



Space for Waste

Planning for the
Informal Recycling Sector



Chintan Environment Research and Action Group



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Chintan is a registered, non-profit organization working on issues of sustainable, equitable, consumption through grass roots work, research and outreach. We work in the area of the informal sector and recycling, waste management and toxics, environmental education and child environmental health.

Our work includes organizing the informal recycling sector, helping build their capacities and collectively finding opportunities for them to equitably participate in the delivery of urban environmental services.

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Preface

Chintan has been working on environmental issues for almost five years now. An important focal area for us has been the issue of sustainable, equitable consumption. Chintan's entry point into this issue is through the issue of waste. One of our concerns revolves around the functioning of the informal sector, comprising waste pickers, kabaris or waste traders and reproducers. This sector both enables and subsidizes consumption by the middle classes, while supplementing the inadequate waste handling infrastructure that exists. Yet, they remain without any official recognition.

This is indeed a strange position, because verbally, the recycling sector is praised for its contribution in many seminars and workshops across the country. Indeed, even the Planning Commission, in the Bajaj Committee Report, 1994, stresses home the importance of the sector and its poor working conditions. However, the ground reality remains different. The sector works in conditions of great insecurity, collecting and segregating waste under hazardous, unplanned conditions. The waste is sold to waste dealers, or kabaris, who also operate from shanties under unplanned conditions. Ironically, they pay substantial amounts to various agencies, formally or otherwise, for using this land. The work of this sector was earlier estimated to have saved the city of Delhi, for example, at least Rs. 12 lakhs daily in costs of sheer manpower. However, this report shows that the amount is much higher. The picture that emerges is one of the poorest persons in urban India subsidizing the life-styles and consumption of the richest.

One of the important reasons why the sector is forced to work in this invisible way is the absence

of any provisions for their work in the planning of cities. This puts them beyond the margins of legality. Without official sanction of their work, the activity of the recyclers itself becomes illegal and more vulnerable to various pressures from civic authorities. In general, by planning for a sector as vital as this, the activity of recycling itself receives a boost, and the benefits extend to the government as well.

Chintan decided to understand the planning needs of this sector by undertaking a study in Delhi, a city we know well. Our team comprised both members of the recycling industry and professionals who were well versed with planning and environmental issues. Our approach was to understand the needs layer by layer, from the level of the ragpicker to the biggest waste dealers. In each case, questionnaires were administered and data collected through observations and measurements. We then worked intensively with Hazards Centre, to understand the data within the planning framework. The emerging picture was presented to various sections of the informal recycling sector and their comments and suggestions incorporated. A final report was then generated.

This is that report. It offers policy makers both a rationale and the means by which the needs of the informal sector should be included in planning for a big city. We hope that this report helps policy makers see the possibilities of partnering the sector with new eyes, but also, encourages them to actualize these possibilities.

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Contents

- 1.0 Introduction Page 1
 - 1.1 About the Study Page 1
 - 1.2 Solid Waste Management Page 2

- 2.0 The Informal Sector in Solid Waste Management Page 4
 - 2.1 An Overview Page 4
 - 2.2 Waste Generation and Collection Page 5
 - 2.3 Waste Collection by Self-employed Waste Pickers Page 8
 - 2.4 Collection and Segregation by Employed Labourers Page 10
 - 2.5 Small Kabarisi Page 11
 - 2.6 Thiawalas Page 14
 - 2.7 Big Kabarisi Page 14

- 3.0 Planning Norms Page 15

- 4.0 Recommendations Page 17

- References Page 18



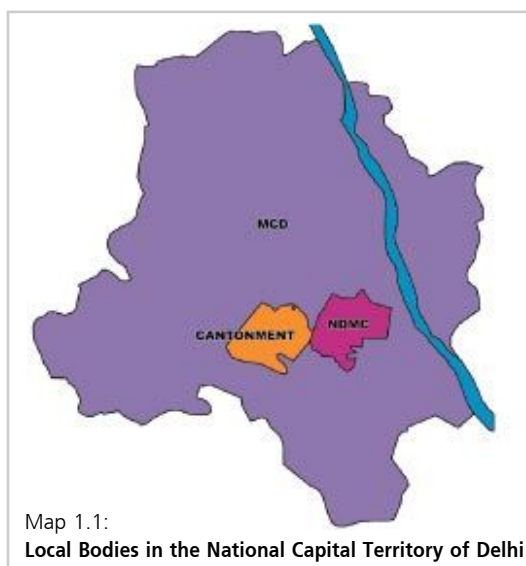
1.0 Introduction

1.1 About the Study

India has traditionally been a nation whose population predominantly (80%) lives in its villages. However, another reality is slowly but surely emerging: the great urban boom. By 2021, it is estimated that 40% of Indians will be living in urban areas. As urban conurbations and corridors emerge in various parts of India, how will they impact on the urban poor, their livelihoods, and the environment?

For several years now, Chintan has been working amongst one of the most underprivileged sections of the urban poor – the sector of self-employed people called waste pickers. In Delhi itself, where it is said they may number upto 70,000 persons, they save the municipalities at least 6 lakh rupees daily, picking up between 9-15% of the waste, but their own professional and personal situation is far from empowered and profitable. A study currently being undertaken by Chintan shows that this informal sector itself feels that cuts, beatings, vehicle hits on roads, unsegregated waste, toxic chemicals in the waste, and breathing ailments, including acute breathlessness through fumes and allergies, are amongst the most common occupational hazards they face. This is also being borne out by clinical tests. This is further compounded by poor living conditions, which are also the cause of diseases seen in the study: worm infestations and stomach ailments - a direct result of poor sanitation. Often they are unable to access adequate care for these ailments. Owing to their status/image, they are unwelcome in Government hospitals and are under-confident about accessing even the most basic facilities. Thus, recycling takes place at the cost of human health. It no longer remains a green activity.

The entire process of recycling has not been studied in any great detail and many of the figures being cited are estimates. It was, therefore, considered appropriate by Chintan to initiate a study that would open up the field for further enquiry and at least provide a basis for making intelligent decisions about what could be done to relieve the distress prevailing within the sector. This study began in 2002 with a reconnaissance study amongst 127 waste pickers to establish some kind of baseline and refine the survey methodology. Later it was followed up by a survey of a much larger sample of 623 waste pickers and the 80 small kabaris to whom they were supplying the waste. 588 employees of these kabaris were also interviewed, as were 36 thiawalas and 6 big kabaris. Later, as gaps in the data became evident, another 32 small kabaris were surveyed. The data was collated and analyzed with the help of Hazards Centre.



Map 1.1:
Local Bodies in the National Capital Territory of Delhi

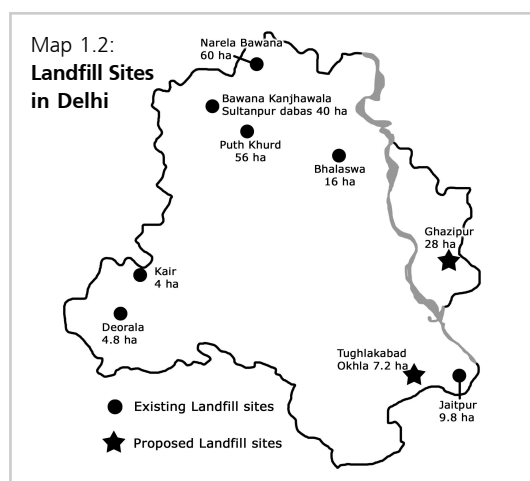
One of the unique features of this study has been that all the data has been collected by waste pickers along with other researchers from Chintan. This provides a wealth of qualitative detail, and brings to the fore the innate knowledge of the terrain by the surveyors. The draft report was also presented before a public meeting of waste pickers to obtain their responses and consent to the findings of the study. Since Chintan's organizational work at the time of beginning the study was in the New and Central Delhi area, most of the respondents were either from here or the immediate periphery. Furthermore, the entire area has not been completely covered because of obvious limitations of time and money. Nevertheless, the conclusions drawn in this final report will, we hope, prove to be of great value to all those practitioners and researchers and policy makers who are concerned with this sector.

1.2 Solid Waste Management

Currently, Municipalities across India are facing up to a new challenge: handling greater amounts and types of waste each year, as consumption levels rise. The provision of basic services is primarily the responsibility of the three local bodies in the National Capital Territory (NCT) of Delhi - the Municipal Corporation of Delhi (MCD), the New Delhi Municipal Committee (NDMC) and the Cantonment Board (CB) [Map 1.1]. Among the three the MCD is the largest local body with the responsibility of providing the basic amenities to both rural and urban areas encompassing 1397.3 sq kms or 95 per cent of the whole NCT area. The figures for waste generation have increased from 4,000 metric tonnes (MT) in 1994-95 to almost 8,000 MT in 2002. By 2020, it is estimated that waste will rise up to 23,000 MT. In the absence of instruments to reduce the waste generated, how can a Municipality tackle this increasing mess?

It is now widely recognised that Solid Waste Management is an integrated affair comprising of various interlinked steps (ISS, 2000):

- Minimising waste generation
- Maximising the reuse of recyclables
- Promoting safe and sound disposal
- Extending full coverage of services



However, in actual practice, the MCD continues with the traditional practice of providing for:

- Neighbourhood bins for collection of household waste
- Primary transport of street waste to bins and collection points
- Secondary transport to disposal sites
- Actual disposal

Such a system, then, does not provide for either minimization or recycling the waste. The entire focus is on transporting the waste by trucks and disposing it in sanitary landfills (SLF). The MCD spends between Rs 3-400 crores every year on sanitation and cleanliness alone. While this sum is likely to sharply increase in the coming years, the real problem lies in disposal. Since 1975, 20 SLFs have been created, of which 15 are exhausted, while 2 are suspended. Only 3 are operational at Bhalaswa, Ghazipur, and Okhla, and even these are close to exhaustion. These include the 7 new sites totaling 228.5 hectares that were proposed in the Delhi Master Plan in 1990 (DDA, 1990) [Map 1.2]

According to the National Capital Region Planning Board (NCRPB), therefore, the capital is now faced with the enviable task of finding as much as 28 sq km of landfill space to meet its needs till the year 2021, and another 100 sq km by 2050. The requirement until 2021 itself would cost nearly Rs 800 crores. Since space is at premium within the National Capital Territory, the MCD has been carrying on negotiations with the State Governments of Haryana, Uttar Pradesh, and Rajasthan for several years to provide land for SLFs. However, none of these State Governments have agreed, nor are they likely to (The Hindu, 2004a).

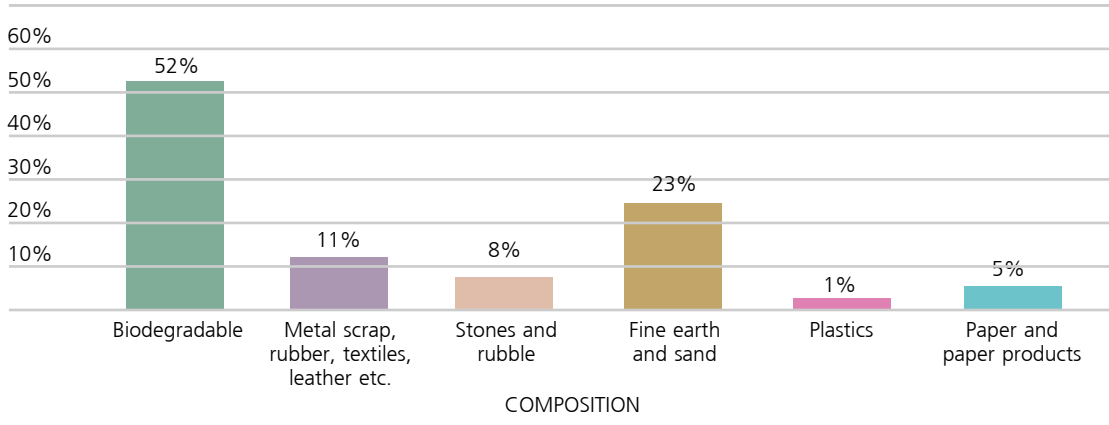
The authorities have, thus, been forced to accept the need for minimization and recycling. The Union Ministry for Environment and Forests brought out the Solid Waste Management and Handling Rules in 2000. These Rules determine the path of waste from initial generation to final disposal. Prior to this event, there was a great deal of interest in the issue of solid waste, with various municipalities already attempting a number of exercises in waste management. Alongside this, NGOs had also tried a range of exercises in community awareness building, working with waste pickers to deliver adequate waste handling capacity, composting, and segregation. However, these efforts were mostly piecemeal and no centralized, coordinated effort was undertaken where multiple partners – the government departments, municipalities, NGOs, waste pickers, residents and market associations, and entrepreneurs would collectively be able to define a common goal where they would work in partnership. One potential lies in the fact that over 50% of the waste generated in India is organic, which can be composted [Figure 1.1]. Segregating this and handling it separately can not only minimize the quantity going to the landfills but also save on transportation costs.

On October 2nd, 2001, the Government of NCR, Delhi adopted the Delhi Plastic Bag (Manufacture, Sales and Usage) and Non-Biodegradable Garbage

(Control) Act, 2000. The new laws make it mandatory to compost organic waste, implement segregation of waste at the source of generation, optimize recycling, and containerized transportation of waste. But the segregation of waste was made compulsory only on January 1, 2004, while the MCD announced plans for segregation in 12 wards out of 134 beginning April 1 (The Hindu, 2004b). No effective measures have been put into place to actually ensure or facilitate segregation and recycling. The dhalaos and bins do not have separate spaces for different kinds of waste. While only half of MCD's 540 tipper trucks are on duty at any given time, none of them has provisions

for handling segregated waste. And the landfills too dump waste in one aggregated heap, while the bulldozers ensure that everything is mixed up while they are spreading the garbage. There are no official policies to minimise the amount of waste, particularly the component used for packaging. The only measure so far has been a nominal ban on plastic carry bags, although recently the plastics industry lobby has successfully managed to propagate the advantage of thicker carry bags which are "easier to recycle". The informal recyclers, though, get no official advantage out of these policies.

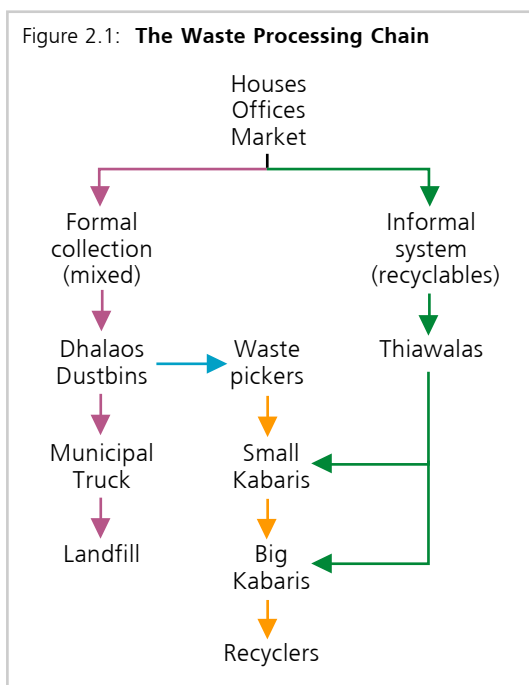
Figure 1.1: **Composition of Indian Solid Wastes**



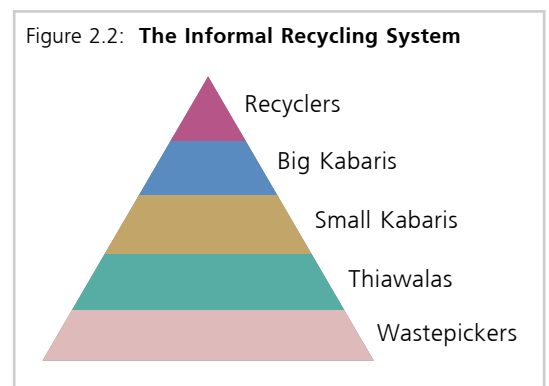
2.0 The Informal Sector in Solid Waste Management

2.1 An Overview

Since the local municipal authorities are unable to adequately and effectively deliver the different sectoral services for want of funds, manpower, technology or efficiency in the system, their tasks are being fulfilled by a huge mass of workers involved in the informal sector. This sector includes waste pickers, small kabaris (small middlemen), thiawalas (collectors) and big kabaris (larger middlemen). The workforce involved in the process counts more than one lakh in number. Some studies estimate that the amount this informal labour force saves the three Municipalities is a minimum of Rs. 6 lakhs daily. The linkage among the workforce could be understood through the following figure:



It has been seen that while the urban poor produce the least amount of waste, they live in areas that have limited, or no waste handling facilities, as well as inadequate service delivery. Additionally, waste is generally dumped in the peripheral parts of the city where the poor also live. Almost all of the recycling is through the informal sector, which comprises waste pickers, small buyers, a host of agents and finally, the recyclers. Hence, while recycling is carried out by the poor and offers them a livelihood, it is fraught with risk. The immediate burden of the toxic waste is borne by them since there are almost no satisfactory systems or designed facilities in place which can handle waste generation. Although waste pickers are the backbone of the waste collection process in Delhi, small kabaris are one of the most important components in the chain. They buy the waste from waste pickers and sell it to big kabaris who deal with specific items and materials. In order to understand this recycling process Chintan conducted a series of surveys among the different components of the process. The aim was to propose development policies that would be of benefit to both the government as well as the informal workforce involved in the process.



The informal sector of recycling works like a pyramid [Figure 2.2]. The first layer comprises several hundred thousand men, women and children in urban pockets who mine garbage heaps and bins for recyclable wastes like plastics, paper and metals. At the second layer come the small middlemen, often poor themselves, who buy waste from the rag pickers. They in turn sell the waste to the third layer, comprising large buyers who own huge godowns. Finally, at the top, devouring all the labor and materials from below are the actual recyclers themselves. Most of the city interacts with the first and the second layer, whose labor actually propels recycling in India. These are also the repositories of knowledge and information about waste at the local level, and have no inhibitions – caste-based or otherwise – about handling waste. It is precisely for these reasons that Chintan decided to conduct the study with their participation and involvement.

2.2 Waste Generation and Collection

Before detailing the results of the study, it would be useful to compute how much waste is generated in Delhi and how much of it would be collected by waste pickers. According to the Central Pollution Control Board (ISS, 2000), in 1995 the solid waste generated by the city of Delhi was 4,600 tonnes per day (tpd) and this had climbed to 5,500 tpd by 1997. This was computed at the rate of 0.45 kilograms of waste generated per capita per day (kcd). At the same rate, the waste generated in 2001 would be 6,200 tpd. However, there are reasons to believe that the waste generated may be much higher than this. The Delhi Master Plan (DDA, 1990) provides a figure of 0.67 kcd for the NDMC area and 0.60 kcd for the MCD area, as a standard against which to provide dhalaos. By this reckoning, the total waste generated in Delhi in 2001 should be around 8,300 tpd.

The standard of 0.60 kcd appears to be a more reasonable figure based on data available from independent sources. For instance, household waste is collected from several colonies in Delhi and the average waste per household per day works out to 1.6 kg (ISS, 2000). Given that most of this is biodegradable kitchen waste that is used for composting, it would be reasonable to assume that the total waste per household is about 3.2 kg, and for an average family size of 5, the per capita waste generation would be about 0.61 kcd.

Apart from the solid waste disposed from houses, there is also the considerable bulk of material that emanates from markets and commercial centres. During the current study, waste cast away by shops and establishments was measured over three days from the Loknaya Bhawan / Prithviraj Market / Khan Market, and Jangpura Market areas [Table 2.1]. The first is comparable to a Community Centre catering to a population of 20,000 families, while the second is akin to a Local Shopping Centre, serving the needs of 3,000 families. The shops at Loknaya Bhawan specialise in lighting fixtures, while Prithviraj Market supplies automobile parts, and there is a considerable amount of waste packaging material, which is picked up by waste pickers for recycling. Khan and Jangpura Markets are for consumer goods, but Khan Market is more up-market and has a number of hotels, restaurants, and fruit and flower shops which produce bulk organic waste but few recyclables. What is also interesting is that the bulk waste that proves to be of interest to wastepickers comes from liquor shops.

These figures also give a daily average waste generation of 3.22 kg per shop/establishment. According to the Tenth Five Year Plan on Manpower and Employment (GNCTD, 2002), the number of enterprises in the city in the sectors of trade, restaurants and hotels, storage, communications, and community services is roughly 4.6 lakhs. This excludes the 1,3 lakh manufacturing enterprises. Hence, one could assume that as much as 1500 tpd of waste is being generated by these sectors in commercial zones in Delhi every day. Hence, a conservative estimate of the total waste in Delhi could be anything between 9-10,000 tpd. In this context, it should also be noted that, as the consumer market has increased in the last decade, the nature of packaging has also changed dramatically. Every consumer product is being attractively packaged to increase sales, and much of this packaging material is composed of synthetics which occupy large volumes but provide little weight. Nevertheless, paper, polythene, and cardboard or corrugated board are the main waste products sorted out and extracted for recycling by waste pickers. If the compostable biodegradable waste were also picked up, the usable waste could be higher than the 60% measured at Loknaya Bhawan and Jangpura Market.

How much of this waste is eventually collected and disposed of by the municipal authorities? In 1996 the garbage generated was estimated at 5,167 tpd (at 0.45 kcd), while only 3,500 was collected – which is equivalent to 68%. But in 1996 the Supreme Court issued orders

Table 2.1: **Waste production in markets of South Delhi**

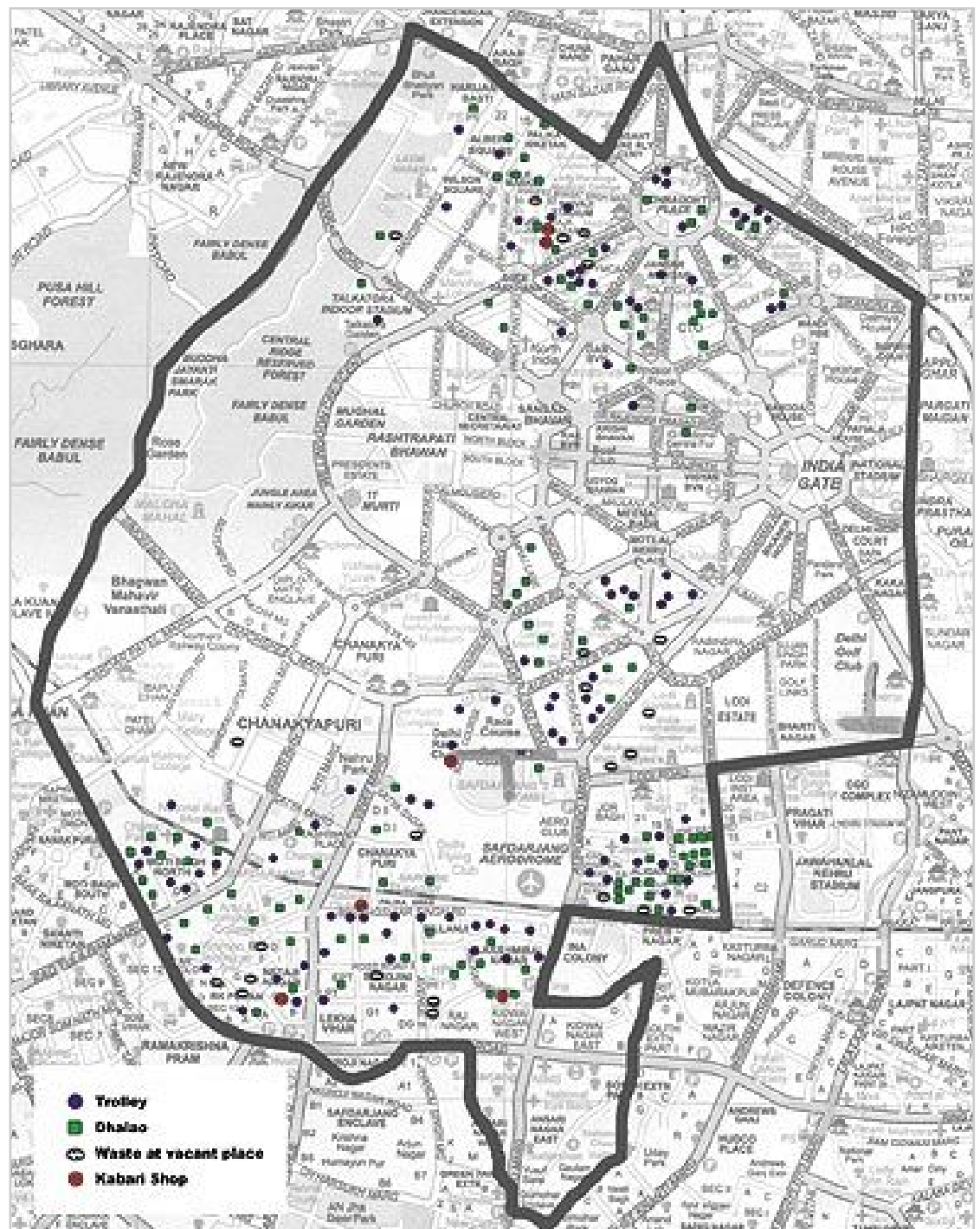
Market (number of shops covered)	Total weight of waste per day (kg)			Average Per Day	Kg per shop	Usable Waste
	Day 1	Day 2	Day 3			
Loknaya Bhawan (44)	112.2	96.5	165.6	125	2.84	58 %
Prithviraj Market (59)	196.0	163.5	235.0	198	3.36	31 %
Khan Market 1 (55)	240.0	250.1	251.5	247	4.50	6 %
Khan Market 2 (63)	143.0	145.6	159.5	149	2.37	4 %
Jangpura Market (38)	121.6	115.5	105.7	114	3.01	59 %



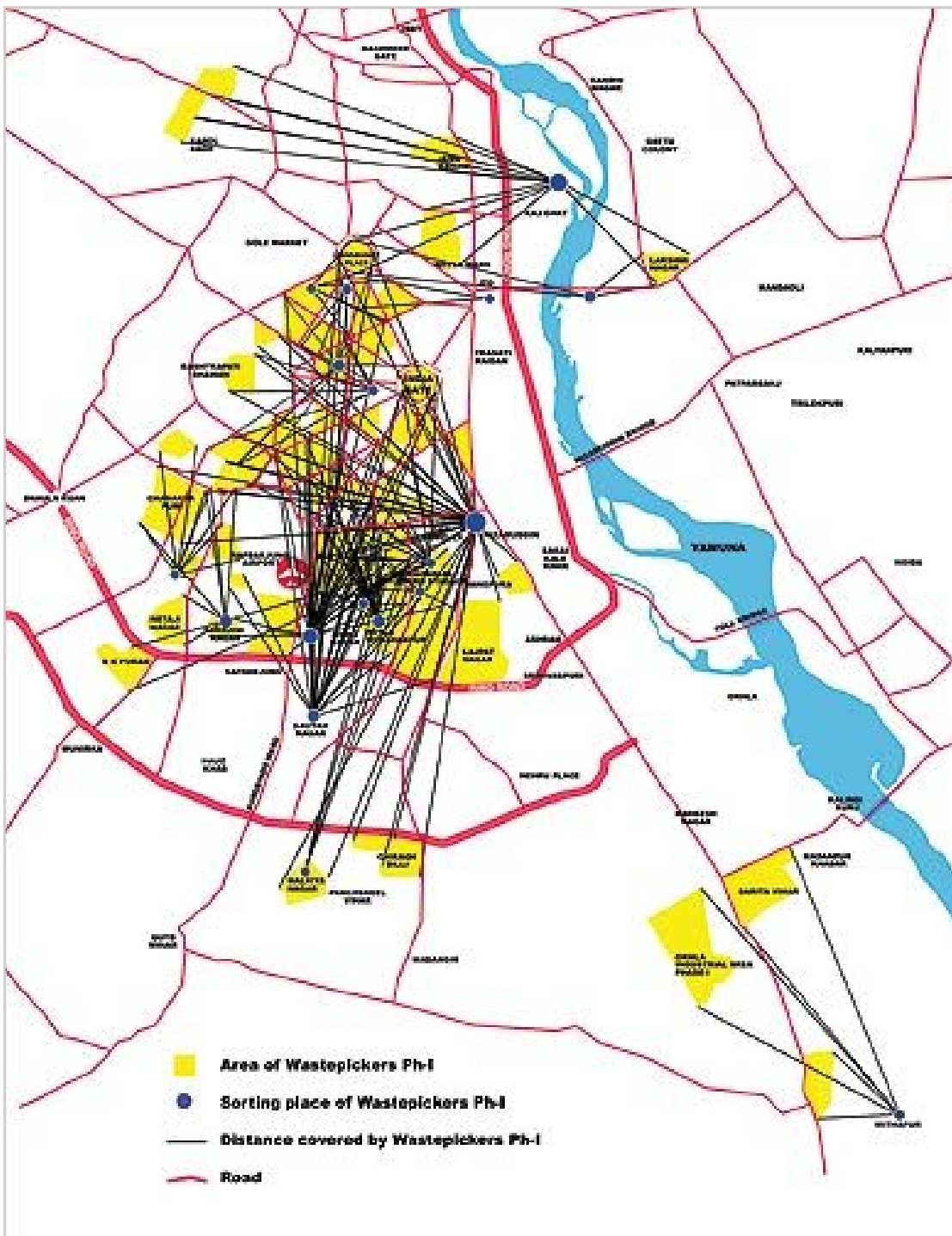
for better management of waste in urban areas and by 1998, MCD claimed that their collection had jumped to 5,000 tpd. However, in 1999, CPCB was estimating that collection still remained below par at 4,000 tpd (ISS, 2000). In other words, MCD's collection has gone below 50% over the years. This is borne out by the performance of the actual collection mechanism set up by MCD. In 1996, the Sanitation wing of the MCD was claiming that it had put up 337 dhalaos and 1428 dustbins. But, in the same year, NEERI came up with an estimate of 412 dhalaos and 1184 dustbins, along with 176 open sites. In either case, the total number of collection points does not exceed 1.5 per 10,000 population, which is well below the actual requirement. The Master Plan suggests that there should be 4 dhalaos at the Neighbourhood level, which has a population of 1,000 families or 5,000 persons.

Chintan's researchers have mapped all the collection points in about half the NDMC region [Map 2.1]. The areas excluded from the survey include the sparsely populated areas of Safdarjung Airport, AllIMS/Safdarjung hospitals, the diplomatic area around Chanakyapuri, President's estate, North and South Blocks and the Central Vista, Golf Course and Central Ridge, the Supreme Court, and the colonies of Pandara Road, Bapa Nagar, Kaka Nagar, and Lodi Estate. In the remaining area, the researchers mapped 101 dhalaos, 105 trolleys, 23 open sites, and 6 kabari shops. Thus, NDMC has obviously got a much higher density (as high as 7 per 10,000, at least) of collection points than MCD. Even then, there appears to be a need for open sites for dumping waste – as much as 11% of the total collection points, which matches well with the ratio in the MCD areas. What is

Map 2.1: Collection Points in NDMC Region



Map 2.1: Map 2.2: Segregation points of Wastepickers Phase I



important to note is that the NDMC is a high-profile high-security area in which 'unauthorised' activities are strictly prohibited, and yet the imperatives of garbage disposal are such that open sites exist, as do the 6 kabaris who provide an outlet for recycling the waste.

It is from these collection points that the waste pickers extract the recyclable waste and supply it to the middlemen. If the data given above are any indication, then the volume of trade must be staggering. If MCD is realistically collecting and transporting only 4-4,500 tpd, then the informal sector may be lifting much of the remaining 4,500-6,000 tpd. This also calls into question the assumption of most SWM specialists that only 13-20% of this waste is recyclable.

As the present study demonstrates, the usable content of waste from markets can be as high as 59%. If composting of biodegradable waste were to be included in the recycling process, then the recovery rates could be even higher. Thus, if the organic waste from the fruit and flower shops in Khan Market were lifted for composting then the recovery rates in both sections of the market would jump from the current 4-6% to a potential 55-70%. As against this huge potential, both the NDMC as well as MCD have only one composting plant each in existence.

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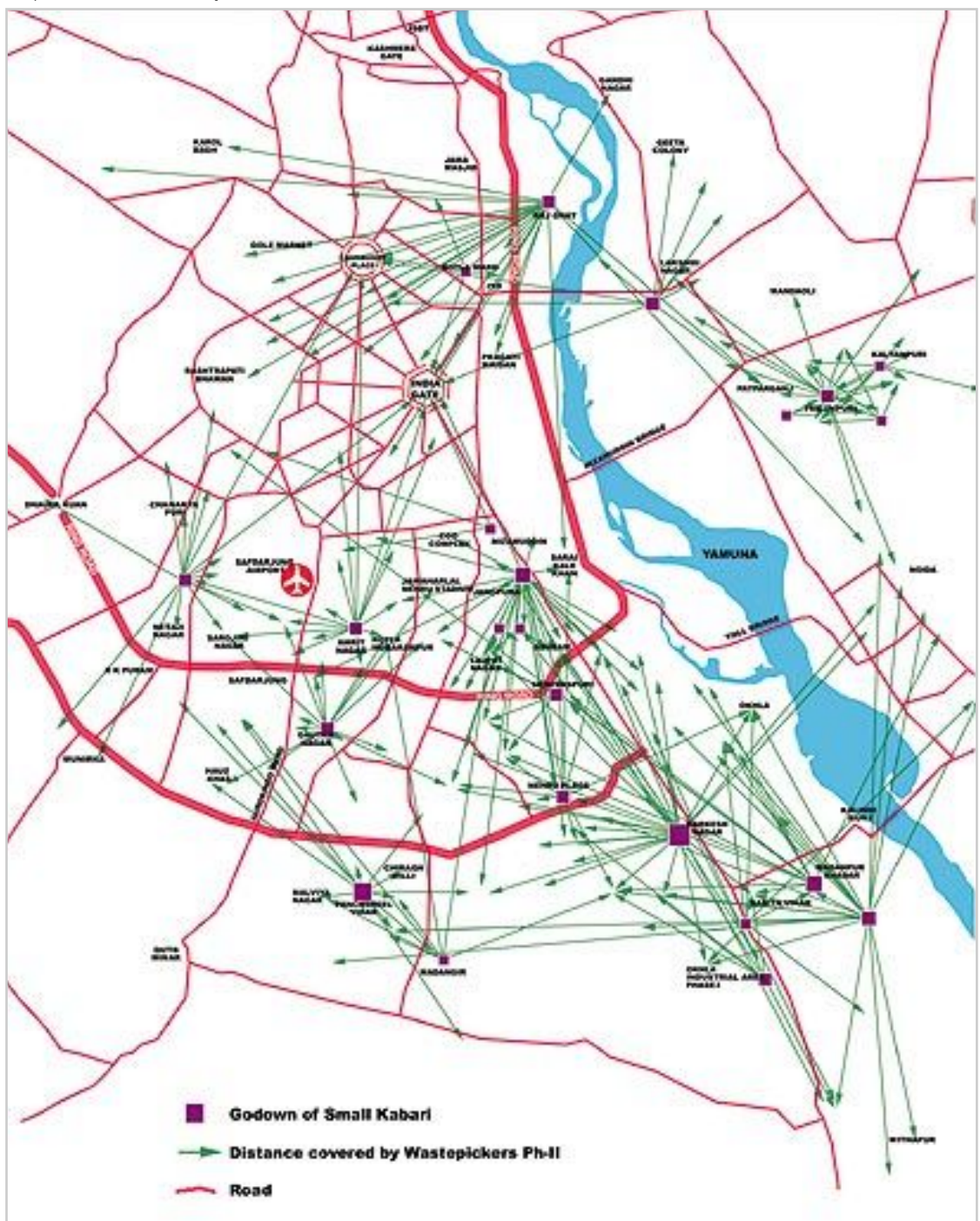
2.3 Waste Collection by Self-employed Waste Pickers

The waste picker is the lowest member of the recycling chain, who actually forages in the markets and at the collection points or open sites for the material which has value in recycling. S/he is typically a young person (though not a child) with a large woven HDPE sack flung on her/his shoulder. A waste picker normally begins her/his work as early as 4 am in the morning otherwise s/he'll miss the waste. After the collection of material, before s/he sells the material to kabari, it should be sorted out according to different types of waste. The transaction at the selling point is complex: one could get paid less if the waste is sub-standard and wet, and the rates vary depending upon market fluctuations. The waste pickers mostly live either in the slums (usually near the shop of a kabari),

on footpaths, or inside dustbins. Their access to basic amenities is poor, only a few of the essential services are available in their neighbourhoods. The police beat them regularly on one pretext or another, generally to extort money or ensure 'security', and often burn their bags of waste, leaving them with nothing to show for a day's work.

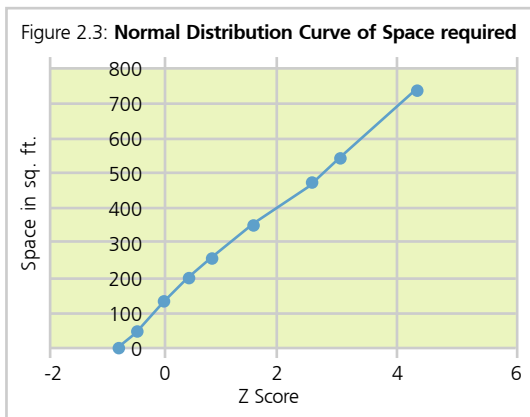
In the first phase of the study, 127 waste pickers were interviewed, with an average age of 31 years. They were mainly operating out of workplaces near Nizamuddin (19.7%), Kidwai Nagar (14.2%), and Kanchanpuri (Rajghat) (13.4%). Most of the trips (185) were into the NDMC area, while the rest (107) were in MCD areas. Between them they covered most of the NDMC area except for Gole Market and there were 24 segregation points where they collected and separated the waste into its recyclable components

Map 2.3: Area of Wastepickers Phase II

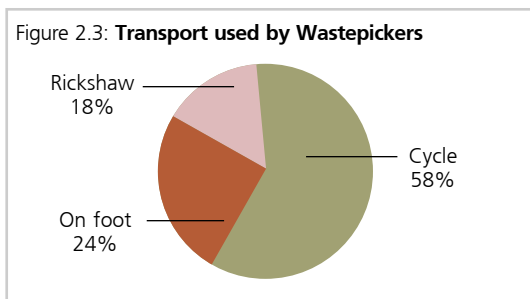


[Map 2.2]. These segregation points were roughly 1.5 km apart. An idea of the high degree of 'protection' offered by security personnel to the NDMC area emerges from the fact that only 8 of these segregation points were able to operate in this area, the rest were outside NDMC. Interestingly enough, 54.4% said they were segregating their waste in or in front of the kabari's godown, while 33.1% conducted this activity on the footpath. But closeness to the eventual buyer is obviously critical for the trade itself.

For primary segregation the average space required appeared to be 125 sq ft (or about 12 sqm). Since the average quantity of goods kept at the segregation point was 138 kg, the average space requirement per kg worked out to a little under 1 sq ft/kg [Figure 2.3]. While most waste pickers were keeping the waste only for a day before selling it off, a few were keeping it as long as a week, thus giving an average holdover time of 2 days. In other words, the waste pickers were collecting an average of 69 kg of waste per day.

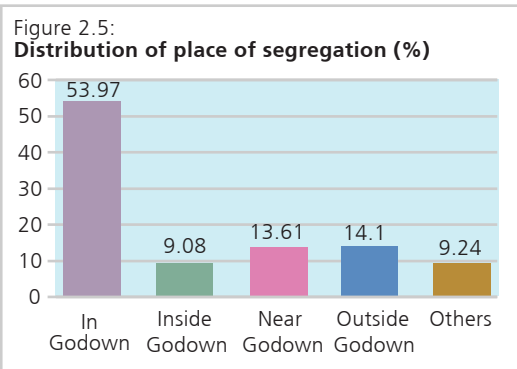


The mode of transport for collecting the waste was mostly cycles (58%), followed by walking (24%), and rickshaws (18%) [Figure 2.4]. This is understandable because NDMC authorities do not permit cycle rickshaws within their area. MCD permits rickshaws on payment of Rs 360 per year. Thus, the distribution of segregation points, kabari godowns, and waste picker trips in this sample is completely determined – one might even say, distorted – by the arbitrary regulations imposed by the NDMC.

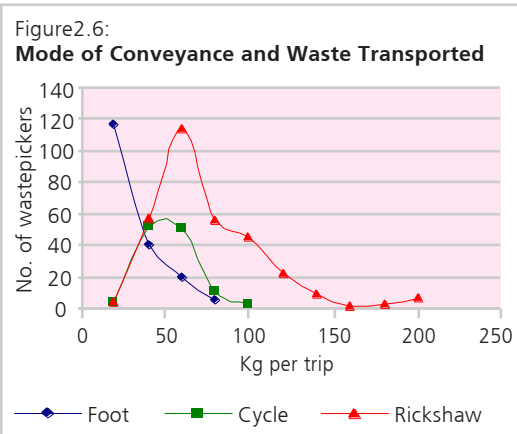


In the second phase of the study, 623 wastepickers were interviewed, who were associated with the 80 small kabaris surveyed during this phase [Map 2.3]. Only one cluster of kabaris was located inside the NDMC area. The rest were all in the MCD areas. Consequently, the waste pickers covered a much

larger range of ground. Only 152 of their trips were into NDMC, 826 trips were made into MCD territory. Because of their direct association with kabaris, a much higher percentage (90.5%) were segregating their waste inside, near, or outside the godown [Figure 2.5]. Also, there was much greater use of rickshaws (51%) than cycles (19%) because of the relaxation of permits in the MCD area. 90% of this sample were single wage earners and, on an average, they were collecting 57 kg of waste daily, which is less than the smaller sample. This is somewhat inexplicable, considering that the bigger sample was using a much larger percentage of rickshaws, and can only be ascribed to survey shortcomings. Earnings of this group averaged Rs 90 per day, which is significantly lower than the minimum wage for unskilled labour (Rs 127) stipulated for Delhi.



In this context, what is of great significance for the larger sample is the correlation between the mode of transport, the loads that can then be transported, and the related earnings [Figure 2.6].



As the survey data shows, the waste pickers who operate on foot are largely (86%) able to carry less than 40 kg of waste on one trip, range between 6-7 km and earn Rs 50 daily. Those who have cycles are mostly (86%) transporting between 40 to 60 kg over 20-25 km and earning Rs 100 per day. The same percentage of rickshaw operators load between 40 to 100 kg in one trip, but travel 10-15 km. The distances and territory that the rickshaw operators cover are also determined by the restrictions placed on rickshaw movement by the municipal and police authorities. The ability to enhance earnings is also, therefore, dependent on the mode of transport that the waste picker is able to use. It should be noted

that while the rickshaw could belong to the kabari, the cycle often has to be purchased by the waste picker herself/himself. Hence, the waste picker must have the capital saved to indulge in this purchase which, in turn, is dependent on the extent of her/his earnings. Quite clearly, this is related to the extent to which the waste picker is able to get formal recognition and space for his vehicle in the design of civic life.

For understanding the nature of this formal recognition, we can now also make some intelligent estimates about the number of waste pickers required for servicing the entire city. The first assumption, based on the data provided by this study, is that the average waste picked up daily by the waste picker is 60 kg, which goes down to 40 kg if s/he is confined to walking, and goes up to 100 kg if rickshaws are permitted. The second assumption is that the waste picker is currently picking up as much as 40% of the waste at the collection points and markets, and that this could go up to 70% if there were arrangements for segregating and processing the biodegradables into compost. And the third assumption is that the MCD is not picking up between 4,500-6,000 tonnes per day of urban waste. Thus, it can be estimated that currently the city needs 30-40,000 waste pickers just to collect the usable waste and transport it to the small kabari. This figure does not include, as we shall see later, the other participants in the informal sector such as the employees of the kabari and the thiawalas. Each waste picker will also require 60 sq ft of space for segregating the waste and this is something that can be easily built into the design of the collection point or dhalao.

2.4 Collection and segregation by Employed Labourers

Apart from the self-employed waste pickers who find a livelihood in the waste management trade, there is another section of labourers who are employed by the middlemen kabaris. While the survey of small kabaris (see next section) disclosed that the kabaris themselves claim to employ an average of 3 labourers each, the labourers themselves have a different perspective. 588 employees associated with 80 kabaris were surveyed. On an average each kabari was thus found to have 7 employees, although some had as many as 20. The task distribution between them appeared to be 40% as waste pickers, 32% on pheri and 25% for segregation, loading and unloading, and roughly 3% were engaged in supervisory tasks [Table 2.2]. It is possible that only some of these were regarded as 'employees' by the kabaris - which would explain the difference in perception between the kabaris and their associated workers. This is also supported by the observation that 77% of the workers maintained that they had no filial or personal relationship with the owner.

Table 2.2: Work profile of the employee

Type of job	Percentage
Rag Picker	40.14
Pheri	31.63
Segregation	17.69
Segregation / Loading / Unloading	7.14
Munim	1.02
Manager	1.02
Packing / Segregation / Loading / Unloading	0.34
Pheri/Segregation	0.34
Servant	0.34
Loading/Unloading	0.17
Weighting	0.17

90% of all the workers reported that their working hours varied from 8-10 hours. 80% further said that after finishing the day's work they slept either in the godown or in the godown's jhuggi [Figure 2.7]. While 7% went to hotels for food, 82% cooked their meals wherever 'home' was. In other words both work and residence were generally centred

Figure 2.7: Sleeping Arrangements of the Employees (%)

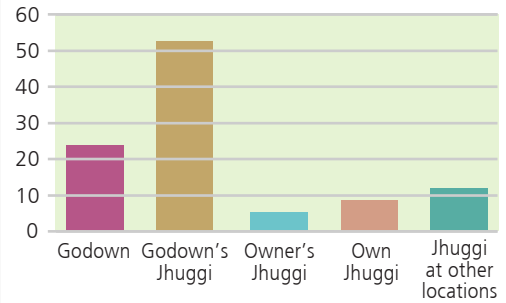
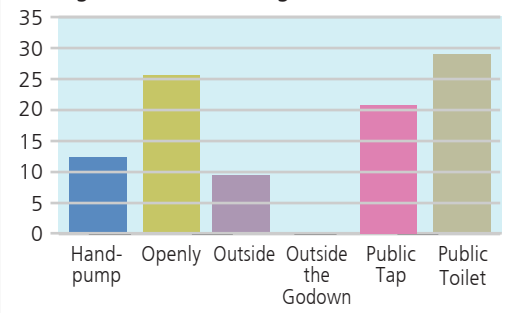


Figure 2.6: Arrangements for Bathing



around the workplace itself. But toilets and bathing facilities were extremely limited. 65% were dependent on public facilities such as toilets, taps, and handpumps, while 25% accessed open spaces [Figure 2.8]. In other words, while shelter was informally available in the godown, other civic services were absent. This has to be kept in mind when planning for a system of waste management that not only takes care of the waste but also of those who process the waste. Thus, the design of the godown would have to be such that it provides adequate space for segregation and storage of waste, as well as for the

living requirements of the associated workers (see next section).

If we assume that the 72% employees of the small kabaris, who are waste pickers and on pheri, are included in the total estimate of 30-40,000 waste pickers in the city, then that would mean that the other 28% can be assumed to be engaged in segregation and supervisory tasks. This gives another estimate of a further 12-16,000 workers in the trade. Thus, the total number of men, women, and children earning a livelihood from waste collection, segregation, and recycling in the informal sector could be as high as 42,000 to 56,000. In the absence of a formal census this is a reasonable estimate, particularly since it matches with other qualitative assessments made by those who have been involved with the trade for many years. If we take even the figure for the minimum wage stipulated for unskilled workers in Delhi, it means that this work force is saving MCD an annual wage bill of at least Rs 20 to 26 crores, or 14-19% of its annual budget. This, once again, underlines the need for the city to look anew at the entire informal sector of waste management and devise ways of recognising, appreciating, and strengthening its contribution to civic life.

2.5 Small Kabaris

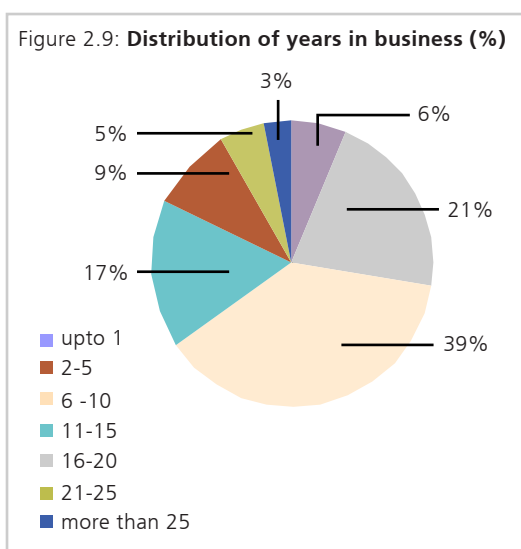
A small kabari is a person who looks after storage, segregation, and circulation of the waste. This section, though much smaller than the number of waste pickers, plays an important role not only in employment generation but also in terms of recycling of resources and promoting waste disposal. However, as in the case of the waste pickers, the functioning of the kabaris appears to be greatly distorted by the rules and regulations that govern the city. A more scientific and organised effort is required to make this section economically viable and, thus, promote rational solid waste management.

Table 2.3: **Prior work experience**

Type of Work	Percentage
Pheri	54
Work with kabari	15
At Redlight	3
Paper collection, pheri	3
Ragpicker	3
Rickshaw	3
Rickshaw, Pheri	3
Service	3
No data	15

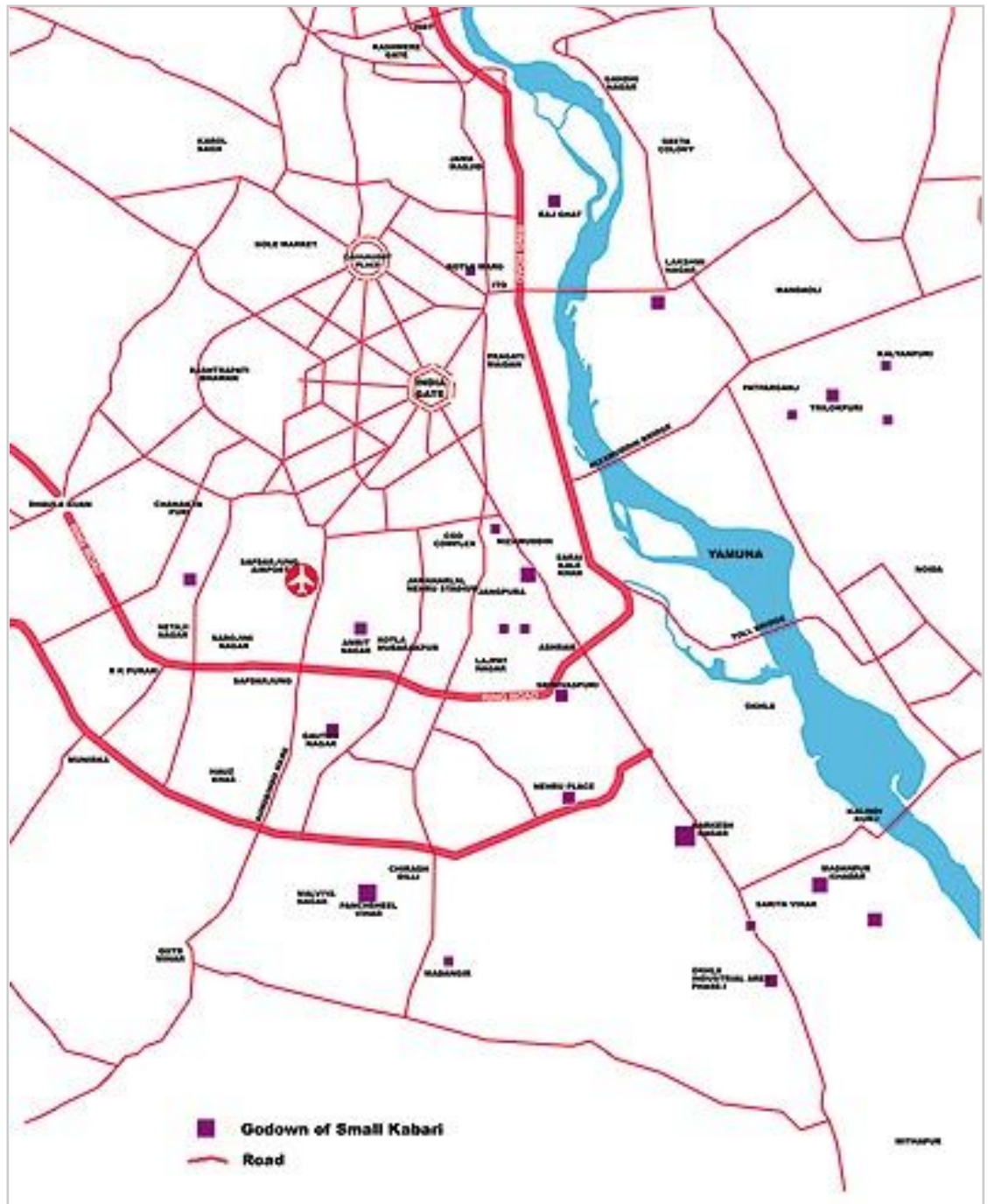
80 small kabaris were surveyed in the second phase of this study to look into their requirements of space and labour for storage, segregation, circulation, and transportation of waste. 35% of the sample claimed that they were from Delhi itself, a similar percentage was from Uttar Pradesh, while 20% had roots in Bihar. Only 1 person said he was from Bangladesh. The average age of this group

was 35 years, somewhat older than the waste pickers, and this is logical considering that 78% of them had been waste pickers themselves (in the city) before graduating to become middlemen [Table 2.3]. For this upward mobility some literacy and numeracy skills were necessary and hence, only 23% said they were illiterate. On an average, they had been in business for 11 years [Figure 2.9], although the entire range was from _ to 42 years. 78% of the small kabaris were running their business on land rented out by private landlords, irrespective of the actual ownership of the land. 76% depended on the waste business entirely to earn a livelihood and 89% had only one shop or business. They claimed to have an average of 3 employees (which was different from the 7 claimed by the employees themselves, as we have seen earlier) and 95% did not own any vehicle of their own.



While this study cannot claim to have undertaken a complete coverage of all kabaris, the location of the 80 small kabaris interviewed was mapped and it was discovered that there were some unexplained gaps in the Madanpur Khadar to Bhogal and Madangir to Bhogal routes. A supplementary survey then discovered another 32 small kabari godowns in these areas [Map 2.4 overleaf]. The key issue related to all these small kabaris is the space available and its planned usage. In the Master Plan there is no space allocated for the business of recycling. Dhalaos, for instance, are defined as "a premises used for collection of garbage for its onwards transportation to sanitary landfill". There is thus, not even an acknowledgement that space and labour could be required for segregation and storage of useful materials from waste for further recycling. There is a provision for Junkyards and Godowns, but these are permitted only in wholesale commercial and manufacturing zones. On the other hand, this study shows that the kabari godowns exist in clusters all over the city at an average distance of 3 km (see Map 6). There is only one surveyed kabari existing in the NDMC area but that has to do more with the restrictions than the actual requirements.

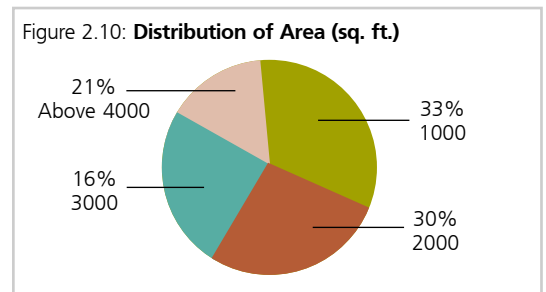
Map 2.4: Small Kabari Godowns



The kabaris themselves claim that until 2002 there were about 80 godowns in the NDMC area, but it has now come down to 8. They also report that the police do not allow godowns to come up in the NDMC area because the affluent colonies in the area are averse to the idea of living next to such 'dirty' godowns. Even in the MCD area there is considerable pressure by the built-up colonies but the official restrictions are still not fully in place. The monthly rent for these places varies from Rs 3,000 in Trilokpuri to Rs 5,000 in Madanpur Khadar, and Rs 8,000 in Mata Sundari Marg. Changing the location of the godown or being evicted from the old one creates considerable difficulties for both kabaris and waste pickers, because there is loss of work as well as clients. In addition, the commuting distances increase and the rents could also climb up. Improvements in the facilities at the godown are not considered to be

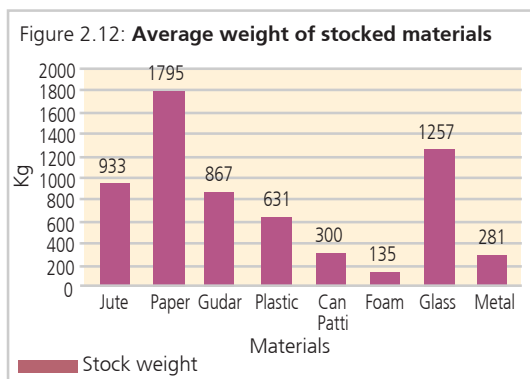
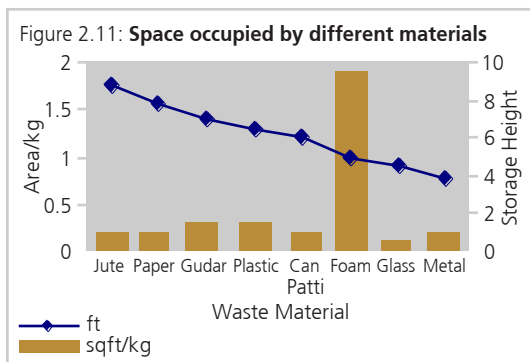
good investments because it immediately attracts the attention of the police. Since the land does not belong to the kabaris, but is taken on rent, it further dissuades them from building any permanent or substantial structures.

While the average space that these godowns occupy is 2157 sq ft (200 sq m), 79% of the kabaris occupy a total space less than 3000 sq ft [Figure 2.10].



Of this, the average shaded space is 34 sq m, the bounded space is 48 sq m, and the open space is 116 sq m. The godown space occupied for storage is slightly less than the shaded space at 32 sq m, indicating an optimum use of space. The material stored averages 1315 kg, but there is a variety of materials of different densities and so they tend to occupy space differentially. The heaviest materials are paper, glass, and jute bags, but the material with the greatest bulk is foam. Hence, the space required for storage and segregation of material depends upon the nature of material [Figure 2.11].

Some material could be stored in open space while others would be destroyed in case there is rain. Jute, paper, and gudar can be stored to greater heights (7 to 9 ft) but require shelter from the rain, while glass and metal occupy half the height (4 to 5 ft) and can be kept in the open. Even though the largest weight of average stock is composed of paper and glass waste [Figure 2.12], followed by jute and gudar, foam is the biggest problem because it takes up a middle height (5 ft) but occupies a huge floor area (1.9 sq ft/kg), 6 to 9 times more than the other materials.



Some other information that is available from the study is that while average storage is roughly 1500 kg, peak season storage during the monsoons may go up to two to three times as much. But the facilities available to the small kabari for segregation and storage are pitifully few. While 89% have a couple of bulbs or a tubelight for lighting purposes, only 39% have a fan, 41% have a stove, 30% have access to water supply by handpump or tap, and the kanta for weighing purposes is available in 75% of the godowns. This lack of infrastructural capacity can be directly traced to the "illegality" of the entire trade in the eyes of the law. Since municipal and civic norms do not recognise the need for this facility, hence there is no provision for it, and the trade is constantly under threat of extortion, eviction, or harassment. However, this study can begin spelling out some norms for scientifically planning for the trade.

Table 2.4: Peak season collection of various materials stored (averages)

Name of Items	Weight Per Day (In Peak Season)	Monthly Weight (In Peak Season)	Weight per Trip
Can Patti	12.0	950.0	900.0
Foam	15.0	423.3	423.3
Glass	198.2	4020.0	2381.5
Gudar	115.7	2700.0	3742.9
Jute Bags	76.7	3700.0	2500.0
Metal	52.4	783.4	397.1
Neel Board	500.0	1000.0	5000.0
Paper	309.3	6933.4	2325.0
Plastic	121.4	2538.4	953.3
Rubber	800.0	21000.0	5000.0
Silver	3.0	30.0	60.0

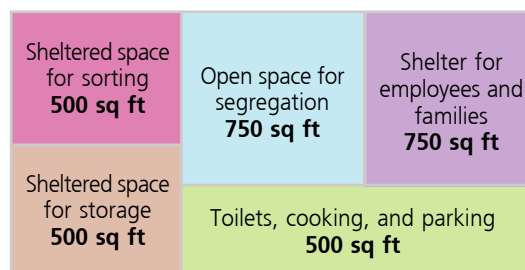
Since a conservative estimate of per capita waste generation of 0.6 kg emerges from this study, and it is proposed that 40% can be recycled, then it becomes clear that a population of 5000 persons will generate enough waste to supply at least one small kabari on an average. This is equivalent to the primary Neighbourhood level of settlement as defined in the Master Plan (see Table 2.5).

Table 2.5: Hierarchy in Urban Development

S. No	Level	No of Families	Population	Area (ha)
1.	Housing Cluster	50	250	
2.	Housing Area	1,000	5,000	1.63
3.	Neighborhood	3,000	15,000	7.2
4.	Community	20,000	1,00,000	39.73
5.	District	1,00,000	5,00,000	20.0
6.	Division	2,00,000	10,00,000	60.8

Source: Delhi Master Plan, DDA, New Delhi, 1990

Hence, space must be provided in the civic plans for waste segregation and storage at this level and the best place to locate it may be next to the shopping centre so as to ensure maximum visibility, access, and cleanliness. The space requirement could be based on the estimates provided by this study that 80% of the small kabaris surveyed had a total space less than 3000 sq ft; the open space was about 2000 sq ft; the shaded space was less than 500 sq ft; and so was the occupied space within the godown. This, then gives the following rough layout for an average godown. If an area of 3000 sq ft with 10 ft height is not available, it may be possible to provide a 2-storeyed structure with a base area of 2000 sq ft for all the facilities.



2.6 Thiawala

Thiawalas operate at an intermediate level between ragpickers and small kabaris. They have “thias” at critical locations in commercial centres and shopping areas where aggregate waste such as newspapers, used bottles, corrugated board etc., is delivered to them at the “thia” itself. These are then sold either to small kabaris or to big kabaris. 36 thiawalas were surveyed, all in Connaught Place, which is demarcated as a Central Business District.

Figure 2.13: Distribution of Storage Space (%)

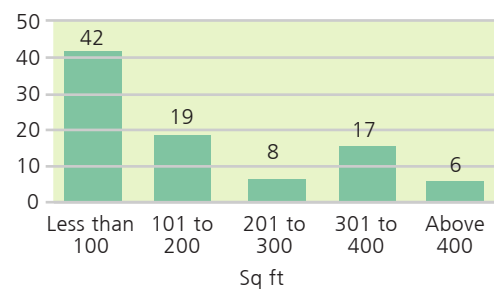
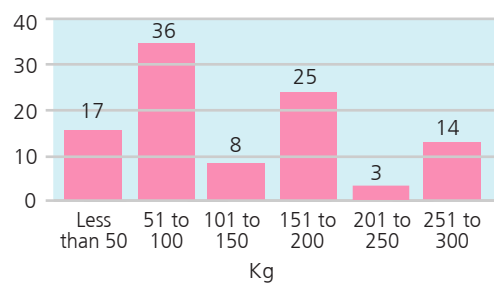


Figure 2.14: Distribution of Waste Material Stored (%)



The average age of the thiawalas is 37 years, varying between 20 years to 50 years. On an average they collect 143 kg of material every day [Figure 15] for which they require 240 sq ft of storage and sorting space [Figure 14]. 81% of the thiawalas said that the waste that they collected could be temporarily stored at the requirement of 2 sq ft of space per kg per day. This waste is then transported to the kabari by the thiawala, mainly by tempo (49%) and by cycle rickshaw (40%). This gives an idea of the amount of waste transported as well as the distance, since tempos and rickshaws have different capacities with regard to this. Some thiawalas appear to prefer tempos even when the weight of material to be transported is as low as 50 kg, while some use rickshaws even when the weight goes up to 300 kg. Hence, there is obviously a deliberate choice involved in the selection of transport depending upon the mass of material, the distance involved, the possible sharing of modes, and the civic restrictions in place. Particularly since the transport is hired, with only 31% of the thiawalas owning a cycle and the rest travelling on foot.

From the market data presented earlier, it becomes apparent that the usable waste generated by a shop is about 1.1 kg per day (we ignore here the Khan Market data on the grounds that it is an outlier that does not represent the average commercial complex where thiawalas would be present). Hence, on an

average, a thiawala would theoretically be required for every 130 shops for daily collection of waste. Connaught Place, which is classified as a Central Business District with approximately 7,000 establishments, would therefore, require 60 thiawalas to service its requirements. This corresponds to the number of thiawalas surveyed in this study. In the hierarchy of markets defined in the Master Plan, the Local Shopping Centre (3,000 families and 4,600 sq m) would need to provide for at least 1 thia, while the Community Centre (20,000 families, 54,200 sq m) would need 7 thiawalas. The District Centre (100,000 families, 440,000 sq m) would have 30 thiawalas. Each thia, in turn, would need 20 sq m of space for segregation and storage. These norms have to be woven into the codes for urban design.

2.7 Big Kabari

The big kabaris are akin to the wholesalers of the waste processing chain. They get their supply of bulk reusable waste from the small kabaris and the thiawalas. And they eventually pass on the material to the recycling units. Hence, they need large storage capacities to keep the material and supply it according to the market demand. Only 6 big kabaris were interviewed during the course of this study and they were from Kotla Village, Madanpur Khadar, Indra Amar Colony and Matiyala. The average storage area in their godowns was assessed at about 57,000 sq ft (or 5,300 sq m) and the average weight stored there was 59,300 kg or 5.9 tonnes. This represents an average density of storage (0.96 sq ft/kg) more than that of the thiawalas (1.5 sq ft/kg) but significantly less than that for the small kabaris (0.38 sq ft/kg). This means that the design of the godowns has to be such as to facilitate efficient stacking and retrieval of the waste material in high stacks. These godowns though, are no better equipped than those of the small kabaris. 5 out of 6 had an average of 5 bulbs and 3 fans each, while there were no exhaust fans or heaters, 4 had kerosene stoves, 3 had coolers, and 2 had access to water and weighing equipment.

The location of the big kabari godowns would be determined by both the accessibility to the suppliers (the small kabaris and the thiawalas), as well as ease of transport to the recycling units in truckloads. If we are to assume that the small kabaris supply to the big kabaris on a weekly basis, while the thiawalas do so on a daily basis, then each big kabari would, on an average, have to be associated with at least 6 small kabaris and 20 thiawalas. Thus, currently if there is a small kabari cluster at every 3 km distance with an average of 5 small kabaris each, then there should be one big kabari among them. This roughly translates into 1 small kabari per 10,000 population and 1 big kabari per 60,000 population.

3.0 Planning Norms

There is section on the informal sector in the Master Plan in which it is proposed to incorporate the sector in trade in the planned development of various use zones. Unfortunately, this section only mentions about teh-bazari (the tax levied by the Municipality for hawking goods on the pavement) and gives a set of guidelines of the informal units permitted for different facilities. There is no reference to the informal workforce involved in the process of recycling in Delhi. However, the data generated by this study does give some clues about a set of proposed norms as given below [Table 3.1].

Other design norms would have to be developed to provide the necessary infrastructural facilities for the informal sector work force if it is to be recognised as playing an important function in civic life. For example, provisions for disposing off domestic and commercial waste in segregated bins at source have to be put in place. Negotiated contracts would have to be put in place to formally recognise the waste pickers as supplementary municipal workers and to give them protection from harassment. There is clearly a need to replace the existing dhalaos with modern, scientifically designed recycling depots that are able to

Table 3.1: Norms for Various Sectors in Informal Waste Processing

Category	Norm per 100,000 population	Guidelines
Waste pickers	215	Each waste picker handles 60 kg of waste per day and requires 60 sq ft of space near the dhalao for segregation
Other workers	90	Each worker requires 125 sq ft of space near the kabari godown for segregation as well as road space for transportation
Small kabaris	6	3000 sq ft has to be allotted in a shopping centre to each small kabari for segregation and storage of about 1500 kg of waste, and shelter for workers.
Thiawalas	33	Thiawalas are located near markets and commercial centres and each thiawala collects waste from 150 shops and establishments daily
Big kabaris	1.5	The big kabaris need storage space of 60,000 sq ft for roughly 60,000 kg of waste which they collect weekly from the small kabaris

accommodate both the new needs and the existing recyclers. This will not only allow the waste pickers to follow the new laws but will also help to reduce the incidence of their numerous health problems arising from unsegregated waste lying in the open. The problems associated with stray animals littering the areas around the dhalaos can also be addressed through these stations.

Similarly, the small and big kabaris, and the thiawalas have to be given formal space at appropriate locations to carry on their trade. Residents' associations have to understand that waste is a problem that is created by consumers and hence, the associations have to take initiatives to handle their own waste. Incentives to either reduce waste or to handle it locally have to be engineered through fiscal measures. Market associations also have to develop codes for positioning thiawalas and kabaris in their areas and to provide for adequate transportation routes. Once formal recognition is available, the development of infrastructural facilities would also take place. But it has to be remembered that these facilities are not only meant for the processing of waste but also for an adequate quality of life of the workers associated with picking, segregating, transporting, handling, and recycling of waste. In short, tackling waste can be facilitated by the evolution of well-designed systems and incentives.

There are several examples from different countries which provide useful clues about how to handle waste in an organised and humane manner. For instance, some of the best examples include the Zabbalen from Egypt, where waste collectors have been organised to provide services, micro-enterprises in Latin America for waste pickers, and government intervention for safeguarding ragpickers' interests in Indonesia. These case-studies demonstrate the value of supporting this sector, rather than marginalising it. Numerous benefits can be achieved by including it in policy making or the planning process, through providing it with the facilities it requires in order to carry on its work with greater efficiency and in less hazardous conditions.

Its inclusion therefore, becomes a critical aspect of waste handling in urban India.

Municipalities across India are facing up to a gargantuan task, as they undertake waste collection, transportation and disposal in these times of increased waste generation. In some cases, they have also undertaken waste reprocessing through composting etc. There is, regardless, an increase in complaints and problems with service delivery and the municipalities are finding it harder to continue their work on their own. It is increasingly being propagated that many of these components can be privatised with immediate economic and other advantages to the municipalities. Hence, the idea of privatisation of


waste collection and reprocessing is now becoming accepted more widely, and in some cases, even implemented. However, even if we bring in private enterprises to handle the waste, the huge informal sector will continue to offer substantial subsidies to these enterprises, which will profit at the expense of the already exploited underprivileged section of society. In this context, any shift towards privatisation that does not take into consideration the already vibrant informal sector in the planning process should be seen as a waste of resources. It is imperative to harness the strengths of the informal sector and to consider organised waste handling by them as an alternative to the 'private' sector. A normative shift towards 'privatisation' of waste handling services would therefore, be more sustainable and stable if the informal sector itself were to be organised to transform it into a new avatar of a more visible private service provider.

4.0 Recommendations

- There is an immediate need for the city to look anew at the entire informal sector of waste management and devise ways of recognising, appreciating, and strengthening its contribution to civic life.
- While planning for a system of waste management, it has to be kept in mind that it not only takes care of the waste but also of those who process the waste.
- Although the waste picker is the lowest member of the recycling chain, s/he plays the most important role in it. Waste pickers should get formal recognition and space in the design of civic life.
- The Small Kabari is one of the key components in the recycling chain. Majority of the waste pickers is associated with small kabaris. Space requirement is the key issue of small kabaris. A total of 3000 sq ft of total space should be provided for the godown of small kabaris (see the layout plan for an average godown in section 2.5)
- Thiawalas operate at an intermediate level between wastepickers and small kabaris. They have “thias” at critical locations in commercial centres and shopping areas. There should be adequate numbers of thiawalas in commercial and shopping areas and for each thia, 20 sq m of space should be provided (see section 2.6).
- Certain planning norms have to be adopted for the various sectors in the informal waste processing, as per Table 3.1, section 3.

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Space for Waste is based upon the planning and spatial needs of the informal recycling sector, comprising waste-pickers, kabari-walas (junk dealers and traders), thiawalas (temporary, individual waste buyers), amongst many other players. It is based upon the premise that in order to undertake proper segregation and recycling of waste, it is vital to recognize and strengthen the sector by planning for them and facilitating their improved working conditions. This study details the norms and needs, determined collectively with the informal sector in Delhi.