**Sampurn(e)arth helps increase in income of local waste workers by 20 percent.**

Sampurn(e)arth has not conducted an impact assessment of its activities. The intervention has however resulted in several environmental and social benefits. The enterprise has also led to several positive environmental impacts. For instance, it channelized over 8,500 kg of dry waste for recycling for Axis Bank Foundation as of March 2013. In its initial days of operations, the enterprise installed a biogas plant in the Tata Institute of Social Science (TISS) campus[52] that processed over 55,000 kg of food waste from the campus canteen and generated biogas equivalent to 1,000 kg of LPG, which was used in the dining hall for cooking.[53] By 2014, the enterprise had managed 1200 metric tons (MT) of waste. [54]

The enterprise has also provided several direct and indirect benefits to the low income communities, especially the waste pickers. It has helped them provide dignity and better livelihoods. The enterprise directly employs waste pickers, makes them waste managers, and connects them to the market. It usually engages with local waste pickers and helps them increase their income by nearly 20 percent.

## Challenges and Lessons

Key challenges faced by the enterprise include low willingness among potential customers to pay for better waste management facilities and non-segregation of waste at source. Sampurn(e)arth's operations are threatened by the presence of competing informal waste-workers and scrap-dealers.

## Road Ahead

Sampurn(e)arth plans to expand in terms of revenue, services, and geographies of operation. Currently working with a team of nearly 80 members[55], Sampurn(e)arth plans to expand its services and capacity in different cities, as a profitable business model. [56] The enterprise's revenue targets for 2016-17 is INR 5 crore-INR 6 crore (USD 750,000-USD 900,000) and INR 15 crore (USD 2.25 million) in 2017-18.[57] It plans to expand its reach in Mumbai, and serve at least 10 percent of the city in the next couple of years. Currently it serves 43,000 people (that is roughly 0.2 percent of Mumbai's population)

The enterprise aspires to reach a handling capacity of about 400-500 MT/day and engage with about 1,000 waste-pickers by 2019.[58] The enterprise plans to achieve this by increasing its outreach partners and franchisees, and expanding its product portfolio.

Sampurn(e)arth prefers to leverage technology to improve performance of business activities. It plans to develop of a mobile application; the first version will track routes of the registered scrap dealers and subsequent versions will allow customers to schedule requests for waste pick-up.

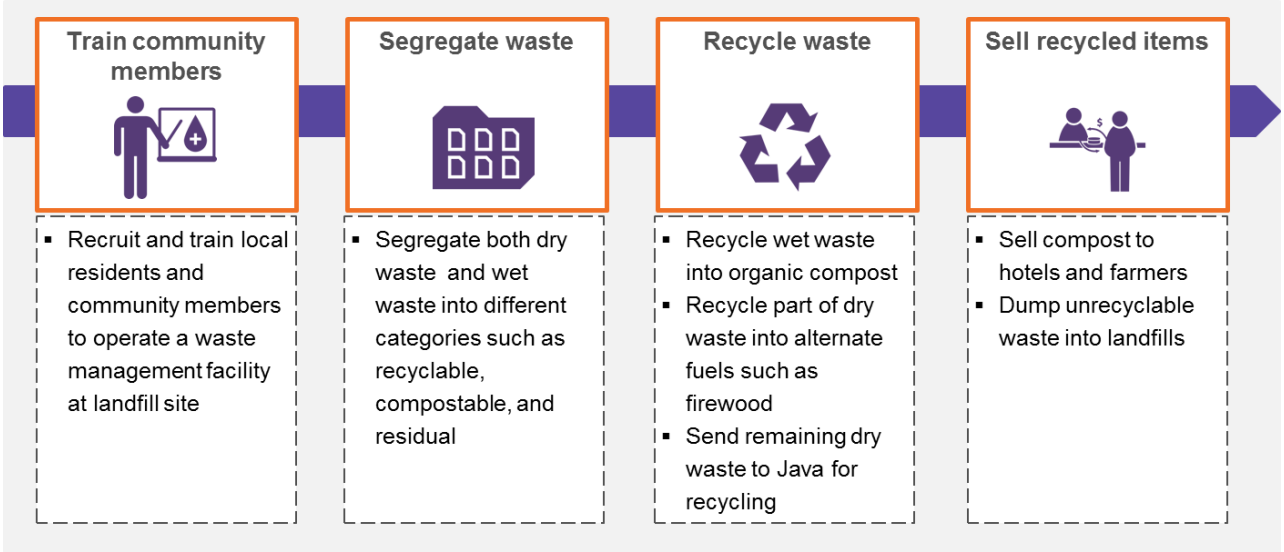
[52] in December 2011
[53] Sampurn(e)arth Environment Solutions, Samhita http://www.samhita.org/social-organisation/sampurnearth-environment-solutions-pvt-ltd/
[54] Sampurn(e)arth, Artha Venture Challenge, 2014 http://www.arthaventurechallenge.com/selectedventuredetails/37/4eo2zC4b2nU=
[55] 60 under the payroll and 100 more in the cooperatives in and around Mumbai
[56] SAMPURN(E)ARTH – A Mumbai based Start-up which is converting Waste into Wealth, The Optimist Citizen, April 2016 http://www.theoptimistcitizen.com/sampurnearth-a-mumbai-based-start-up-which-is-converting-waste-into-wealth/
[57] Self-reported
[58] Self-reported

## CASE STUDY: Bali Fokus

**Founding year:** 2000
**HQ**: Bali, Indonesia
**Countries of operation :** Indonesia
**Orientation:** NGO
**Employees:** 200
**Turnover:** USD 105,000

The lack of adequate, safe and sustainable waste management has been one of the most critical environmental challenges faced by most developing countries. The challenge is even more for island nations that grapple with growing consumption and finite space for waste disposal. Municipal infrastructure that is the norm in developed nations, including proper sanitary landfills and recycling facilities, remains largely absent in countries such as Indonesia. Government-run services collect only 30-40% of the total solid waste generated, mostly in higher income areas of Indonesia. This has led to pervasive environmental problems and health risks, especially for communities living adjacent to open waste dumps and for poor urban settlements without organized waste management systems.

BaliFokus Foundation facilitates the development and provision of waste management solutions to the low-income groups in Indonesia. The enterprise trains local communities to develop waste management solutions for themselves. The enterprise has impacted over 500 households.




### Operating Model

BaliFokus Foundation is an Indonesia based NGO that facilitates affordable integrated waste management services to the small-scale industries, communities and smallholder pig farmers[59] in Bali and other regions.

The waste collection company that the Foundation facilitated in Bali, PT Jimbaran Lestari, was the first company in Indonesia to get a permit for waste collection and recycling. It is also helping the government draft Indonesia's first-ever bill on waste management and waste management strategy related to climate change issues.

The enterprise has several programs for waste management including decentralized wastewater treatment system (DEWATS), decentralized solid waste management (DESWAM), and water supply program promoted and implemented jointly with BORDA (Bremen Overseas and Development Association). DEWATS is a modular system approach to ensure efficient wastewater treatment performance. DEWATS is again categorized into DEWATS-SME that caters to the requirements of small and medium enterprises, and DEWATS-CBS that caters to the sanitation requirements of poor urban settlements. The concept of DESWAM is to execute an adequate

[59] Farmers rearing pigs/ cows

and environmentally-friendly and affordable decentralized solid waste management. The program adopts a 3R (Reduce, Reuse, Recycle) approach which is implemented at different levels of communities to create a synergized active participation and cooperation among stakeholders.

At the waste management facility in Jimbaran, the solid waste management program of the enterprise is operated by the workers recruited from the local village and by the community themselves. BaliFokus provided guidance to recruits and trains local residents to operate a waste management facility at the landfill site. Workers separate waste into recyclables, compostable and residuals to transport to the dumpsite.

The dry waste that mainly includes packaging materials is sorted, bundled and shipped to Java for recycling. The wet waste that mainly consists of food waste is drained and the solids are sold to local pig farmers. Liquid waste is processed in a septic tank, while solid waste is separated and sold as firewood. Lighter materials are composted in big piles, sprayed regularly and turned manually. The resulting compost is then sold back to the hotels. Only the residual unrecyclable material, which is nearly 30 percent of the total, goes to a landfill. The enterprise also partners with hotels to collect scum and grease and then dry it to sell it wax-makers who convert it to biofuel.

The major customers of the enterprise include hotels, recyclers and farmers who buy the food scraps and compost. As of today, Jimbaran Lestari has partnered with 20 hotels and has cooperation with 10-15 pig farmers.

BaliFokus partners with various stakeholders such as International POPs Elimination Network (IPEN), Women in Europe for a Common Future (WECF), Global Alliance for Incinerator Alternatives/ Global Anti-Incinerator Alliance (GAIA), Health Care Without Harm – Asia, Environmental Engineering Department - Bandung Institute of Technology, and Centre for International Health – Ludwig-Maximilians-Universität München.[60] Partnerships are developed for various programs, ranging from policy advocacy to the ground implementations.

### Financial Sustainability

**To upgrade Jimbaran Lestari, BaliFokus has taken a soft loan of USD 150,000 from KfW in 2000.**

The waste management facility in Jimbaran maintains its financial sustainability by appropriately balancing its costs and revenues. Initially, it had taken a soft loan of USD 150,000[61] from Kreditanstalt für Wiederaufbau (KfW) as part of Industrial Environment and Pollution Control program coordinated by the Ministry of Environment of Indonesia. The IEPC-KfW program cooperates with local banks to channel the funds to support the Small and Medium Enterprises (SMEs).

Other waste management facilities assisted by BaliFokus in Temesi composting facility in Gianyar[62] and KIPRAH jointly implemented with BORDA partner network[63], also receives carbon credit funding from the voluntary carbon market, and funds from individual donors[64] that add to its financial sustainability.

Some of the major cost components of waste management facility include remuneration to the employees, transportation costs including maintenance costs of collection truck, and cost incurred as 'tipping fee' for dumping the unrecyclable or waste residues into landfills.

[60] Bali Fokus website http://www.balifokus.asia/partners
[61] @ 14 percent interest rate
[62] Temesi Recycling http://temesirecycling.com/id/
[63] KIPRAH community based integrated waste management project, Indonesia, https://cdm.unfccc.int/ProgrammeOfActivities/Validation/DB/J8AS7C008XO90OT9BYMYLY2T23DSUS/view.html
[64] BaliFokus website http://www.balifokus.asia/partners

The primary source of revenue for waste management facility in Jimbaran is the collection fee from hotels. The hotels pay the enterprise to collect wet, dry and organic waste from their premises. The enterprise is paid as per the volume of the waste[65] collected by the enterprise. Another revenue stream includes sale of recyclables such as plastic bottles and cans to scrap dealers.

The company has achieved break-even in 5 years and returned the loan on the 3rd year after signing the contract with the local bank.

### Impact

Jimbaran Lestari has impacted 200 waste workers' by making them a part of the enterprise value chain. The enterprise trained hotels staff and housewives in easy-to-learn daily practices, such as waste separation and composting, performed at home using simple household tools. In addition, the enterprise helps generate secondary source of income for local people who craft recyclables into utility items. The enterprise estimated that household waste in the participating villages was reduced by 50 percent.[66]

**The enterprise helped reduce and recycle the waste in the participating hotels and households at least by 50 percent.**

### Challenges and Lessons

BaliFokus encounters challenges from its customers, and unauthorized waste management enterprises. It also faces operational challenges linked to human resources and price realization of waste. The foremost challenge faced by the enterprise in Jimbaran is unwillingness of the customers to pay for a proper waste collection services. Hotels and restaurants, that are the major customers of the enterprise, hesitate to increase the contract fee to be paid to the enterprise every year. Other informal waste collectors have paid the hotel staffs to get the waste collection contract and have offered a 50:50 profit sharing scheme and other benefits for hotels staff as an incentive.

The enterprise finds it difficult to hire and retain qualified human resources, including workers and managers. It also faces stiff competition from unauthorized waste management companies. Another critical issue faced by the enterprise is that 60-70 percent of waste is organic or wet. However, the price of compost or soil enhancer is very low, which results in low cost-effectiveness. The enterprise also encounters corruption at various points in the value chain.

### Road Ahead

The enterprise has opened a 'garbage bank' unit. This concept is promoted by the Ministry of Environment, Indonesia all over the country to provide incentives for the communities to separated and recycle their wastes. As a part of this initiative, people would be able to sell recyclables to the garbage banks in return for money.

As the result of the decentralization, many local governments recommended customers to take the local service providers. Tight competition of wastes collection services, more competitors and operation runs by foreigners, made the Jimbaran Lestari had to downsize the scale of its operation, diversify their business and serve only the customers in the southern part of the island.

As a non-profit organization, BaliFokus is promoting the zero waste approach as the solution for waste management in Indonesia. BaliFokus also works with the national stakeholders to advocate the roadmap of waste management and promote a climate friendly solution, support the circular economy and sustainable consumption and production pattern.

[65] The calculation based on number of rooms and occupancy rates

[66] BaliFokus, The Goldman Environmental Prize 2009 http://www.goldmanprize.org/recipient/yuyun-ismawati/