Solid Waste Recycling in Addis Ababa, Ethiopia: Making a business of waste management

Solid waste management is a major challenge facing the cities in the developing world. The commercial recycling of organic waste into a valuable organic fertiliser called “Bio-compost” is new in Addis Ababa and it is having a noticeable impact on improved organic waste management and urban agriculture.

Integrated Biofarm Enterprise (IBE), a private limited company in Ethiopia, began operations in Addis Ababa in 1998, based on a philosophy of working with nature to achieve high quality, sustainable productivity and low levels of waste and environmental loss. Since then, IBE has served as a national model for waste management, environmental restoration, resources management and food production to benefit the surrounding community (Getachew Tikubet, 2002).

For the past eight years, IBE has also functioned as a training and demonstration centre. It now also operates field stations in different regions of the country (Assella, Mekele, Assossa and Gurage), which strengthen training and research opportunities has involved urban organic waste recycling and utilisation in collaboration with different partners.

The major objectives of this project are to increase awareness, set up the production of organic fertiliser from solid waste collected from residential areas and marketplaces and stimulate its use for urban and rural agriculture.

The major partners in this Solid Waste Management (Bio Recycling) project are:
Bioeconomy Association (BEA) – Non-governmental organisation
Addis Ababa City Administration (Clean, Beautification and Park Agency) - Governmental organisation
Arada Sub City of Addis Ababa - Governmental organisation
Birhane Clean and Environment Sanitation Association – Private business organisation.

ORGANIC SOLID WASTE

Organic solid waste is collected from the central fruit and vegetable marketplace in Addis Ababa and from residences and shops located around the market. Tackling this waste takes up a considerable part of the municipality’s budget.

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Training crop production using soil mixed with bio compost

The assembly of wastes occurs at two levels. The first is at market and household level. The fruit and vegetable wholesale and retail market collect wastes in garbage tanks, while waste from residences and shops around the market area is collected by a private business organisation called Birhane Clean and Environment Sanitation Association. A fee is paid for this service to the association. The second level of assembly from the market area to the project area and other dumping areas is carried out by the municipality. About 40 m3 or 3500 kg organic waste is collected from this market area per day. But only 16 m3 or 1400 kg is used for this project because of capacity problems. The rest needs to be dumped outside the city by the municipality. IBE received about 534,000 kg of waste in 2006. Separation of organic wastes from non-organic wastes and sorting are done at both levels of collect-
tion. The non-organic wastes go to other industries, and the income generated by this is designated for Birhane Clean and Environment Sanitation Association.

The various participants in the waste management system all learn about proper handling, collection, sorting, transportation and loading. In addition, training is given to 100 youths employed by the Birhane Clean and Environment Sanitation Association, who participate in the solid waste management process with the assistance of the Bioeconomy Association (BEA).

The compost preparation area of IBE in Addis Ababa is located 6 km from the waste source area. The project uses an above-ground compost preparation method to recycle the organic waste. Each phase of the process takes about three months, and IBE completed three phases in the past year; hence it converted the 534,000 kg of waste into 265,800 kg of bio-compost, which was sold packed and unpacked.

BEA determined the nutrient content of the bio-compost through laboratory tests conducted by the International Livestock Research Institute (ILRI). These showed that it provides more than the average nutrient requirements for plant growth and by far more nutrients than the local soil prepared with the inorganic fertilisers DAP and Urea. The high percentage of organic matter in the bio-compost, which is not present in the inorganic fertilisers, also gives the soil better structure, water absorption capacity and aeration. In addition, bio-compost is applied usually only once every 2 to 3 years, making it less expensive to use than inorganic fertilisers, which are applied every year.

a bio-compost logo in two languages, English and Amharic (the local language), a list of ingredients, available nutrients, instructions for use and a contact address. The bags are prepared in three different weights, 2 kg, 4 kg and 25 kg, intended respectively for small and medium size compost beneficiaries and middlemen (super markets). In addition, 100 bags of bio-compost are packed without a seal or label. These are used by IBE or sold to direct customers. Certification is in progress and IBE has already been granted official support and recognition for this by the Ministry of Agriculture and Rural Development and the Environmental Protection Authority.

The standard instructions for use of bio-compost are to mix 3 to 4 kg of bio-compost with an equal part of local soil and apply this to each square metre of land. The price of bio-compost was 2 Birr/kg (about 0.235 USD/kg) in 2006 and 2.5 Birr/kg (about 0.294 USD/kg) in 2007. This is nearly half of the current market price of inorganic fertiliser.

IBE uses and markets the bio-compost in three ways.

a) For internal use: IBE in Addis Ababa has about 5 ha of horticultural land and a nursery site. Here IBE applies about 185,000 kg of organic fertiliser (before packaging).

b) To project-based trainees: IBE has given practical training and backstopping assistance to more than 21,000 trainees, most of whom have their own farms. All of these trainees bought bio-compost from IBE when they started farming. For example, 200 members of the former Fuel Wood Carrier Women’s Association bought 10,450 kg for 26,100 Birr (about 3,071 USD) at a rate of 2.5 Birr/kg (about 0.294 USD/kg) for their horticultural farm at the City of Addis Ababa, Keraneyo subcity in May 2007 (which is 1999 in the Ethiopian calendar).

c) To shops and supermarkets: IBE sells the bio-compost from its main distribution centre. Customers include Abader, Abrico and Adgemu supermarkets and agricultural input suppliers at Addis Ababa. It also promotes the product to different flower farms.

Nearly 70% of the bio-compost produced in 2006 was used by IBE itself. However, it is estimated that 80 to 90% of the bio-compost produced in 2007 and 2008 will be sold. The majority of customers are urban dwellers, who use the bio-compost on their homesteads, and periurban farmers, who use it for the production of horticultural crops. IBE also gives training courses to different groups and sells its products for project-level urban agricultural production. These groups are made up of youths, women cooperative members, fuel wood carriers, partially sited individuals, students, retired persons, orphans, nuns, etc. More than 90% of the bio-compost marketed is for use in urban agriculture, but the rural market for bio-compost will also grow as awareness of the product increases among rural farmers. IBE is the first and only entity in Addis Ababa engaged in the commercial collection and recycling of organic waste.

**FINANCIAL ANALYSIS**

The financial analysis below is based on incurred costs and revenues and estimated opportunity costs. IBE has incurred costs for labour, implements, soil nutrient analysis, packing, marketing, salary and administration, which are estimated to be 404,136 Ethiopian Birr (47,545 USD). This also includes the costs for assembling, loading, transporting and unloading wastes that are covered by the partners. Without these opportunity costs, the estimated total is 226,936 Ethiopian Birr (26,698 USD) (see table). The business has the capacity to earn 135,189 Birr (15,905 USD) and 312,389 Birr (36,752 USD) with and without consideration of opportunity costs, respectively.

Birhane Clean and Environment Sanitation Association has a training service and provides assistance on waste management. The city’s waste dumping site is located 13 km from the waste source area, whereas IBE’s waste recycling area is located 6 km from the source area. As a result, by dumping at the IBE site, the municipality saves the time and costs associated with transporting each truckload of waste the extra 14 km. Therefore, IBE is not expected to cover this opportunity cost. After evaluating the previous year’s performance, the partners extended their agreement for the coming years and the Environmental Protection Authority of Ethiopia also approved the expansion in size and scale.
Table 1. Cost-benefit of IBE

<table>
<thead>
<tr>
<th>Items</th>
<th>Revenue/ Cost</th>
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<tbody>
<tr>
<td></td>
<td>In Birr</td>
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<tr>
<td>Revenue (from sale of bio-compost)</td>
<td>539,325</td>
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<tr>
<td>Labour</td>
<td>49,746</td>
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<tr>
<td>Implements</td>
<td>15,000</td>
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<tr>
<td>Soil nutrient analysis</td>
<td>4,500</td>
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<tr>
<td>Packing costs</td>
<td>85,440</td>
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<tr>
<td>Marketing costs</td>
<td>12,000</td>
</tr>
<tr>
<td>Salary and administrative costs</td>
<td>48,000</td>
</tr>
<tr>
<td>Opportunity costs</td>
<td>177,200</td>
</tr>
<tr>
<td>Assembling at the market</td>
<td>14,400</td>
</tr>
<tr>
<td>Loading</td>
<td>10,800</td>
</tr>
<tr>
<td>Transport to project area and unloading</td>
<td>144,000</td>
</tr>
<tr>
<td>Others</td>
<td>8,000</td>
</tr>
<tr>
<td>Total Cost (including opportunity costs)</td>
<td>404,136</td>
</tr>
<tr>
<td>Total Cost (not including opportunity costs)</td>
<td>226,936</td>
</tr>
<tr>
<td>Profit (including opportunity costs)</td>
<td>135,189</td>
</tr>
<tr>
<td>Profit (not including opportunity costs)</td>
<td>312,389</td>
</tr>
</tbody>
</table>

The business is financially feasible if the bio-compost is sold at a price that is not lower than the break even price of 1.52 Birr (0.18 USD) considering opportunity costs and 0.85 Birr (0.10 USD) per kg without consideration of opportunity costs. Since IBE is a private limited company, any profit earned is reinvested.

PROMOTION
IBE promotes bio-compost organic fertiliser and urban waste management recycling in general in the following ways:
- By managing bio-compost marketing centres.
- By inviting officials of different governmental and non-governmental organisations to visit the project.
- Through the media (advertisements) and publications including brochures, newsletters and posters.

The municipality also actively promotes urban agriculture and the use of bio-compost.

CONCLUSIONS
Waste management is a big issue in urban management, especially in mega cities like Addis Ababa. Land is scarce in these cities and it needs to be used productively and efficiently. Therefore, businesses that recycle organic wastes and produce standardised and packed organic fertilisers as described here are vital. They contribute to urban waste management but also indirectly to the promotion of safe agriculture in the city by providing organic fertiliser to urban farmers in small packs.

Agriculture is an important part (85%) of Ethiopia’s economy and labour force. But, due to land degradation, agricultural production has become dependent on fertiliser application. As a result, Ethiopia imports vast amounts of inorganic fertiliser. Bio-compost thus has important potential in this country.

References

The sharing of experiences and innovations between urban and rural farmers is important and efficient because rural farmers have knowledge that has been generated over many decades. For instance, the Msinga people have developed innovative ways to cook, process and mix indigenous vegetables in order to preserve them and balance nutrients in their diet (Njokwe, 2006). Rural areas have more wild varieties of indigenous vegetables than urban areas, which have fewer or no wild areas at all. On the other hand, urban farmers have invaluable experience on how to survive on very scarce resources with limited or no support, and they have access to markets. These and other lessons are being shared through the network of rural and urban farmers interacting through the FSG.

The farmers’ evaluation reports showed that the yield of exotic and indigenous vegetable cultivated in trench and raised plots is very high. Production costs are low compared to the conventional farming system. Through various experiments conducted together with farmers and at Ukulinga farm, FSG will further strengthen the exposure of urban and rural farmers to innovative techniques Eventually, a market development strategy will be adopted to allow the communities to raise income to meet some of their needs.

Notes
1) In Msunduzi, these institutions include CINDI Network, Institute of Natural Resources, Department of Health, Department of Social Welfare, Department of Agriculture, the Farmer Support Group (FSG) of the University of KwaZulu-Natal, and the School of Agricultural Science and Agribusiness of the same university.

References