
WASTE MANAGEMENT PROBLEMS IN SURABAYA¹ AN INTEGRATED SUSTAINABLE APPROACH

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Introduction

During the Earth Summit in Rio de Janeiro (1992) Surabaya together with Kitakyushu and along with very selected cities in the world were awarded with the Honor City Programme by UNCED. Earlier Surabaya was also awarded with The UNEP Award (1990) in New York. However, in the second half of the nineties, Surabaya deteriorates in maintaining its environmental quality whereas Kitakyushu and Surabaya decide to strengthen their relationship by commitment in working together to bring Surabaya back to its capacity to improve the overall environmental quality starting with re-managing the urban waste disposal system. Together the waste management experts of Surabaya and Kitakyushu attempt to conceptualise a waste management model that is environmentally sound, manageable by a city in developing world and sustainable.

Contextual background

As the second city in Indonesia with effective population of about 3.5 million in an area of 320 km² and more than half belong to the low income people, waste is a serious problem. In the city government organisation, a department to look after urban waste management exists with an overall responsibility to ensure that the city is neat, clean and free from any impact incurred by urban waste. The waste that is under the responsibility of department are waste produced at domestic, markets, shops, hotels, offices, hospitals, industries, harbour, etc. basically waste disposal is managed in two tiers system. From the producers to the depot station is the responsibility of the producers. City government is in principle only responsible to look after waste that is accumulated at depot stations to the final disposal city. For this service waste producers have to pay fee to about US\$0.60 per month for social institutions, twice as much for medium class housing and more than US\$20 for five star hotels, etc. Annually the fee collected amount to only about US\$1.7 million that is about half of the budget allocated for waste management (about 6% of the total city budget). This is far from sufficient to properly managed waste disposal supported by working equipment.

To manage city waste only one final disposal site of about 3.5 Ha. Exist using sanitary landfill method. It is further supported by 76 designed depots stations and 147 provisory depots spread all over the city. There are 108 working trucks of different types and carrying capacity from 6 m³ to 14 m³, compactor, dump truck, etc. Other supporting vehicle also exist such mobile toilets, human waste trucks, etc. it is also interesting to remind that in 1993 JICA consultant has conducted study on waste problems in Surabaya. It was identified that waste was generated at 2,95 liters/capita/day. The total waste generated in Surabaya was about 8800 m³/day or 264 000 m³ per month. In another study conducted at the same time by the Laboratory for Housing and Human Settlements of ITS found out that waste pickers collect about 30% of recycled waste not included in the JICA study. Meaning that if waste pickers does not their work an additional of 80 000 waste should be disposed or and additional of about US\$1 million is needed. This only showed the importance of the role of waste pickers that in the early nineties was included in the waste management system, was based on semi-clean production approach.

Concept and approach

Managing waste in most cities in the developing countries has been done through the end-of-pipe approach. On the other hand, in late eighties, clean production approach has been promoted first to deal with industrial waste, Later the clean production approach was widely applied to other waste disposal problems, including urban waste. However, the basic principle of waste in itself has not been clearly and thoroughly been dealt with. This is important, as whatever approach will be applied, it need to fit into the principle and context of how and where the waste will be managed.

In the early nineties, Surabaya has introduced the **5R** principle in waste management. It consist of:

- **Reduce**; means to take as little as possible waste home.
- **Reuse**; means that using any thing as long as possible before it is considered as waste.

¹ This paper was prepared as initial report to the survey done as part of the joint research conducted by Environmental Department of Kitakyushu City with the Laboratory for Housing and Human Settlements of ITS supported by the Waste Management Department and City Planning Board of Surabaya City and first presented at a seminar in Kitakyushu City 20 September 2002

- **Recover**; to give other use for things that is being considered as waste, such as making envelope out of used paper or flower pot from used car tire, etc. In this category composting to produce organic fertilizer is included, especially mini ones.
- **Revalue**; is to sell the so-called waste (used cans, magazines, bottles, etc.) as second hand goods as other value to special buyers (locally known as (*rombengan*) that is still popular in many Indonesian cities.
- **Recycle**; to extract the substance of the waste for used as basic material such as paper, metal, plastics, glass, etc.

It should be reminded that the basic principle of the existence of waste is universal, that every body is producing it and every body do not wanted to have waste in their back yard, including their own produced waste. It is therefore essential that the respective people as producer of waste should also take greater responsibility in managing its disposal. Waste disposal should be managed as close as where it is produced. The farther is the place where disposal is being managed, the greater the problem that should be resolved. It is better to reduce or if possible prevent the occurrence of problem so that it needs not to be resolve, hence the clean production approach, it all this principles can be integrated, that waste can be managed in a sustainable and environmental friendly way.

Profile of the study

When there was a change in the Mayor of Surabaya in 1994, gradually waste management system returned to end-of-pipe approach with business as usual attitude of the officials. Needless to say waste problems gradually also increased to a state of unmanageable situation that anger the citizens and together with other problems end-up to the dismissal of the Mayor and install the vice Mayor to take over the responsibility of running the city. At this special point of time Kitakyushu City offers to assist Surabaya city government in redesigning its waste management system working with The Laboratory for Housing and Human Settlements of ITS.

The basics of the “new” design follow the logic mentioned in the previous chapter with emphasis on clean production approach. Two inner city sub-district (*kelurahan*) related to depot stations Pakis (central-east) and Dinoyo (central-west) were chosen to do detailed study on waste and citizens perception to the problem and possible solution of urban waste. The respondents were randomly chosen among the inhabitants of the low-income population living in the kampungs that also consist of one third middle high income people as can be seen in the income data below. There are 63.43% female respondents with 11.11% reaching elementary education, 65.74% high school education. There are 37.5% working in the formal sector, the rest are mostly self-employed to include retired persons (14.35%). Income category consist of 36.58% have less than US\$ 57 per month per household, 32,41% to US\$ 104 and the rest are higher than US\$ 104.

The household size consists of 22.22% less than 3,42% between 4-5 and the rest more than five persons per household. In term of age, most are in the productive category of less than 50 years (more than 60%). Most of them (60.04%) were born in the respective kampungs of the sub-district. Most of them owned their house (85.19%) and impermanent condition (93.53%). Most of the house (78.70) use piped waster for cooking. Only a few have to depend on water vendors and well. For them pipe water are good and sufficient as they have no complain of sickness. For washing they use more well water. They also have individual toilets (93.06%).

If in the formal housing domestic waste is collected daily, not so in the low income housing such as in the kampungs. Only 29.63% of the people in the studied kampungs claimed that their waste is collected daily. Another 20.37% claimed that their domestic waste is collected every other day. Between two days to one week of waste collection is done to 36.57%. The rest were only serve with waste collection once a week. Most of them are satisfied with the clean condition of their kampungs. If not then they do community work on holidays. They stated that once a week communal work is done by 10.65%. But mostly (31.46%) they do it once a month.

As mentioned earlier in the paper, waste collection from household to depot station is the responsibility of the people themselves. The equipment needed to look after waste

collection at the first tier should also be self provided. It is also interesting to note that 53.70% claimed that waste pickers visit their homes to look for waste that can be recycled. Irregular visit by waste pickers is claimed by 31.48%. This fact only proved that even in the low income housing of the kampung is also look upon an potential for waste recycling.

It is apparent that the lady is more involved in looking after the disposal consists of only 5.56%. Other family members including by domestic worker do the rest of the work. Most (35.19%) have waste container permanently made is the front part of the house. Another 16.67% use used plastic bags and 29.63% use whatever means is available and non-permanent. The neighbourhood unit organisation (*rukun warga or RW*) is responsible in organizing waste collection system as claimed by 81.94%. About 10% can be considered as not well managed. There is not effort what so ever to do otherwise than the conventional way is waste disposal.

How do people perceived when alternative waste management system that requires greater participation of the waste producers (people) would be introduced. Out of the elements of the 5R concept, people chose revalue (47.69%) as the most popular method of waste reduction. About 39.48% do not have any idea what to do or no opinion. Asked of the women are willing to pioneer in waste reduction movement, 44.44% stated that they are willing to participate and quite a number (55.09%) are reluctant. This might partly due to the fact that 65.28% said that there were significant improvements of waste management in the last five years.

The following table shows the waste composition from the respective depots of the study:

Items	ITS ² (%)	JICA ³ (%)
Organic	44.81	71.85
Paper	17.64	12.45
Plastic	16.46	7.60
Metal	1.99	0.90
Glass	8.07	0.90
Rubber	0.0	0.54
Textile	3.29	1.94
Others	7.74	3.84

To the figures presented above, JICA conclude that every persons produced 2.95 litres per day. In our study the size of waste produced average to more than 4 litres per capita per day. It very much depends on the compactness of the waste. Therefore the ITS study is accurately based on weight rather than volume. For organic waste are 145.97 grams per person per day and 22.48 grams for non-organic waste per person per day. In the average every persons produced 168.45 grams per day.

It is further important to see the profile of waste pickers in general. There are about 1600 persons working as waste pickers throughout Surabaya organized under the Indonesian Waste-pickers Association (API) with sub organisation in various localities as deemed necessary. Waste pickers sell their picked waste to waste accumulators that consist about 25-30 various sizes. The accumulators (**waste pickers**) consist of 71.43% (**62.5%**) men. Most only enjoyed elementary education 42.86% (**47.06%**), and about the same numbers finished high school, 42.96% (**5.9**). Only 14.29% (**41.17%**) have not finished elementary education, mainly women. In term of income, they received between US\$ 57 or Rps. 500,000 to US\$ 104 are 14.29% (**12.5%**) and the rest or 85.71% earned more than US\$ 104 (**18.75%**). No family earned less than US\$ 57 (**62.5%**). Household size is rather large, 4-7 members are 71.43% (**56.25%**) and 8-10 consists of 28.57% (0% but **43.75%** of waste pickers have 1-3 household members). They are mostly young, 14.29% (**31.25%**) between the age of 21-30, 57.14% (**12.5%**) are age of 31-40 years and 28.57% (**18.75%** and the rest over 50 years old with **6.25%** does not know their age) between 41-50 years.

As for the duration of them working as waste accumulators (**waste pickers**) 14.29% (**6.25%**) worked less than 5 years; 28.57% (**18.75%**) between 5-10 years and the rest (**40%**) more than 10 years. They mostly originate from Surabaya to 28.57% (**12.5%**), out side Surabaya but in the same province 28.57% (**81.25%**) the rest from our side East Java province. They do separate the waste collected and sell it mostly to factories that produced basic material to finished product for use. They will support of their role will be (again) included in the waste management system and don't mind if they have to change

² The study if TS differentiate the waste into 9 items not included "others".

³ at city management scale 1993

their way of doing the work. This showed the willingness to support the improvement of waste management system.

Towards an integrated and sustainable approach

Needless to say that the study clearly indicate the potential for and support received to introduce better waste management system. In principle the 5R and clean production approach will pose no serious problem to be used. However the model for integrated and sustainable waste management still need to be discussed with the Kitakyushu city experts. A seminar in two levels will be conducted to deliberate the initial model. First it will be discussed with the respective community at the studied kampungs. Then the findings will be discussed in a city scale seminar to include wider stakeholders to arrive at a final model (hopefully). However, certain components of the model can be identified from the findings of the study.

It is important to increase the awareness of the community that every one is responsible to reduce the waste they produced. In Kyoto waste is collected twice weekly. In most other cities, including in Europe the most waste is collected three times per week. This condition corresponds to the findings in the kampungs. It is proposed that waste will be collected every other day and Sunday is a holiday. Next continued campaign should be under taken on the principle of 5R and clean production approach.

Further waste management should focused in the transfer depot stations that have to be modified to include the function of waste selection, picking and if possible a mini composting process is also included. As ample place of work for waste pickers should be provided, as they are very much responsible in reducing the budget need to look after the waste picked by them. From earlier studies parallel undertaken by ITS to the study done by JICA, waste puckers can reduced the waste to more than 50% and up to another 30% can be composted. Meaning that waste that have to be disposed at the final disposal site will not be more than one third.

If the final waste disposal site is designed not only in a sanitary way, but also in rotary sequence, it can easily be sustainable meaning that the old (mature) waste can be used as backfill material for construction sites. Waste management should also be an integral part of the wider environmental improvement activities, from tree plantings to environmental education can activities for all age from children to retired persons looking after environmental demonstration sites that should spread to all level of the city and activities. Kitakyushu has experience that should be shared with others.

Ideally and environmental council can be established that can be attached to existing organisation such as the citizens council now exist in Surabaya. At local neighbourhood level, many kampungs has already their community council that look after the affairs in the kampungs. Once the people in the kampungs tool active part in the effort, it is not difficult to influence higher income community to get themselves involved. It was clearly shown in late eighties when Indonesia was introducing the Noble City Award (*Adipura*) movement that put Surabaya at the highest level of achievement and later earned itself the UNEP Award in 1990. Needless to say that the department of waste management should also be adjusted to make itself more accountable and transparent to what it is doing or not doing.

Concluding notes

Five main concluding notes should be observed:

1. There exist great potential in the community to better organised waste management system involving the people
2. Leadership in the city can play an important role, both in positive and negative terms
3. In a globalizing world, cities need to be more competitive and it should among others be reached through better environmental management
4. Clean production approach and extreme waste reduction effort seem to be *THE* alternative to achieve sustainable waste disposal system
5. Finally, people as producers of waste should be made aware of their responsibility to look after their own waste. It is waste that we should control or we will be controlled by the waste to become part of them.

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