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Involvement of Household, Government and NGOs in Solid Waste Management in Khulna City: A Comparative Analysis

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Abstract: This study has analyzed the generation, characteristics and especially disposal system of solid waste in Khulna city, as urbanization and economic progress increases consumption of resources also tend to increase of waste at the same rate. This leads to immense negative impact on environment in the sense of generation of waste by the urban. Improper management of solid waste is one of the main causes of environmental pollution and degradation in many cities. Developing cities like Khulna, the third largest metropolitan city in Bangladesh, have now begun to acknowledge the environmental and public health risks associated with uncontrolled dumping of metropolitan solid waste (MSW). To these attempts, a survey was conducted to observe the present scenario of total MSW management system in Khulna city. Result reveals that near about 9-11% of total generated wastes are collected by door-to-door collection system provided by mainly non-governmental organizations (NGOs) and community based organizations (CBOs) using 46 non-motorized rickshaw vans. Moreover, the major portion of collected wastes is disposed to the nearest secondary disposal site (SDS) by these organizations and then transferred to ultimate disposal site (UDS) or to private low-lying lands from there by the city authority. A small portion of organic wastes is going to the composting plants of NGOs. In this survey it is seen that major identified problems of existing management of MSW by NGOs and CBOs are the irregular collection of solid waste, nonpayment of service charges by the beneficiaries, involvement of child labor, reluctance of city dwellers participation etc. Finally the paper suggests that some measures and steps should be taken to keep the city nice and healthy.

Keywords: NGOs, Household, Awareness, Solid Waste, Environmental Degradation

1. Introduction

Rapid urbanization and population growth are largely responsible for very high increasing rate of MSW generation in the urban areas of Bangladesh. Due to unplanned waste disposal and improper waste management, environmental alarming conditions in urban areas were not the prime concern even a few decades ago in the developing countries like Bangladesh (Bhuiyan et al., 2003). But high population growth in urban made the environmentalists think about the scientific waste management with maximum priority in urban planning. Rapid urbanization and population growth are largely responsible for very high increasing rate of MSW generation in the urban areas like Khulna. As such, most of the urban local bodies are finding it difficult to keep pace with the demand for adequate solid waste management and conservancy services provided by the urban local bodies. Empirical analyses using macro-economic data indicated that the per capita generation of MSW was at least 0.3-0.4 Kg per day even for the poorest people. In general, one percent increase in population is associated with a 1.04% increase in MSW generation, and 1% increase in per capita income is associated with a 0.34% increase in total MSW generation (Bartone, 1995; Rafizul et al. 2012a).

Solid waste disposal poses a greater problem because it leads to land pollution if openly dumped, water pollution if dumped in low lands and air pollution if burnt (Chowdhury, et al.2008). Khulna city is facing serious environmental degradation and public-health risk due to uncollected disposal of waste on streets and other public areas, blockage of drainage system by dumping wastes indiscriminately and

by contamination of water resources near uncontrolled dumping sites.

To investigate the present scenario of household waste collection system, A survey was conducted by visiting the household to gather information and their opinion about solid waste management at different ward under city corporation areas and to find out the total number of NGOs and CBOs involved, their MSW management activities, and the present scenarios of secondary disposal sites and roadside open dumping.

There are total 8 NGOs and 2 CBOs involved in MSW management at different wards of KCC. The city authority collects waste partially by door-to-door collection system in some ward . CBOs like 27 no. ward Poribesh Unnoyon Committee and Nobo-jagoron works partially in 27 and 16 ward, respectively. The total waste collection from generation sources by NGOs and CBOs is only 8 to 12% of total MSW generated in Khulna city. One NGO are involved in composting of organic wastes by running one com-posting plant situated in Rajbandh. Prodipan is the only NGO involved in partial management of medical waste in Khulna city. In Khulna city, a survey was conducted to find out the total number of NGOs and CBOs, their MSW management activities, and the present scenarios of secondary disposal sites and roadside open dumping. A few meetings were arranged with the conservancy department of the city corporation office and the directors of all NGOs to collect the data and information of MSW management.

Recycling is an efficient and effective solid waste management system. Motivations of this paper are to dispose-off the waste from the household kitchen to the ultimate disposal site (UDS) or collecting the organic or inorganic waste to the final treatment plant and energy generation, organic manure production. Creating awareness among the city dwellers, motivations criterion to popularize the issue among the urban population, role and benefits of the CBOs, responsibility and involvement of various government & non-government organization are also spelled out in the paper.

2. Study Area

In Bangladesh, Khulna is the third largest city and has been known as an industrial city with a port and stands on the banks of the Rupsha and the Bhairab rivers. It is in the south-western part of the country. Geographically, Khulna lies between 22^0 47′16′′to $22^0$52′ north latitude and $89^0$31′36′′ to $89^0$34′35′′ east longitude. The city is 4 meter above the mean sea level (MSL) (Murtaza, 2002). Total area of KCC is 47.0 sq.km. comprising 31 wards (BBS,2001). Moderately rapid population growth 3.8% mainly due to rural-urban migration and gross population density is very high about 18,000 per sq. km. (Rafizul et al. 2012b). It was reported that about 50% of the total population in Khulna is migrants, mostly employment purposes. Presently the population reaches to 1.5 mil-lions (BBS,2001), results a pile of garbage accumulated every-day and remains ill managed and creating enormous health and environmental hazards. As such, Khulna city was selected as the study area of the research.

Figure 1. *Map of Bangladesh*

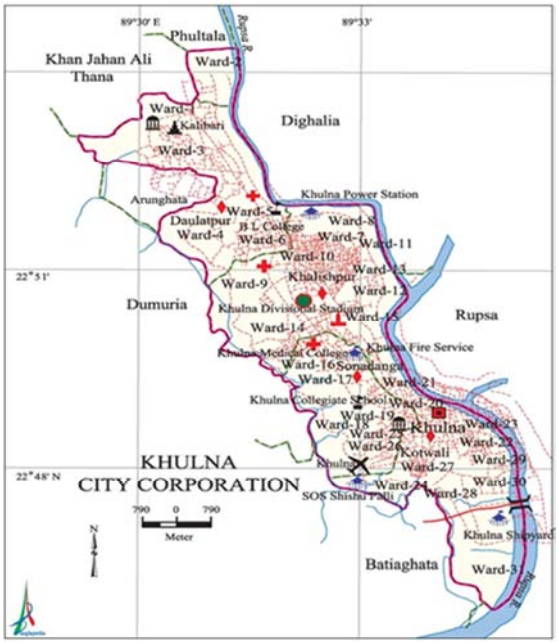

Figure 2. *Map of Khulna city*

3. Review of Literature

Solid Waste Management is considered as the most prominent environmental concern and key management issue. According to Bartone, 1995, the current practice of collecting, processing and disposing municipal solid wastes is considered to be least efficient in the developing countries. The typical problems are “low collection coverage and irregular collection services, crude open dumping and burning without air and water pollution control, the breading of flies and vermin, and the handling and control of informal waste picking or scavenging activities” (Bartone, 1995).

Although some cities do spend significant portions of their municipal revenues on waste management (Cointreau, 1982, 1994; Thomas-Hope, 1998; Schubeler, 1996 and Bartone, 2000), they are often unable to keep pace with the scope of the problem.

Sustainable solid waste management is a relatively new discipline in Small Island Developing States and success of Solid Waste Management Projects (SWMPs) has been threatened by social risks associated with the inadequate inclusion of the public in decision making on SWMPs (Clairvair O. Squires, 2006).

Many cities in Africa and India collect less than half of the waste they generate. Worldwide, over two thirds of human waste are released into the environment with little or no treatment, resulting in a deterioration of the urban environment in the form of air, water, and land pollution that pose risks to human health and the environment (Suez Lyonnaise des Eaux 1998).

The major sources of solid wastes in Khulna are residences, whole and retail sale market places including shopping places, streets, hotels and restaurants, hospitals and private clinics, educational institutions, cinemas, bus, railway and launch/steamer ghats, slaughter houses, etc (Murtaza, G. 2002).

The present study focuses on the three components of waste management –waste collection, transportation and disposal – with the aim of representing present management condition of solid waste in Khulna city. Besides the present paper also focuses a comparison of management capacity between 2013 & 2004.

4. Methodology

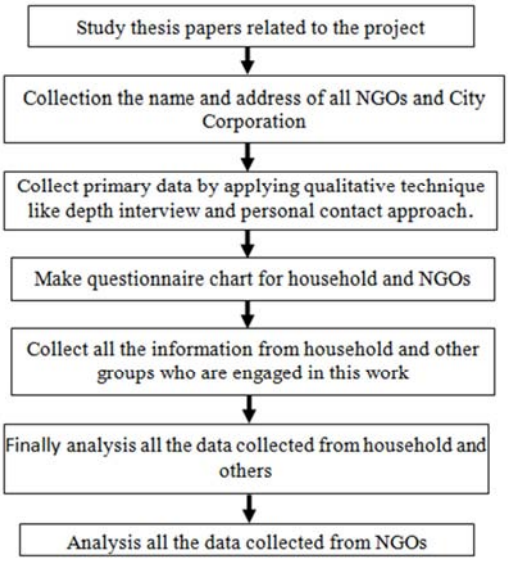

Figure 3. *A Flow Chart on Methodology of the Study*

Data had been collected by applying qualitative technique like depth interview and personal contact approach. Total sample respondents were around 500. Data had been collected purposively from different respondents group like city corporation employees, housewives, garbage collectors (tokai's & scavengers). Their opinion had been collected to get an insight into existing waste management system. Their suggestion had also been considered in the study. Secondary data had been collected through pursuing different reports of City Corporation, web materials, various articles, journals and books. The steps were followed presented in Figure 3

5. Analysis and Results of Present Study

To represent the existing management system of MSW in Khulna city as well as involvement of NGOs and CBOs for this management tiers were analyzed after collecting requited information through questionnaire survey and excel analysis, the following results were presented and hence discussed in the following articles.

5.1. Present Scenario of MSW Management in Khulna City

The major portion of MSW is dumped to the nearest SDS. From there KCC vehicles collect the wastes and transport it to the UDS of KCC. Some NGOs transfer their collected organic wastes to compost plants. Whilst the city authority has some limited numbers of non-motorized rickshaw vans and hand trolleys those are mainly used for the collection of MSW from community bins which is located at roadside and transfer to SDSs. Besides, the drain sludge is also collected by these vans. City authority collects waste from SDS then transfers it to the ultimate disposal site at Rajbandha. The area of ultimate disposal site at Rajbandha is about 30 acre. Two new disposal sites are also in processing at Mathabangamouja and Solua. Mathabanga is about 25 acre and Solua is about 16 acre. Open dumping is practiced for ultimate disposal, as there is no controlled/ engineered/sanitary landfill in Bangladesh. More or less 40 SDS sites are available in city area from where KCC vehicles are collected wastes (Rafizul et al. 2012b). The city authority places some haul containers (HCs) and permanent concrete/masonry bins in SDSs.

KCC 26 motorized and about 155 non-motorized vehicles for waste collection and transportation. Only motorized vehicles are used for collection of wastes from SDSs and then transfer to UDS. Non-motorized vehicles are uses for transfer wastes from community bins to SDSs. The recent survey shows that about 520 ton waste produce daily in Khulna city where collection capacity of KCC in about 65-70%.

5.2. Overall Management Scenario of MSW in Khulna City

In a city, MSW management is so much important to keep the city habitable. In developing country like Bangladesh most of the city authority is not enough concern about the solid waste management. It has so far been ignored and less studied environmental issues in Bangladesh. But recently the situation has begun to change. City Corporation is responsible for the operation and maintenance of municipal services, including solid waste management. In KCC it is

made up of 8 functional departments and the conservancy department is responsible for management, maintenance and monitoring of solid waste, street sweeping, public latrine and urinal, drain sludge, and street lighting etc. In the Khulna city the main producers of solid wastes are residences, whole and retail sale market places including shopping places, streets, hotels and restaurants, hospitals and private clinics, educational institutions, cinemas, bus, railway and launch/steamer ghats, slaughter houses etc. The percentage composition of waste combined from all locations was about 74.4% organic matter, 9.1% paper, 3.5% plastic, 1.9% textile and wood, 0.8% leather and rubber, 1.5% metal, 0.8% glass and 8% other waste shown in figure 4.

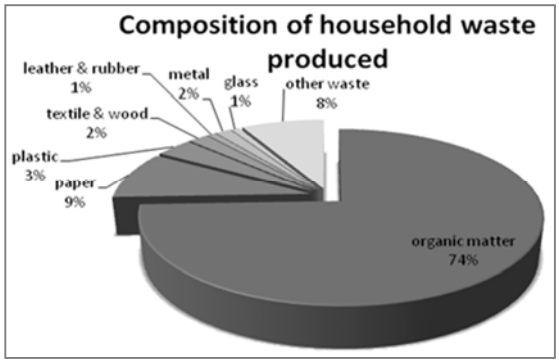

Figure 4. *Composition of household waste produced*

The biodegradable fraction (organic matter) is normally very high as compared to other fractions, essentially due to the use of fresh vegetables and foods, Organic matter ranges from 68 to 81%, while paper and plastic are about 7 to 11% and 3 to 4%, respectively. Glass, leather and rubber were the smallest composition. A Pie chart (Figure 4) is presented below for better understanding.

In the collection system normally NGOs and CBOs conduct the door to door collection. Now a day's city corporation authority also conducts the door to door collection system in a small area. Form the survey it is found that about 8-12% of total MSW was collected by NGOs and CBOs in door to door collection system, city authority collects about 2-4% of total waste by door to door collection system provided in Figure 5. About 40-50% waste is dumped in SDS by self conduct. Moreover more or less 36-48% of MSW was remained unmanaged.

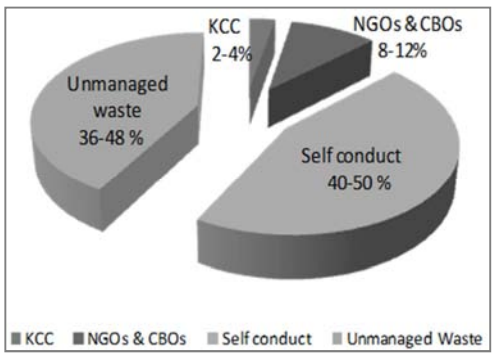

Figure 5. *Door to door collecton capacity*

5.3. NGOs and CBOs Initiatives for MSW Management

Now a day's NGOs are providing an important support to some ignored sector such as waste workers and enterprises to organize themselves to improve working conditions and facilities, technological support, increase earnings and extend access to essential social services such as health care and schooling for children in Khulna. NGOs normally help some social private sector to improve and increase their facilities. Normally city corporation authority collects and disposes solid waste from the local dustbins and secondary disposal points. It is the responsibility of the respective households to dispose their wastes generated by them. Since the dustbins are normally available near to their houses and numbers of dustbins are sufficient, the households throw the wastes here and there. This causes serious environmental problems to the surroundings areas. In order to bridge the gap between the producer of solid waste at the household's levels and its disposal at the dustbins levels, NGOs and CBOs are playing a significant role in collecting the solid waste for the individual households in particular areas. These organizations are not only involved in collecting the waste from the individual households, but also involved in transporting these wastes to the secondary points. These NGOs and CBOs are also actively engaged in building awareness of the city dwellers regarding proper management of waste and establishing Solid Waste Management Committees (SWMCs) at the community levels. These NGOs and CBOs are working in different areas of the city in exchange of some service charges.

In contrary, at present in Khulna city there are about 8 NGOs, working in MSW management sector. They are working in different wards. First they consult with the Commissioner of the respective ward. Then they may obtain the permission from the conservancy department of the city corporation office. Prodipan and PRISM are the two national NGOs they are not directly involved in solid waste collection and management. Their works are distributed to different NGOs and CBOs. They are, however, monitoring NGOs work and providing required suggestion and mechanical support to improve the management system. The detailed information about NGOs and CBOs working is provided in Table 1 and hence discussed in followings.

5.3.1. Management Efficiency of MSW of NGOs

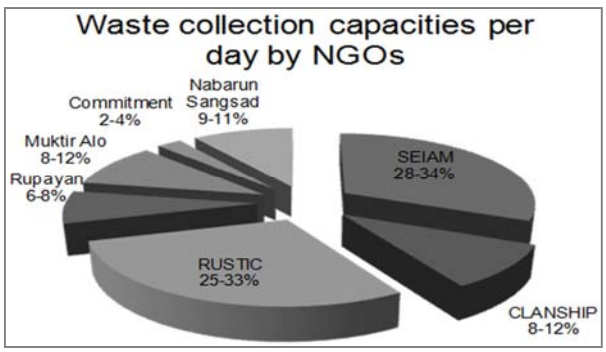

Figure 6. *NGOs collection capacity*

In last few years the number of NGOs and CBOs decrease. At the same time the collection capacities of NGOs also decrease. The Figure 6 shows the present collection capacity of different NGOs. From the Figure 6 it can be seen that NGO named SEIAM is doing the highest waste collection in Khulna city. Moreover, result reveals that with respect to total NGOs coverage, SEIAM has been covered approximately 28 to 34%. Then, the second position holding by the NGO named RUSTIC which collects about 25-33%. In addition, CLANSHIP collects 8-12%, NabarunSangsad collects 9-11%, MuktirAlo collects about 8-12%, Rupayan collects 6-8% and Commitment collects the smallest amount about 2-4%.

Table 1. *NGOs and CBOs involvement of solid waste management in Khulna city*

Status	Name of NGOs/ CBOs	Year**	Working area (Ward no)	Household (No)	Van (No)	HR	Expenditure (TK./Month)
NGOs	SEIAM	2006	19,25,26	8450	13	27	47000
	CLANSHIP	2003	17*,16*	1364	4	8	25000
	RUSTIC	1997	16*,17*,18	4700	12	26	42500
	Rupayan	2001	19,20*	925	3	7	14000
	Muktir Alo	1998	23,21*,22*	800	4	6	10500
	Commitment	2000	11	550	1	3	7000
	Nabarun Sangsad	1997	24,27*	1200	4	9	21000
	Prodipan	1998	Not Specified	Clinical		8	28000
	27 No. Ward poribesh unnoyon committee	2001	27*	2200	4	12	29000
CBOs	Nobo Jagoron	2004	16*	250	1	2	6

HR-Human Resource; * Partially; ** Starting year of involvement in MSWM at Khulna, 1US$=70tk

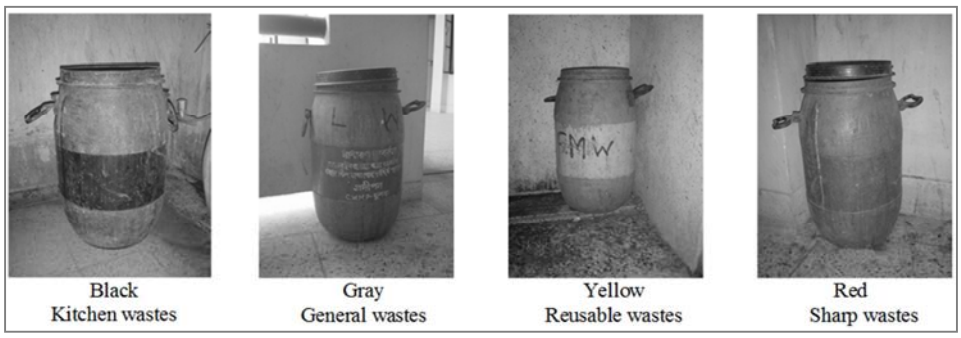

Figure 7. *Container for the storage of clinical wastes in generation point (after Rafizul et al.2012c)*

5.3.2. Healthcare Waste Management of NGOs

In contrary, in Khulna city there are about 200 clinics, hospitals and pathology as healthcare facilities (Rafizul et al. 2012c). Every day these clinics, hospitals, pathologies produces a large amount of clinical waste. There is only one NGO, PRODIPON is conducting the healthcare waste management in Khulna city. For managing of healthcare waste, four plastic containers were supplied by PRODIPON for separating waste in different categories shown in Figure 7.

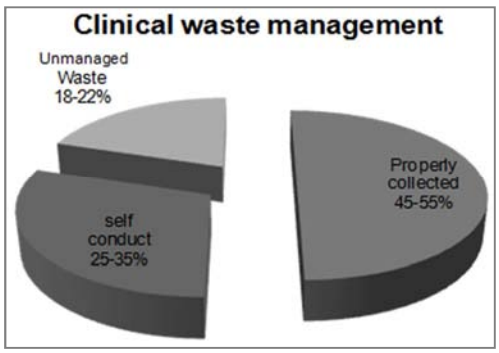

Figure 8. *Management of clinical waste*

The Figure 8 shows that about 45-55% of total clinical waste is properly collected. About 25-35% of total clinical waste is disposed by self conduct and the remaining part about 18-22% of total waste.

5.3.3. Household Coverage by NGOs

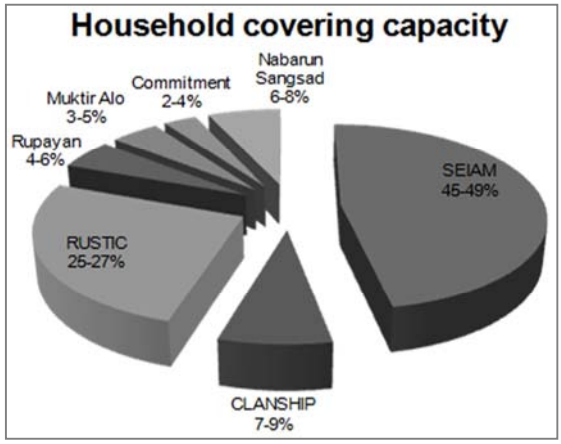

Figure 9. *Household covering capacity*

An idea about the household covering capacity by NGOs (in their covering area) can be grown from the pie chat provided in Figure 9. In Khulna city SEIAM cover the maximum number of household. They are covering about 45-49% of total household covered by NGOs in Khulna city. Then comes the name of RUSTIC. They are covering about 25-27%. In addition, commitment cover the considerably minimal number of household about 2-4%. Other NGOs can be arrange as CLANSHIP then Nabarun Sangsad then Rupayan and then Muktir Alo.

5.4. Present Scenario of Household

From the questionnaire survey it was reported that Door-to-door collection system is most preferable waste collection system indicating not having any knotty of disposal of waste by household themselves most specifically women. But some household strongly oppose door-to-door collection system due to payment. Although Due to not having any dustbin near the house, they are to dispose waste by door-to-door collection system. Pie charts are presented to show the preferable waste collection system (figure-10) and present disposal system (figure-11) by household in Khulna city found from questionnaire survey.

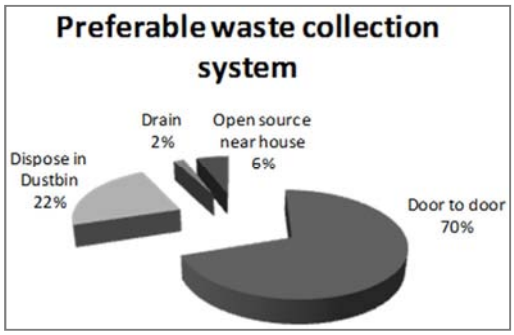

Figure 10. *Preferable waste collection system*

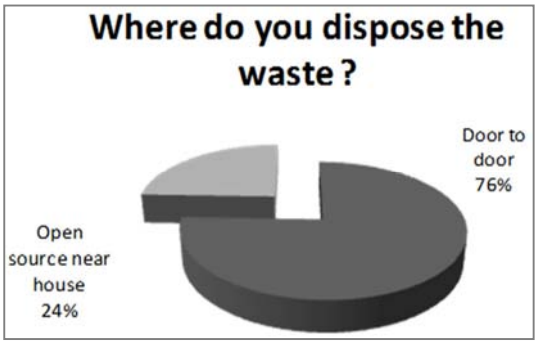

Figure 11. *Where do you dispose the waste?*

5.5. Providing Facilities of NGOs

In conducting the solid waste management the workers of NGOs are ofently get some sickness . As they work with waste and most of the time surrounded by waste many kind of bacteria and virus can easily effected them. Most of the time it is seen that they are suffering from many kinds of skin diseases. In this regard some NGOs help them. They support them financially. From the Figure 12 it is seen that about 43% of total NGOs are supportive in worker health support and 57% are not supportive. More then half of the NGOs do not care about the health of workers.

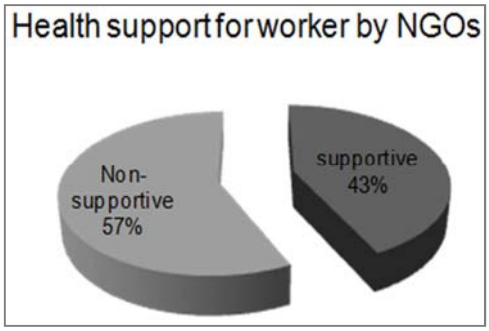

Figure 12. *Health support provided by NGOs*

Figure 13 provides the informatiom of bin supply by NGOs. In khulna city, about 75% 0f NGOs doesn't supply any bins to the household to collect the waste and about 25% of NGOs supply bins which is not enough. Moreover, These bins are open covered which is not hygenic due to bad odour spreads over the surroundings.

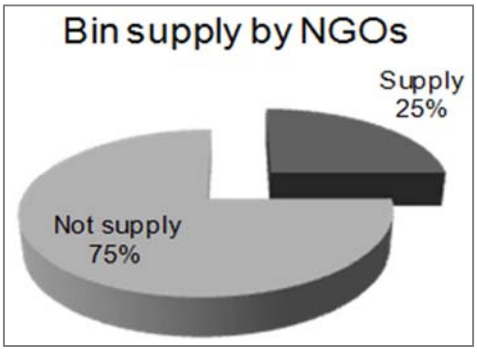

Figure 13. *Bin Supply by NGOs*

5.5.1. Payment Status of NGOs

Several study reveals that for safe and sustainale management of MSW in Khulna city as the friendly environment, the household are interested to pay a tinny amount to the NGOs (WasteSafe 2005). It is the interesting policy for MSW manegement. The payment status of different household and clinic for MSW management in different NGOs is provided in Table 2.

Table 2. *Payment status of household for waste manegement of NGOs and CBOs*

NAME of NGOs	Payment (TK)
SEIAM	5 to 20
CLANSHIP	30 to 100
RUSTIC	5 to 50
Rupayan	average 20
MuktirAlo	30 to 250
Commitment	10 to 20
NabarunSangsad	10 to 30
Prodipon	Per clinic (200 to 3000)
27 No. Ward poribeshunnoyon committee	15 to 30

In figure 14 & 15,It was also reported that most of the people are aware of the hazardous effect of waste if that are not properly managed although many of them don't know about humus manure that can be produced from these. That's why it is strongly recommended to grow awareness among people and its usefulness to live in pollution free hygienic environment.

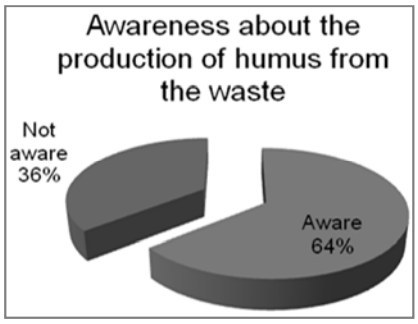

Figure 14. *Awareness about the production of humus from the waste*

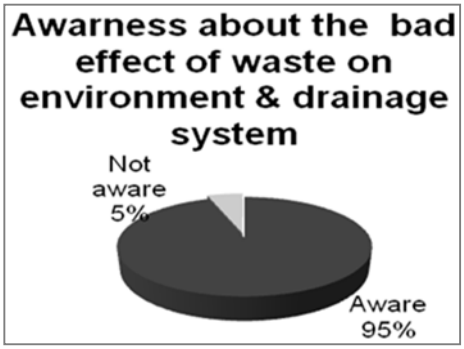

Figure 15. *Awareness about the bad effect of waste on environment & drainage system*

6. Comparison between 2013 & 2004

From the data reported in 2004 and 2013, it can be comprised that due to reduction of NGO's and CBO's involvement, Door-to-door collection system is decreased. For better understanding a comparative bar diagram (Figure 16) is provided.

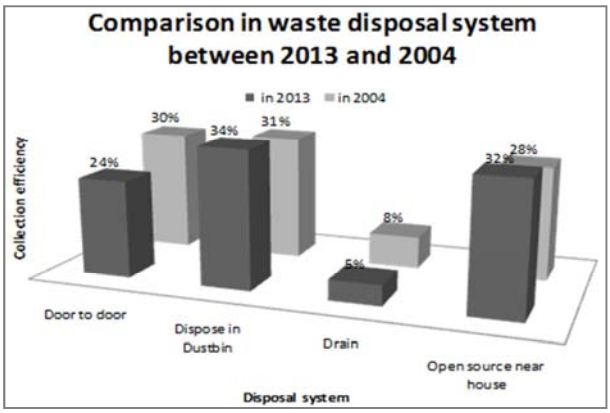

Figure 16. *Comparison in waste disposal system*

From the data of 2004 and 2013 it is seen that peoples are mainly interested in selling inorganic waste than reuse. Comparison chart is provided in (figure 17).

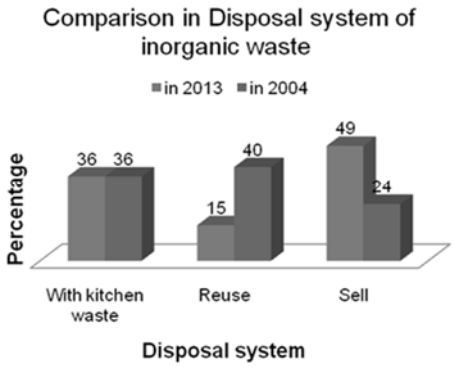

Figure 17. *Comparison in Disposal system of inorganic waste*

With the increase in awareness and difficulties in self-disposal of waste, people are more interested to pay for door-to-door waste collection. A comparison is provided in bar diagram (Figure 18).

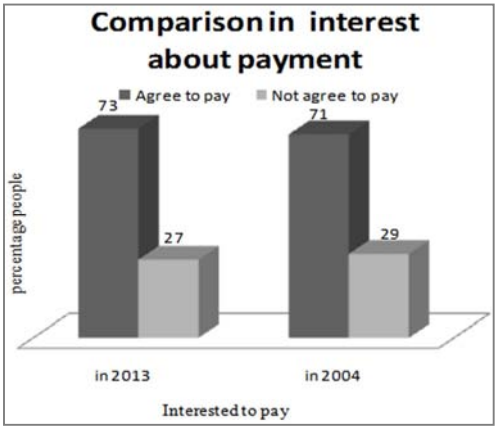

Figure 18. *Comparison in interest about payment*

A comparison can be developed with the data of 2004 about the preferable time of waste collection shown in figure 19, which indicates that with the increase in women involvement in wage earnings, they prefer morning than noon.

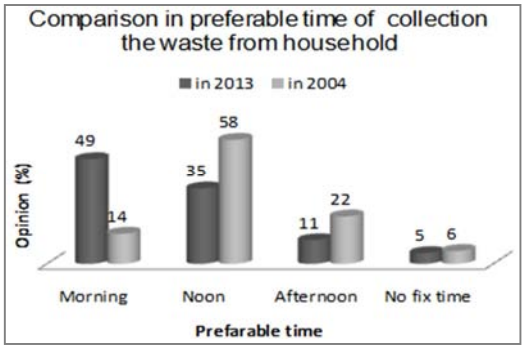

Figure 19. *Comparison in preferable time of collection the waste from household*

From the questionnaire it is revealed that most of the city

dwellers want the dustbin close to the house about 5 minute walking distance. Although may be, due to the present unhygienic situation of the secondary disposal sites. A considerable fraction of people want it far away (about 5-10 minute) from their house. A comparison bar diagram shown in figure 20 provides the data of 2004 and 2013.

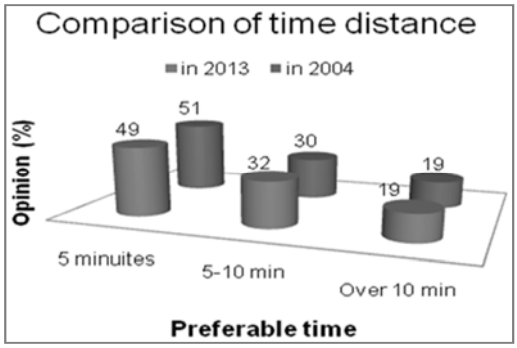

Figure 20. *Comparison of time distance from household*

6.1. Comparison of NGOs Performance

Figure 21 shows that in last few years the number of NGOs and CBOs are decreased abruptly.From Figure 21 it is seen that in 2004 the number of NGOs and CBOs were 13 and 9 respectively where as in 2013 the number of NGOs and CBOs are 8 and 2 respectively.

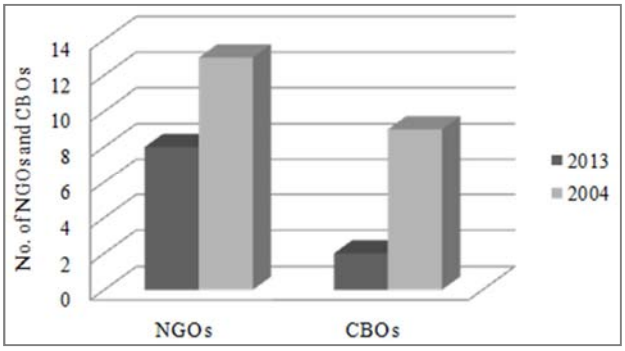

Figure 21. *Comparison of no of NGOs and CBOs*

6.2. Comparison of Household Covering Capacity

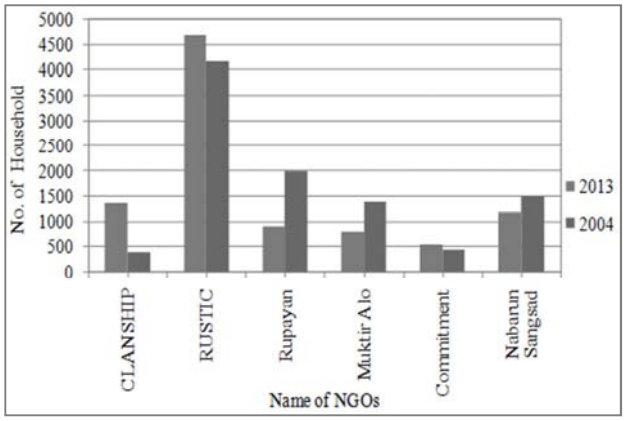

Figure 22. *Comparison of household coverage NGOs Performance*

The comparison of NGOs and CBOs Household covering capacity for MSW manegement in different location of Khulna city is provided in Figure 22. Figure 22 reveals that the household coverage for MSW management of CLANSHIP NGO had the highest for the year of 2013 in cntrast of 2004. However, in case of Commiment NGO, the difference of performance is significantly minority. Again incase of RUSTIC the household covering capacity is increased in 2013 in cntrast of 2004. On the otherhand, for Rupayan, Muktir Alo, Commitment and Nabarun Sangsad, the household covering capacity is significantly decreased in 2013 in cntrast of 2004.

6.3. Comparison of Transportation and Human Resource

The comparison of NGOs and CBOs transportation capacity involving in MSW manegement in different location of Khulna city is provided in Figure 23. Figure 23 shows that the number of non-motorized vans of RUSTIC and CLANSHIP NGOs are increased in 2013 in cntrast of 2004. However, in case of Commiment NGO, the number of non-motorized van is remain unchanged. Again incase of Rupayan, Muktir Alo and Nabarun Sangsad the number of non-motorized vans is decreased in 2013 in cntrast of 2004.

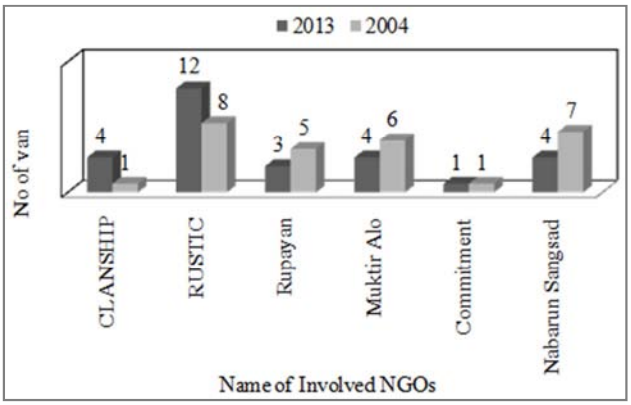

Figure 23. *Comparison of transportation*

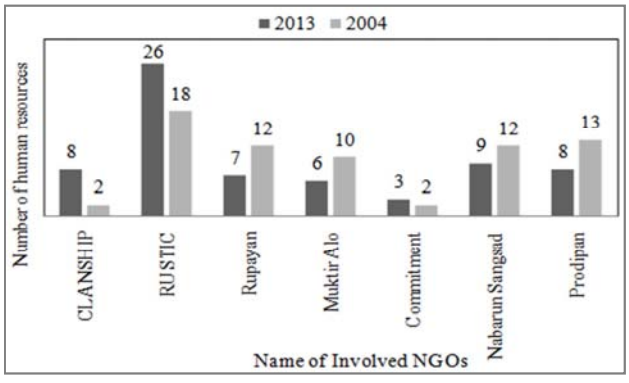

Figure 24. *Comparison of human resource involved in different NGOs*

Figure 24 provides the comparison of NGOs and CBOs human resource, involving in MSW management in Khulna city. Figure 24 shows that the number of human resource of RUSTIC, Commitment and CLANSHIP NGOs are increased

in 2013 in contrast of 2004. However, in case of other NGOs and CBOs, the number of human resource is decreased in 2013 in contrast of 2004.

7. NGOs Involvment in Composting

Only one NGO (RUSTIC) is involved in Khulna city for composting of organic waste through two composting plants situated Rajbandha. CBOs are not involved with these potential sectors until now. In 2001, RUSTIC started a small-scale compost plant as a pilot project in a land of KCC near a locality in the city. The initial production capacity was 245 kg in a period of 45 days. In 2004, the city authority ordered to stop the plant due to strong public complains of bad odor. After that, all collected wastes are disposed to nearby SDSs. The new compost plant of RUSTIC is constructed at its own land in Rajbandha. A special provision of the new plant is vermicomposting. Vermicomposting is the process of using worms and microorganisms to turn organic waste into black, earthy-smelling, nutrient-rich humus (A Ahsan *et al. 2012)*.

Now the area of each composting plant is 47 decimal lands adjacent to one of the final garbage dumping yard of the city authority. The production capacity of this plant is two ton per day and the raw material is used about 12-14 metric ton per day represent in Table 3. The price of humus is 8 TK/Kg. The number of total manpower in this sector is 19. These plants are operating as revenue earning enterprise of RUSTIC for sustainable MSW management.

(a) Drying of organic wastes

(b) Final product (compost)

Figure 25. *Composting plant of RUSTIC in Rajbandha, Khulna*

Table 3. *NGOs involvement for composting plant in Khulna city*

Name of NGOs	RUSTIC
No. of Plants	2
Plant Area (Decimal lands	47
Land Ownership	Own
Maturation Period (days)	45
Unit price (TK./Kg	8
Manpower Involved (people)	19

8. Problems Associated with NGOs in Khulna City

The NGOs and CBOs face various problems during working in MSW management. The following are the recognized problems:

1 Lack of training facilities, awareness, co-operation among the organizations and financial resources. Then, lack of sufficient number of roadside bins and facilities for wearing gloves, masks involved in waste collection, removal and transportation.

2 Irregular payment of service charges by the households. Then poor motivation for proper waste disposal can be due to low awareness of the hazards of irresponsible solid waste management or social factors that make it unacceptable for certain members of the household to take waste to the roadside bins.

3 Absence of the services of waste collectors and fixed location for collecting waste. Moreover absence of legal status of involving authorities in MSW management.

4 Non-motorized rickshaw vans require frequent repairing and needs to be changed after 4-5 years. So continuous financial support is required for its operation and maintenance.

5 Issue of cost recovery through recycling of resources not yet taken into consideration.

Due to unhygienic working environment and low salary, workers problem arises. Moreover absence or irregular medical checkup facilities for workers involved in waste collection and removal and Involvement of children in collection of waste.

9. Concluding Remarks

Due to lack of proper financial support and subscription, many NGOs and CBOs had been stopped. In 2004, there were 22 NGOs and CBOs and six composting plant in Khulna city, but now the numbers are only 10 and 2, respectively. Despite considerable expense, the situation tends to deteriorate further due to the rapid growth of industrialization and population. The experience on the use of advanced technology in this sector, however, has been largely negative. An analysis of best practices and lessons, learned in order to transfer of technology and advanced waste management methods should be conducted. However, the involvement of NGOs and CBOs has improved the MSW management system in some aspects. To have an integrated management and safe disposal system, immediate steps

should be taken to handle MSW collection by the concern authority to sustain the process of MSW management and to resolve the entire problems associated with this regard.

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