Replication of Surabaya’s Composting Practices:
A main activity of the Kitakyushu Initiative

JICA Kyushu, 30 June 2011
Toshizo Maeda, IGES Kitakyushu Urban Centre

Waste Composition in Surabaya

Plastic
8%
Paper
8%
Street sweeping
13%
Woods/bamboo
10%
Others
8%
Organic
55%

Organic waste shares more than half (as much as 70-80%) of total amount of waste generation.

Prioritize reduction of organic waste

Promote composting
A) at each household
B) at composting centres

Source: Keputih, (2002)

Inputs by the city

(Data source: Cleaning and landscaping Dept., Surabaya)

Total number of household compost baskets distributed for free by Surabaya City

Number of composting centres

Average daily amount of waste disposed at Benowo Landfill* in Surabaya, 2004-2009

*Note: Benowo is the only final disposal site in Surabaya City.
(Data source: Cleaning and landscaping Department, Surabaya)

- 20% reduction in 4 years!
- 30% reduction in 5 years!!

OUTPUT: WASTE REDUCTION
Surabaya’s successful solid waste management model

**Step 1.**

Development of a model community, from 2004 to 2006:
Cooperation between Kitakyushu International Techno-cooperative Agency (KITA) and Pusdakota (a local NGO),

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**Social and environmental benefits**

- Employment
- Production of herbs and vegetables using compost
- Waste segregation and promotion of recycling
- Income by selling compost

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**Starting a model project**

- Waste composition survey
- Shredding of waste
- Mixing with seed compost
- Temperature measurement
- Fermentation and pH tests
- Explaining how to use baskets to residents
Surabaya’s successful solid waste management model

**Step 2.** Scaling up the model project by the City Government, from 2005 – 2011:
- Setting up composting centres
- Distributing compost baskets to residents

**Composting and its positive impacts in Surabaya**

Parks became greener using compost
Streets became greener using compost
Bratang Composting Centre
Sarokwijenan Composting Centre
Repudran Composting Centre

**Activities of PKK (a women’s group) and Environmental Cadres**

Waste segregation training
Explaining how to use compost baskets
Manufacturing bags from waste
Meeting of Environmental Cadres
Activities of Environmental Cadres
Environmental Event

**Surabaya’s successful solid waste management model**

**Step 3.** Organising a community clean-up campaign, from 2005 – 2011:
- Cooperation with NGOs, private companies and the media
- Successful involvement of citizens in the waste management activities
Surabaya’s successful solid waste management model

Efficient Composting Method
- High productivity (within 2 weeks)
- Using only local materials
- No offensive smell, no leachate
- Fast, cheap and good quality!

Composting Options
- Organic waste from households
- Organic waste from vegetable markets
- Household compost baskets (17,000 baskets distributed)
- Community composting centre (PUSDAKOTA’s case)
- Market waste composting centre (54 centres under Cleansing Dept)
- Takakura Home Method (THM)
- Takakura Susur Method (TSM)*
- New Window Method

Types of composting options in Surabaya:

Composting Methods
- Constructions open-air windrow composting on waste dumps (Pendam and indeterminate methods)
- Fermentation
- Composting in a heap for 4-6 months by extending the compost in two and mixing composts suitable to optimize the quality.
- Collect and education on the composting
- Composting is less space requirement
- No foul smell (not rotting)
- Active microorganism in compost enriches the soil
- Features:
  1. Fast and less space required
  2. No foul smell (not rotting)
  3. Low-cost, low-tech and easy operation
  4. Using only local materials
  5. Active microorganism in compost enriches the soil

Financial Analysis of Composting Practices
- Is composting financially sustainable?
Costs of composting promotion

Promotion of composting and waste segregation (only 1-2% of the total solid waste management expenditures)
- Land procurement for a new landfill site
- Management of final disposal site
- Procurement and maintenance of waste management equipment and facilities
- Administrative expenses
- Waste collection and transportation
- Park management

Annual solid waste management costs: USD10 million per year

Cost saved from waste reduction: 40t/d x 365days x (USD1,800/t) = USD4,200

The cost of composting promotion in USD23/t

Is operation of a composting centre financially sustainable?

PUSDAKOTA (NGO)’s composting centre:
- 1.4t/day collection → 40t/month collection
  → 10t/month of compost production
- Sales of compost: 10t/month @ USD100/t
  → Income USD10,000/month
- Expenditure: USD650/month
  (incl. labor and utility costs)
  → Profit: USD350/month = USD4,200/year
  Can purchase a new shredder!!
  (If all the compost is sold...)

Profit, hidden profit: 40t/month x USD23/t = USD900/month = USD11,000/year

City government may think about giving a subsidy for building a composting centre.

How much waste management cost per tonne?

Waste management cost in Surabaya: (collection and landfill management)
- USD10 million/year (2007)
  → USD21/t

Landfill construction cost (27ha): USD6.5 million

Divided by 1,500t/d x 365days x 5yrs & 1,300t/d x 365 days x 2yrs = USD21/t (not including cover soil)

Waste management cost: USD23/t or more

How much did the city save by reducing waste?

Composting centre

14 composting centres in Surabaya City: Composting 50 t/day = 1,500 t/month

Compost production: 300t/month (20% of input)
- Replacing the purchase of soil conditioners
  300t/m x USD20/t = USD6,000/month

PLUS, cost saved from waste reduction:
1,500t/month x USD23/t = USD34,000/month

Profit: USD40,000/month = USD48,000/year

Is free distribution of compost baskets make business sense?

Distribution of household compost baskets in Surabaya:
- 17,000 units distributed for free by the city in 5 years
  - Distribution cost: USD10/basket x 17,000 = USD170,000
  - Campaign cost: USD10/basket x 17,000 = USD170,000
  - Total cost: USD340,000

Benefit:
- Waste reduction: 17t/day (= 17,000 households x 1 kg/day/household)
  - Cost saved from waste reduction: 17t/day x 365days x USD23/t
    = USD414,000/year

Cost recovery in 2.5 years!

Enlarged benefit:
- Waste reduction: 40t/day (2007)
  - Cost saved from waste reduction: 40t/day x 365 days x USD23/t
    = USD330,000/year

Cost recovery in 1 year!!
**Why people practice composting at home?**

**Household financial analysis:**
- Organic waste: 1kg/day/household → 30kg/month
- Compost: 6kg/month (20% of input)

**Purchasing price:** USD0.07/kg (= USD70/t)
- Income: USD0.42/month
- Not enough economic incentive.

**Main driving forces are:**
- Improvement of kitchen environment & self-use of compost for plants and gardens
- Need a monitoring system (= Community environmental leaders)
- Dropping out rate is High! (only 20% continue practicing)

**Recommended actions in 3 years**

1. **Possible actions in Sibu, Malaysia**
   - **Market-waste composting centres**
     - Process 2 t/day (= producing 0.4 t/day)
   - **Composting centres in communities and schools**
     - Process 0.5t/day @ 4 sites → 2 t/day
   - **Distribution of compost baskets to residents**
     - 1,000 households (25% of the total households) → 1 t/day
   - **Organizing a community clean-up campaign**
     - Involve private companies, local newspapers and TV programmes
   - **Compost purchasing scheme**
     - City starts purchasing the compost for park maintenance
     - Free distribution to farmers; marketing of compost
   - **Technical assistance by Kitakyushu City, KITA, IGES and JICA**

**Estimated GHG emissions avoided at landfills**

**Chances for Carbon Credit**

- Potential: 10,000 t-CO₂/year reduction @ USD10/t-CO₂ → USD100,000/year
- Reduction of organic waste generation through composting:
  - 1,500 t/day → 60 t/day of food waste and 20% of park & garden waste
  - Total CO₂ emissions avoided at the final disposal site and the future projection

**Results in Sibu, Malaysia**

- Total amount of solid waste is not decreasing...
  - Population is increasing
  - Economy is growing
  - More consumption, more waste
  - The scale of composting practices may not be large enough...

- It requires a systematic and city-wide approach to achieve total waste reduction.
  - Commitment by the Mayor (leader) and responsible officers is a prerequisite.
Spreading Surabaya’s model in other cities and countries

Model 1: Replication by NGOs
Roles of inter-mediators are essential for replicating/scaling up good practices.

NGOs facilitate replication of good practices to other NGOs and community groups within and outside the city. But, they have difficulties in mobilizing resources from local governments.

Model 2: Scaling Up by Local Governments
Local governments can scale up NGOs’ good practices within the city. (It usually does not go beyond the city boundary.)

Model 3: Scaling Up by Local Governments and NGOs
Local governments can assist NGOs/community groups in scaling up good practices to other NGOs/community groups within the city.

Model 4: Replication from City-to-City
External organizations can facilitate replication of good practices from cities to cities.
Kitakyushu Initiative Final Report

- Describes the outputs and achievements of the KI programme
- Provides recommendations to national and local governments, as well as managers of inter-city programmes similar to KI
- Presented to the Ministers and delegates of the MCED 6*, Astana, in Sep/Oct 2010

* MCED 6: 6th Ministerial Conference on Economy and Development in Asia and the Pacific