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ALTERNATIVE SERVICE DELIVERY MODELS TO TRANSFORM CITYWIDE MUNICIPAL WASTE SERVICES:

THE CASE OF THE MUNICIPAL CORPORATION OF DELHI[1]

Paper No. 47

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Abstract

This paper discusses the process of involving the private sector in the management of the solid waste for the Indian capital Delhi – an urban area with a population of over 14 million. The Municipal Corporation of Delhi (MCD) is among the largest municipal bodies in the world

The first section of the paper provides a detailed description and analysis of the MSWM service in Delhi and its challenges. The next section describes the overall reform context in the MSWM sector in India. The paper then introduces the waste collection and transportation challenge and discusses the approach and process involved in detailed structuring of the preferred implementation option. The next section provides a brief overview of the process of bidding for private sector participation and an update on the present position of the awarded contracts. Finally the last chapter presents some of the learning on key success factors including openness and creativity on the part of the project developers, the need for detailed discussion with stakeholders and the importance of a transparent structuring and bidding process

1. Introduction

The Municipal Corporation of Delhi (MCD) has a large jurisdiction of 1,497 km^2 and serves a population of more than 14.5 million. Municipal solid waste management (MSWM) is a core function of the Municipality and has remained a key challenge for it. Historically MCD has been concentrating on street sweeping, secondary collection and transportation, and waste dumping activities in MSWM. These activities were carried out mainly by MCD staff itself with a staff strength of more than 50,000 and an annual expense of more than Rs 4000 million (US$ 90 million). Due to a number of reasons ranging from the need to comply with the new regulation on waste management, to various court cases for bad services as well as the huge internal management challenges of employing such a large workforce, MCD was keen to develop an alternative service delivery model that would address the need for development of new practices, techniques and technology to meet the Government of India (GoI) regulations on waste management and improve the MSWM services within the city.

1 The views presented in this paper are the authors only and do not represent views of the Institutions they work for.

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The development of an alternative service delivery model particular to Delhi was a very challenging exercise due to vast scale of operations, limited data available on operations and performance, and limited experience of implementing the new MSWM regulation in megacities, among others. This paper aims to discuss key elements of the project structuring and development process and the logic of the decisions taken in the development phase. Very early in the exercise itself it was clear that an "utopian model" was not feasible, and so alternative but intermediate service delivery models would need to be developed which are in line with the future vision of the sector.

The first section of the paper will provide a detailed description and analysis of the MSWM service in Delhi and its challenges. The next section will describe the overall reform context in the MSWM sector through the MSW rules 2000[4] and the broad sequencing of waste management reforms in phases. The paper will then introduce the waste collection and transportation challenge and discuss the approach and process involved in detailed structuring of the preferred implementation option. The next section will provide a brief overview of the process of bidding for private sector participation and an update on the present position of the awarded contracts. Finally the last chapter will present some of the lessons learned regarding key success factors including openness and creativity on the part of the project developers, the need for detailed discussion with stakeholders and the importance of a transparent structuring and bidding process.

2. MSWM in India : Fertile ground for experimenting with alternative service delivery models

Local governments have always been central to running waste management services. As in other countries, local governments from their initiation as an institution for governance had responsibility for waste management as an essential service. Local governments, however weak financially or technically, - often with the support of state governments – have been providing basic cleaning and waste management services. With the rapidly growing population in urban areas, the expansion and strengthening of urban services, including MSWM, had lagged far behind acceptable standards. Although this was evident in most cities, it was only after the plague in Surat in 1994 and the subsequent Public Interest Litigation that the crisis in MSWM services was brought to the fore across the country.

When the Municipal Solid Waste [Management and Handling] Rules 2000 (MSW rules) were gazetted under the EPA Act, a new set of standards and monitoring mechanisms was set forth and, for the first time, local bodies would be monitored by higher tiers of government for the solid waste management services they provided. As an impact of this regulation, local governments are actively looking at alternative service delivery models especially involving the private sector. Some reasons for this increasing focus by Municipalities on alternative arrangements are:

- Many requirements of the MSW rules have not been fulfilled by municipalities in the past – such as primary door-to-door collection or sanitary landfilling – and therefore there are very limited skills and knowledge within municipalities to handle these activities.
- Most municipalities lack the finance to expand operations into new, unserviced geographic areas or into new activities;
- The increased need to focus on efficiency improvements to reduce cost and reallocate expenses within the waste management chain to activities like treatment and disposal;

4 MSW rules 2000, refers to a Government of India regulation called the Municipal Solid Wastes (Management and Handling) rules; which was implemented in the year 2000, under India's Environmental Protection Act.

As a result of this, many models are emerging and are being experimented with across the country and India today represents a fertile ground for experimenting with alternative service delivery models in municipal waste management.

3. Background of MSWM services in Delhi before the new planning exercises started in 2002

3.1 Background information on Delhi

Delhi was a small town in 1901 with a population of just 4 lakhs (0.4 million). Delhi's population started increasing after it became the capital of British India in 1911. During the partition of the country, a large number of people migrated from Pakistan and settled in Delhi, and in the decade 1941-51 the population growth rate was 90%. Migration into the city continued even after Partition. The 2001 Census recorded a population of 1.38 crores (13.8 million) residing within Delhi with 3.81% annual growth rate and 46.31% decennial growth rate during 1991-2001.

As the country's capital, with vibrant trade and commerce and excellent employment opportunities, Delhi has attracted people from all over the country and its population today reflects the characteristics of almost every region of India. Delhi thus reflects the wealth and diversity of India wherein diverse religions, languages, customs and cultures co-exist. Religious, cultural and social functions of different socio-cultural groups are celebrated in Delhi.

Delhi is among the top three States or Union Territories in terms of per capita income (Rs 38,864 or US$ 880 in 2000-01). More than 80% of the state income is from the tertiary sector. However, with the continuous inflow of labourers and unemployed persons, the number of people living in sub-standard areas is increasing. More than the 45% of Delhi's population resides in slums, unauthorized colonies and other unplanned settlements.

With the rapid pace of urbanization, the rural area within the state of Delhi is shrinking. The number of rural villages has decreased from about 300 in 1961 to 165 in the 2001 census. The percentage of rural population of Delhi has also declined from 47.24% in 1901 to 6.99% in 2001[5].

3.2 Background on MCD and its Conservancy and Sanitary Engineering Department

The Municipal Corporation of Delhi (MCD) is among the largest municipal bodies in the world, providing civic services to an estimated population of more than 12.7 million citizens in the capital city. It is next only to Tokyo in terms of area. Within its jurisdiction are some of the most densely populated areas in the world. Delhi, with its urban and semi-urban population of 12.3 million (1997 data), is estimated to generate more than 6000 tonnes of solid waste every day. While Delhi has been growing in terms of its population, any efforts on part of the MCD (which has its jurisdiction on 94% of the land area of the state of Delhi), the New Delhi Municipal Corporation (NDMC)[6] and the Cantonment Board[7], which are the three municipal entities which are responsible for municipal solid waste management in Delhi, are being undermined by increases in the generation of waste, the dearth of land demarcated for waste processing facilities, encroachment onto existing sites, and paucity of funds, leading to contamination of groundwater and surface water resources, and to air pollution, in the vicinity of Delhi.

5 The above text is based on the Economic Survey of Delhi, 2001-2, Introduction.

6 NDMC is a small corporation in the State of Delhi, under which most of the areas of the new capital city of Delhi designed and developed by the British in the period between 1915 and 1940 lies.

7 The Cantonment Board has the jurisdiction to provide municipal services in a small area which mainly contains military establishments in the Delhi State.

The Conservancy and Sanitation Engineering (CSE) Department of the MCD is responsible for solid waste management within the jurisdiction of the MCD including rural and urban villages, slum clusters, regularised unauthorised colonies, roads, streets and public conveniences. The statutory responsibilities of the CSE specifically related to municipal solid waste management include:

- Garbage collection, transportation and disposal;
- Sweeping across an area of approximately 700 km^2;
- Repair and maintenance of the dhalaos (waste storage facilities) and street dustbins (waste containers) under its jurisdiction;[8]
- The repair and maintenance of the refuse removal vehicles and equipment, and other municipal vehicles.

Table 1 : Manpower Structure and Strength of the CSE Department of the MCD

Staff Designation	Total Numbers
Director-in-Chief	1
Director	2
Joint Director	6
Superintendent Engineer (Auto)	1
Superintendent Engineer (E&M)	2
Executive Engineer	27
Assistant Engineer	46
Junior Engineer	80
Sanitary Superintendent	26
Chief Sanitary Inspector	36
Sanitary Inspector	22
Assistant Sanitary Inspector	726
Sanitary Guide	603
Vehicle Driver	941
Safai Karamchari[9]	49,710
Total	**52,229**

Source: Municipal Corporation of Delhi, 2004.

MCD maintains a large fleet of vehicles for transportation and secondary collection of waste from various waste receptacles to the disposal site. The main types of vehicles used are: Refuse Removal Trucks (RRTs), Loaders, Mini Dumpers, Tractor-trailers and also Buffalo carts in rural areas. The CSE Department has nine workshops for the maintenance of their vehicles servicing all the 12 zones.

The secondary waste collection operations begin early in the morning with the assignment of collection points (dhalaos, dustbins and open sites) to each driver mainly using two types of beats[10] – loader beat and manual beat. A loader beat involves a front end loader accompanied by 4 to 6 refuse removal trucks. Manual beats are assigned in the congested areas where loaders cannot go and in which refuse removal vehicles are loaded by manual labour (4-6 Safai Karamcharis per truck).

8 Dhalaos are large masonry enclosures with concrete a floor and roof typically with a capacity between 4 to 6 tons of waste. These waste receptacles are quite typical to Delhi's waste management system. Street dustbins often are also made of masonry or concrete but rarely with more than one ton capacity.

9 Safai Karamchari's are street sweepers who use manual techniques for street sweeping.

10 Beats refer to schedules. *Loader beat* refers to schedules for the Front end loaders used to lift the waste from the ground on to trucks, while *manual beats* are schedules for a group of Safai Karmacharis responsible for lifting waste from collection points that cannot be reached by the front end loaders.

4. Key challenges that were addressed at the start of the new planning effort

The present system of collection, transportation and disposal of waste poses manifold problems in providing timely, quality, aesthetic and hygienic services. In spite of employing, at large costs, a huge workforce and a battery of owned and operated vehicles for the service, the present level of service is far from users' satisfaction.

The principal objective of the new project being undertaken by MCD is to create an efficient and effective garbage collection, transfer, treatment and disposal system in Delhi which would be in compliance to the MSW rules.

The planning and project development effort from MCD would have overall outcomes which would be:

1. Reduce the health and hygiene risks related to municipal waste for the entire population in Delhi,
2. Improve productivity of man, materials and equipment in the waste sector,
3. Promote economic operations of services,
4. Promote and protect the quality and sustainability of the urban environment.

The Municipal Solid Waste (Management and Handling) rules 2000, specify a number of activities and standards to be adhered to throughout the MSW management chain. This regulation was the guiding document that was followed while developing the outline of the upgradation of services. At the start of the exercise, a rapid due diligence[11] of the waste management practices at MCD was undertaken by means of field visits and discussion with all levels of MCD staff involved in waste management. In addition, discussions with NGOs and resident welfare organizations were also conducted as part of profiling the collection, transportation and disposal systems. Along with this, a detailed costing exercise for service delivery under the current system was done. This led to a clear picture of the present system and the important pitfalls as well as the risks associated with the changing of standards and operational practices.

The rapid appraisal led to a number of very revealing aspects, a few of which are highlighted below:

- There was no comprehensive database of staff and equipment involved in solid waste management at MCD;
- MCD had, on the instructions of a court of law, tried to provide door-to-door collection services, but had found it an unviable proposition as it would cost MCD more than another Rs 1000 per ton of waste collected (i.e.. it would raise the CSE budget by around 35 per cent).
- The dhalaos/collection points for waste in the city varied immensely. The size and capacity were a function of the available area and the expected waste generation in each catchment area. The density of placing of the collection points also varied tremendously and there was no binding logic that determined the location of the collection points. Also there were no norms for the upkeep and maintenance of the collection points and so at any time many of the dhalaos were in a bad state of repair
- Informal ragpickers provided door-to-door collection services in many middle- and higher-income neighbourhoods
- Informal ragpickers also operated in dhalaos where they segregated recyclable material, and were also present at the dumpsite
- Although most dhalaos were designed with gates and locking arrangements these were not maintained and allowed free access to birds and animals.

11 An investigative study similar to an audit of the policies and practices engaged in by MCD to confirm all material facts in regards to its solid waste management operations incl. legal, technical, environmental, health and financial aspects.

- Drain cleaning waste/sludge, small construction debris and street sweepings were also part of the waste deposited at dhalaos.
- Front end loaders were used by MCD to lift the waste from dhalaos. Many of these loaders were often in a bad state of repair and this led to manual loading or backlogs in collection.
- Open trucks, often more than 12 years old, were used to collect the waste and this led to spilling of the waste en-route and a low tonnage carried on each trip.
- MCD had experimented with the whole range of loading and transportation vehicles including dumper-placers[12], rear-loading and side-loading compactors, and small vehicles such as auto rickshaws and small trucks, but these vehicles were unused and lying in a state of disrepair at various MCD transportation workshops
- MCD had two mechanized compost plants and a waste-to-energy plant that were dysfunctional
- The dumpsites had severe health and environmental issues related to their functioning.

Table 2 : Compliance criteria and how MCD services were faring

Sl.No	Activities specified by MSW rules	MCD practice	Practice status
1	Segregation at the household level	Nil	Noncompliant
2	Primary collection	Nil or very limited	Less than 200 out of 2500 residential colonies
3	Containerized and segregated storage	Nil	Open dhalaos were the norm
4	Street sweeping	Yes	Other than in new areas
5	Transportation in closed vehicles	Nil	Open vehicles used
6	Treatment of biodegradable waste	Nil or very limited	2 compost plants inactive
7	Sanitary Landfill	No	Open dumping

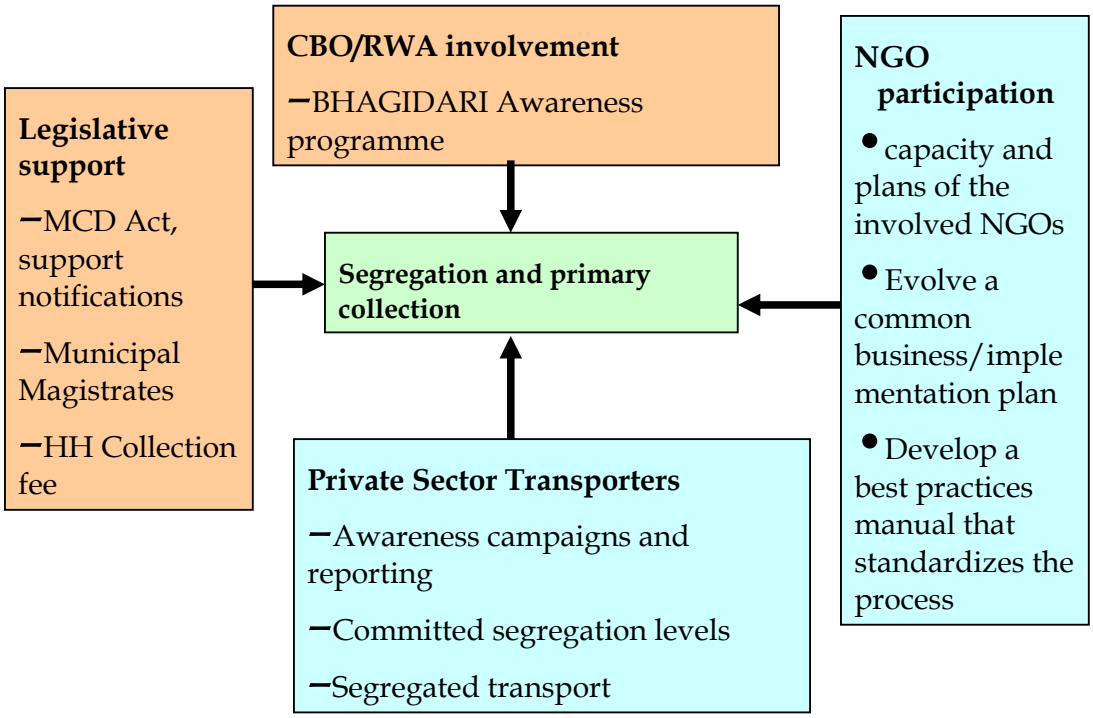
The first set of decisions was around the **unbundling** of the MSWM sector in Delhi to increase accountability. This was essential since the involvement of household and communities is critical for primary collection and street sweeping, but of less importance in other segments such as secondary collection, transportation and treatment and disposal. Unbundling also provided the benefit that it would help *ring fence*[13] the various activities and therefore reinforce the accountability of the responsible agencies. Also due to a number of tactical reasons, such as the availability of land for treatment and disposal and the need to provide benefits to citizens in a short time frame, a strategy that would quicken the upgradation process was developed. The strategy envisaged unbundling the chain of desired MSWM activities into **three bundles**. The first bundle consisted of **primary collection and segregation at the household level** [where a consistent long-term programmatic awareness raising support was required from MCD, amenable to CBO and NGO partnerships]; the second bundle of **collection and transportation** and the third for **treatment and disposal** which were each distinct activities requiring particular and distinct sets of skills and are measurable activities which were amenable to contractual arrangements with a role for the private sector.

To address the primary collection and segregation challenge across the city a variety of efforts were undertaken in a comprehensive manner. Regulation and monitoring was strengthened, awareness programs developed, CBOs/RWAs and NGOs were engaged as part of a wider community engagement programme of the government called the *Bhagidari* programme as in the Figure 1 below.

12 Dumper-placers is a term widely used in India to refer to a vehicle and bin combined system in which a bin is lifted hydraulically onto the vehicle. They are also known as skip trucks and load luggers..

13 Ring fence: is a term used to broadly indicate the creation of dedicated, non fungible, earmarked funds or activities or manpower and equipment. This organized through a number of ways with the prime objective of increasing the accountability in service delivery.

Figure 1: Multi-pronged effort to implement segregation at the Household level



This was an ongoing effort which was strengthened through legislative efforts and monitoring mechanisms. The other two set of bundles where no work has happened so far were to be started simultaneously. As it was well documented in other cities like Mumbai, and in certain small clusters in Delhi, scaling up segregation at the household level would not be possible without a segregated secondary collection and transportation system. This was the case as the credibility of the enforcers of the household segregation policy, the Municipal Corporation itself, would be at stake if it asked householders to segregate waste but then mixed it for transportation. This led to the prioritizing, developing and implementing of an institutional option immediately for segregated collection and transport. Simultaneously work started on studies and land acquisition for a implementing a long-term treatment and disposal master plan. Since this paper deals with the development of the details of the institutional arrangements for collection and transport, it will not discuss the details of the Master Plan for Optimal Waste Treatment and Disposal for the Entire State of Delhi which was created by a Danish firm called COWI for the period of 2005 – 2025.

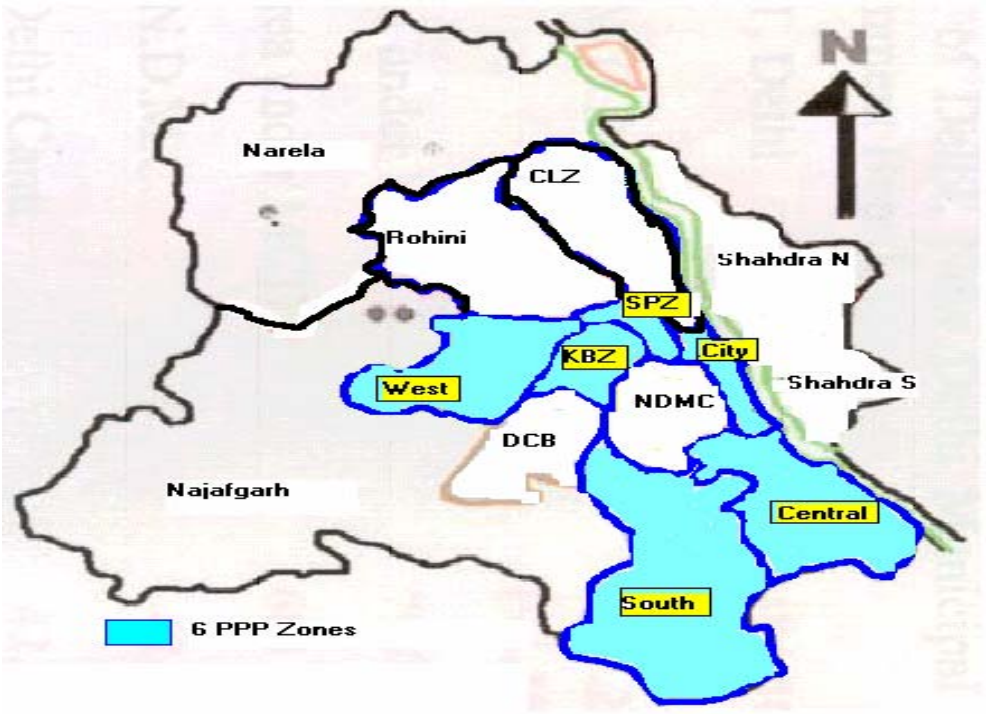
5. Structuring a citywide collection and transportation upgradation project

As discussed in an earlier section, the overall reform exercise at MCD was divided into three distinct programme components. This section will discuss in some detail the component related to reform of the collection and transportation system and lay out the key parameters and the discussion and decisions made around it that led to the creation of a particular alternative service delivery model and changes in the mix of responsibilities between the public and private sector to provide improved services.

Much of the initial discussion within the MCD was related to the carving out of a) geographic area for experimenting with the new model to be developed and b) the selection of the sub-activities related to operation of the collection and transportation system could be run in partnership with the private sector.

The issue of the zones to be developed under the new institutional arrangements was arrived at keeping in view the willingness of the councillors from these zones, as well as the wish to identify compact and urbanized zones for this exercise. After deliberations at senior levels at MCD, six of the 12 zones were identified for the project. This also was recommended and supported as it would allow for benchmarking service delivery across six zones operated under a partnership with MCD verses six zones fully run by MCD. It was hoped that this would bring in a level of competition into this sector and help in improving services overall. Figure 2 shows these zones, and Figure 3 shows the proportions of the population, area and waste associated with each system.

Figure 2: Six zones identified for collection and transportation reform



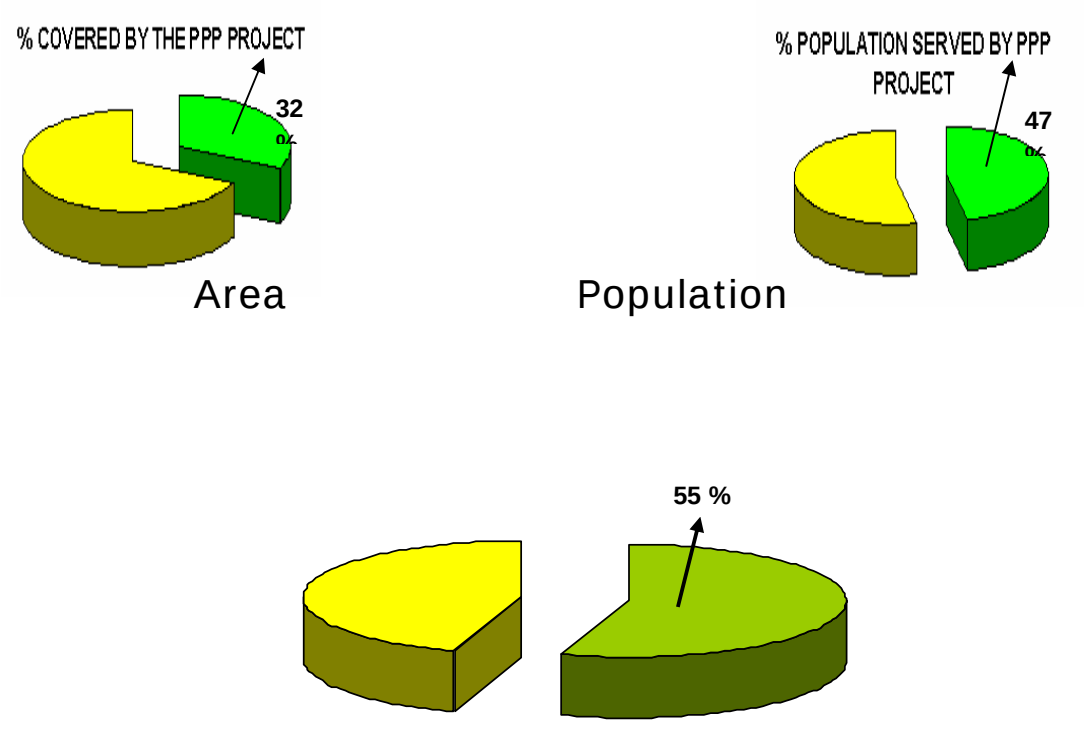
The rapid due diligence of the collection and transportation activities carried out in the six MCD zones revealed a huge scope for improvement of the quality, efficiency and cost of service delivery. As an example out of the total vehicle fleet, on an avg. 67% Refuse Removal Trucks were in working order and 56 % Front End loaders were in working order on any given day.

With the view to create a well integrated set of operations which would not require a large scale displacement of MCD staff a technical team from MCD and its advisors went though a structured decision making process based on a detailed calculations as well as some discussions with waste management experts.

Some of the important questions that arose during the initial project structuring phase included

- Value added by the Informal Sector, can it be recognized in the PPP project?
- Should pre-transportation be brought under the purview of the private transporter?
- Is private /NGO involvement in street sweeping not possible?
- Drain cleaning – Should it or shouldn't it be bundled as an activity along with MSW collection?
- Could waste receptacle structures be potential revenue sources?
- Were the MCD vehicles of any value under the new system?
- Could the vehicle workshops be leased to the new transporting entity?

Figure 3: Coverage in terms of area, population and waste



These aspects were discussed in the context of the possible institutional arrangements that included

- Primary collection / pre transportation [house-to-house collection or streetwise collection] : unorganized ragpickers (in this option the unorganized rag pickers were to continue providing either house-to-house collection services or streetwise collection services)
- Primary collection/ pre transportation [house-to-house collection] : Ragpicker 1 + NGO/private party (In this option the ragpickers were to continue providing either house-to-house collection services or streetwise collection services in coordination with NGOs or local small private enterprises)
- Primary collection / pre transportation [house-to-house collection] : MCD safai karamcharis in-house (In this option MCD staff called safai karamcharis were to continue to provide either house-to-house collection services or streetwise collection services)
- Primary collection / pre transportation [house-to-house collection]: same as the larger transporter (In this option the formal large transporter is engaged through a bidding process was to provide either house-to-house collection services or streetwise collection services.)

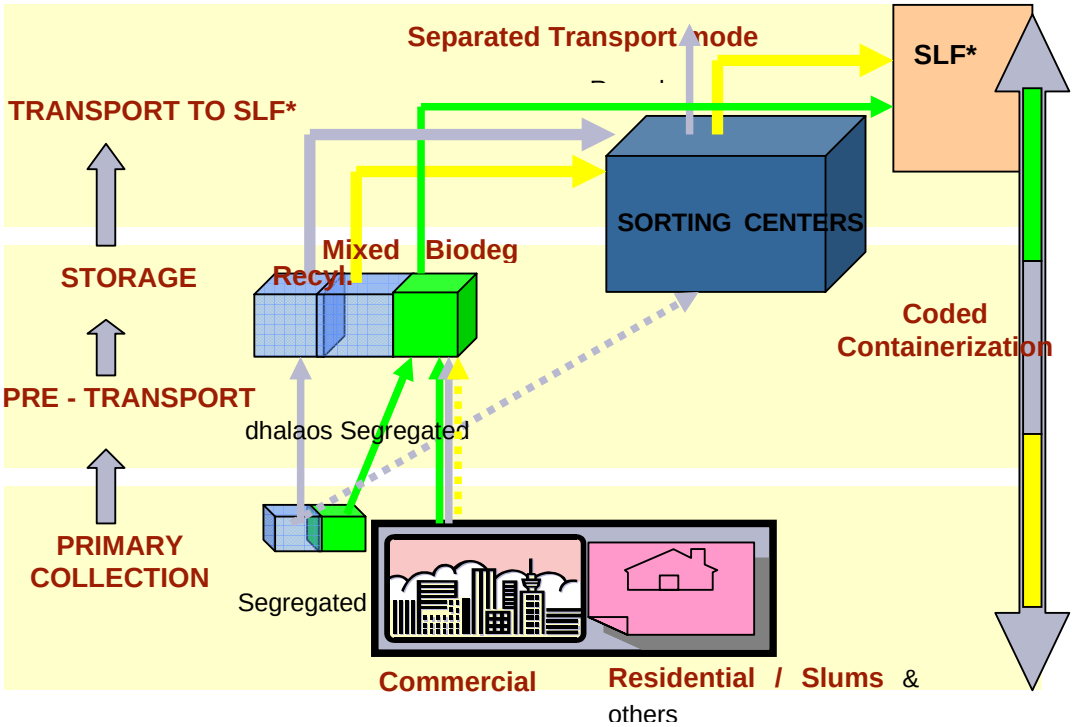
These options were evaluated against common evaluation criteria as in Figure 4 and it was decided that large private transport contractors working in tandem with resident welfare association engaged NGOs or small scale service providers would be the most desirable option. Figure 5 shows the system that was selected.

Figure 4: Institutional options and evaluation criteria

1. Primary collection / pre transportation – H-to-H col/streetwise col : unorganized ragpickers
2. Primary collection/ pre transportation – H-to-H col/ streetwise Col : Ragpicker 1 + NGO/Private Party
3. Primary collection / pre transportation – H-to-H col/streetwise col : MCD SK in-house
4. Primary collection / pre transportation – H-to-H col/streetwise col same as the larger transporter

EVALUATION CRITREA	HIGH	MEDIUM	LOW
Compliance to MOEF rules	✓		
Ensuring Sorting at Source		✓	
Convenience of general users	✓		
Visible impact of new implemented system	✓		
Ease of Contractual arrangements		✓	
Cost to MCD		✓	
Ease and consistency in sorting		✓	
Ease of Monitoring			✓
Risks of interconnection	✓		
Socialistic Press response			✓

Figure 5: Schematic representation of the new system to be implemented



* SLF = sanitary landfill

6. Risk Analysis

After the development of the broad outline of how the system would operate a detailed risk matrix related to the project development and operation was drafted. Each type of risk was allocated to the party which was best suited to manage it. Other than this an instrument to control and monitor that risk was also decided. Please see Tables 3 and 4.

Table 3: Risk Analysis - 1

Risk Category	Activity	Risk to be Controlled	Generator of the Risk	Party/s affected by the risk	Method of Controlling the Risk	Party/s allocated the Risk
Operating Risks	Primary Collection	Design of appropriate system for Collection	Nature of the sector itself incl.	MCD and the Pvt Operators	MCD to provide complete information of the present	Pvt Operator
		Construction of Dalaos/Transfer Stations	Pvt Operator	Pvt Operator	Realistic deadline with penalty for commencing operations after	Pvt Operator
		Staffing to operationalise project	Ragpickers / CBOs	Pvt Operator	Exclusive Contract, Police support if reqd	Pvt Operator + MCD
		Equipment Procurement and Operations	Pvt Operator	Pvt Operator	Realistic operationalising deadline + performance criterea	Pvt Op
		Household Segregation	Households	Pvt Operator	Regulatory & Enforcement Support from MCD/SPCB etc	Shared between Pvt Op/MCD
		Segregation during Pre transportation and at	Pvt Ops	Pvt Ops	Performance criterea/monitoring	Pvt Ops
		Non Collection of Garbage	Pvt Ops	Hholds, CBOs MCD	Performance criterea /monitoring and penalties	Pvt Ops
		Door to Door Fee Collection	Hholds,	Pvt Ops	Regulatory and Enforcement support by MCD	MCD and Pvt Ops
	Secondary Collection	Non Collection of Garbage	Pvt Ops	Hholds, CBOs MCD	Performance criterea /monitoring and penalties	Pvt Ops
		Birds/Nucence/Animals/r agpickers at Daloas and	Present Collection	Society at large, Ragpicker	Containerisation of Waste	Pvt Ops

Table 4: Risk Analysis - 2

Risk Category	Activity	Risk to be Controlled	Generator of the Risk	Party/s affected by the risk	Method of Controlling the Risk	Party/s allocated the Risk
Supply Risk	Primary Collection	Non deposit of Waste to Pvt Ops	Hholds, CBOs	Pvt Ops	Min waste Guarantee by MCD	MCD
	Collection and	Non lifting to Dalaos / Transfer Stn	Pvt Ops	Pvt Ops	Performance criterea/ monitoring and penalties	Pvt Ops
Depositing risk	At Landfill site	Closure of Land fill site	MCD	Pvt Ops	Clause of alternative site, additional payments	MCD
Regulatory Risk	Primary Collection	Change in regulation for greater segregation	Courts/ SPCBs	Pvt Ops and MCD	MCD Campaign and Pvt Campaign	MCD
	Pre/Collecti on and	Change in regulation in Primary Collection/Pre	Courts/ SPCBs	Pvt Ops and MCD	Involvement of PCB in evolving Performance Criterea	MCD
Revenue risks to Project	All	MCD Tipping Fee	MCD	Pvt Ops	Creating a speacial budget / fund for the project	MCD
		Hhold fee	Hholds	Pvt Ops	Regulatory and enforcement Support + Min Gurentee from	MCD
		Advt Fee risk	MCD/ Courts	Pvt Ops	MCD to gurentee if not available	MCD + Pvt Ops

Based on the accepted division of risk a business case and financial model were created which clearly documented that design risks followed by operating risk were the main drivers of value in this sort of a model. In effect it meant that the quality of the design of the system will have the largest impact on the cost efficiency of the system. It was already known that MCD had a very poor track record of system design which led to the high cost of service provided by it. Therefore it was decided to transfer the design risk along with the operational risk to the private sector. The next set of issues that significantly impacted the risk profile of the project were Operational Risks such as collection efficiency achieved and trips achieved per vehicle per day. This was also a key reason to pass on the entire risk of operations to the private sector that was expected to bring in better management and logistics skills to reduce the costs in operations. Figures 6 and 7 show risks in more detail.

7. Salient features of the contract

Based on a number of parameters and decisions and detailed calculations a concession contract for a private sector entity which would provide MCD with waste collection, segregation and disposal services was developed.

Brief overview of the Partnership option developed:

- Concession contract as the private sector entity would need to undertake all capital expenditure upfront: MCD (concessioning authority) to authorize the bidder to design, procure, build, operate, maintain & transfer the project facilities.

- The concession period would be fixed at 9 years to capture the full life of the new vehicles brought in by the private sector.
- The period of construction and procurement would form part of the concession period to incentivise early operation.
- The contract would provide for exclusivity in the notified area of each of the Zone Sets during the concession period. In this way there will be competition for the market but not in the market as the city and residents were not ready for collection and transport competition – the fees still came directly from the city not the users.

Figure 6: Risk Analysis -3

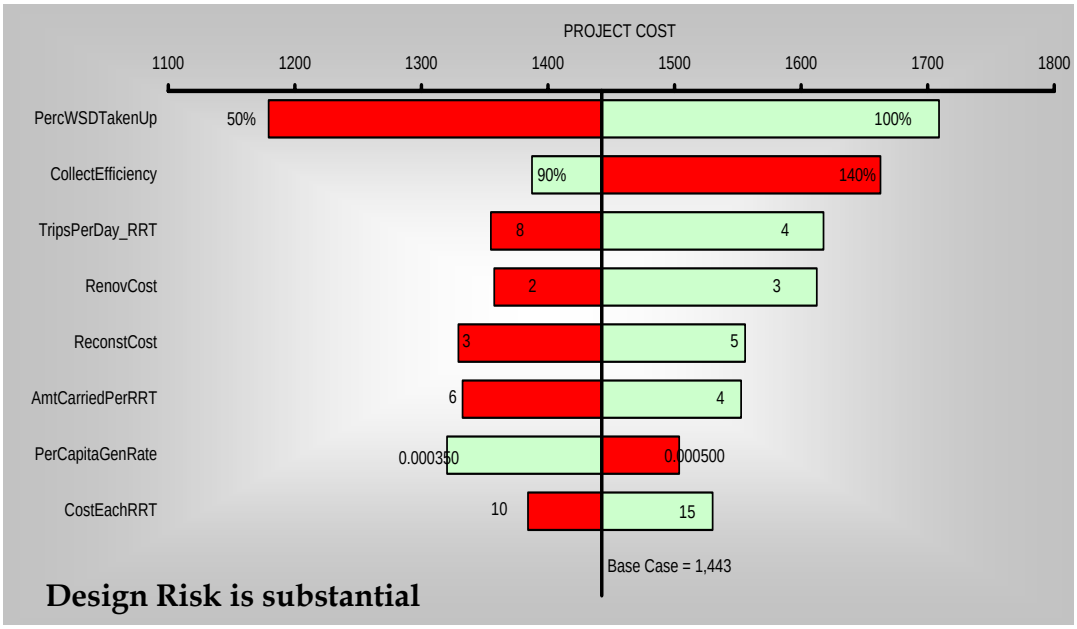
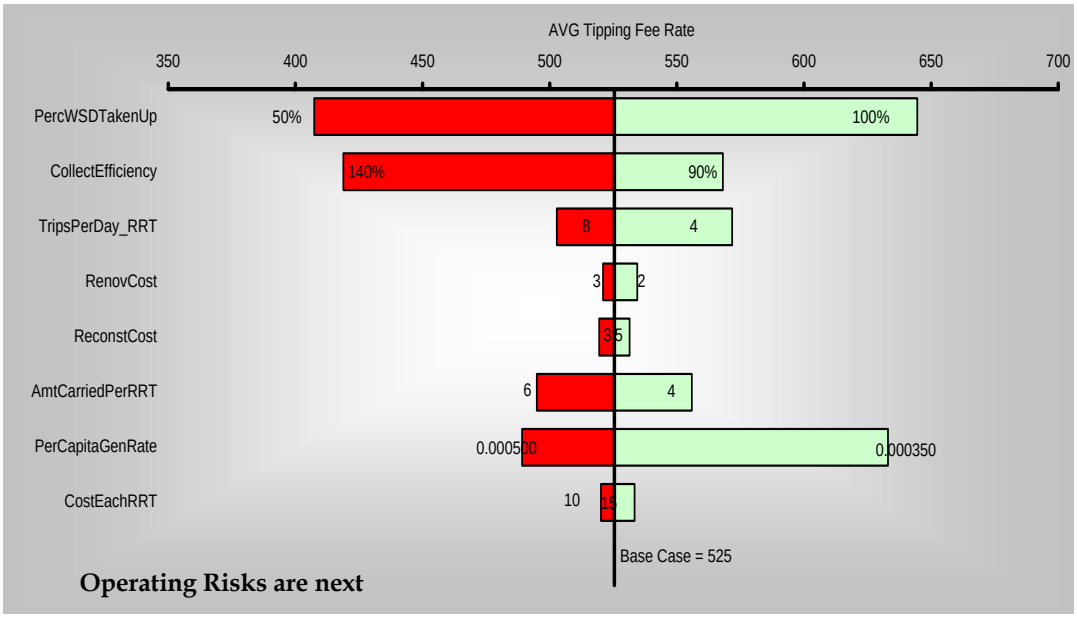


Figure 7: Risk Analysis -4



The major changes the project was aimed at addressing were:

- Segregating at source or separating as close to the source of waste generation as possible, into two categories – (i) biodegradable and recyclables, (ii) other dry waste;
- Adherence to the Municipal Solid Waste (Management and Handling) Rules, 2000;
- Maximising value recovery from sale of recyclables;
- Containerization (covered), colour coding and careful monitoring of the waste generation, collection and transportation;
- Single-handling of waste;
- Minimization of displacement of existing waste workers both formal and informal;
- Minimisation of dumping of the recyclables at landfill sites.

The proposed private partner is expected to:

- provide paid door-to-door collection (if demanded by the waste generators);
- ensure collection of waste from street corner bins (SCBs) placed at regular intervals in the specified areas;
- redesign and maintain existing dhalaos to allow for receipt of wastes from the generators, segregation of the waste as biodegradable and recyclables up to the specified level and storage till the collection of waste from dhalaos. The private partner is expected to put his own workforce for the receipt of waste at the dhalaos and for maintenance of dhalaos;
- design the waste sorting and recycling station for the separation of collected waste up to the specified level (different for different years) at the specified site;
- design, procure, operate and maintain a transportation system including equipments, vehicles and manpower for regular collection of waste from the *dhalaos* and street corner bins and from the waste sorting and recycling station and finally disposal of the segregated waste at the identified landfill sites;
- design, procure, operate and maintain existing auto workshops;
- promote public awareness campaigns for segregation of waste by generators. The private transporter was to assist in implementing segregation at source by awareness creation and other means which they could develop. The contract was heavily incentivised to encourage the private transporter to assist in this exercise. Towards this there was a segregation benchmark created which the private transporter is expected to meet year after year, and a set of tests to be conducted by an independent third party to ensure this. The scope for separation by the private contractor was made available so as to cover policy and implementation support uncertainties of the government. To allow recycling to continue a set of close to 40 recyclable items were excluded from the list of waste the transporter could transport to the landfill.
- To set up the entire proposed system in a period of 9 months before starting the actual operations after verification from an independent consultant;
- The selected private partner will be penalized for not achieving the segregation level of waste, sufficient level of waste collection, maintenance of dhalaos, condition of transport and collection vehicles and satisfaction level of general public etc.;
- The selected private partner will hand over the entire project facility to MCD at zero cost on the expiry of the 9 years term.

The MCD will be paying a fixed “monthly tipping fee in terms of rupees per ton of segregated municipal solid waste brought and weighed at the weigh-bridge of the landfill site” as per the rate quoted by the selected private partner to compensate for the capital costs and operating costs incurred by him.

Third party monitoring is to be conducted to oversee the operations of the private sector. Detailed technical schedules on the monitoring mechanisms and criteria were laid out as part of the concession agreement. Also safeguards are put in place to ensure that the third party monitor does not have any other relation to MCD or the private firms

MCD has also set a segregation benchmark varying from 5% in Year 2 to 20% from Year 8 onwards which is a percentage of total number of vehicle trips to the landfill site required to pass the tests relating to level of biodegradability. In case the private party fails to attain the segregation benchmark, a 15% penalty on the tipping fee will be levied by the MCD.

Figure 8: Segregation benchmarks to be implemented by the private firms year on year

Year of Operation	Months from COD	SB= Segregation Benchmark for the corresponding months (in % terms)*	R= Applicable penalty for corresponding months (in % terms)
Year 1	1 - 12	0	Nil
Year 2	13-24	5	15
Year 3	25-36	10	15
Year 4	37-48	12	15
Year 5	49-60	15	15
Year 6	61-72	18	15
Year 7	73-84	20	15
Year 8 onwards	85 onwards	20	15

* The percentage of the total number of vehicle trips to the Landfill Site during the preceding month which have duly passed the Tests relating to level of biodegradability in accordance with the O&M Requirements

8. Bidding out the collection and transportation project

Stakeholder consultations were key to the smooth development of the project. During the early project development process MCD and its advisors had a series of formal and informal meetings with all categories of stakeholders including Resident Welfare Associations, Community-based Organizations, Non-Governmental Organizations, private sector – both national and foreign – small MCD transporters etc. These meetings were also complemented with two open meetings which were advertised by open invitations printed in newspapers and were open to all interested persons. A strong marketing exercise was conducted by the MCD advisors in which over 200 local and international companies were contacted and the project was explained to them. Other than this the Federation of Indian Chambers of Commerce and Industry organized a half-day briefing session on the project for all its members.

A two-stage bidding process for choosing the private sector partner in each project was decided. The first stage was a pre-qualification stage and the second would be the submission of detailed technical and financial bids. In an effort to ensure competition and to ensure that at least two operators were selected in the bidding process, the number of zones that a bidder could win was restricted to a maximum of three from the beginning of the bidding process.

Since there were only a couple of companies in India that had the complete experience to match the tender requirements, the bid allowed for the building of consortiums which combined transportation, manpower management and construction skills. Out of the more than 40 companies that applied, six were short-listed and invited to bid in two sets of zones. Finally three companies managed to win one MCD zone or more. The concession agreements were signed with three companies namely, Delhi Waste Management (P) Ltd; Metro Waste Handling (P) Ltd and A.G. Environ Infra Project (P) Ltd. These firms have started operation in close to 40 percent of their allocated zones and are expected to take over the full zones from the end of March 2006. As an outcome of this exercise MCD is expected to save between Rs 200 and 400 (US$ 4.5 to 9) per ton of waste transported according to the zone from which the waste originates, while significantly improving standards and complying with the national MSW rules.

Table 5: Improved standards expected from the new institutional arrangements

Present Condition	Proposed Improvement
Dhalaos located at far-off places.	Storage facilities to be placed at suitable accessibility to users.
Waste mostly exposed and spilling out from storage facilities. Unaesthetic and not user friendly.	Storage facilities to be designed in order to avoid open exposure of waste to environment; to be aesthetically acceptable and user-friendly.
No distinction of bins for collection of biodegradable and non-biodegradable wastes.	Bins with different colours to be installed. Bins for storage of biodegradable wastes to be painted green, for recyclable wastes to be painted white and other wastes to be painted black.
Manual handling as well as motorized collection takes place.	Manual handling to be prohibited and wherever not possible should be undertaken with proper precaution and due care for the safety of workers
Open vehicles are used for carrying wastes from dhalaos.	Covered vehicles will be used.
Waste spilled while carting.	Scattering of waste to be prevented while carting.
Waste collected from storage facilities on periodic basis.	Waste to be collected on regular basis.
Mixed waste is transported.	Vehicles to be designed to carry segregated wastes.
Not compliant to the MSW (M&H) Rules	Compliant to MSH (M&H) Rules

9. Lessons learned from the implementation of the project

Critical to the whole project development and implementation process was the amount of time, patience, creativity and openness to suggestions demonstrated by the project development team. The amount of time and effort spent on **consulting with all key stakeholders** and incorporation of their views was the most import success factor. It is evident that a reform exercise without high levels of consultation will not be successful in India.

The other critical factor was related to **simplicity, transparency and discipline** adhered to during the development and bidding process. On many occasions these principles were tested and the determination of the project team to stick to these principles went a long way in mitigating any risk of allegations and political interference around the project.

It was very clear that any such structural change in the model for service delivery would need detailed development and buy-in from all stakeholders. To achieve this there is no second option but to design a consultative development process and implement the new model with thorough transparency and discipline.

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