

BUSINESS MODEL PROFILES: NUTRIENTS

SUMMARIZED FROM THE FORTHCOMING PUBLICATION
RESOURCE RECOVERY FROM WASTE



RESEARCH PROGRAM ON
Water, Land and
Ecosystems



Large-scale Composting for Revenue Generation

Business characteristics

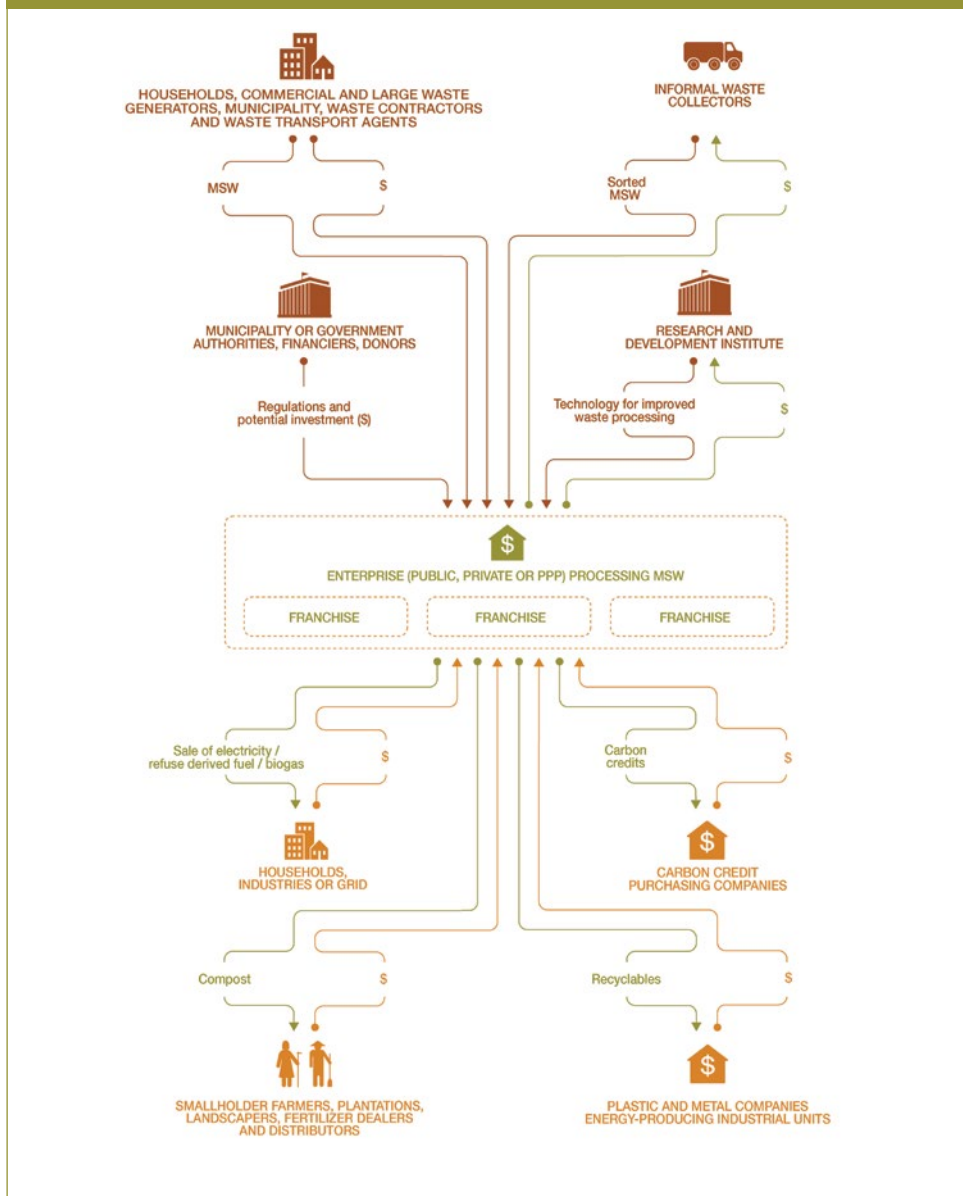
Geography	Any urban center, assuming availability of land for plant construction
Scale of production	Minimum plant size processes 60-100 tons of municipal solid waste (MSW) per day, with a maximum size of 1,500 tons per day
Type of organization	Public, private, public-private partnership (PPP) or social enterprise/entity
Investment cost range	USD 415,000-USD 1.5 million depending on technology used
Key costs	Capital investment (land, machinery, licensing), operation and maintenance (labor, research and development [R&D], marketing and distribution, etc.), and financing costs (interest on borrowed funds)
Revenue stream	Sale of compost, service fees for waste collection, sale of recyclables, government assistance (if any), potential franchising royalties, consultancy revenue, and sale of electricity and carbon credits

Business model

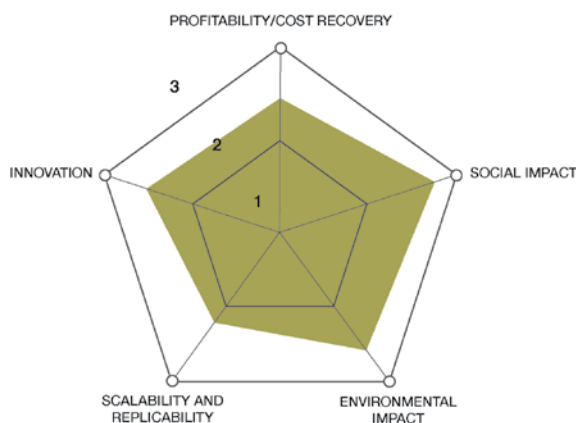
The business model converts MSW collected from large urban areas into organic compost. It relies on a multiple-revenue stream approach by expanding the business to include a variety of activities (e.g., sale of recyclables). In doing so, it provides the following social benefits: (i) provision of sustainable and affordable waste management services to communities and businesses; (ii) increased supply of environmentally-friendly fertilizer to agricultural producers at affordable prices; and (iii) provision of recyclables to energy-producing industrial units at competitive market prices.

The business can be initiated by a public or private entity, a PPP or a social enterprise. It generates revenue mainly from waste collection fees charged to the municipality, households or businesses, and by selling organic fertilizer and recyclables. It can also earn additional revenue from selling energy and carbon credits. Strategic partnerships with the government, private enterprises, donors, research and development institutes, and community-based organizations are imperative for the sustainability of the model. This allows the business to optimize the allocation of resources and activities, reduce risk associated with high capital investments and establish an assured market for their product.

BUSINESS MODEL VALUE CHAIN



Business performance



The business model scores particularly high on social impact, with improved waste management services, cost savings to municipalities and employment generation for the urban poor, including women. It also has a significant positive environmental impact by improving soil health and decreasing nutrient release into soils and water bodies from reduced chemical fertilizer use, and reduced greenhouse gas (GHG) emissions from the production of chemical fertilizers and landfill emissions.

Main risks

Market risks: Market power held by chemical fertilizer producers can negatively affect the market demand for organic fertilizer. High seasonality in demand for compost, increasing investment and operational costs, and price volatility in the carbon market are key risk factors to be taken into account.

Technological risks: For large-scale operations, the technology can be highly mechanized, which implies increased investments and labor costs for highly skilled workers. Additionally, given its high energy requirements, any shortage or infrequency in energy supply can significantly affect operations.

Political and regulatory risks: Stronger political support for chemical fertilizer use and lack of specific government guidelines for the certification of compost can represent a significant risk to the sustainability of the business.

Safety, environmental and health risks: Risk of workers' exposure to waste and related pathogens, if the appropriate gear is not used. Microbial testing should be a routine measure for quality assurance of the compost product.

Case study: Bangalore, India

Terra Firma Biotechnologies Limited (Terra Firma) is a public limited firm which processes MSW into organic compost, and recycles plastics and inert materials. It owns and operates several integrated resource recovery plants receiving MSW from the city of Bangalore, with a capacity of up to 1,400 tons of MSW per day.

The success of Terra Firma's model rests on a multiple-revenue stream approach. Revenue is generated from: (i) sales from organic fertilizer products; (ii) service fees from the municipality and other private clients for waste processing; (iii) sales from recyclables; (iv) consultancy fees; and (v) franchising royalties. The diversification of their portfolio mitigates risk

associated with fluctuations in demand for organic fertilizer products.

Strategic partnerships have also contributed to sustainability of the business. The municipal corporation of Bangalore city and other commercial establishments and townships are contracted out for the collection, separation and delivery of waste to Terra Firma. It also partners with fertilizer companies and their network distributors to market and sell their compost. Terra Firma's activities have helped to significantly reduce the city's waste management costs, reduce human exposure to untreated waste and contribute to the livelihoods of local communities through employment generation.

Key performance indicators (as of 2015)

Capital investment:	USD 527,996 (additional investments have been made with scaling-up of activities)
Labor:	215 employees (200 unskilled, 15 skilled)
Operation and maintenance cost:	USD 1,278,807 including the cost of marketing
Output:	20,000-22,000 tons of compost per year
Social and environmental impact:	Significant job creation, reduced human exposure to untreated waste and reduced waste management costs
Payback period:	7-8 years

For more information on the business model and related cases, see Chapter 9 of **Otoo, M.; Drechsel, P. (Eds.). 2017. Resource recovery from waste: Business models for energy, nutrient and water reuse in low- and middle-income countries. London: Earthscan/Routledge. In press.** The book has been produced by the Resource Recovery and Reuse subprogram of the International Water Management Institute (IWMI), under the CGIAR Research Program on Water, Land and Ecosystems (WLE) and its Rural-Urban Linkages Research Theme. The support of the Swiss Agency for Development and Cooperation (SDC), the International Fund for Agricultural Development (IFAD), and CGIAR Fund Donors (www.cgiar.org/about-us/our-funders/) is gratefully acknowledged.