SOLID WASTE MANAGEMENT AT NEW DELHI RAILWAYSTATION-A CASE STUDY

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ABSTRACT

Indian Railways is one of the largest networks of railways in the world.. Millionsof people and millions oftonnes of goods are handled by this network on a daily basis.Through its 9116 trains and 1.6 crore passengers, it generates 300,000 litres of human waste from the "open discharge" toilets and 8960 tonnes of solid waste across its terminal buildings all over the nation .Surprisingly,although the Indian Railways could be termed as the highest generator of solid waste ,it does not have any specialized solid waste team for effective handling and disposal of solid waste. Improper solid waste management is hazardous for the community as it could lead to bad odor , diseases and other nuisance.Talking about the loopholes in the management of solid waste in trains and stations,their efforts have not reached grassroots levels at mostof the places.The responsibility of maintenance of cleanliness on railway premises as well as waste management rests with a number of departments viz, commercial, medical, engineering, mechanical, electrical etc, and the inefficiency is a result of poor cooperation amongthem.

The main objectives of this study were : to provide a review of key concepts and issues relevant to solid waste management at New Delhi Railway Station ; analyze and evaluate the existing solid waste management systems and to suggest recommendations and areas for further research. The methods used in data collection were: review of documents and literature, interviews, survey and field observation.

Keywords: Maintenance Of Cleanliness, Open Discharge Toilets, , Railway Station, Solid Waste Management

I. INTRODUCTION

"Every Endeavorwill be made by the Railway Administration with the active cooperation of users to ensure cleanliness and hygiene at railway stations and in trains."**Citizen Charter of Railways**

Solid Waste Management is a part of public health and sanitation, and according to the Indian Constitution, falls within the purview of the State list. Since this activity is non-exclusive, non-rivaled and essential, the responsibility for providing the service lies within the public domain.The activity being of local nature is entrusted to Urban Local bodies .The Urban Local body undertakes the task of solidwaste management service with its own staff, equipment and funds. In a few cases, part of the said work is contracted out to private enterprises or NGOs.

Unfortunately there has been no major efforts to create community awareness either about the likely perils of poor waste management or the simple steps that every citizen can take which will help in reducing waste generation and promote effective management of solid waste generated.In developing countries specially in Asia, environmental protection has often been neglected

II. FOCUS AREAS

New Delhi, the capital city of India has a geographical area of 1484 square kilometer. The latitudinal and longitudinal location of Delhi are 28° 36′ 50″ North, 77° 12′ 32’ East. The state stands at the northern part of India. Haryana and Uttar Pradesh are the other states, which share their borders with Delhi in the west and east respectively. Delhi geography divides the state into three parts- the Delhi ridge, the Yamuna flood plain . The Delhi ridge is the most important characteristic of the state and is a part of the Aravalli range that passes through New Delhi.New Delhi railway station is located in EastDelhi.NewDelhi is political and economical hub and also has historical importance as it has many historical and heritage sights like Red Fort, QutubMinaretc to visit.This city experiences extreme of temperature both in summers and winters. Delhi geographically isdivided into three parts –the Delhi ridge, the Yamuna flood plain and the plains. Delhi receives rains during June to October. Most precipitation occurs in July. (AverageRainfall 617mm)

2.1Existing Solid Waste Management at New Delhi Railway Station.

There were 16 platforms with 43 trolley vendors and 50 fixed stalls at NewDelhi station. Total no. of trains coming to New Delhi Railway Station is 305 trains per day.

Table 1: Facilities at New Delhi railway station

Sr. No.	Facilities	Quantity/Methods
1)	Platforms	16
2)	Trolley venders	43
3)	Fixed stalls	50
4)	Dust bins (steel/plastic bucket)	480
5)	Collection of solid waste	Manually with trolley
6)	Disposal process	Dumping outside station

Source: Chief Health Inspector, NDRS

2.2 Generation of Solid Waste –Quantitative Analysis

From the data in Table 2, it can be seen that total number of passengers (outgoing) from New Delhi railway station in year 2010-2011 are 2,25,000/day and in year 2011-2012 are 2,50,000/day. The similar no. is expected to be incoming .Therefore in a day no. of passengers using railway station premises can be taken as double of above daily average. We can safely take this figure as 2,50,000 x 2=5,00,000 passengers/day .This should be noticed that people working on railway station or entering to use railway stations as shelter are not included in the above mentioned number . As per railways norms the quantity of solid waste generated /passenger is 64gms,

therefore from the data we can say that solid waste produced in a day on New Delhi Railway Station is 32000kg. From quantitative analysis it is calculated that solid waste produced per day presently at New Delhi railway station is around 32000kg and for future estimation a certain factor need to be added to the present waste.

2.2 Segregation by NGO "Chintan"Few years back the task of segregation of solid waste was given to an NGO "Chintan" They segregate the bottles, paper cups etc and send the recyclable material to the recycling units. Recycling of the bottles is done by the bottle crusher and then these crushed portions are packed and sold by weight in market to earn money.

Table 2: Passenger details of New Delhi Railway station

Month	**2010-11**				**2011-12**			
	AC classes	Sleeper	General/ Unreserve	Total	AC classes	Sleeper	General/ Unreserve	Total
April		1296000	5905770	7201770		1125000	6075000	7200000
May		1348128	6093732	7441860		1154750	6600086	7754836
June		128808	6090720	7378800		1110000	5794530	5905530
July		1380864	6247585	7628449		1158625	5942204	7100829
Aug		1331016	5987402	7318418		1158470	6611649	7770199
Sept		1357200	6323160	7680360		1123500	6398460	7521960
Oct		1348128	5970321	7318449		1159400	6579750	7739150
Nov		1309680	6070680	7380360		1117650	6252090	7369740
Dec		1412112	5904229	7316341		1161105	6794611	7955716
Jan		1337712	5888853	7226565		1155680	5741386	6897066
Feb		1178688	5628700	6807388		1045800	5253836	6299636
Mar		1413600	6200651	7614251		1165600	6884635	8050235
Total	7166574	14834808	72311803	94313185	25907602	13635580	74928237	114471419
Monthly Average	597215	1236234	6025983	7859432	2158967	1136299	6244020	9539285
Daily Average	19907	41208	200866	261981	71966	37877	208134	317976

2.3Collection and transportation of solid waste The dust bins are provided at each platform, stalls and at key locations for providing facility to passengers and venders to throw the solid waste. The dust bins are lined with plastic polythene to prevent the seepage of leachate. The daily collection of solid waste at New Delhi railway station is found to be about 32 ton. The CHINTAN workers come with trolley with covered container and empty the dust bins in it and transport by pulling the trolley to the dump yard outside the station. The solid waste is periodically collected, transported and dumped throughout the day

.2**.4Dumping of the solid waste**

The solid waste is dumped in masonry open vats provided at the end of the station. Then the municipal vehicle collects and disposes it off at landfill siteatOKHLA, situated 15 km away from thestation.

- Presently rag picking sweeping and moping of floors, clearing of stable litre is done on contract basis.
- Contractor (NGO Chitan) dumps all garbage collected after empting all the station dustbins in their trolleys at Ajmeri gate location.
- The Northern Railway has helped the NGO to setup a bottle crushing machine at the working station near Ajmeri gate.
- Contractor from health department disposes off this garbage, rubbish, stable litre outside municipal area near okhla dumping ground.
- As per contract removal of night soil and sullage water is being done by 1000 hrs daily.
- Removal of garbage, rubbish, stable litre outside municipal area near okhla dumping ground by truck is being done regularly by 1200 hrs. once and again by 1700 hrs daily.
- Overall contractor disposes off the rubbish three to four times a day by means of 2 truck and 10-15 NGO workers.These workers segregate the non biodegradable and biodegradable and then pack them in bags and send to their respectiverecycling units.
- 40%of the total waste is wet which is send for landfilling at Okhla.
- The dry waste comprising of paper, aluminum etc. is sent to recycling units.

III. QUALITATIVE ANALYSIS OF SOLID WASTE

3.1Sampling of solid waste: Grab samples of MSW generated at 16 platforms were collected and brought outside the station. Then, the segregation of waste was done by hand picking of non-biodegradable materials like plastic, papers, wood, biodegradables, inert, metal, glass etc. with the help of railway contract labours.

3.2 Preparation of Sample for Analysis About 100 Kg of solid waste sample was collected from the heap and the segregation of sample was done to find out the physical compositions in solid waste (Fig. 1)The physical composition of the solid waste generated at New Delhi railway station isas in table 3 and fig 1 respectively.

Table 3: Physical Analysis of SW sample

Waste Type	Composition % by weight
FRUITS/VEGETABLES	22
PAPERS	23.3
GLASS	4
PLASTIC USABLE	7
CLOTHES	1.5
METAL	0.4
PLASTIC	22
DUST	19.5
HAZARDOUS WASTE	0.3

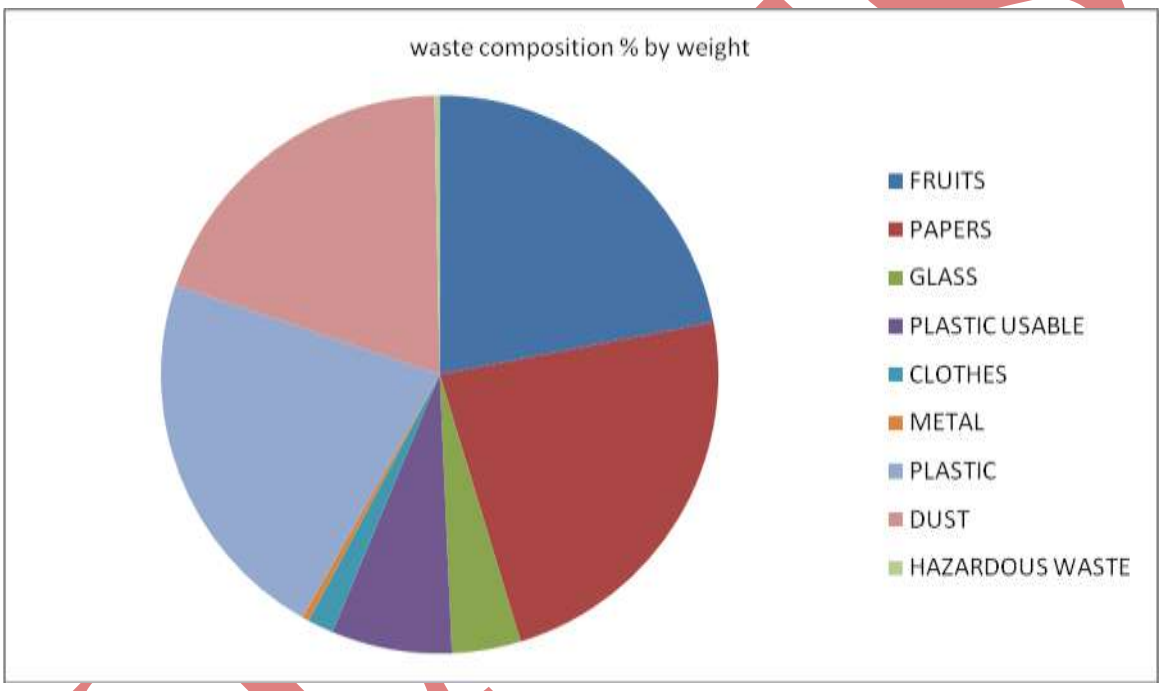


Fig 1: Physical Analysis of SW sample

IV. GIST OF PRESENT STATUS OF SOLID WASTE MANAGEMENT AS SEEN AT NEW DELHI RAILWAY STATION

- Proper storage of waste at source is lackey.
- Segregation of recyclable waste done in an organized way by NGO CHINTAN,though at some times some nuisance are created by the rag pickers and the NGO workers are blamed for it and that at times discourages them.
- Segregation of bio-degradable and inert waste is not done, generally it is sent for landfilling.
- NGO workers wear there green uniform and take full precautions regarding health issues by wearing boots and gloves and using polythene bags inside the trolley in which the dustbins are emptied.
- Waste transportation inefficient and done mostly in open vehicles
- Final disposal is generally done through crude dumping at Okhla site.

- There is a problem of Rag pickers who collect recyclable material from waste bins/dumpsites and litter the waste causing in-sanitary conditions and are also responsible for activities like stealing at the station.
- These rag pickers at times steal the garbage bags of these workers so that they could earn money by selling bottles.

4.1 Reasons for Improper Management of waste

- Lack of proper institutional setup for waste management, planning and designing.
- Multidepartment responsibility in handling, storage, transport processing and disposal of waste and lack of proper coordination and cooperation between these departments.
- Lack of technically trained manpower.
- Lack of community training and involvement.
- Lack of awareness creation mechanism.
- Indifferent attitude of govt. and citizens to levy user charges and create sustainability.
- Lack of strict rules and regulations within the station premises for public as well as rag pickers .

4.2 Challenges and Limitations

Railways had neither developed any standards as benchmarks for various cleanliness activities nor a cohesive action plan detailing milestones and the roadmap for achieving them. At the zonal level, the norms were either totally absent or not comprehensive enough, rendering the SWM efforts ineffective. Multiple departments are involved in SWM activities leading to lack of coordination among them and it leads to SWM efforts ineffective. As such, accountability does not go with responsibility. Station Masters/Managers are primarily responsible for operations such as reception and departure of trains from the station, shunting of trains, management of signals and level crossings, undertaking operating inspection of the station, repair and maintenance of station buildings, tools and equipment, water supply arrangements etc. Cleanliness, thus, was a very low priority area for them in view of the wide spectrum of responsibilities.But hiring NGO on contract basis was a rising step towards cleanliness but still the effort is not up to mark a lot of changes and additions are required whether be it coordination among departments or managing of waste .

4.3 Deficiencies encountered during study

Based on the case study and literature review, the following ten areas of improvement is required:

- Better Source Separation
- Better Data Management
- Training and Education
- Involvement of Employees and the community
- Integration of Waste Pickles
- Morale and Environment Awareness
- Planning
- Partnership
- Management

V. BROAD ACTION PLAN

There is a need to integrate resources recovery component into the current practice of waste management. Waste should be considered as resources and the waste management policy should be focused on conversion of waste into resource rather than mere safe disposal.

(i) In order to promote recycling there is a need to create market conditions. This can be achieved by adopting the buyback system. Under this certain waste producing products can be made to carry 'label of guarantee of a prefixed refund on the left over of the product' it is important to note that this practice already exists as a informal sector all over India.

(ii) Segregation of waste at source into biodegradable, recyclable and hazardous is a primary imperative to avoid the problem of overflowing bin, it is necessary to have bins that can accommodate 20% of waste more than the waste generated.

(iii) Transportation vehicles should have segregated waste while transporting. Also, vehicles should have compacting mechanism especially for biodegradable waste.

(iv) To avoid huge transportation costs, it is desirable to have decentralized locations for waste management.

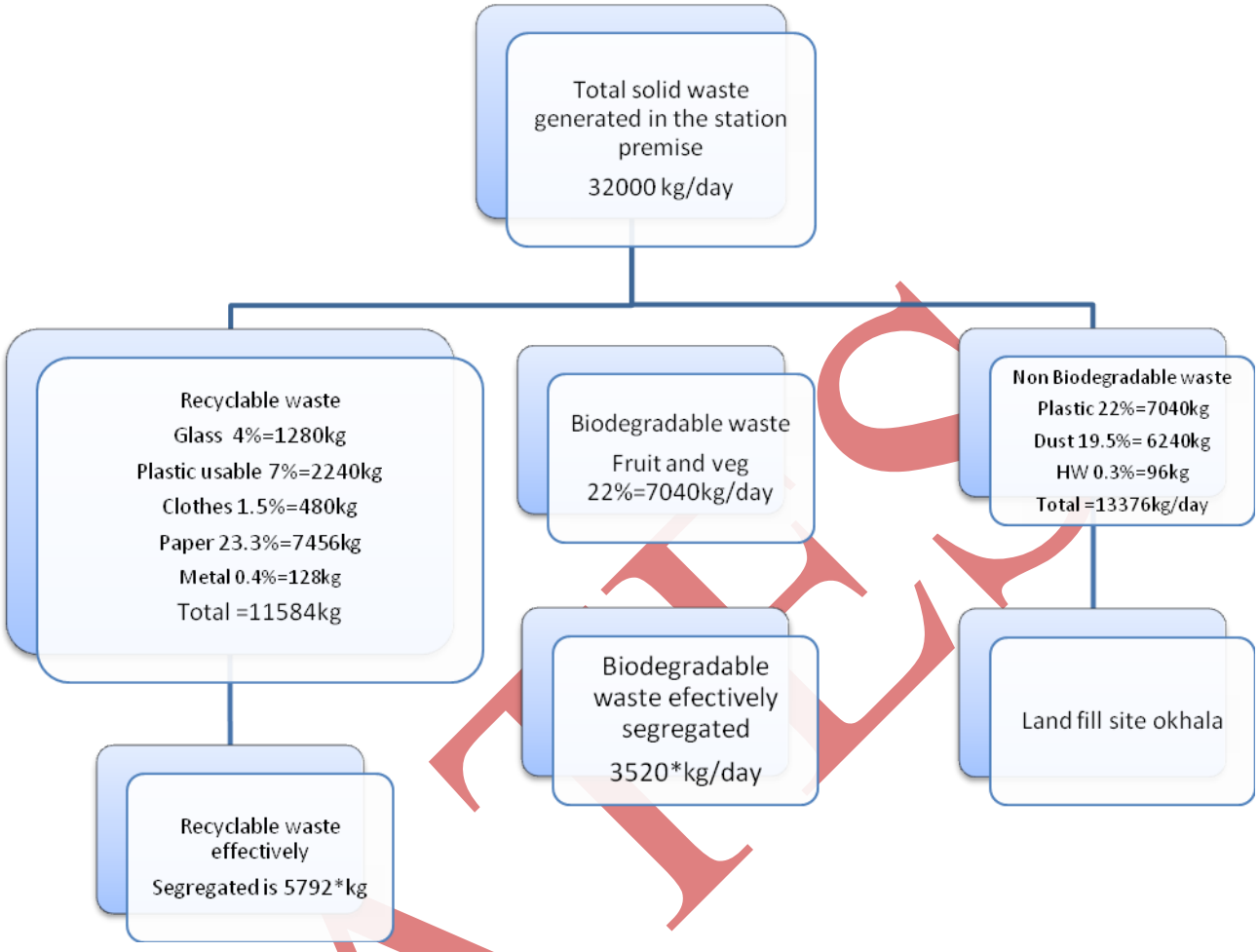
(v) Concerted efforts, using the latest technology should be made to convert the maximum quality of waste into compost and recycled resources.

(vi) Private organizations / cooperatives / self-help groups to participate should be encouraged to participate in waste management.

(vii) Comprehensive training program and massive campaigns for raising awareness among the civic-body administrators, health-staff, and municipal staff should be taken up.

(viii) Several waste products such as leather, plastics, paper, bottles, tins etc. can be brought under one roof for recycling. Recyclable products should be with display labels announcing the same.

Fig2: Flow diagram of solid waste management for New Delhi Railway Station



*expecting 50% segregation efficiency

Fig2: Flow diagram of solid waste management for New Delhi Railway Station

VI. CONCLUSION

"We humans have an amazing potential to convert everything useful into waste and anything waste into useful resources, if willing...." ---Anonymous

This review of case study undertaken against the background of the above mentioned policy decisions revealed that although many steps are being taken by railway authorities to have better SWM at railway stations but still required standards are not achieved due to inadequacy of standards, action plan and clear norms or cleanliness, absence of an unified departments responsible for maintaining a clean and hygienic environment in station premises and in trains by Indian Railways which is imperative since an average of 1.4 crore passengers frequent the railway station and travel in the trains every day all over the country. It is, therefore essential that quality standards in line with international best practices providing benchmarks or goals are prescribed, along with a comprehensive action plan, identifying milestones and providing a road map toward goal of neat and clean railway premises.

The RSWM program provides a model for learning about the conditions pertaining to solid waste management in developing countries. The complexity of issue associated with solid waste management in general and at locations like railway stations makes solid waste planning and management a challenging task. The quantity of solid waste generated at New Delhi station is same as other stations like Calcutta, Chennai, and Mumbai etc. It is worth noticing that segregation of waste, storage, transport, disposal as well as public awareness and training is now must and need to be given a much serious thought than is being given. In fact the solid generated can be very easily converted into an attractive source of income with proper policies and govt. support. This case study of the RSWM program helps to clarify the problem situation by providing a description of the various stakeholders, elements and issue involved with program implementation, and discussion of the conceptual and theoretical understanding relevant to the program. The methodological contribution of this study is the sharing of experiences and challenges the conduct of study about SWM in developing countries that will be useful to other researchers in the field.

A full-fledged awareness program should be planned and started for workers as well as normal public to understand and help in better practices for hygienic, sanitation and segregation of waste using separate bins for non-biodegradable and biodegradable waste.The nuisance of rats and flies is common on New Delhi railway station. These are the agents which spread various diseases among passengersthat come daily at New Delhi railway station. To provide the healthy environment for these passengers it is necessary to take action for complete irradiation of rats and flies. The solid waste generated can be properly managed by proper co-ordination between health inspectors of New Delhi municipal cooperation, Railway department and NGO workers.

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