Enhancing public awareness and stakeholders’ empowerment and involvement in waste management –
Through a case in Surabaya, Indonesia

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A programme of UN-ESCAP*; Supported by Kitakyushu City, MOEJ*, MoFA* and IGES; Information sharing of good practices

* UN-ESCAP: UN Economic and Social Commission for Asia and the Pacific
* MOEJ: Ministry of Environment; MoFA: Ministry of Foreign Affairs
A case of Surabaya, Indonesia

Population: 3 million
2nd largest in Indonesia
Centre of East Indonesia

Environmental cooperation with Kitakyushu City since 2001

Main cities where Surabaya’s composting practices were replicated

Figure-1 Location of Surabaya City and replication of Surabaya’s practices in other cities
Background

Keputih Final disposal site was closed in 2001 due to opposition by residents. Waste filled the streets and drains.

New Benowo Landfill: 800 scavengers; 35km from city centre; Surrounded by fish ponds; demand for waste reduction is high

(Status in 2001)

(Photo courtesy of PKK Surabaya)
Waste Composition in Surabaya

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: KITA (2002)
Inputs by the city

14 composting centres were set up in Surabaya
Inputs by the city

Figure 2 Number of compost baskets and composting centres in Surabaya

The city adopted the composting method at three existing composting centres in 2005 and 2006 and has since established ten additional centres. There are 13 composting centres managed by the city, in addition to the one managed by Pusdakota. (Data source: Pusdakota, Kitakyushu City, and Cleansing and Landscaping Dept., Surabaya)

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Output: waste reduction

Average daily amount of waste transported to Benowo Landfill* in Surabaya, 2004-2008

* Note: Benowo is the only final disposal site in Surabaya City.
(Data source: City Development Planning Department (BAPPEKO), Cleansing and Landscaping Department, Surabaya.)

- 1,500t/day
- 1,300t/day in 2007
- 1,150t/day in 2008

(Data source: City Development Planning Department (BAPPEKO), Cleansing and Landscaping Department, Surabaya.)
Output: waste reduction

**Composting at each household:**
- 19,000 units sold by PUSDAKOTA
- 19,000 units copied by communities (assumption)
- 600 units of a communal type distributed by Cleansing Department, which caters for about 5 households each (= 3,000 households)
  \[\text{40,000 households x 1kg/day/household} \rightarrow 40t/day\]

**Composting at 14 composting centres:**
- Cleansing Department: 13 composting centres, 40t/d (= 80m³/d)
- PUSDAKOTA: 1 composting centre, 1.4t/d

*1 ton of composting reduces 2-3 tons of waste.*

**Reuse and Recycling** of other dry waste

- Remaining **120t/d** (2007) and **270t/d** (2008) reduction by **Reuse** and **Recycling**.
Social and environmental benefits

- Better household environment
- Greener and cleaner streets
- Good environmental education tools
Social and environmental benefits

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

Relationship of main stakeholders in Surabaya

Surabaya City

Support for the campaign

Cleansing and Landscaping Department, Surabaya City

Operation of 12 composting centres

Distribution of household compost baskets

Coordination of NGOs and Environmental Cadres

1. External agency
   Kitakyushu City, KITA*

Catalytic role in coordination of various stakeholders
* KITA: Kitakyushu International Techno-cooperative Association

Development of composting methods

2. NGOs & community groups

Unilever, Jawa Pos (media group)

Organising Green & Clean Campaign

NGOs & community groups

NGOs & community groups (Environmental Cadres)

3. Local Government

PKK (women’s group)

Operation of a community composting centre

Distribution and sale of household compost baskets

Purchase of compost from households

Hands-on composting trainings (more than 80 times)

4. NGOs & community groups

Pusdakota

5. Private companies

Support for the campaign

Distribution of household compost baskets
Step 1.

Development of a model community:

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

(photos courtesy of KITA)
Development of a model community (Pusdakota (NGO)’s activity)

- Segregated waste collection from the community
- Shredding at the composting centre
- Fermentation
- Household compost basket
- Selling compost
- Green streets using compost
Achievements by KITA’s intervention

PUSDAKOTA’s compost centre: before and after KITA’s intervention

(photo courtesy of KITA)
Step 2.
Scaling up the model project by the City Government, from 2005 – 2010:

- Setting up composting centres
- Distributing compost baskets to residents
Composting and its positive impacts in Surabaya

(Photos cited from “Sparking Parks in Surabaya”, Cleansing Department, Surabaya City, 2008)

- Parks became greener using compost
- Streets became greener using compost

Bratang Compost Centre
Sonokwijenan Compost Centre
Keputran Compost Centre
Activities of PKK (a women’s group) and Environmental Cadres

- Organic-unorganic waste sorting
- Waste segregation training
- Explaining how to use compost baskets
- Recycling trainings
- Manufacturing bags from waste
- Turn waste into blessing

Meeting of Environmental Cadres
Activities of Environmental Cadres
Environmental Event

(Photo courtesy of PKK Surabaya (top row) and Environmental Cadre of Tegalsari, Surabaya (bottom row))
Step 3.
Organising a community clean-up campaign, from 2005 – 2010:

- Cooperation with NGOs, private companies and the media
- Successful involvement of citizens in the waste management activities
Community and Private Sector Involvement

Award winning community

Green streets

Campaign sponsors

Entrance to a community

Award winning housewives group

Products made from waste

(Photo courtesy of Uli Peduli)
(5) Main stakeholders (Uli Peduli (an NGO funded by Unilever))

Total number of Environmental Cadres in Surabaya Is 28,000!

20% of communities are participating in the campaign

Number of Environmental Cadres under Uli Peduli (Unilever) and participating communities in Green & Clean Campaign

Figure-30 Number of RTs which participated in Green & Clean Campaign and the number of Environmental Cadres under Uli Peduli (source: Uli Peduli (2008))

Number of RTs participated in Green & Clean Campaign

- 325 in 2005
- 283 in 2006
- 355 in 2007
- 1,797 in 2008

Number of Environmental Cadres under Uli Peduli

- 317 in 2005
- 1,500 in 2006
- 5,684 in 2007
- 19,871 in 2008
Efficient Composting Method

- High productivity
- Using only local materials
- No offensive smell, no leachate
- Fast, cheap and good quality!
COMPOSTING METHODS

Figure 8 Operational flow of Takakura Composting Method
(Prepared by Maeda (2009) with technical supervision by Kouji Takakura, JPeC Co., Ltd.)

Features:
1. **Fast** and less space requirement
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
Composting Options

Types of composting options in Surabaya

- **Organic waste from households**
  **Location of composting**: Household compost baskets (19,000 baskets distributed)
  **Composting methods**: Takakura Home Method (THM)

- **Organic waste from vegetable markets**
  **Location of composting**: Market waste composting centre (13 centres under Cleansing Dept)
  **Composting methods**: New Windrow Method

- **Community composting centre**
  **Location of composting**: Community composting centre (PUSDAKOTA’s case)
  **Composting methods**: Takakura Susun Method (TSM)*
  New Windrow Method

*TSM stands for Susun Method*
Financial Analysis of Composting Practices

Does it make business sense?
Costs to promote composting

Expenditure of Cleansing Department Surabaya, 2006-2008

[ Rp. million]

- 180,000
- 160,000
- 140,000
- 120,000
- 100,000
- 80,000
- 60,000
- 40,000
- 20,000
- 0

2006 2007 2008

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

Annual solid waste management costs:

USD10 million per year

- Waste collection and transportation
- Park management
- Administrative expenses

Figure 5  Annual expenditures of Cleansing and Landscaping Department, Surabaya, 2006-2008
(Data source: City Development Planning Department (BAPPEKO)Cleansing and Landscaping Department, Surabaya; prepared by Maeda (2009))
How much is the solid waste management cost per tonne?

Waste management cost in **Surabaya**: (collection and landfill management)

USD10 million (2007)

Divided by 1,300t/d x 365days:

⇒ USD21/t

Landfill construction cost (27ha):

USD6.5 million

Divided by 1,500t/d x 365days x 5yrs
& 1,300t/d x 365days x 2yrs

⇒ USD2/t (not including cover soil)

Waste management cost:

USD23/t
Is operation of a composting centre financially sustainable?

PUSDAKOTA’s composting centre:
1.4t/day collection ➔ 40t/month collection
➔ 10t/month of compost production

Selling at USD100/t
➔ Income USD1,000/month

Expenditure: USD650/month

➔ Profit: USD350/month
= USD4,200/year
➔ Can purchase a new shredder!!

Plus, cost saved from waste reduction (40t/month)
➔ Hidden profit: 40t/month x USD23/t = USD900/month = USD11,000/year
➔ Can build a new composting centre in few years!!
How much did the city save by reducing waste?

13 composting centres of Surabaya City:
  Composting 40 t/day = 1,200 t/month

Compost production: 300t/month (25% of input)
  Replacing the purchase of soil conditioners
  300t/m x USD20/t = USD6,000/month

PLUS, cost saved from waste reduction:
  1,200t/month x USD23/t
  = USD27,000/month

Profit: USD33,000/month
  = USD40,000/year
How much space is required for composting centres?

**Necessary space** for a composting centre (incl. the office space):

- **1t/day** (30t/m) of waste input: **100m²** → Compost production: **6t/m** (Income: USD600/month)
- **3t/day** (90t/m) of waste input: **200m²** → **18t/m** (USD1,800/m)
- **5t/day** (150t/m) of waste input: **300m²** → **30t/m** (USD3,000/m)

**Fig.** Area of composting centres and amount of processed organic waste in Surabaya

*Source: Interview with Cleansing Department Surabaya*
Does free distribution of compost baskets make business sense?

Distribution of **household compost baskets in Surabaya:**
- **19,000 units** distributed for free by the city in 5 years
- Distribution cost: USD10/basket x 19,000 = USD190,000
- Campaign cost: USD10/basket x 19,000 = USD190,000
- Total cost: **USD380,000**

Benefit:
- Waste reduction: **19t/day** (= 19,000 households x 1 kg/day)
- Cost saved from waste reduction: 19t/d x 365days x **USD23/t**
  \[= \text{USD160,000/year}\]

Enlarged benefit:
- Waste reduction: **40t/day**
- Cost saved: **USD340,000/year**

**Cost recovery in 2.5 years!**

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

Household financial analysis:  
1kg of organic waste/day/household  
→ 30kg/month  
→ 6kg/month of compost (20% of input)

Purchasing price: USD0.07/kg  
→ Income: USD0.42/month  
→ Not enough economic incentive.

Plus,  
improvement of kitchen environment & use of compost for plants and gardens
Estimated GHG emissions avoided and projection at landfills

[t/year]

Potential: 10,000t-CO$_2$/year reduction @ USD10/t-CO$_2$ $\rightarrow$ USD100,000/year

Reduction of organic waste generation through composting: 80t/day (= 60t/day of food waste and 20t/day of park and garden waste)

Total CO$_2$ emissions avoided at the final disposal site and the future projection

Figure 6  Reductions of organic waste generation and consequent greenhouse gas emissions in Surabaya (Prepared by Maeda (2009), based on the first order decay model from “Tool to determine methane emissions avoided from disposal of waste at a solid waste disposal site (version 04)”, CDM Executive Board, UNFCCC)
4. Recommendations for other cities
e.g. Actions for 15% reduction in waste generation

Inputs in **Surabaya**: 10-15% reduction target

- Waste generation: 1,500t/day → 1,300t/day
- Composting Centres: processing **40t/day (= 2-3% of total waste)**
- Population: 3 million (= 600,000 households)
- Household compost baskets: **19,000 units (= 2-3% of households)**

Inputs in **Sibu, Malaysia (proposal)**:

- Waste generation: 130 t/day → 110 t/day (**15% reduction!**)  
- Composting Centres: process **10 t/day (= 7-8% of total waste)**
- Population: 200,000 (= 40,000 households)
- Compost baskets: **2,000 households (= 5% of households)**
e.g. Possible actions in Sibu, Malaysia

1. Market-waste composting centres
   – Process 5 t/day (= producing 1t/day)

2. Composting centres in communities and schools
   – Process 1 t/day @ 3 sites ➔ 3 t/day
   – Purchasing of compost; promotion of compost use for farmers

3. Distribution of compost baskets to residents
   – 2,000 households (5% of the total households) ➔ 2 t/day

4. Organising a community clean-up campaign
   – Involve private companies and local newspapers and TV programmes

5. Compost purchasing scheme
   – City starts purchasing the compost for park maintenance
   – Free distribution to farmers; marketing of compost

6. Technical assistance by Kitakyushu City, IGES and JICA

Target 20 t/day reduction
130 t/day ➔ 110 t/day
(10 t/day by composting & 10t/day by recycling)
Spread of Surabaya’s model in other cities and countries

INDONESIA
Surabaya
Semarang
Medan
Makassar
Palembang
Central Jakarta
Balikpapan
Tarakan

PHILIPPINES
Bago
Cebu
Cavite
Talisay
Puerto Princesa

THAILAND
Bangkok
Sankamphaeng
Sri Lacha

MALAYSIA
Sibu
Kuala Lumpur

NEPAL
Lalitpur

INDONESIA → PHILIPPINES → MALAYSIA → NEPAL

Surabaya → Bago → Sankamphaeng → Sibu

Semarang → Cebu → Sri Lacha → Kuala Lumpur

Medan → Cavite

Makassar → Puerto Princesa

Palembang → Talisay

Central Jakarta → Bangkok

Balikpapan

Tarakan

Lalitpur
International Consultative Meeting on Expanding Waste Management Services in Developing Countries
IGES / Kitakyushu Initiative for a Clean Environment

Workshop in Surabaya, August 2008
International Consultative Meeting on Expanding Waste Management Services in Developing Countries
IGES / Kitakyushu Initiative for a Clean Environment

Replication in 5 cities in Indonesia

In cooperation with JICA, Ministry of Environment and Ministry of Public Works, Indonesia

Central Jakarta City
Makassar City
Palembang City
Tarakan City
Balikpapan City

In cooperation with JICA, Ministry of Environment and Ministry of Public Works, Indonesia
Development of a model project in Bago, Philippines

- **Vermicomposting**: 3 months for processing
- **Changing to Takakura Method**: (2 weeks for fermenting)
- **Using mud-press from sugarcane**
- **Household compost boxes and pots**
Implementation in Bago, Philippines

- Composting training
- Monitoring the use of basket
- Workshop in Bago
- Distribution of baskets
- Open dumping site
Copied from Bago to Cebu, Philippines

2,000 baskets were distributed by Pagtambayayong (NGO)

Dump site is full

A small vegetable garden next to a make-shift hose using compost made from kitchen waste
Copied from Bago to Talisay, Philippines

Composting Workshop in December, 2008 in Talisay

Day 1

Day 11

Hon. Mayor of Talisay
Copied from Bago to Ternate, Cavite, Philippines

A composting centre build by an NGO in Ternate, Cavite

Participants in a work shop in Ternate, Cavite
Application in Bangkok, Thailand

Din Daeng composting centre

Checking the condition of a household compost baskets
Hon. Vice Governor of Bangkok

Workshop-training in Bangkok, March 2009
Copied from Bangkok to Lalitpur, Nepal

- Preparing seed compost
- 200 out of 600 households using baskets

Compost Basket
Application in Sibu, Malaysia

Workshop training

Source: Sibu Municipal Council
Replication Models of Good Practices

Replication does not happen automatically

- It was learnt that the implementation of pilot projects and sharing knowledge on best practices were insufficient (1st cycle)
- Many projects remain singular events without further replication. Why?
Replication by NGOs

1. Training provided to others became source of NGO’s revenue
2. Common feature: Strong mandate and high motivation to spread good practices beyond their operating borders
3. Win-win situation for NGOs and KI programme
Scaling up by local governments

New composting centres were set up
Scaling up by local governments in cooperation with NGOs

1. Household compost baskets were distributed through the network of NGOs and environmental cadres
2. Community cleaning campaigns were organized with the support of private sector and media
Replication from city-to-city & through inter-city network

Indonesia

- Surabaya’s solid waste model
- Composting practices

Financial supports
- JICA’s Grassroots Grant
- CLAIR*
- Japan Fund for Global Environmental

Kitakyushu City

- KITA
- Kitakyushu Initiative Programme

Inter-mediators

UNESCAP

Thailand

- Bangkok
- Sankamphaeng
- Sri Lacha

Malaysia

- JICA Malaysia Office
- Sibu
- Kuala Lumpur
- JICA Nepal Office
- Lalitpur

Malaysia

- JICA Nepal Office
- Bangkok

Philippines

- Cebu
- Talisay
- Cavite
- Puerto Princesa

APFED**

* CLAIR: Council of Local Authorities for International Relations
** APFED: Asia Pacific Forum for Environment and Development
Replication by Central Government (SANIMAS* in Indonesia)

Ministry of Public Works (PU), Indonesia

Financial support by donors

Local government

Pilot project

Replicated project

Local government

Pilot project

Replicated project

Local government

Pilot project

Replicated project

Local government

Pilot project

Replicated project

Local government

Pilot project

Replicated project

Local government

Pilot project

Replicated project

Local government

Pilot project

Replicated project

NGO

BORDA

NGO

NGO

NGO

Inter-mediators


More than 300 replicated projects under the SANIMAS programme by the Ministry of Public Works (PU) (2007-2009)

* SANIMAS: Low-cost decentralized wastewater treatment programme in Indonesia
Replication by External Organisations and City-to-City

Financial support by donors

**LINAW / PSA* Program**

Inter-mediator

**Inter-mediators**

- Muntinlupa City
- Dumaguete City
- San Fernando City
- Manjuyod City

**Pilot project**

**Capacity building**

**Local government**

**Replicated project**

**LINAW programme (2003 – 2006)**

4 cities

**PSA programme (2007 – 2010)**

10 cities and 2 Water Districts

Replication of low-cost wastewater treatment systems in the Philippines

*LINAW: Local Initiative for Affordable Wastewater Treatment; PSA: Philippine Sanitation Alliance; both programs are funded by the United States Agency for International Development (USAID)*
Replication models are applicable in other areas

**Replication** and expansion of good practices/policies are an easy way to induce large impact

Needs for **information/knowledge sharing**

Roles of **inter-mediators**: NGOs, local governments, central governments, inter-city networks,

**Potential areas**

**3Rs & RESOURCE EFFICIENCY**
- Centralized composting
- Household composting
- Recycling, waste banking
- Improving final disposal sites

**WASTEWATER**
- Septic tanks and septage management
- Decentralized (on-site) wastewater treatment

**CROSS-CUTTING ISSUES**
- Environmental education

Thank you! maeda@iges.or.jp
http://form.iges.or.jp/r/c.do?4n_12l_3e_zoq
http://kitakyushu.iges.or.jp/publication/index.html
Summing up...

- **Empowerment and involvement** can improve MSWM decision making and facilitate implementation.
- Building trust and respect **takes time**; it is a task of deepening local democracy which goes far beyond just improving MSWM.
- Involving citizens is **easier** if working through established and respected organisations and leaders.
- The case of **Surabaya** shows clearly the **benefits** of involving stakeholders in SWM.
- This case also illustrates the **need to develop partnerships** with multiple stakeholders.

Thank you for your kind attention!