Community Based Solid Waste Management from Household to Secondary Collection Point: Case Study of Sir Syed Road and Iqbal Road Area

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Abstract

To ensure proper advancement of an area in a sustainable way, protection of environmental sector is a must. Developing countries like Bangladesh face many challenges to assure a healthy environment to its citizens because of lack of resources. Furthermore, enough attention is not given to solid waste management, especially in the Capital, Dhaka resulted into many deleterious consequences like blockage of drainage system, odor problem, open dumping etc. In this scenario, an integrated framework with all functional elements (collection, transport, treatment, and disposal) is of prime importance. Investigation of primary waste collection system was the main purpose of this study. Existing condition of primary waste collection scenario from household to secondary collection point in Iqbal Road and Sir Syed Road Area, of Ward-32 of Zone 05 of Dhaka North City Corporation has been explored. Three kinds of Participatory Rural Appraisal (PRA) tools (space, time and relationship) were used for analyzing existing collection scenario of the study area. Community was involved through focus group discussion to find out existing problems and possible solution to them. The three major problems identified were scattered waste in secondary collection point, door to door collection problem in high rise buildings, and pedestrian disturbance. After assessing existing scenario and capacity of the community, it has been found that community based source separation system is the only feasible solution of existing major problems. For successful initialization of source separation, necessary procedural, institutional and social reform are necessary. In order to run an effective primary waste collection system, essential interventions are mandatory from bottom to top level. Household awareness is a must but it can only be assured if the whole community is aware and active. Moreover, without proper policies and rules, any solution to effective primary waste collection system would be fruitless.

Key Words: *Solid Waste Management, Primary Waste Collection System, Secondary Collection Point, Source Separation, Community based Waste Management.*

1 Introduction

In economically developing countries like Bangladesh, waste management in urban areas is a difficult problem because of the scarcity of financial, human, and other critical resources. Having no appropriate legislation about waste management, Bangladesh as well as the Capital, Dhaka is facing difficulties both in collection and disposal process. Dhaka North and South City Corporations are involved only in secondary collection (from secondary collection point to disposal site) of wastes. Even after that, their collection coverage is only 50% (Japan International

Co-operation Agency, 2005). However, having no regulating or managing authority in primary collection (household to secondary collection point) process, different areas of Dhaka city have adopted different strategies for primary collection of household waste. The strategies involve full or partial coverage by NGOs or local organizations, and informal door to door collection by DCC cleaners (Japan International Co-operation Agency, 2005). Unfortunately, some of the areas have no primary collection process at all. Therefore, both environment and public health are badly affected in those areas. This study aims at exploring existing condition of waste collection scenario from household to secondary collection point in Iqbal Road Area, at Ward-32 in Zone 05 of Dhaka North City Corporation. Furthermore, this study has identified prevailing problems in waste collection system in the study area and recommended some possible solutions to solve these problems.

2 Methodology

The PRA tools used in data collection are social and resource map, transect walk, timeline, daily activity schedule, seasonal diagram, mobility map and venn diagram. Stakeholders from different levels have been interviewed to find out the existing problems. Focus group discussion and pair wise comparison matrix were used for identification and ranking of existing problems. Collected data was analyzed using PRA tools like process map, dream map and cause effect diagram. After data collection and analysis, possible solutions have been proposed considering the context and needs of community people. Households, Cleaning Service Committee, van drivers who are waste collectors, officials from City Corporation have been consulted before proposing possible effective solutions.

3 Study Area Profile

The study area covering neighborhoods of Sir Syed Road and Iqbal Road is located in Mohammadpur Thana under ward 32, Zone 05 of Dhaka North City Corporation (DNCC).With 1200 households, the study area is mainly predominated by residential land uses. In four or five places in the study area, minor open dumping occurs. Waste of open dumping mainly includes leaves and litters. These are cleaned by sweepers who work under Dhaka North City Corporation (DNCC). In the intersection of Iqbal Road and Sir Syed Road, one drum is provided for waste dumping. This is also cleaned by the cleaners of DNCC. The secondary collection point of the study area is located at the connecting point of Aurangjeb Road and Sir Syed Road. It is in front of Bangla Bazar Market and at the back side of Family Planning Hospital. There is no boundary defining the area of secondary collection point. Thus sometimes conflict arises between vehicular movement and sorting of waste.

Figure 1. Location Map of Study Area (Iqbal Road, Ward 32, Zone 05, DNCC)

4 Existing Scenario of Solid Waste Management System

The description of existing waste collection system is described below with necessary timing and money transferred in each stage.

- ***Beginning of Daily Journey of Vans to Collect Waste:*** Van drivers keep their vans at Rayer Bazar which is far located from the study area. Therefore they have to start their journey to bring their vans almost one hour earlier at 08:00 A.M. to serve the study area on time.
- ***Collection of Waste from Building to Building:*** Waste collection is done at two times a day to cover the whole area but waste are collected only once per day from the households. In some of the buildings, cleaners of apartments collect waste from door to door and keep them at specific point in ground floor from where van drivers collect waste.
- ***Unloading of Waste from Vans in Secondary Collection Points:*** As each van has to make twice a trip daily to cover the whole study area, unloading of waste also occurs twice a day. Waste are kept open in the ground in secondary collection point in front of Bangla Bazar before transferring into truck.
- ***Sorting of Recyclable Waste in Secondary Collection Point:*** Paper and Plastic waste are separated at secondary collection point in front of Bangla Bazar. Three people stay at secondary collection point who mainly perform this waste separation. Paper and plastic waste are sold in a retail market located in Rayer Bazar.
- **Transfer of Waste from Secondary Collection Point to Compactor:** Van Drivers and the three people who stay at secondary collection point mainly transfer waste from secondary collection point to compactor. Then waste is carried to landfill by compactors.

Table 1. Daily Activity Schedule and Financial Mechanism of Waste Collection System

Daily Activity	Time Schedule	Financial Mechanism	Responsible Authority
Beginning of Daily Journey of Vans to Collect Waste	08:00 A.M. - 09:00 A.M.	Monthly Rent:300 for each van, total 900 for three vans	Iqbal Road Cleaning Service Association
Collection of Waste from Building to Building	09:00 A.M.-10:00 A.M., 11:00 A.M.-12:00 P.M.	Monthly Bills: BDT 80 from buildings with cleaners BDT 100 from buildings without cleaners	Iqbal Road Cleaning Service Association
Unloading of Waste from Vans to Secondary Collection Point	10:00 A.M.-10:15 A.M., 12:00 P.M.-12:15 P.M.	Monthly Salary of Waste Pickers: BDT 7500 for each	Under the supervision of Iqbal Road Cleaning Service Association
Sorting of Recyclable Waste in Secondary Collection Point	10:15 A.M.-11:00 A.M., 12:15 A.M.- 01:00 P.M	Recyclable waste are sold at a price of BDT 150-200 daily	Under the supervision of Iqbal Road Cleaning Service Association
Transfer of Waste from Secondary Collection Point to Compactor	11:00 A.M-01:00 P.M	Free service provided by Dhaka North City Corporation (DNCC)	Compactor provided by JICA used to carry waste from secondary collection point to landfill under the supervision of DNCC

Source: Field Survey, 2015

5 Institutional Relationship

There are total five organizations in Iqbal Road and Sir Syed Road Area who are responsible for waste management. Among them, the most active one is Iqbal Road Cleaning Service which is designated as Private Collection Service Provider (PCSP) by DNCC. They are the main responsible authority in Iqbal Road Area for primary waste collection. Total eight men work for this service. Households pay a monthly fee to them for primary waste collection. The vans that are used by Cleaning Service are licensed and controlled by Waste Management Office (WMO) of DNCC in Ward-32. Thus DNCC is related to community through WMO. The councilor office of Ward

32 in the locality has the greatest influence but the interaction is lower. Welfare Association of Iqbal Road and Sir Syed Road has provided bins along the streets of the area.

Table 2. SWOT Analysis

Prospect	**Problems**
Strength	**Weakness**
✓ Owner's association is active in each apartment working for the welfare of the people. ✓ Land of secondary collection point is owned by DNCC where mini transfer station can be built up without any conflict. ✓ The relation between private and public waste management organizations is very good.	✓ "Iqbal Road Welfare Society" is not concerned about solid waste management. ✓ No source separation is done at household level. ✓ Waste is scattered in secondary collection point. ✓ Waste pickers have to collect waste from door to door in some apartments. ✓ Some households do not pay fees regularly for waste collection. ✓ CUWG (Community Unit Working Group) has become inactive since two weeks after formation in 2007.
Opportunity	**Threat**
✓ DNCC has taken initiative for constructing mini transfer station. ✓ A modified van design has been proposed by DNCC and JICA. ✓ According to Building Construction rule 2008, household waste should be kept at a specific location within the building site.	✓ Capacity of compactor is 5 ton. But the amount of waste generated in the study area is 10 ton. So, the whole procedure is done at two time intervals. ✓ There are only 52 compactors in Dhaka to collect waste from secondary collection points. So the compactors cannot cover all the areas at a preferable time.

Source: Field Survey, 2015

6 Identification of Problems and Possible Solutions

Problems regarding waste collection system from household to secondary collection point have been identified and possible solutions have been proposed based on the view of community people.

6.1 Identification of Major Problems

The three major problems identified after focus group discussions among different stakeholders i.e. Iqbal Road Cleaning Service Association, officials from DNCC, members from Apartment Owners' Association, and apartment cleaners are discussed below.

6.1.1 Wastes are scattered in Secondary Collection Point

Due to lack of awareness of the workers, there is flaw in waste transfer process from secondary collection point to compactor. The cleaners do not use the 5 feet X 6 feet long filtering polythene provided by Dhaka North City Corporation. Waste sorting is done in secondary collection point and there is no washing facility. As a result, some waste are left out on the ground. There are a few number (almost 50) of compactors serving both Dhaka North and South City Corporation. They serve the study area at morning. Some people do not want to keep the waste generated after morning period (09:00 A.M.-10:00 A.M., 11:00 A.M.-12:00 P.M.) at home till the next morning. They throw their waste in secondary collection point, therefore filthier open dumping occurs. Odor pollution takes place and health hazard arises as workers do not use any protection while sorting waste. Pedestrians feel disturbed while walking near the secondary collection point.

6.1.2 Door to Door Collection Problem in Some High Rise Buildings (>=6 storied)
Van drivers have to go to the individual households of high rise apartments. There is a chance of waste dropping off from open container in lift. The van drivers have to use staircases, because they are not allowed to use lift with waste containers. There is one person per van, his work load increases from door to door waste collection in high rise apartments. Due to small gap in the system, absence of cleaner makes huge loss of labor and time.

6.1.3 Pedestrian Disturbance
Waste collection vans are parked on footpaths while loading of vans blocking pedestrian traffic. Moreover, waste are not kept covered in vans. Therefore, odor problem arises and pedestrians are disturbed. Sorting of waste in secondary collection point encroaches road as there is no boundary line. This encroachment disturbs pedestrian flow. Because of pedestrian disturbance, chaos is created and time is lost.

6.2 Possible solutions
Source separation at all stages of waste collection system can be the solution of all the major three problems discussed above. In households, there can be four baskets for kitchen, plastic, paper and glass wastes. Then at the ground level of the apartments separated waste will be stored in four different drums. Vans would collect kitchen waste daily. At a particular day (most households prefer Friday), waste pickers would collect recyclable waste; they need to collect paper, plastic and glass waste separately.
***Source Separation as a Solution of Scattered Waste in Secondary Collection Point*:** Source separation at household level and in collection vehicles would eliminate the necessity of sorting in secondary collection point. There will be no chance of dropping of wastes in secondary collection point. If waste are also kept separated in secondary collection system, there will be no drop off of waste while transferring to disposal site. Mini transfer station is being constructed to provide washing facility and a boundary to the secondary collection point.
Source Separation as a Solution of Door to Door Collection Problem in High Rise Apartments (>=6 storied): If source is separated at household level, it would reduce the waste volume and encourage household members to carry waste to the ground level of building. It would eliminate the hardship of waste pickers. Households themselves would naturally be very careful about using lifts or staircases and would not drop waste. Some households are motivated to do so as it is mentioned in Building Construction Rule 2008 that, household waste should be kept at a specific location within the building site (Ministry of Housing and Public Works, 2009).Introduction of garbage chutes may have another solution to door to door collection problem that was introduced in similar kind of high rise apartment in Segunbagicha (Field Survey, 2015). But chutes have to be properly maintained as unclean chutes may result in increased number of cockroaches.
Source Separation as a Solution of Pedestrian Disturbance: Source separation would lead to the elimination of sorting in secondary collection point and therefore, would reduce encroachment of road which will ultimately eliminate the problem of pedestrian disturbance. Waste pickers will not require much time to collect waste from individual households if wastes are stored at a particular location at the ground level. As a result, pedestrians will be less disturbed due to the parked vans on footpaths (Banu, 2000)

6.3 Necessary Interventions for Successful Source Separation

Procedural Reform: Three major reforms are required- first, source separation at household level. Second, storing of separated waste in different drums or containers at the ground floor of each apartment. Third, source separation in collection vehicles. Existing vans can accommodate three baskets/ bags within them where separated waste can be placed.
Institutional Reform: A community based organization, Community Unit Working Group, or Iqbal Road and Sir Syed Road Welfare Association, or both can supervise Iqbal Road Cleaning Service for the collection and selling of recyclable materials. DNCC should adopt rules and regulations regarding source separation and Waste Management Office of DNCC must have to be very active for supervision and monitoring of mini transfer station.
Social Reform: Social attitude towards waste pickers should be improved. They can be given uniforms, whistles, masks and gloves for protection. A harmonious relationship should be established among community based organizations, waste pickers, households and waste management office of DNCC. Awareness programs like training programs, workshops, advertisement through leaflets can be introduced (Berstein, 2004).

7. Recommendations

Awareness Creation among Households: Awareness rising programs can be carried out through TV, Radio, training programs, workshops etc. Households should understand that their small contribution can make a huge change (Ahmed, 2009).

Community Based Source Collection System: There should be co-operation between service providers and residents. The communities can force each household to separate waste and enforce primary collection systems where wastes would not be collected unless they are separated. According to Fujii (2008), in developing countries source can be separated successfully only through community based collection system.

Extended Role of Dhaka North and South City Corporations: At present, there are only 50 compactors to serve the whole Dhaka. For that reason, all the areas cannot be served at the preferable time. There exists huge time lag between waste generation and collection. Number of compactors can be increased. Monitoring capacity of Dhaka North and South City Corporations should be increased at primary collection system.

Preparation of Strategies and Action Plan: It has been stated in National 3R Strategy for Waste Management that source separation needs to be done both at household and community level but no action plan has yet been prepared for effective source separation system (Department of Environment, 2009). Waste Management Office of DNCC from each ward based on the community context can prepare action plan to effective primary waste collection system.

8. Conclusion

Existing primary solid waste management system faces various problems due to ignorance of responsible authorities and unawareness of households. Inactiveness of community based organizations is another reason behind existing improper system. Effective solutions of these problems have been practiced in many of the foreign countries and they are not unknown to the relevant authorities. Though some good practices were tried to be introduced at the household level, they failed because of lack of community involvement, improper system and ignorance of relevant authorities. So, necessary interventions should be taken from bottom to top level involving all stakeholders. Policies, rules, and regulations should be made for strategic action plan of effective proper primary waste collection system. At last, but not the least, households should be conscious and perform properly and actively in the process of primary waste collection system.

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