Indonesia Surabaya Recycle Business Proposals

Pilot Project on the Recycle-Based Intermediate Waste Treatment Facility in Surabaya City, Republic of Indonesia

- Treatment sustained at low cost
- Safe and hygienic work environment
- Promotion of efficient recycling
## History

An Islamic sultanate existed in Surabaya from the 15th to 16th century, and Surabaya served as a political and military foothold in the eastern part of Java Island. After a conflict, it was occupied in 1625 by the Sultanate of Mataram, which was a powerful state at the time. Through this occupation, the Sultanate of Mataram held under its control almost the whole of Java Island, except the area occupied by the Banten Sultanate and the Dutch settlement of Batavia.

Surabaya grew as a commercial port during the Dutch colonial period, but later it was occupied by the Japanese forces in 1942 during the Pacific War and was bombed by the Allies in 1944.

When Japan surrendered in 1945, a battle started between the British troops of the 49th Brigade, which landed on October 25th, and the pro-Indonesian independence group. This marked the beginning of the Indonesian War of Independence. Surabaya was later occupied by the pro-Indonesian independence group, but then was occupied again by Dutch forces in 1947. Finally, in 1949, it was incorporated into the Republic of Indonesia. The city is also home of Sukarno, the first President of the country.
Current State of Waste in Surabaya City-1

Current data

<p>| | |</p>
<table>
<thead>
<tr>
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</thead>
<tbody>
<tr>
<td>Volume of waste</td>
<td>1,200 tons per day</td>
</tr>
<tr>
<td>No. of waste collection vehicles</td>
<td>300 per day</td>
</tr>
<tr>
<td>DEPO</td>
<td>170 or more</td>
</tr>
<tr>
<td>Waste pickers</td>
<td>Several thousand</td>
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</tbody>
</table>
Many waste pickers are engaged in activities to extract resources in a non-hygienic environment at the final disposal site and DEPOs. Resource recovery rate is low since work efficiency is low.
Flow of Waste in Surabaya

**Households/Offices**
- Collection by communities
- Waste pickers (Several thousands)

**Transfer Station**
- Depo 160 facilities
- Transfer of waste
- Surabaya City Department of Cleanliness and Gardens (DKP) / Private operators
- Waste pickers (Several thousands)

**Benowo Disposal Site**
- Volume of waste received: 1,200 tons per day
- Collection vehicles: 300 per day
- Cost for collection and treatment: 1.1 billion yen per year
- Waste pickers 1,000 to 1,200 persons

Landfill disposal cost: **1,200 yen per ton**

It is the only final disposal site, but its treatment capacity is nearing the limit.
Approximately 30 waste pickers in each Depo.

Some work from 3:00 a.m. in the morning to 11:00 p.m. in the evening, and their income is in the range of 8,000 yen to 25,000 yen per month.

They work under the blazing sun and in the rain.
Distribution of Uniforms

- Distributed work uniforms to all workers to improve appearance.
- Explained the details of the project and its future outlook, and described the advantages and disadvantages.
- Decided on the division of roles.
Results of the Study on Composition (September 25, 2012)

Data based on the total of three days from September 26 to September 28.

Total quantity over the survey period: 2,866.1 kg

<table>
<thead>
<tr>
<th>Items</th>
<th>Organic</th>
<th>Plastic</th>
<th>Paper scraps</th>
<th>Metals</th>
<th>Other</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weight</td>
<td>2,211.5 kg</td>
<td>374 kg</td>
<td>116 kg</td>
<td>7.5 kg</td>
<td>157.1 kg</td>
</tr>
<tr>
<td>Proportion</td>
<td>77.2%</td>
<td>13%</td>
<td>4%</td>
<td>0.3%</td>
<td>5.5%</td>
</tr>
</tbody>
</table>

Reliability is low with data over three days, but it gives a basis for developing a plan.
Proposal for Improvement (Business Plan)

**Households/Offices**
Collection by communities
Waste pickers (Decrease naturally with employment at Super Depo, etc.)

**Super Depo**
- Recycle-based intermediate treatment facility

Currently brought directly to the final disposal site.
Waste received: 1,200 tons (40 tons per day × 30 facilities)

Upgrade existing transfer stations (Depos) to recycle-based intermediate facilities, or “Super Depos,” which have functions of a wholesale.

**Commission fee for treatment:**
1,200 yen per ton

**Benowo Disposal Site**
- Volume of waste received: 1,200 tons
- Collection vehicles: 300 per day
- Cost for collection and treatment: 1.1 billion yen per year

Waste pickers (Decrease naturally with employment at Super Depo, etc.)
Waste sent to the final disposal site will be 30% of the current amount (70% reduction), and the life of the disposal site could be extended.

**Landfill disposal cost:** 1,200 yen per ton

**Policy of Surabaya City**
Interested in reducing waste through the deployment of intermediate treatment facilities (TPST) within the city.

**Super Depo (Recycle-based intermediate treatment facility)**
- Selection and processing
  - Food waste ⇒ composting (Yield: 20%)
  - Valuables ⇒ Separation
  - Residuals

(50 persons employed in each facility)

Return some portion of profit to communities

**Deployment of Super Depos in 40 locations within the city**
Operate one Super Depo as a pilot project

**Outsource the treatment of residuals at the disposal site minus 1,200 yen per ton**

**Composting at the compost center**
3,000 to 5,000 yen per ton
Sell to manufacturers as raw material
10,000 yen per ton

**Possible to reduce**
- Waste pickers
- Cost for collection and treatment
- Commission fee for treatment
- Landfill disposal cost

**Food waste ⇒ composting**
Yield: 20%

**Valuables ⇒ Separation**

**Residuals**

**Possible to reduce**
- Policy of Surabaya City
- Improvement of living conditions for informal sector
Valuables are taken out from carts using separation conveyors inside the plant.

- Removed recyclable materials are washed, crushed, and compressed to generate added value so they can be sold at an increased unit cost.
- Efficiency is improved in a hygienic workplace. ⇒ Workers can work comfortably.
Current Progress

**Line for separation at SUPER-DEPO (First step)**

- Plastic: 13%
- Paper scraps: 4%
- Metals: 0.3%
- Foreign materials: 5.5%
- Organic: 77.2%

**Compost center (Second step)**

- Transferred by DKP: 10%

**BENOWO final disposal site**

- 85% reduction

**Sold to farmers**

**Waste collection**

- Plastic
- Paper scraps
- Metals
- Foreign materials
- Organic

**Sold to resource recovery operators**

**Plastic**

**Paper scraps**

**Food waste**
As part of the agricultural policy, the Government encourages farmers to use organic fertilizer in Indonesia. Leading manufacturers of chemical fertilizer also produce organic fertilizer, and act as a window for sales. (Unit sales price of organic fertilizer: 10 yen per kg)
GRK (Gas Rumah Kaca) can be reduced from two perspectives: 1. Reduction in the discharge of methane gas by compost production, 2. Reduction in the fuel consumption of transportation vehicles through reduction in the amount of garbage. Numbers below are estimated values. Correct numbers will be calculated based on this year’s investigation.

<table>
<thead>
<tr>
<th>Reduction item</th>
<th>Reduction effect (15 t/day)</th>
<th>Reduction effect (150 t/day)</th>
<th>Reduction effect (1200 t/day Whole of Surabaya City)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Reduction in the discharge of methane gas by compost production</td>
<td>2,150 t-CO2/year</td>
<td>21,500 t-CO2/year</td>
<td>172,000 t-CO2/year</td>
</tr>
<tr>
<td>2. Reduction in the fuel consumption of transportation vehicles</td>
<td>30 t-CO2/year</td>
<td>290 t-CO2/year</td>
<td>2,280 t-CO2/year</td>
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<tr>
<td>Total (1. + 2.)</td>
<td>2,180 t-CO2/year</td>
<td>21,790 t-CO2/year</td>
<td>174,280 t-CO2/year</td>
</tr>
</tbody>
</table>

Demonstration stage in 2013  
Business development stage  
Expanding to whole of Surabaya City
Advantages of Commercialization

1. Low-cost treatment
2. Reduction of transportation costs (CO2)
3. Increase in recycling rate
4. Healthy work environment (enhancement of employment)
5. Farmers are able to use low-priced compost.
2013

Demonstration of the current project (at a scale of 15 tons per day).

2014

Demonstration test at a scale of 20 to 40 tons per day, with a fully-equipped compost production line.

2016

Commercialization making use of the ODA Operation of a facility at a scale of 100 tons per day as a model, aiming at developing a self-sustaining business model in the local context.
Through this environmental project in Surabaya, in which we operate a hygienic and safe recycling plant, we will strive, together with the workers of the plant, to realize healthy and improved living conditions for the workers, and will aim at achieving a recycling rate of 80% or more and at achieving treatment of waste at the lowest cost in the world.

Furthermore, we will make an effort toward improvements in education and will aim at working for this environmental project with pride, thus creating an organization in which people can grow together, understand each other, and share the excitement.

Yasuhiro Nishihara
Senior Managing Director
Nishihara Corporation
Thank You !!