

CASE

Socially-driven municipal solid waste composting for profit (Waste Concern, Bangladesh)

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Supporting case for Business Model 12	
Location:	Dhaka, Bangladesh
Waste input type:	Municipal solid waste (MSW)
Value offer:	Efficient waste management service and provision of high quality compost
Organization type:	Private (Social Business Enterprise)
Status of organization:	Operational since 1995
Scale of businesses:	Small to medium scale: 3–20T of organic waste per day Large scale: 75–100T of organic waste per day
Major partners:	Dhaka City Corporation (DCC), Ministry of Environment and Forest (MoEF), Sustainable Environment Management Programme (SEMP) of the UNDP

Executive summary

Waste Concern Group, established in 1995, is a Social Business Enterprise (SBE) comprising both 'For Profit' and 'Not-for Profit' enterprises with the vision to contribute towards waste reuse, environmental improvement and poverty reduction through job creation and sustainable development. Waste Concern works in partnership with the government, private sector, local communities and international agencies. Amongst its various lines of business activities, the key ones are solid waste management and resource recovery where compost production plays an essential role. Waste Concern's compost business models implement both a small-to-medium decentralized community-based approach and large scale CDM (Clean Development Mechanism)/carbon trading approach. Waste Concern has been particularly successful by forging strategic partnerships with the local government, private enterprises and community-based organizations to optimize the allocation of resources and activities, reduce risk associated with high capital investments and establish an assured market for their product. The local government gave Waste Concern legal access to the city's waste and provided land for the plants. This is a win-win partnership as by alleviating Waste Concern of its high initial investment costs, the municipality gains from reduced waste collection and landfill costs. Waste Concern earns revenue through its established door-to-door collection service by means of rickshaw vans for which households pay a nominal amount of between USD 0.14 to 0.57 depending on income levels.

Additional revenue is generated from compost sales and carbon trading on international markets. Compost is sold in bulk to private chemical fertilizer companies who rebrand and sell through their own marketing and distribution networks. This sales strategy ensures an assured, large and growing market base for Waste Concern's compost. Waste Concern's extensive business activities has created a value chain generating thousands of jobs among the urban poor particularly women; and has also contributed to reducing greenhouse gas emissions by 62,200 tons between 2001 and 2006 (excluding the CDM project). This local business has reduced solid waste management expenditures and saved landfill area.

KEY PERFORMANCE INDICATORS (AS OF 2012)

	SMALL SCALE		MEDIUM SCALE	LARGE SCALE
Scale of production (quantity of waste processed):	3 tons/ day	10 tons/ day	20 tons/ day	700 tons/day
Land use (square meter):	468	1,338	2,341	N.A.
Capital investment (USD):	14,609	41,739	73,043	16,500,000
O&M cost (USD):	4,348	14,493	28,986	N/A
Output (tonnes of compost/day)	0.75	2.5	5.0	130.0
Potential social and/or environmental impact:	Value chain generated approx. 1,000 jobs among urban poor; reduced GHG emissions by 62,200 tons between 2001 and 2006; 13.4 ha of savings in landfill area			800 jobs created; reduction of 89,000 tons of GHG emissions [as of 2012, 150 jobs created and reduction of 34,200 tons of GHG emissions]
Financial indicators:				
Pay Back period (years)	2	1.71	1.5	-
Post-tax IRR	N.A.	N.A.	N.A.	N.A.
Gross margin	8,696	28,986	57,971	N.A.

Context and background

The city of Dhaka, the capital of Bangladesh, produces about 4,700 tons of solid waste per day. The Dhaka City Corporation (DCC) is responsible for managing the waste; however with an ever-shrinking waste management budget and unavailability of landfill sites, it is only able to collect less than 40% of the total waste. As a result, waste is dumped in open areas and unmanaged landfill sites, creating many serious threats including diseases, intolerable odor, contamination of water sources, emission of greenhouse gases and exposing the rag-pickers to hazardous waste. In view of the then-prevailing problem, two young and dynamic urban planners, Iftekhar Enayetullah and Maqsood Sinha, founded Waste Concern, initially a research-based non-governmental organization (NGO) in the field of waste management and environment. Waste Concern is mainly involved in collection and processing of municipal solid waste (MSW) into compost and marketing thereafter. It began its composting operations in 1995 on an experimental basis in a small area of 1,000m² lent to it by the Lions Club for a period of three months. This demonstration project was to explore the technical and commercial feasibility of the labor-intensive aerobic composting technique. It also adopted door-to-door collection of waste with the help of rag pickers by providing them with rickshaw vans. This activity started by covering 100 households which subsequently increased to 600 households by 2004. At the time of the study, the service was extended to 1,400 households by partnering with community-based organizations. Waste Concern has set an example for a successful decentralized community-based waste management business. Using an appropriate composting technology in combination with sound financial management, as well as an appropriate marketing strategy ensures high quality compost and

constant sales throughout the year. This model is already been replicated in 27 cities of Bangladesh and 10 cities of other developing countries with the support from external support agencies as well as local entrepreneurs. In 2005, to scale up its model with private investment, Waste Concern in partnership with a Dutch recycling company called World Wide Recycling BV initiated a project where carbon trading has been harnessed. This is the world's first compost plant using CDM opportunity.

Market environment

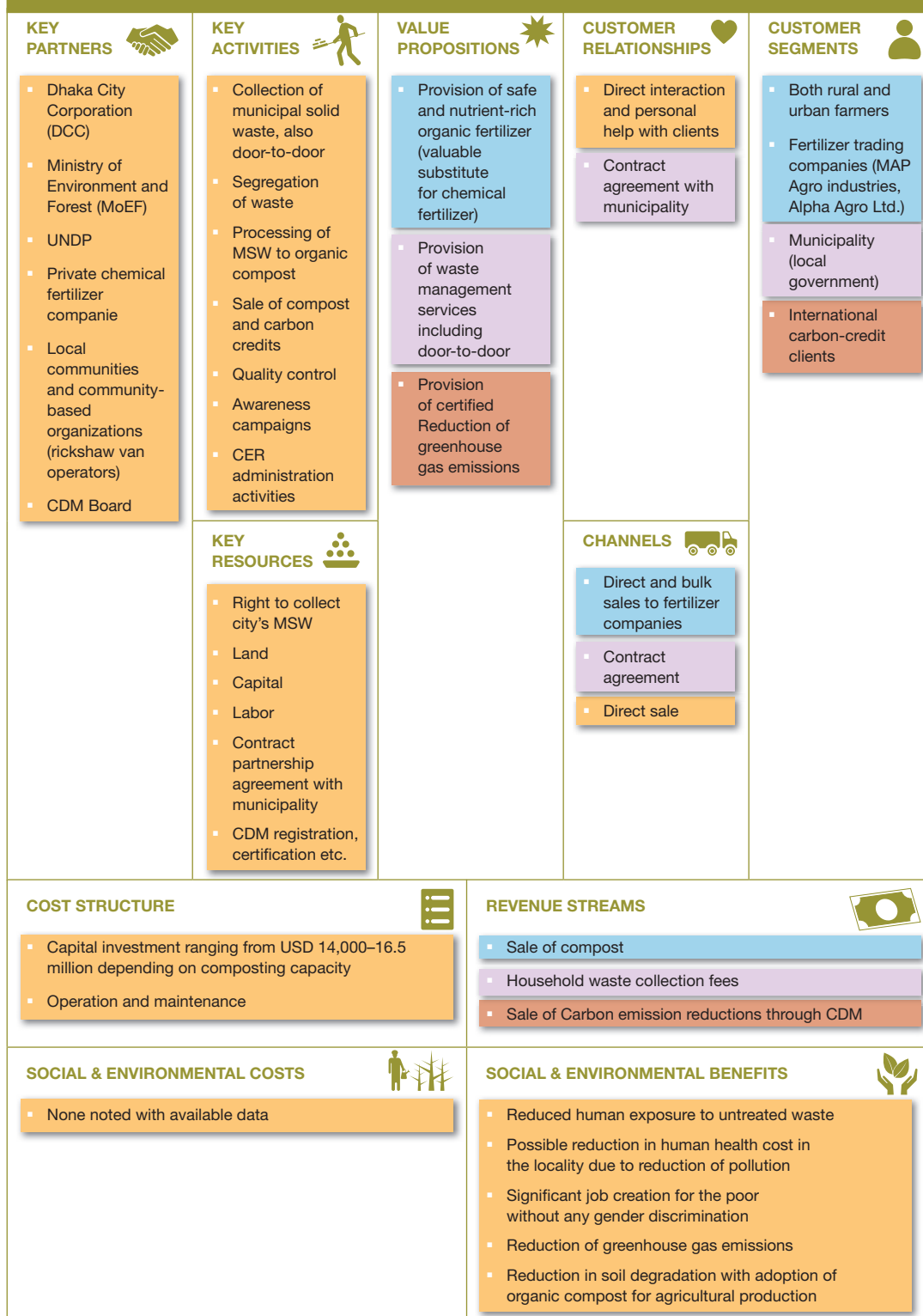
Huge amounts of waste are generated daily in the city of Dhaka, which the Dhaka City Cooperation has found difficult to manage. Indiscriminate waste disposal and unmanaged landfills spurred Waste Concern's desire to enter into a partnership with both private and public organizations to process MSW into organic fertilizers for agricultural purposes. While this initiative addressed the imminent environmental and social challenges, the production of compost represented a valuable agricultural input alternative for farmers. The extensive use of chemical fertilizers has degraded the soil to a great extent and an alternative to successfully replace synthetic fertilizers was a necessity and Waste Concern compost with value addition by MAP Agro filled this gap and made for the correct type of replacement for chemical fertilizers. Additionally, the growing popularity of industrial poultry farming in the country also created an increasing opportunity for compost as poultry feed. An approval from the Bangladesh Agriculture Research Council for the suitability of the compost product for agricultural purposes and policy support from Ministry of Agriculture was essential for market acceptance.

Macro-economic environment

With an estimated population of 291 million by 2050 in Bangladesh, total rice demand is expected to reach 68 million tons, which is more than twice that compared to 2007. To match this anticipated spike in agricultural production, chemical fertilizer application and demand are expected to reach an all-time high (Basak, 2014). Government provides subsidies on chemical fertilizer for agricultural producers which accounts for about 6% of total public expenditure. Farmers have generally been found to use chemical fertilizers indiscriminately without adequate information on actual soil and plant requirement. Over-application is common and this has resulted in depleted soils and a decline in crop yields. The use of organic fertilizers will play a vital role in restoring soil fertility and improving crop productivity. Policy instruments to address market price distortions created by the current subsidies on chemical fertilizers will be imperative to catalyze business development in the organic fertilizer market. A detailed analysis of the policy environment was provided by Matter et al. (2015).

Business model

Figure 157 represents Waste Concern's business model canvas. Using strategic partnerships that engage both public and private entities, Waste Concern's compost business models implement a small-to-medium decentralized community based approach and large scale CDM/carbon trading approach. This figure presents an aggregate of both the small-to-medium decentralized community based approach and large scale CDM/carbon trading approach. As a key characteristic of their business model, Waste Concern has forged strategic partnerships with the local government, private enterprises and community-based organizations (CBOs) to optimize the allocation of resources and activities; reduce risk associated with high capital investments and establish an assured market for their product. At the start-up, development agencies such as UNDP, UNICEF and CIDA provided both financial and expertise support for smooth operations of the business. Research institutes (universities) did and continue to provide periodic quality testing of the finished compost for which the services are paid for by Waste Concern. The local government provided land for the composting plants and gave Waste Concern legal access to the city waste. In alleviating Waste Concern's initial investment costs, the municipality gains from reduced waste collection and landfill costs. Whilst Waste Concern has a

FIGURE 157. WASTE CONCERN BUSINESS MODEL CANVAS (INCLUDING BOTH THE COMMUNITY-BASED AND CDM COMPOSTING MODELS)

legal permit from the DCC (main governing body in charge of managing waste) to access and process municipal waste in Dhaka, it does not have exclusive rights (own) to the waste and thus there remains the risk of facing competitors (e.g. compost producers) for the waste input. However, with over 4,700 tons of waste generated daily in the city and DCC limited capacity to properly manage only 40% of the waste, risk associated with input (waste) supply is relatively low. Community-based organizations are contracted for the collection and separation of waste, which ensures a consistent supply of high quality waste input for Waste Concern and income for the CBOs. Waste Concern earns a revenue through the established door-to-door collection service by means of rickshaw vans by the CBOs for which households pay a nominal amount of between USD 0.14 to 0.57 depending on income levels.

Municipal solid waste is processed into compost and sold directly in bulk through an established countrywide marketing and distribution system of private chemical fertilizer companies such as MAP Agro, providing an assured and large market base for their product. On the other hand, without established marketing and distribution channels, Waste Concern faces a strong buyer power as they mainly sell their compost to price-setting private chemical fertilizer companies who rebrand and sell the compost product. To reduce buyer power risk, Waste Concern launched an information campaign using farm demonstrations to raise consumer awareness and product demand. Waste Concern is negotiating with other large bulk compost users to limit their dependency on their main customer – MAP Agro Fertilizer. This has been an important strategy to also increase their direct market share as substitute products (e.g. other organic fertilizer products and chemical fertilizers) continue to flood the market. The threat of new business entrants is very high as there is an increasing availability and unlimited access to the waste input. Waste Concern, however, has an edge over new entrants given its strong partnerships across public and private sectors and communities, which is essential to mitigate many of the market risks it faces.

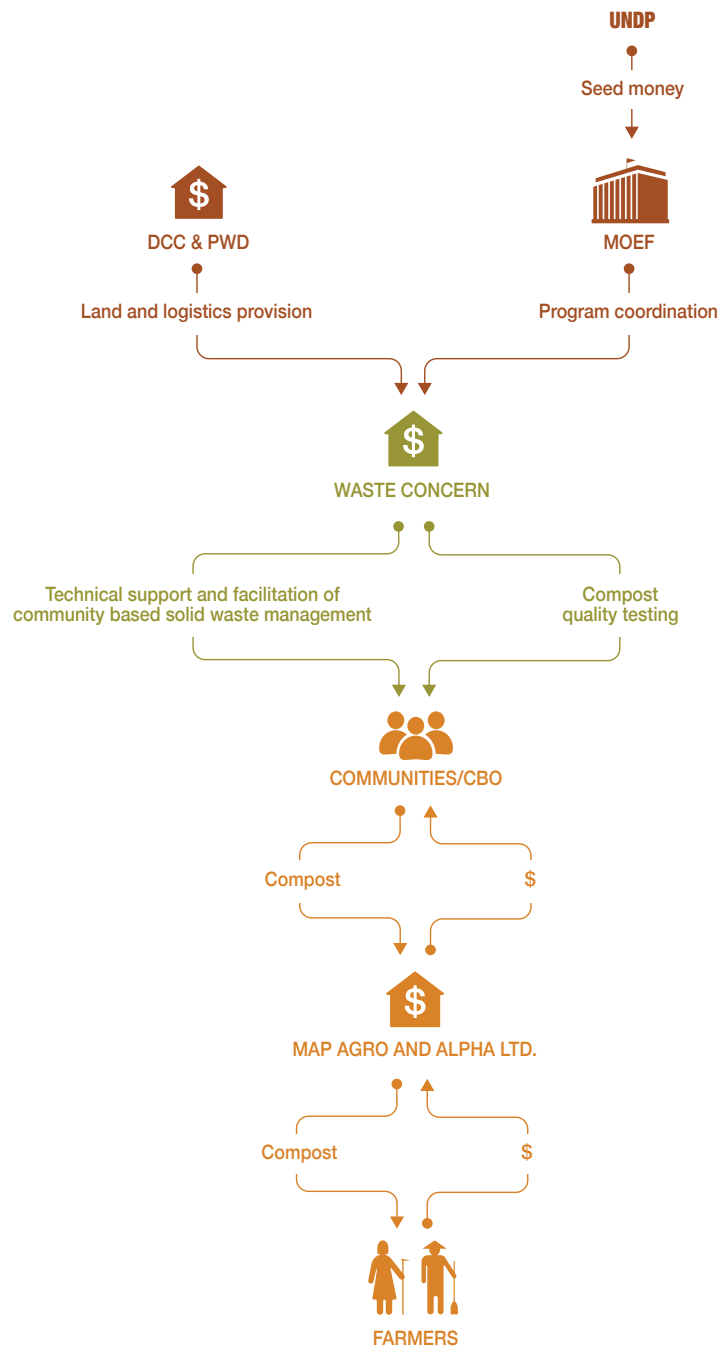
Value chain and position

Waste Concern's business operations cover the entire MSW value chain, providing services from collection to processing of the waste. Its activities have been implemented under two main business models namely:

a. Partnership model of community-based composting

Waste Concern's initiatives combine both public and community spheres with private sector involvement (Figure 158). Seed money from UNDP in partnership with the Ministry of Environment and Forests, Dhaka City Corporation (DCC) and Public Works Department (PWD) were utilized to implement community-based, solid waste management projects. A key characteristic of Waste Concern's community-based composting model is that it can be adapted to many contexts both in urban and rural areas. It has also shown great potential for implementation in slum areas at a small-, medium- or large-scale. The small-scale model processes three tons of organic waste daily, with the medium- and large-scale models processing three to 10 tons and more than 11 tons of organic waste per day, respectively. By focusing its efforts on the city's slums, an area where more than a third of the city's 11 million people live, Waste Concern has created a system that allows the community not only to dispose of trash effectively but also helps them to raise money. The organizational set-up of the composting scheme follows a business approach, which means that the community is seen as client who is paying for the service of waste collection. Waste Concern earns revenue through its established door-to-door collection service by means of rickshaw vans with capacity of 1.18m³ for which households pay a nominal amount of between USD 0.14 to 0.57 depending on income levels. Waste Concern largely sells its compost in bulk to private chemical fertilizer companies such as MAP Agro Fertilizers, who rebrand and sell the compost through their established countrywide marketing

FIGURE 158. WASTE CONCERN VALUE CHAIN – PARTNERSHIP MODEL OF COMMUNITY-BASED COMPOSTING UNDER SEMP

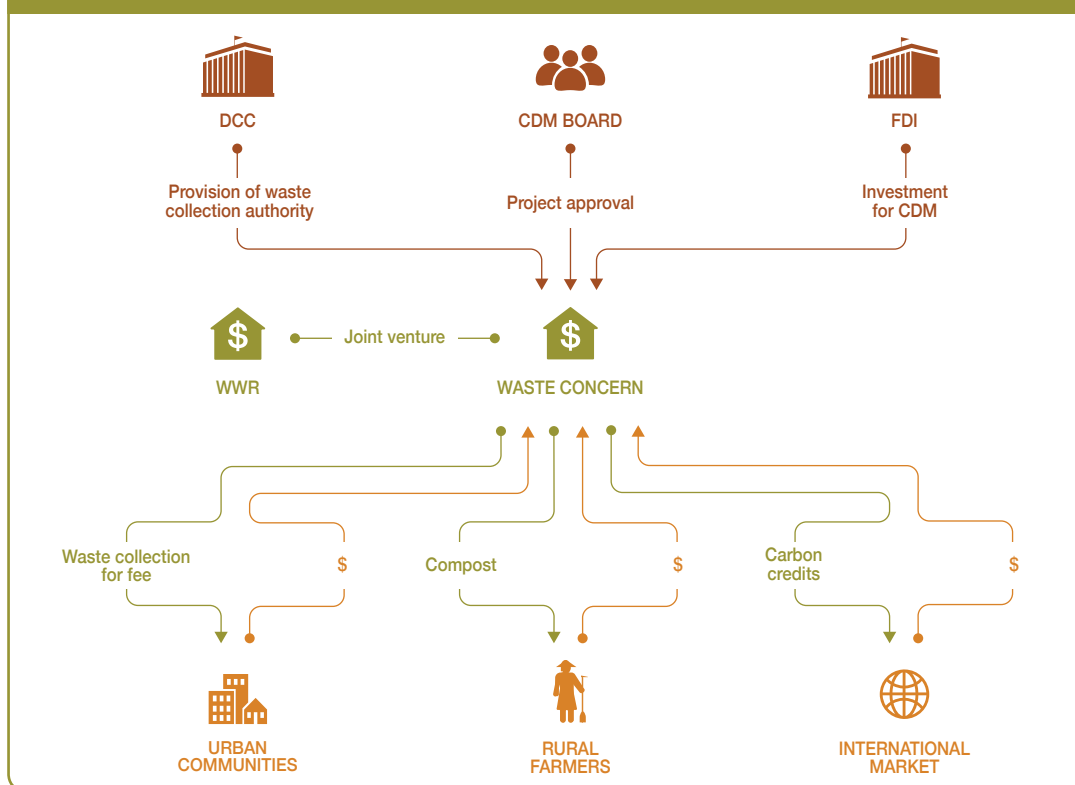


and distribution system. This partnership provides access to an assured, large and growing market base for Waste Concern's compost, selling about 10,000 tons of organic fertilizer per year (2010), which represents a significant portion of the market. This marketing strategy mitigates competition risk that they would otherwise face with chemical fertilizers. The community-based composting scheme has an added benefit for the communities of Dhaka in that they share in the profits made in selling the compost, earning USD 0.09 per kilogram. This model has improved the livelihoods of community members as the compost collectors come from the community and earn up to USD 52 per month¹. The sustainability of this model is grounded in strong partnerships and the assured benefits accruing to each partner.

b. Composting under CDM/carbon trading model

Waste Concern has also established the world's first CDM compost plant in Bangladesh. This carbon trading-based business model is based on strong partnerships between the public, private and community spheres (Figure 159). Waste Concern partners with the Clean Development Mechanism's Board, which approves a compost plant project owned as a joint venture by Waste Concern and World Wide Recycling (WWR). Dhaka City Corporation (DCC) provides the approval for the collection and processing of the city's waste by Waste Concern. The compost plant obtains organic waste from the urban population through direct collection from vegetable markets. The resulting higher-yield, lower-cost compost is sold to rural farmers, and the carbon credits obtained are sold on the international market. A key characteristic of this model is that the municipality does not bear any cost with the setup of the project. Waste Concern collects all waste free of charge; and also bears

FIGURE 159. WASTE CONCERN VALUE CHAIN – CDM/CARBON TRADING SUPPORTED COMPOSTING



the cost for the land of the compost plant. This model saves the city numerous costs associated with waste collection, transportation, and disposal. The plant has two major sources of revenue: one is compost (organic fertilizer), and the other is Certified Emission Reduction (CERs)². The compost plant processed between 75–100 tons of organic waste on a daily basis between 2009 and 2010. By 2012, the project had processed 76,697 tons of organic waste and generated 34,200 CERs. In addition to reducing greenhouse gas emissions, this model also generates valuable carbon credits on the international market. This project has improved livelihoods in the community, creating 150 direct jobs for the poor, with these jobs cutting across the entire MSW value chain from compost plant operation, transportation of waste and in the distribution of compost. This model is grounded in a win-win partnership between key players and has been instrumental in attracting large amounts of foreign direct investment (FDI) in the area of organic composting and carbon trading using the Clean Development Mechanism (CDM) of the Kyoto Protocol.

Institutional environment

Although the solid waste management system in Bangladesh is still not well organized, efforts are under way to improve the organizational structure for solid waste management in different cities. An example is Dhaka City Corporation which has established a Solid Waste Management Cell to improve the waste management services in the city. At the national level, the Urban Management Policy Statement, 1998 was enacted and implemented by the Government of Bangladesh, which recommends municipalities to privatize waste management services and give priority to slum areas. For more recent policy development see Matter et al. (2015). The special emphasis and encouragement of private sector participation in water supply and sanitation in urban areas is gradually resulting in the provision of efficient and reliable waste management services to the public, especially those in slum areas.

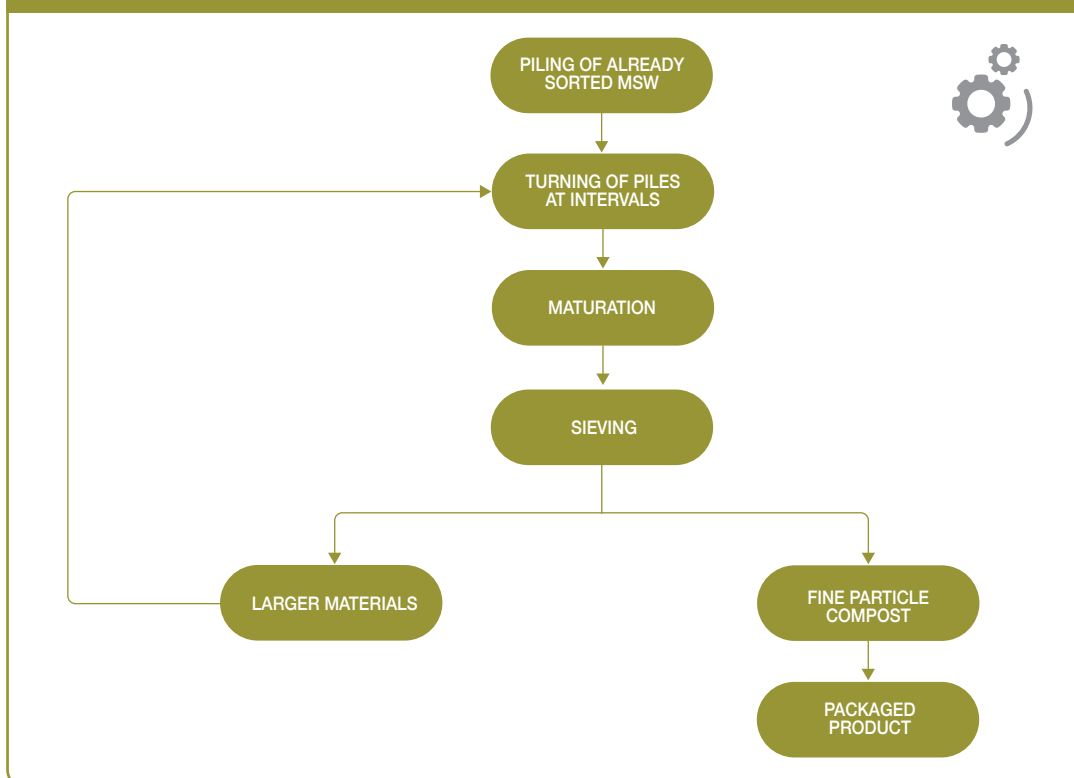
Technology and processes

A box-type composting technique was adopted because it is a low-cost process that needs less turning compared to the Indonesian Windrow Method, which was originally used (Figure 160). It has limited mechanization and is suitable for Bangladesh's climatic conditions. The composting process requires 40 days for decomposition and a maturing period of 10–15 days. Special measures are taken to reduce the odor. After maturing, the compost is screened and graded according to particle size and packed for marketing. Waste Concern has also developed two other types of composting methods apart from the Box Composting under the UNDP supported Sustainable Environment Management Programme (SEMP). These are the Aerobic Composting and Barrel Type Composting methods. All three techniques are simple, low cost and labor intensive methods which are suitable to the socioeconomic and climatic condition of Bangladesh.

Funding and financial outlook

For Waste Concern's decentralized business model, there is a range of plants across the city of different sizes and investment cost. These range from USD 14,000 to USD 73,000. The cost of maintaining and operating a plant also varies from USD 4,300 to USD 29,000 depending on the size of the plant. The company has benefited from the provision of land by the local government at no cost and financial support from Lion's Club, UNDP, UNICEF and CIDA, as well as technical guidance. Financial data was not accessible for the CDM business model. For both models, Waste Concern generally has two main revenue streams: a) compost sales; and b) carbon trading. About 31,100 metric tons of compost is sold on yearly basis yielding revenue of USD 998,621. There is the possibility of revenue generation from carbon credits for the decentralized business model. However, with a decline of the carbon market, these options have to be carefully analyzed.

FIGURE 160. PROCESS DIAGRAM OF WASTE CONCERN



Socio-economic, health and environmental impact

Waste Concern's diverse projects have created numerous direct and indirect benefits for the economy and the environment. The simple idea of converting the high organic content of the waste, into compost brought about a valuable substitute for chemical fertilizers. Overuse of chemical fertilizers has been a serious problem in Bangladesh which has led to severe soil degradation. Farmers had no real alternatives in the absence of the organic fertilizers in the market prior to the entrance of compost from Waste Concern in the agricultural input market. Compost produced by Waste Concern has increased per hectare yield by 30–50% by adopters (potato farmers). The Waste Concern business, extending from collecting and processing waste produced in urban areas to selling compost to rural farmers, has created a value chain generating close to 1,000 jobs among the urban poor, especially women. The total value of the compost sold in the local market between 2001 and 2006 was USD 1.10 million. Close to 500,000 people are benefiting from household waste disposal system across the country. Waste Concern has also contributed in reducing greenhouse gas emissions by 62,200 tons of CO₂e between 2001 and 2006 (excluding the CDM project), and saved 13.4 ha of landfill area. The upcoming CDM project is also expected to reduce greenhouse gas emissions by 1 million tons over eight years, produce 50,000 tons of compost per year. At a global scale, this initiative has the potential to reduce transboundary impact of GHG and attract foreign direct investment. Waste Concern has also extended itself in the policy-making arena, steering environmentally appropriate governmental regulations, both existing and new. To date, they have been influential in the development of 27 governmental policies and spearheaded efforts at influencing the government to develop national policies and guidelines in issues in the like of CDM Project Approval Process for Government.

Scalability and replicability considerations

The key drivers for the success of this business are:

- Increasing need for sustainable waste management solutions.
- Strong, strategic partnerships with city municipality, Ministry of Environment and Forests, Dhaka City Corporation, Public Works Department, Community-Based Organizations, Private Fertilizer Companies and development agencies, gaining Waste Concern a.o. free or low-cost access to waste and to land.
- A perceived necessity to replace chemical fertilizers due to their effect in degrading soil and environment.
- Government (ministry of agriculture policy) that support/promoted use of compost for agricultural purposes.

The Waste Concern model has high replication potential and has already been replicated in 27 cities of Bangladesh and 10 cities of developing countries with the support from external support agencies as well as local entrepreneurs. Adopting a labor-intensive, cheap and low technological approach, the business does not require a large capital investment (except for land purchase) or state-of-the-art machinery, which removes one of the major constraints for business start-ups especially in the developing world context. The decentralized composting approach reduces transportation costs and makes use of low cost technologies based on manual labor and ensures waste is well sorted before it is composted. This minimizes many of the problems and difficulties that have led to the failure of large centralized composting plants in the past. There is great potential for the upscaling of this model due to its simplicity. Many decentralized units can be attached to the main business as long as raw material or the market demand does not become limiting factors. However, the decentralized approach to composting of waste work best for secondary cities and small towns where local government can allocate land. Similarly, the large-scale carbon trading model has a high replication potential. The technology adopted is semi-mechanized and offers opportunity to use unskilled and informal labor, indicating its suitability for developing countries.

Summary assessment – SWOT analysis

Figure 161 presents the SWOT analysis for Waste Concern. Composting has become a promising business in Bangladesh. Waste Concern has been particularly successful by using a suitable composting technology in combination with a sound financial management and an appropriate marketing strategy, which enables Waste Concern to produce high quality compost and ensure constant sales throughout the year. This business can hardly meet the demand for compost and processes several hundred tons of city waste daily since 2010 (Waste Concern, 2011). Increasing governmental and international support along with growing demand for normal and enriched compost, spurred by the user awareness building programmes, are seen as key opportunities for replication and up-scaling of the business. Waste Concern will, however, face increasing competition from new market entrants and increased buyer power if it does not explore new key customers or begin to establish its own marketing and distribution channels. Waste Concern is an example of an innovative social entity utilizing a simple business approach to address some of the major waste management and environmental challenges in Dhaka, Bangladesh and its model of organic composting is a clear demonstration of a successful business model that includes the poor, especially women both in the supply and the demand chain.

FIGURE 161. SWOT ANALYSIS FOR WASTE CONCERN

	HELPFUL TO ACHIEVING THE OBJECTIVES	HARMFUL TO ACHIEVING THE OBJECTIVES
INTERNAL ORIGIN ATTRIBUTES OF THE ENTERPRISE	STRENGTHS <ul style="list-style-type: none"> ▪ Limitless and exclusive supply of municipal solid waste ▪ Low O&M due to adoption of simple technology ▪ Goodwill earned due to environmental stress relief ▪ Good local buy-in due to establishment of brand for quality ▪ Research and development work to strengthen the product ▪ Excellent relationship with partner organizations ▪ Decentralized composting units that do not depend on one another 	WEAKNESSES <ul style="list-style-type: none"> ▪ High dependence on few main customers – strong buyer power ▪ Profit structure highly dependent on cheap labor
EXTERNAL ORIGIN ATTRIBUTES OF THE ENVIRONMENT	OPPORTUNITIES <ul style="list-style-type: none"> ▪ Absence of strong competitive organic fertilizer suppliers to the market ▪ Up-scaling potential of CDM project to earn carbon credits and set-up of additional decentralized units ▪ Compost as poultry feed increases the market ▪ Scale of production and transboundary GHG effects can potentially attract Foreign Direct Investment ▪ Scale of impact and steering environmentally-appropriate governmental regulations provides positive market effect 	THREATS <ul style="list-style-type: none"> ▪ Increasing competition from other compost businesses ▪ Increasing labor wages ▪ Unstable carbon market

Contributors

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Case descriptions are based on primary and secondary data provided by case operators, insiders or other stakeholders, and reflect our best knowledge at the time of the assessments 2014/15. As business operations are dynamic data can be subject to change.

Notes

- 1 Based on 2014 exchange rates: USD 1 = 77.65 taka.
- 2 For carbon trading purposes, one CER is considered equivalent to one metric ton of CO₂ emissions.