

This item is held in Loughborough University's Institutional Repository (<https://dspace.lboro.ac.uk/>) and was harvested from the British Library's EThOS service (<http://www.ethos.bl.uk/>). It is made available under the following Creative Commons Licence conditions.



creative  
commons  
C O M M O N S D E E D

**Attribution-NonCommercial-NoDerivs 2.5**

**You are free:**

- to copy, distribute, display, and perform the work

**Under the following conditions:**

 **BY:** **Attribution.** You must attribute the work in the manner specified by the author or licensor.

 **Noncommercial.** You may not use this work for commercial purposes.

 **No Derivative Works.** You may not alter, transform, or build upon this work.

- For any reuse or distribution, you must make clear to others the license terms of this work.
- Any of these conditions can be waived if you get permission from the copyright holder.

**Your fair use and other rights are in no way affected by the above.**

This is a human-readable summary of the [Legal Code \(the full license\)](#).

[Disclaimer](#) 

For the full text of this licence, please go to:  
<http://creativecommons.org/licenses/by-nc-nd/2.5/>

**INTEGRATION OF THE OFFICIAL AND PRIVATE  
INFORMAL PRACTICES IN SOLID WASTE MANAGEMENT**

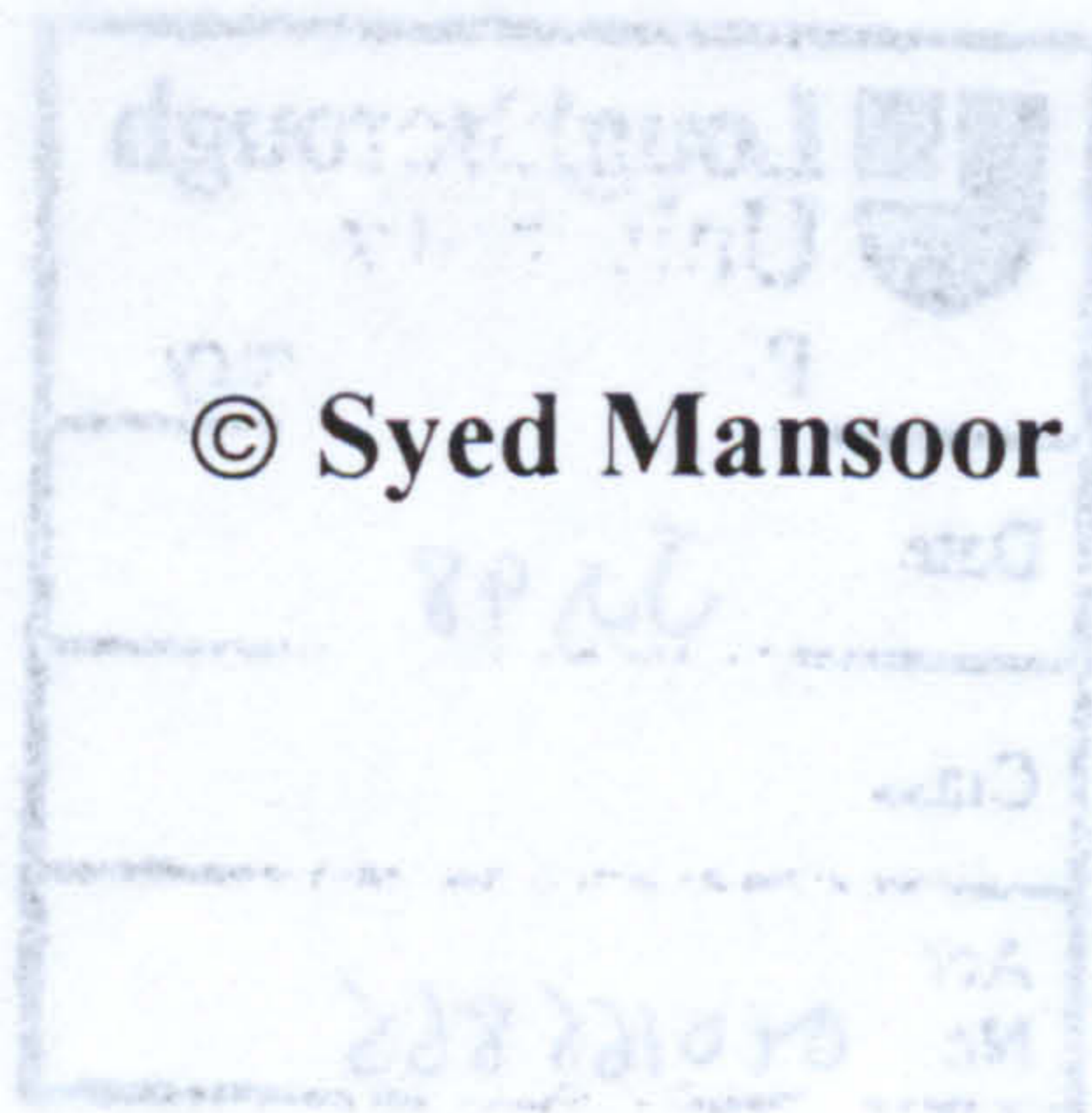
by

**SYED MANSOOR ALI, B.Sc, M. Eng.**

**A Doctoral Thesis Submitted in partial fulfilment of the requirements for  
the award of Doctor of Philosophy of Loughborough University**

**May, 1997**

**© Syed Mansoor Ali 1997**



## **DEDICATION**

*This thesis is dedicated to Alvina, my wife for her patience and support during the research work and to my father for a regular 'progress check' on my research work.*

## **ACKNOWLEDGEMENT**

The research work has been made possible by the help, assistance and advice of a number of people. First, of all, I am deeply indebted to my supervisors Dr Andrew Cotton for his advice, comments and thoughtfulness. Dr Cotton not only helped academically but also arranged some funds for the research. Dr Adrian Coad acted as my co-supervisor till August 1995 and made some extremely useful comments on the initial drafts. The staff working at the Water, Engineering and Development Centre (WEDC), Loughborough University have helped whole heartedly in one way or other to support me in completing this thesis. My particular thanks go to my colleagues Darren Saywell, Sara House and Sohail Khan for reading and commenting on my initial drafts.

A number of people in Pakistan helped me during the phases of data collection. I am particularly thankful to Ms Sara Siddiqui, Mr Pirzada Mohammad Rafi and Mr Hafiz Arain for their sincere co-operation. I had received a significant help in Faisalabad from Mr Shahid Mahmood and Mr Kevin Tayler. My special thanks to a number of sweepers, waste pickers, itinerant waste buyers and middle dealers who shared the data and information for the thesis.

I am also grateful to Ms Jo Beall for her kind advice on the methodology adopted for the thesis. A number of international experts helped and encouraged the research work, the author is particularly thankful to Dr Christian Furedy, Mr Arnold van de Klundert, Mr Roger Pfammater, Dr Pieter van Buekering and Dr Pieter Streefland for continuous encouragement and interest in my work. Last but not least my thanks to Mr Howard Billam for editing the language and format of the thesis and Mr Arsalan Ali for assistance in data analysis.

## ABSTRACT

Solid waste management in low income developing countries is generally the responsibility of the official sector, such as municipal corporations. However, there are extensive inputs from the from the private informal sector in waste collection, separation and recycling. Four different activities in the private informal sector have been studied to identify the potential of their integration with the official system. Where integration means that the official sector accepts those practices and incorporates them into existing practices and future plans. All the cases have been selected from the city of Karachi, Pakistan. A multiple case study approach was adopted to assess the potential for integration, constraints to integration, attitudes, relationships and dependencies. It has been concluded that under the present circumstances, the private informal activities in solid waste management cannot be integrated formally with the official system. The main constraints to integration are public and municipal attitudes, the interrelationships and dependencies, interference by politicians and the lack of understanding on the wide range benefits of integration. Future models must be developed on the private informal practices within the official systems, such as primary collection of waste through municipal sweepers. A number of benefits of the private informal practices were also highlighted by the research which may be considered as opportunities once integration takes place. The recommendations include a number of actions and potential policy changes which could be done to promote integration and a better partnership between the private informal and the public sector.

**Key Words:** solid waste, informal sector, recycling, primary collection, partnership, Karachi, Pakistan.

# TABLE OF CONTENTS

---

<b>ACKNOWLEDGEMENT</b>	<b>(iv)</b>
<b>ABSTRACT</b>	<b>(v)</b>
<b>CHAPTER 1</b>	
<b>INTRODUCTION</b>	
<b>1.1 General</b>	<b>1</b>
<b>1.2 Global problem of solid waste management</b>	<b>1</b>
<b>1.3 Solid waste management in developing countries</b>	
<b>1.4 The municipal system</b>	
<b>1.5 Informal activities in solid waste management</b>	<b>4</b>
<b>1.6 Integration</b>	<b>5</b>
<b>1.7 Conclusion</b>	<b>5</b>
<b>CHAPTER 2</b>	
<b>LITERATURE REVIEW</b>	<b>6</b>
<b>2.1 Introduction</b>	<b>6</b>
<b>2.2 Solid waste management in developing countries</b>	<b>7</b>
<b>2.3 Informal activities</b>	<b>11</b>
<b>2.4 Community based activities</b>	<b>14</b>
<b>2.5 Integration of informal and community based activities</b>	<b>17</b>
<b>2.6 Sweepers system</b>	<b>23</b>
<b>2.7 Conclusion</b>	<b>26</b>

## CHAPTER 3

<b>METHODOLOGY</b>	<b>27</b>
<b>3.1 Introduction</b>	<b>27</b>
<b>3.2 Objectives</b>	<b>28</b>
<b>3.3 Hypothesis</b>	<b>29</b>
<b>3.4 Constraints</b>	<b>29</b>
<b>3.5 Assumptions</b>	<b>29</b>
<b>3.6 Menu of methods</b>	<b>30</b>
<b>3.7 Open - ended exploratory method</b>	<b>32</b>
<b>3.8 Rapid appraisal of private informal recycling</b>	<b>32</b>
3.8.1 Structured interviews with the housewives	35
3.8.2 Itinerant waste buyers	37
3.8.3 Middle dealers	38
3.8.4 Main dealers	39
3.8.5 Recycling industry	40
3.8.6 Street pickers	40
3.8.7 Municipal sweepers	41
3.8.8 Municipal officers	42
<b>3.9 Lessons from Phase I of data collection.</b>	<b>43</b>
<b>3.10 Multiple case study</b>	<b>44</b>
<b>3.11 Case Study I - The Suzuki system</b>	<b>46</b>
3.11.1 The programme discovery	47
3.11.2 Semi structured interviews	48
3.11.3 House to house survey	50
3.11.4 Interviews with municipal and private sweepers	51
3.11.5 Cleanliness assessment of the area	52
3.11.6 Cordon survey	52
3.11.7 Quantities of separated re-saleable materials	53
3.11.8 Transfer point monitoring	54
<b>3.12 Case Study II - The KAWWS programme</b>	<b>54</b>
3.12.1 Access to the programme	55
3.12.2 Interview with the programme organiser	56
3.12.3 Interview with private and municipal sweepers	56
3.12.4 House to house survey	57
3.12.5 Discussion with district health officer	57
3.12.6 Other surveys and assessments	58
3.12.7 Quantities of separated materials	58

<b>3.13 Control Area</b>	<b>59</b>
3.13.1 General	59
3.13.2 Interviews with private and municipal sweepers	60
3.13.3 House to house survey	60
3.13.4 Semi structured interviews with municipal staff	61
3.13.5 Transfer point monitoring	61
3.13.6 Other survey	61
3.13.7 Quantities of separated materials	61
<b>3.14 Analytical framework</b>	<b>62</b>
3.14.1 Categories of indicators	62
3.14.2 Research Questions	63
3.14.3 Analysis of qualitative and quantitative data	63
<b>3.15 Conclusions</b>	<b>64</b>

## **CHAPTER 4**

<b>INFORMAL RECYCLING</b>	<b>66</b>
<b>4.1 Introduction</b>	<b>66</b>
<b>4.2 Major groups and their activities</b>	<b>66</b>
4.2.1 Other Groups	70
<b>4.3 Benefits</b>	<b>72</b>
4.3.1 Source separation	72
4.3.2 Source separated quantities	73
4.3.3 Composition of source separated waste	76
4.3.4 Income from source separation	77
4.3.5 Employment	79
4.3.6 Separation by sweepers	80
4.3.7 Separation on streets and at transfer points	81
4.3.8 Further trade and recycling of waste	83
<b>4.4 Constraints to integration</b>	<b>86</b>
4.4.1 Public attitudes	87
4.4.2 Municipal attitudes	92
4.4.3 Attitudes of actors	94
4.4.4 Relationships and dependencies	95
4.4.5 Other constraints	97
<b>4.5 Conclusion</b>	<b>98</b>



## **CHAPTER 5**

<b>INTEGRATION OF INFORMAL COLLECTION SYSTEM</b>	<b>99</b>
<b>5.1 Introduction</b>	<b>99</b>
<b>5.2 The Programme</b>	<b>102</b>
5.2.2 Inception of the programme	102
5.2.3 The programme operation	103
5.2.4 Programme organisation	106
5.2.5 Main actors	106
<b>5.3 Integration in this context</b>	<b>107</b>
<b>5.4 The programme's benefits</b>	<b>108</b>
5.4.1 Household participation	108
5.4.2 Monthly contribution	110
5.4.3 Resource generation and utilisation	112
5.4.4 Operational efficiency	117
5.4.5 Employment opportunities	118
5.4.6 Community's attitudes: as benefits	119
<b>5.5 Constraints to integration</b>	<b>122</b>
5.5.1 Community's attitudes: as constraints	122
5.5.2 Municipal attitudes	123
5.5.3 Attitudes of workers in the Suzukis system	125
5.5.4 Relationship and dependencies	125
5.5.5 Municipal transportation	128
5.5.6 Impact on municipal sweepers	128
5.5.7 Problems with the Suzukis	129
5.5.8 Political interference	130
<b>5.6 Conclusion</b>	<b>132</b>

## **CHAPTER 6**

<b>INTEGRATION OF A CBOS PROGRAMME</b>	<b>135</b>
<b>6.1 Introduction</b>	<b>135</b>
<b>6.2 The KAWWS Programme</b>	<b>137</b>
6.2.1 The physical area	137
6.2.2 Inception	138
6.2.3 Operation	138
6.2.4 Organisation for waste management	139
<b>6.3 Integration in this context</b>	<b>141</b>

<b>6.4 The programme's benefits</b>	<b>142</b>
6.4.1 Household participation	143
6.4.2 Resource generation and utilisation	146
6.4.3 Operational efficiency	148
6.4.4 Liaison with the government departments	149
6.4.5 Mobilising the housewives	150
6.4.6 Community's perception	150
6.4.7 Conclusions	158
<b>6.5 Constraints on integration</b>	<b>159</b>
6.5.1 Impact on municipal sweepers	159
6.5.2 Relationship and dependencies	162
6.5.3 Municipal attitudes	163
6.5.4 KAWWS organisers attitudes	164
6.5.5 Political interference	165
6.5.6 Commercial activities in the KAWWS area	166
<b>6.6 Conclusions</b>	<b>166</b>

## **CHAPTER 7**

<b>MUNICIPAL SWEEPERS IN WASTE COLLECTION</b>	<b>168</b>
<b>7.1 Introduction</b>	<b>168</b>
<b>Fig 7.1 Logical sequence of arguments in the chapter</b>	<b>169</b>
<b>7.2 Integration in this context</b>	<b>170</b>
<b>7.3 The Sweepers' system</b>	<b>171</b>
7.3.1 Need for the primary collection system	171
7.3.2 The Sweepers	172
7.3.3 Extent of sweepers system	173
7.3.4 Rates	176
7.3.5 Collection rights	177
7.3.6 Arrangement with supervisory staff	182
7.3.7 Other sources of income	184
<b>7.4 A model based around sweepers</b>	<b>186</b>
7.4.1 The Sweepers' micro-enterprise model	189
7.4.2 Economic opportunities	189
7.4.3 Social opportunities	190
7.4.4 Other opportunities	191
7.4.5 Constraints to the micro-enterprise model	191
<b>7.5 Testing the model</b>	<b>191</b>
<b>7.6 Conclusion</b>	<b>192</b>

## **CHAPTER 8**

<b>CONCLUSIONS AND RECOMMENDATIONS</b>	<b>193</b>
<b>8.1 Introduction</b>	<b>193</b>
<b>8.2 Constraints to Integration</b>	<b>193</b>
<b>8.3 Benefits of Integration</b>	<b>195</b>
<b>8.4 Integrated Systems</b>	<b>197</b>
<b>8.5 Further research needs</b>	<b>198</b>
<b>8.6 Recommendations</b>	<b>199</b>

<b>REFERENCES</b>	<b>201</b>
<b>BIBLIOGRAPHY</b>	<b>211</b>
<b>ANNEXURES</b>	<b>216</b>

## LIST OF TABLES

Title	Page Number
3.1 Number of interviews and case studies conducted	32
3.2 Relevant situations for different research strategies	43
3.3 Summary of the surveys and investigations conducted in the area	44
3.4 Summary of all surveys and investigations conducted in the area	53
3.5 Summary of all surveys and investigations conducted in the control area	58
4.1 Summary of actors and activities in the informal recycling process	65
4.2 Percentages of responding population who regularly separate components from their household waste in Karachi	70
4.3 Details of waste lots (in Kg) as sold to itinerant waste buyers from different areas of Karachi.	70
4.4 Per capita separation rates in (kg per person per day) in different areas of Karachi.	71
4.5 Per capita separation and generation rates	72
4.6 Percentage composition of materials separated by households.	74
4.7 Prices paid to the households by itinerant waste buyers for different materials in Karachi (1994).	75
4.8 Number of houses from where sweepers collect waste and their practice of separating and selling waste.	77
4.9 Prices paid (Rs/ kg) for major separated materials at various stages in the recycling chain of itinerant waste buyers. Percentage mark-up at each stage is shown in brackets.	81
4.10 Prices paid (Rs/ kg) for major separated materials at various stages in the recycling chain of waste pickers. Percentage mark-up at each stage is shown in brackets.	81
4.11 Recycling and re-use of some common waste components in Karachi.	82

4.12 Perceived solutions to the problem of solid waste from households in Yasinabad.	85
4.13 Cross-tabulation of frequencies of the knowledge about recycling chain and motive behind recycling.	86
4.14 Cross-tabulation of the knowledge about recycling chain and practice of separating and selling waste components by households.	86
4.15 Frequencies cross-tabulation of respondent's willingness to help street pickers and their perception of picker's usefulness.	87
4.16 Perceived support programmes for pickers from households in Yasinabad.	88
4.17 Nature of interaction between middle dealers and the official agencies.	91
4.18 Facilities and support offered by middle dealers to itinerant waste buyers.	92
5.1 Break-up of the residential plot sizes in the programme area.	101
5.2 System of waste collection and disposal in use by the sample households in the control area and Suzuki area.	106
5.3 Payments in Rs per month made to the Suzuki system as compared to the payments made to the sweepers in the control area.	108
5.4 Household percentages using different services from the municipal sweepers.	109
5.5 Income and expenditures on Suzukis system in Rs per month during the investigation period.	110
5.6 Annual cash flows (in Pak. Rs) of the Suzuki system over the life cycle.	111
5.7 Number of fresh waste piles, garden waste piles, and construction debris in the Suzuki area as compared to control area.	114
5.8 Satisfaction over area cleanliness in the two sample areas as percentage of residents.	116
5.9 Cross tabulation of the residents satisfaction over area cleanliness with the users of different systems in the Suzuki area.	117
5.10 Level of satisfaction and percentages of the respondents on the satisfaction over Suzuki's system.	120

5.11 Reasons of non-satisfaction with the Suzuki system.	126
6.1 Break-up of the residential plot sizes in the KAWWS area.	133
6.2 System of waste collection and disposal in use by the sample households percentages in different areas.	141
6.3 Regular income and expenditures of KAWWS on the waste collection programme.	143
6.4 Payments per house contributing to street sweeping in the sample population.	144
6.5 Impact of the street sweeping contribution on the sample households perception of the area cleanliness in the KAWWS area.	148
6.6 Cross tabulation of the residents satisfaction over area cleanliness with the users of different systems in the KAWWS area.	149
6.7 Impact of the street sweeping contribution on the type of waste collection system in use by the sample households.	150
6.8 Impact of the street sweeping contribution on the sample households perception on the usefulness of KAWWS.	151
6.9 Impact of the street sweeping contribution on the sample households perception on the usefulness of KAWWS at city level.	152
6.10 Suggestions from respondents to improve solid waste management system in the KAWWS area.	153
6.11 Perceived satisfaction in terms of percentages of the households on the programme contribution.	153
6.12 Sweeper`s status and their contribution to household waste collection in the KAWWS area.	156
6.13 Households percentages using different services from the municipal sweepers in the KAWWS and the control area.	157
6.14 Payments in Rs per month made to the sweepers by sample population in the KAWWS and the control area.	157
7.1 Number of sweepers in the municipal staff and the total annual salaries paid to them in Karachi.	166

7.2 Percentages of households using the sweepers system for waste collection in different areas.	169
7.3 Cross tabulation of the average plot size (in sq.-yds.) in the working area and number of houses from where sweepers collect waste.	170
7.4 Cross-tabulation of average plot size in the working area and sweepers involvement in the in-house works.	171
7.5 Average of amounts charged by sweepers to collect waste and the services in different areas.	173
7.6 Official duty and collection rights area of municipal sweepers.	174
7.7 Cross-tabulation of average plot size in the working area and sweepers movement to the other areas.	175
7.8 Cross-tabulation of sweepers sex and their practice of working into other areas.	175
7.9 Details of collection rights transaction among municipal sweepers.	176
7.10 Sweepers times to collect waste from the houses.	178
7.11 Practice of separating re-saleables by sweepers.	181
7.12 Cross-tabulation of numbers of houses from where collect waste with the separation practices of re-saleables by sweepers.	181
7.13 Sweepers involvement in the other part time evening jobs in different areas.	182
7.14 Investment and income opportunities in the sweepers transaction of collection rights for individual sample transaction.	185



## LIST OF FIGURES

<b>Title</b>	<b>Page Number</b>
3.1 Interrelationships between the informal and formal sector in solid waste.	31
3.2 Map of Karachi city showing research areas.	34
4.1 Logical sequence of arguments.	64
4.2 Percentages of major components in the separated waste at the household level in all areas of Karachi.	74
4.3 Households motive behind the separation and selling activity in the sample area of Yasinabad.	85
5.1 Logical sequence of arguments in the case study.	98
5.2 Organisational structure of the Suzuki programme.	104
5.3 Income and expenditures from collection fee.	112
5.4 Distribution and flow of income from transport and sale of re-saleable items.	112
6.1 Logical sequence of arguments in the case study.	132
6.2 Number of waste piles observed in the case study area .	145
6.3 Satisfaction over area cleanliness in the different sample areas as a percentage of households.	147
7.1 Logical sequence of arguments in the chapter.	165
7.2 Position of sweepers in the solid waste management hierarchy.	168

## LIST OF ABBREVIATIONS

Abbreviation	Meaning
AERC	Applied Economics Research Centre (University of Karachi, Pakistan)
CBO	Community Based Organization
DF	Degree of Freedom
FAUP	Faisalabad Area Upgrading Project
ILO	International Labour Organization
IRR	Internal Rate of Return
IWB	Itinerant Waste Buyers
IWM	Institute of Waste Management
KAECHS	Karachi Administration Employees Co-operative Housing Society
KAS	Karachi Administration Society (short form of KAECHS)
KAWWS	Karachi Administration Women Welfare Society
KDA	Karachi Development Authority
KMC	Karachi Municipal Corporation
n or N	Number of cases or sample size
NESPAK	National Engineering Services Pakistan (pvt.) Limited
NGO	Non-government Organizations
ODA	Overseas Development Administration (UK)
OPP	Orangi Pilot Project
PAR	Participatory Action Research
SPSS	Statistical Package for Social Sciences
SSI	Semi-structured Interviews
SWM	Solid Waste Management
UNCHS	United Nations Centre for Human Settlements
WEDC	Water, Engineering and Development Centre (UK)

## LIST OF BOXES

Box Number	Title
1	Waste Pickers - Abdul Rasheed and Ghulam Nabi's Story
2	Waste Picking in America
3	Lead from Automobile Batteries
4	Municipal versus Suzuki System
5	Pickers with the Suzukis
6	Municipal Officers Speak about Political Interference
7	Provisions and Activities by KAWWS
8	Suzuki Programme versus KAWWS Programme
9	Municipal System versus KAWWS System
10	Iqbal collects household waste and is happy
11	Nazeer - a Union Leader of Sweepers Speak
12	Existing versus Proposed System

# Chapter 1

## Introduction

### 1.1 General

The generation of solid waste is not a recent activity. The generation of increasing quantities of waste leading to concerns over its environmental impact is, however relatively modern phenomenon. There is a growing concern over the increased quantities of waste, the higher proportion of non-biodegradable materials and the depletion of natural resources available to dispose of waste. The global burden of solid waste amounted to 1.3 billion metric tons in 1990 (Beede and Bloom, 1995). In a typical city of a low income developing country of population between 8 to 10 million around 25,000 people might be formally and informally employed within the municipal solid waste sector. Expenditures on municipal solid waste collection and disposal in the United States increased from US \$ 4.7 billion in 1972 to 14.5 billion in 1992 (Rutledge and Vogan, 1994). The quantities of solid waste and the expenditure required to cope with it are growing at an alarming rate throughout the world. Management of solid waste is now a large sector of local urban economies. It employs a very high number of workers and because of growing public environmental awareness it has become politically critical. Proper management of solid waste is important for health, well being, stability and the growth of cities.

### 1.2 Global problem of solid waste management

The proper collection and safe disposal of municipal waste is now a very high priority on the universal agenda. More than 178 heads of state signed Agenda 21 which focuses on the four major waste-related programme areas: minimizing wastes, maximizing environmentally sound waste reuse and recycling, promoting environmentally sound disposal and treatment and extending waste service coverage (Agenda 21). Similarly, the UNCHS (Habitat) emphasizes an environmentally-sound and resource-efficient approach to the problem of human policies and programmes (UNCHS, 1992). The World Development Report 1994 advocates the privatization of solid waste services and perceives that market forces and competition can improve the production and delivery of infrastructure services (World Development Report, 1994). In spite of a number of well drafted reports and the clear direction of international priorities there are a number of area of concern.

Since most of the global agenda is targeted to all the countries then it is reasonable to expect that they will propose solutions to the problem which address the rich and the poorer countries equally. Since a number of poorer countries have no solid waste management service at all, it is very difficult for them to aim for the so called 'environmentally sound' practices familiar in the northern countries. Even some market based approaches such as privatisation raises a number of social and economic concerns in developing countries where many poor people survive on waste and waste related activities. The section below discusses the difference between current practices of solid waste management in developed and developing countries and hence argues that the future planning for solid waste management has to be significantly different for both types of countries.

### **1.3 Solid waste management in developing countries**

More than 50% of the world population was living in the low income developing countries in 1990, generating about 45% the total municipal waste generated in the world but contributing only less than 20% of the World's Gross Domestic Product (Beede and Bloom, 1995). The quantities and quality of waste and waste related attitudes are different in developed and developing countries. The northern countries account for a high share of the world's waste which is disproportionate to their share of population. The southern countries generate a disproportionately high share of waste relative to their share of world income. A number of low income developing countries are still struggling to collect all of their generated waste and trying to develop facilities for its disposal. Health and economic costs of failing to adequately collect and manage solid wastes are rarely considered in developing countries (Cointreau, 1982). Although problems of basic waste collection and transportation have been solved in the northern countries there is now a search for more cost effective and efficient methods. Thus goals for waste management systems in the southern countries may be different from those in their northern counterparts.

The labour cost in most of the southern countries is much less than the northern countries. Thus labour intensive systems may be cost effective in southern countries as compared to mechanized systems. In the past a number of mechanised system have been tried in the southern countries and resulted in failure. Most of the southern countries try to improve their solid waste systems by using foreign loans and aids. Aid comes with experts and it is not necessarily true that international experts can acquire a good understanding of local situations in the available time. These experts often bring with them theories and logical frameworks which are designed to demonstrate the best course of action and where, when and why it should be carried out with least

risk (Hamdi, 1996). Such predictions are often extremely difficult to make in the unstable markets and political situation found in developing countries.

There is a wide difference in the public attitudes in the south and the northern countries. Generally in the south, the public is not aware of adverse environmental and health consequences of poor solid waste. Since public opinion does not influence so politicians are not concerned. In large southern cities public complains about scattered waste and newly elected politicians start their reforms with a cleanliness campaign, but this does not transform into a waste management plan or policy.

The institutions responsible for solid waste management in the south lack the capability to safely handle large quantities of waste. They have no trained manpower and institutional capacity to properly manage waste. The Section 1.4 concisely explains the traditional roles and responsibilities of the public sector systems in the management of solid waste.

Finally, a number of private informal activities are attached with the current solid waste management practices in southern countries. Such practices are extensive in nature and often perform many key functions. For example, primary collection of solid waste is often done by municipal sweepers through informal contracts with the households. The recycling sector in a number of southern countries is organised informally. An understanding of all such activities is important before planning any sustainable and socially balanced solid waste management for the future.

## **1.4 The municipal system**

Waste collection, transportation and disposal has traditionally been the responsibility of municipal corporations in the research city of Karachi which is a part of the Indian sub-continent. The solid waste management tasks come under the health department of municipal corporations. Most of the operational responsibility for solid waste management is taken by medical doctors. In large cities, where solid waste management systems include operation and maintenance of motorized vehicles, the engineering division takes the responsibility for such mechanical tasks. The major administrative matters, financial allocations and drafting and approval of legislation take place through municipal councils. The council is normally composed of elected councillors and headed by a city mayor.

In addition to the functions performed by municipal corporations, a number of private-informal activities operate. The most notable private informal activities in Karachi are waste recycling and the primary removal of waste from houses to transfer points. These activities often operate independently of the municipal sector, such as waste recycling, or operate within the municipal waste management stream, such as the primary collection service provided by municipal sweepers. Section 1.5 discusses the private informal activities associated with solid waste management in the low income, developing countries.

## **1.5 Informal activities in solid waste management**

Private informal activities are those which are not regulated and controlled by government agencies. They exist and operate because of market forces or other factors. The informal activities may be explained on the basis of labour categories such as self-employed daily-wage labourers versus salaried workers. The other common classification is based on the type of enterprise. A number of private-informal activities are attached to solid waste management in southern countries. The valuable waste components are separated and sold at the household level. Separated components are traded and ultimately recycled through an established network of dealers, wholesalers and recyclers. Similarly, primary waste collection by sweepers and its disposal at the transfer points is also an informal activity. Recently a number of community based and non-government organisations have also started to share various responsibilities in municipal solid waste management. These organisations are non-government and decentralised but not necessarily informally organised. These activities also contribute to the current solid waste management systems. All these activities are collectively called private-informal (decentralized or non-official)<sup>1</sup> activities in this thesis.

The private-informal activities are important from various aspects. Currently, they fill a gap in the solid waste management service, they are a survival strategy for a large number of the poor and a large employment sector in the urban economy. The number of waste pickers, collection workers and waste buyers is between 1 to 3 percent of the urban population in developing countries (Cointreau, 1990). At present, the formal and informal sectors of solid waste management activities do not accept others' role. For example a higher degree of mechanisation within the formal sector is not beneficial to the informal activities. The important point is to find out whether

---

<sup>1</sup> Definitions about the private informal, decentralised and community based activities are discussed in the subsequent chapters.

or not these activities can integrate with each other for the benefit of solid waste management. This thesis judges the possibility of the formal integration of informal activities within the official systems.

## **1.6 Integration**

The major issue addressed by this thesis is that of integration. The private-informal activities do not normally become a part of the official system. There is always a natural life cycle of private-informal activities during which these activities are neither accepted by the official agencies and nor become part of official policy. Since this thesis judges whether or not, such activities may become part of the official policy and practices, the term integration is defined in each chapter according to the context of the activity described. The chapters are organised in a logical order to reach some concrete conclusions about integration. First a theoretical background is set up in Chapter 2, since there are a number of theories from different disciplines important to the thesis. For example the explanation of informal activities has been derived from theories of labour, wages and markets. There are theories of solid waste management and appropriateness of the solid waste management systems etc. It is important to discuss all the relevant literature before the main discussion on the thesis begins. The methods for data and information collection and an analytical framework are established in Chapter 3. Four different cases of private-informal activities are presented as case studies in Chapters 4 to 7. Each chapter discusses integration by discussing the benefits and constraints attached to that particular activity. Conclusions are drawn at the end of each chapter. A final chapter is included as Chapter 8 which discusses joint conclusions and recommendations from all the case studies.

## **1.7 Conclusion**

Improper solid waste management is a global problem. The level of deficiency and their nature in the solid waste sector is different in the northern and southern countries. The perceived problems in the northern countries are environmental concerns over the long term effects of the current disposal practices and efforts to achieve a higher efficiency at a lower cost. The issue in the southern countries is to achieve at least a minimum level of collection and transportation and to develop infrastructure facilities for the transfer and disposal of solid waste. The research focus is on the private-informal activities and looks at whether or not and how such activities may be integrated with the official system.



# Chapter 2

## Literature Review

### 2.1 Introduction

Problems of solid waste management around the world seem un-manageable. Thompson (1994) mentioned that everything that we discard should in an ideal world, go away and stay away, but this does not happen. The factors involved in not controlling waste are infinite in number, however to make the problem understandable and manageable we chop it down to a manageable size. This thesis is a similar attempt. Solid waste management in developing countries comprises a number of actors and activities all of which may be viewed from a number of different perspectives. These perspectives were developed by researchers, experts and professionals from different disciplines. For example recycling may be discussed by a composting expert to convert biodegradable organic components to a useful product, income from recycling may be looked at as a survival strategy for the poor by a social scientist and recycling can be looked at by an environmentalist as an acceptable and safe way to reduce waste. Thus, in reviewing literature it was deemed important to note the author, the context in which s/he is writing and developing the definitions used. In this way various theories and their application in practice can be critically examined.

The available literature on the topic can be classified into three main groups as follows:

- i) Local literature, in the form of project reports. Such literature is generally based on engineering approach to the problems often supported by economic arguments. Although the focus is usually solid waste management, the literature is generally not grounded on any theory. Such literature is not widely included in this review. However a few references are quoted.
- ii) Solid waste management literature does not have a strict, theoretical base for advancing and developing arguments. However a number of interesting ideas are theorized and shaped in the development of such a literature. Relevant solid waste management literature is included particularly in Section 2.2 which deals with solid waste management in developing countries.
- iii) This group includes literature from a number of disciplines such as social sciences, economics, social history and anthropology. This literature, although not directly focused on solid waste management, covers actors or activities within solid waste management systems. Such literature is usually well grounded in theory. An example of such literature is the anthropological study on

municipal sweepers' community in India (Prashad, 1995). Such literature also extends the boundaries of current knowledge by explaining unexplored areas.

The above categories of literature do not address directly the existing solid waste practices in developing countries from the solid waste management perspective. There is no single body of literature which discusses the integrated social and technical approach in solid waste management. However most of the literature is helpful in explaining, manifesting and systematizing the practices. There are a number of missing links in the problem, not discussed by any of the above categories.

This chapter focuses on the literature concerning the informal activities in solid waste management in developing countries as understood from different theories and perspectives. In the process of discussion it touches upon community based activities such as neighbourhood primary collection systems and informal activities within public sectors, such as a sweepers' system of primary waste collection etc. The chapter also gives an overview of solid waste management problems in developing countries. The criteria used to define the informal activities and constraints to their integration with the official solid waste management system is also given. Once the basic theme is explained, the remaining sections of the chapter are developed around the guiding hypothesis. A number of constraints and attitudes to the integration of informal recycling and the community based systems are also discussed. A few areas were found to be completely unexplored and un-researched, for example it was observed that the sweepers' collection system has not been researched from a solid waste management perspective. Literature from anthropology and social history is also included in this chapter which discusses the sweepers' system. Concluding sections of the chapter are devoted to the literature which supports development of the micro enterprises and other interventions to develop the existing sweepers' system. The final conclusion summarises the main points from the chapter.

## **2.2 Solid waste management in developing countries**

Individuals as waste generators in developing countries are as pragmatic and materialistic as their counterparts in the developed world (Thompson, 1994). However in the developed world there are more resources in various forms available to control the waste as compared to developing countries. Holmes (1993), observed that since there are gross differences in the wealth, use of resources and the quality of life in developed and developing countries, so solutions to SWM suitable for developed countries may not be offered to developing countries. Similarly Cointreau (1990) writing for the international meeting of local authorities, raised the question of the factors

motivating individuals in developing countries and industrialised countries to recycle waste ? She elaborates by mentioning that recycling in the north is being politically driven by public opposition to disposal sites and economically driven by the high cost of disposal attributable to land shortage and tough disposal standards. Whereas it is economically driven as an employment and livelihood strategy in the south. Thus, among researchers, it is more or less an accepted fact that solutions to waste management suitable for the north may not be suitable for the southern nations.

Recent thinking on the solid waste management in developing countries centres around resource recognition by understanding the point of views of all the actors involved. One method to understand all the actors is through stakeholders analysis. **Furedy and Shivakumar (1990)**, looked at solid waste management in Asian cities from the perspectives of their citizens. They identified a number of stakeholders in solid waste management in Asian cities and discussed their diversified perceptions. The identified stakeholders are:

- Municipal officials.
- Slum dwellers and squatters.
- Affluent and middle class residents.
- Poor people whose livelihood depend on waste.
- Waste traders.
- Local manufacturers.
- Elected city councillors.
- Non-government organisations.
- Environmental educators.

**Furedy and Shivakumar** coined the idea of stakeholders' forum to concentrate on understanding the different interests and points of view of the local stakeholders represented. However, among politicians they mentioned elected councillors and overlooked the role of national politicians, who frequently interfere in local decision-making. The idea of stakeholder analysis for solid waste management will be further elaborated in Chapter 8 of this thesis. Furedy's theories are generally built around social arguments. For example she mentioned that the failure of current practices of SWM in developing countries can be attributed to social reasons **Furedy (1989)**. She also argued that if SWM planning is to take into account the realities of economic and social functioning then urban managers need to adopt a broader concept of SWM than the one that guides most planning at present. Furedy questioned the future role of the municipal sector in resource recovery or recycling. The approach of **Klundert and Lardinois (1995)**, is not much different from Furedy's

stakeholders' participation. They feel that an integrated solid waste management system could make use of the strengths of the various actors including the municipal governments, formal private (commercial) sector, the informal private sector and community-based organisations.

**Furedy (1984)**, wrote a pioneering paper on the socio-political aspects of the recovery and recycling of urban wastes in Asia. She theorizes that a number of social and political considerations such as recognition of informal activities will influence and transform solid waste management more in the future than technical innovations. She mentioned a number of research priorities which include:

- Understanding structures of informal systems.
- Training pathways of recovered materials.
- The relationships between formal and informal systems of recovery and recycling.
- Public health aspects of recycling.
- Attitudinal, perceptual and behavioural aspects.
- Public interventions and educational efforts to influence waste related behaviour.

Although Furedy's dis-aggregation of different themes is useful, in practice all these themes are interlinked. For example it is often difficult to separate public health, attitudinal and public education aspects.

**Furedy (1993)**, criticizes current privatization practice and points out that solid waste management in developing countries is still based on conventional health and engineering principles. The city cleansing departments are looking towards higher technology and privatisation for solutions to the problem of inadequate waste management which may be futile.

There is no doubt that Furedy's contribution in researching social aspects of solid waste management is remarkable and she expands boundaries of current thinking on solid waste management. However, issues in solid waste management seem far more complex, than those which Furedy researched from a social angle. She often mis-interprets municipal officers' and politicians' point of view and their understanding of an improved system. For example, efficient and effective solid waste management may be a high priority for politicians and municipal officers but waste pickers may not have a place in their planned improvements. Social development of poor groups involved in waste picking may not lie within the scope of a municipal officers' responsibilities.

**Cointreau, (un-dated)** wrote on the complex nature of solid waste management problem in the developing countries. She is one of the few international experts who wrote about political influences in SWM, in addition to other issues. She pointed out that political influences are generally short term with cosmetic improvements. The other important finding from her paper is about vendors trying to sell inappropriate equipment and technology. International waste management companies and the countries from which they operate usually offer soft-term loans or gifts of inappropriate equipment. Cointreau's understanding at the policy level is remarkably good.

**Scherteinleib and Meyer (1992)**, discussed a number of issues of SWM in developing countries and proposed some plans for future research. One of their conclusions is about the private-informal sector of waste recycling. They found that it might be very difficult to introduce any change to the existing arrangements of informal recycling activities, especially since these activities are generally tightly controlled by informal groups. It should also be emphasised that the complex network should be thoroughly studied before introducing specific changes. This thesis supports the view that because of the absence of institutional support and the organic nature of the informal activities, the actors involved need protection for their survival, which is usually perceived as the tight control of leaders. This aspect has been further researched in the current thesis.

**Scherteinleib and Meyer** consider SWM as the most serious environmental problem confronting the government of developing countries. They identified five specific problems contributing to this situation:

- Inadequate coverage of population to be served.
- Operational efficiencies of the existing system.
- Limited utilisation of the formal and the informal private sector in recycling.
- Inadequate final disposal
- Inadequate collection and final disposal of non-industrial hazardous waste.

A broader look at the literature on solid waste management in developing countries suggest that now there is a more developed understanding on the issues as compared to ten years ago. There is also a consensus among researchers that ideas and solutions suitable for developed countries are not appropriate for developing countries. However the areas which needs further attention are those concerning the understanding and diverse perceptions of solid waste. There is an increased need to understand each stakeholder, his objectives, interest, power and risk.

## 2.3 Informal activities

Informal activities are extremely difficult to transform into definitions but can be recognised and described. The reason for this is, perhaps, the heterogeneous nature and variation in the scale and nature of the activities. Most of the literature on informal activities is labour or enterprise focused, particularly definitions which were developed before 1980. For example in the early 1970's **Hart (1973)** used the term 'informal sector' to that sector of the urban economy which did not appear in the national statistics of developing countries. Hart's definition depends upon the definition of economic activities used to produce the national statistics. The early informal sector studies in Kenya (**ILO, 1972**), described them as the way of doing things, characterised by:

- i) Ease of entry.
- ii) Reliance on indigenous resources.
- iii) Family ownership of enterprises.
- iv) Small scale of operation.
- v) Labour-intensive and appropriate technology.
- vi) Skills acquired outside the formal education system.
- vii) Operation in unregulated and competitive markets.

Similar labour and enterprise-focused definitions were developed by **Weeks (1975)** and **Mazumdar (1976)**. It became clear by the late 1980's that informal sector activities are those, which everybody readily recognises but nobody is able to define accurately. **Grown and Sebstad (1989)** are critical of the enterprise approach and found that it is easier for analysis but insufficient for understanding the activities of many of the poorest and most neglected groups, such as women. They found the terms 'livelihood' or 'survival strategies' as more appropriate. Generally, providing clear and verifiable definitions of informal activities in SWM has proved difficult. **Furedy (1989)** noted a lack of precise definition for informal activities in solid waste management and tried to make the issue simpler by drawing a distinction between what is officially sanctioned or mandated, such as the SWM system of the city, and other activities that are usually regarded as illegal, undesirable, or irrelevant e.g. what actually happens to solid wastes, apart from the normal collection and disposal procedures, such as recovery by street pickers. **Ali et. al (1995)** defined them as those activities which exist outside the official scope, unrecognised by the municipal sector, unregistered and sometimes in defiance of the municipal procedures. Most other literature on solid waste management fails to give a definition of such activities and simply records a number of them.

The main private informal activities identified in this research are informal recycling systems, informal waste collection systems and some decentralised activities which operate through community based organisations (CBOs) and non-government organisations (NGOs). Although activities by CBOs and NGOs often operate through a more formal structure. Similar to the problem of defining informal activities, it is also difficult to ascertain that these activities conform to the definitions of the informal activities or not. This becomes more complex when we observe that the choice of definitions is limited. In the informal sector, recycling has so far been understood as separation practices by waste pickers, whilst in practice it is a combination of a number of formal and informal activities both of which are important for the existence of the recycling sector. The informal collection systems, as described in Chapter 7, are operated by municipal sweepers, who are municipal employees.

**Furedy (1993b)**, commented on the initial draft of the literature review and agreed that informal practices are quite a controversial area. She suggested more analysis of the problem and highlighted the potential of this research to clarify much of the muddle that is found in reports on informal recycling.

**Huysman (1994)**, studied waste picking by women in India as a survival strategy. She sees waste picking as one of the few options through which poor and lower caste women can earn an income to meet their household and child-rearing needs.

Huysman's understanding of the waste material chains looks superficial and rather emotional in some arguments. For example she feels that middle men take a large portion of the added-value of separated materials but appears not to understand the inputs provided to the pickers and waste buyers by middlemen and the security provided in return for this dependency. In short the transaction cost was not taken into account.

Huysman understood the overall changes in the city's solid waste management and foresaw more formal privatisation and streamlined recycling through the formal sector. Her understanding of the diverse perception of the stakeholders operating in the solid waste management scene appears limited. The social arguments, in a number of cases, do not consider the economic realities.

**Cointreau and Kradt (1991)**, gave a description of the recycling activities in a number of developing countries. They found that the numbers of individual street buyers, collection workers and dumpsite scavengers involved in recycling represent from 1 to 3 percent of the urban

population in developing countries. They gave a figure of 10,000 dumpsite pickers in Mexico City and more than 7,000 in Manila, Philippines. In Cairo, there are 12,000 door to door waste collectors who privately run the city's recycling system. They concluded that local governments look upon the scavengers as a nuisance, buy-back centres as an eyesore and dumpsite scavengers as an embarrassment.

**Furedy (1991)**, wrote a well focused article on the source separation activities in developing countries. Her key argument is that, so far, no city has attempted to investigate the amounts of resources recovered at the source, prior to the waste stream appearing. She also raises the issues of a possible decline in source-separation with the rise in standard of living and other economic indicators. She thought that households would not have time to separate waste and carry it to the recycling centres for a small return. She gave examples from China and Malaysia, where source separation activities have declined. Although looking at the development pace of a number of developing countries she concluded that most of those activities are likely to persist in the future. She emphasised the need to understand and study all these practices.

**Haynes and El-Hakim (1979)**, conducted pioneering research on the informal collection and recycling system in Cairo, Egypt. They found that the household waste of Cairo is almost entirely disposed of within the city in a unique manner. They found such an informal system to be the most functional and appropriate in the presence of a great deal of unemployment, inefficient bureaucratic organisations and lack of raw materials.

**Bose and Blore (1993)**, raised the question of the property rights of waste and questioned large scale privatisation of solid waste systems in developing countries. They argue that solid waste in developing countries must be considered as a common pool resource. Discussing the case of Calcutta, India they observed that the informal property rights of waste pickers, collectors and waste dealers have not been understood. Further the informal systems may play a significant role in increasing the economic efficiency of the whole system. The paper concludes that there is a need to develop more understanding of the nature of the role of different groups in enforcing property rights and the nature of contractual relations between them. Since the property right systems could be described (**Furubotn and Pejovich, 1972**) as the set of economic and social relations defining the position of each individual with respect to the utilization of scarce resources. It could be concluded that once human motivations in the current waste management systems are known, better understanding of the organization's allocation and use of resources becomes possible.



**Blore (1994)**, pointed out that the impact of public systems on private activities is generally ignored by policy-makers. In order to make the impact of any changes in the current systems of solid waste management effective it is important to develop an understanding of the whole solid waste management system both public and private.

**Cook and Kirkpatrick (1988)** discussed property rights in the context of privatisation in developing countries. In large organisations the ownership and management are separated and managers may not have a direct interest in profitability. Similarly owners of the property rights may have limited control over management. This thesis describes the extension of property rights on waste picking and waste collection researched in the Indian sub-continent of which more details are provided in the following chapters.

It may be concluded that informal activities in the solid waste management systems play a key role in the delivery of the service in developing countries. They are of different types and sizes and perform a number of functions. They are involved in those areas where a market exists, the service not currently being provided by the municipal sector and where no centralised monopolies exist. However, informal activities are difficult to define using conventional definitions.

## **2.4 Community based activities**

Community based and non-government organisations (NGOs) are taking an increasingly important role in the urban development scene in developing countries. Past experiences show that NGOs can reach neglected groups, possess a remarkable capability for experimentation and innovation and can fill in certain service gaps. **Clark (1995)** saw NGOs as a mechanism to reach vulnerable groups and to promote participatory approaches to development. **Brett (1993)** perceived that NGOs and privatisation are solutions to the so called rigid, corrupt and inefficient state structures. The NGOs fulfil the goals of community involvement, empowerment, sense of ownership and cost effectiveness. **Charlton and May (1995)**, found that public trust of NGOs is much higher as compared to government agencies. However, he predicted that the development activities of NGOs is likely to remain substantially defined by project-related work. During the 1980's, major donors, such as the US Agency for International Development (USAID) and the World Bank, turned increasingly to NGOs as flexible and inexpensive instruments for their development activities (**Meyer, 1995**).

**Brett (1993)**, discussed the role of voluntary agencies as development organisations and raises the issues of their accountability and efficiency. He asks that, although voluntary agencies have many achievements to their credit, whether their use of resources, decision making processes and labour relations are as effective and socially beneficial as claimed. This has yet to be rigorously tested in theory and practice.

Multiple and partially incompatible objectives are involved and what constitutes success and thus 'efficiency' for one party may represent failure and waste to another. Brett pointed out that the claim of voluntary agencies in terms of economic efficiency in its broadest sense, whether actually achieved or not, is still a question (state agencies in a number of processes look at the process in terms of the balance of gains and losses).

Brett's criticism, is of all types and sizes of NGOs, but his argument of 'diverse perception' holds strong validity as seen in the following chapters of this thesis, particularly his argument that a success for one party may be a failure for the other is validated in Chapters 4 to 7. The case studies presented found that a success from the efficiency angle appears as a failure from the poverty point of view and vice versa. There are theories to explain different components of the system but it is difficult to explain interrelationships through a single theory. Available literature is restricted to a few detailed accounts of the community based approaches in solid waste management. In developing countries, the community based approaches are mostly restricted to an improved neighbourhood waste collection system, where the objective is environmental improvement, or a waste separation scheme which has the social objective of supporting pickers.

**Furedy (1992)** gave a detailed account of community based projects in Bangalore, Madras, Manila and Jakarta. Most of those projects have major social and ecological goals. The author perceived those decentralised projects as an alternative to the existing inefficient conventional solid waste management. She strongly argues that solid waste management should be viewed in the context of broader social and ecological goals. In fact, for her paper, she qualified as 'non-conventional' only those projects which have some general social and ecological goals and show potential to change the simple collect-transport-dispose organisations represented by official agencies. Furedy's perception as a social scientist is important. This thesis found huge gaps between the definitions of an improved system from the community, municipal officers and researchers' perspectives. It can be agreed that most of the conventional solid waste management systems do not fulfil the social-development objectives as defined from a social perspective. On the other hand some conventional centralized systems benefit the poor, as discussed in Chapter 7

on the sweepers collection system, which confirms **Sanyal's (1991)** conclusion that decentralized approaches and local governments may oppose informal activities.

Furedy discussed the successes and problems of decentralised systems. One of the key points she put forward is the lack of sustainable co-operation of city authorities. She pointed out that in getting co-operation from city authorities, the decentralised projects often point to the cost-reductions in collection and transportation which are found if wastes are reduced and some waste treatment is decentralised, as well as job creation, and the reduction of waste-picking. In another case Furedy discussed the success of another decentralised project in Manila which achieved a number of social and ecological goals and demonstrated how an NGO can support social and environmental goals. In spite of the success of that project, the Philippine government tried to close the whole project down at one stage. At various places, while discussing the projects, the author gives examples of community non cooperation. Residents responded very poorly to suggestions by a CBO or NGO that they should separate dry and wet waste to benefit the pickers. The other major constraints discussed in the paper are the ways in which projects can become dependent on dedicated individuals and also external funding: both these problems are common to community based approaches elsewhere.

Furedy's paper is a detailed account of the approaches and lessons to be learned from community based projects in solid waste management in Asian cities. The paper also discusses decentralised collection systems and, perhaps, demonstrates a shift from recycling orthodoxy to the understanding of other decentralised approaches, such as waste primary collection systems. Furedy's earlier papers and other literature considered waste picking as the only decentralised (or informal) activity in solid waste management. In the concluding sections the author generalised that the projects take into consideration the diverse motivations of social welfare, convenience, earnings and cleanliness.

**Furedy (1993a)**, wrote about community based projects to promote recycling, improve waste collection and to achieve social development goals. She discussed how different organisations were developing their systems of waste management at the community level and was optimistic on the success of such approaches. She mentioned that physical problems, political constraints and lack of general interest still create difficulties. Among community based and integrated approaches, **Rosario (1994)** reported from Bangalore, India, on finding ways through community participation, of improving the working conditions of the waste pickers, integrating them into the

waste collection system, and exploring alternatives for the collection, transportation and treatment of waste.

**Dudley (1996)** analyses the needs for educating community based field workers. He emphasises the understanding of the term 'community' which, according to him, is not homogenous but contains complex hierarchies, disparities of wealth, and abuses of power. He concludes that the greater our understanding of the system the more likely we are to recognise our ignorance. Dudley challenges the more mechanistic approach of stating a problem, suggesting solutions and actions and executing those actions. Giving various examples he explains that all the projects must be considered as an open ended process and that all programmes of actions should be seen as a link to test further ideas and knowledge which can be used to modify future actions. This thesis adopts a very similar approach for research and argues for a non-mechanistic approach in setting recommendations for the next phase.

**Hasan (1990)**, found that there is a considerable potential for expansion of community based activities to provide better quality and cheap infrastructure. He criticised present government approaches of considering NGOs as social welfare agencies.

Activities of NGOs in solid waste management are limited and their experiences are restricted in developing countries. In many cases their role is to create awareness and act as a pressure group on the municipal sector. In a few cases they also act as service delivery organisations for waste collection services, with a social and ecological goal. This research found that the role of NGOs as waste collection agencies has some potential for success, since there is a service gap in the primary collection of waste. However, there is always a danger that NGOs would create another rigid organisation similar to state agencies or have adverse impacts on the other private, informal activities. Even **Clark (1995)**, while supporting NGOs, admits that they are not always well equipped to represent a broad section of stakeholders. In the concluding sections **Brett (1993)** argues that before making a choice between the private, public and voluntary agencies, one should consider a wide range of activities and not rely solely on ideology. His final conclusion is that this approach enables the selection of the most suitable agency for each case.

## **2.5 Integration of informal and community based activities**

For a community based organisation, an informal sector activity or a more organised non-government organisation (NGOs), the most critical stage is that of integration with the state

functions i.e. integration, in terms of accepting the activity and considering it as a part of official policy. The concept of integration in this thesis lies between the conventionally defined concepts. These are 'vertical integration' from economics and business literature and 'public-private partnership' from public choice theory and community participation. Although there are vast differences of boundaries and the scope of work between the public sector and business organizations, often both lead to the same goals of cost effectiveness and efficiency.

Since large manufacturing or service providing agencies could not perform all the stages of their operation with same economies of scale, they sub-contract total or a proportion of their task. The sub-contracting may take various forms and the whole system is called Vertical Integration:

“A firm is vertically integrated to the extent that it carries out the successive, technologically separable, productive operations or stages required to bring a product into existence and place it in the hands of the user” (Silver, 1984).

Manufacturing industries are utilizing services of distributors, wholesalers and shopkeepers to market the goods for a very long time. Williamson (1985) debating around transaction cost found that a major benefit of integration is to economize the transaction cost. The decision to integrate what, why and to whom, depends upon the local environment and there is no prescription on the degree, breadth, stages and form of vertical integration (Harrigan, 1983).

The term integration is also found in development literature in the form of public-private partnership in relation to the infrastructure and service provision which have been traditionally provided by the public sector agencies. A detailed discussion of such an approach may be seen elsewhere, for example Schubeler (1996) and Batley (1992). Generally speaking, there is no shortage of literature on the methods and benefits of participation, including public private partnership and complete privatization. For example Schubeler (1996) defines that:

“Participation in infrastructure management is a process whereby people - as consumers and producers of infrastructure services, and as citizens - influence the flow and quality of infrastructure services available to them”.

Most of the literature on public-private partnership and participation, similar to literature on economic integration, justify these approaches on the efficiency and cost effectiveness arguments. For example Fernandez (1993) writing on the 'Public-Private Partnerships in Solid Waste

Management', feels that recognition, formalization and delineation of tasks and responsibilities to stakeholders must result in the reduction of public sector tasks in solid waste management.

There is a wide range of literature on the benefits of and opportunities for integration. What is missing from most of the literature is an understanding of constraints to participation. The strengths of private and public institutions could only be integrated if a very thorough understanding of the process of change is available in the respective local contexts. Lack of grass roots research, lack of resources and training to do proper documentation of field experiences and in-appropriate dissemination channels are the main reasons for the limited availability of such research. However, there are few exceptions, **Rahman and Rashid (1995)** wrote about their experiences regarding scaling-up of Orangi Pilot Project (Karachi) activities in other cities of Pakistan. They pointed out a number of constraints in the scaling-up process, particularly when the programme was being adopted as a model by official agencies. **Batley (1992)** pointed out that the current understanding could provide a guide or framework for decisions. Because of dynamic nature of the changes and differences in the socio-economic factors it is extremely difficult, if not impossible to develop universally applicable rules for the public-private partnership. This thesis could provide a framework for local research which may be helpful in understanding the real constraints to integration.

Integration, partnerships and participation need a number of conceptual clarifications. The main problem according to **Weaver and Manning (1990)** is to understand and analyse the present and possible future institutional relationships between various potential partners. The paper does not exclude informal sector activities from the institutional partnership framework, but rather advocates their integration. The main question raised by Weaver and Manning is how to involve informal sector activity in the public-private partnership ?

Based on the review of literature an operational definition of the term 'integration' is:

“The municipal sector formally accepts the activities as those which help the municipal corporation, gives legal protection to the activities, and protects the activities in its planning strategies”.

This provides framework definitions for the four case studies reported in this thesis. Links are defined more precisely in the specific discussions relating to the individual case studies.

For example, NGOs involvement in public interest and development issues raises a need to define the relationship between the state. **Arrossi et. al, (1995)** found that in a number of countries NGOs operate in territories perceived by government to be its own. However, there are cases when area-

based NGOs developed a relationship with the state via local councils. **Hasan (1990)**, writing on the community action groups and NGOs in Pakistan felt that they could help government agencies to overcome certain aspects of urban crisis and lead to the adoption by government of more appropriate urban development strategies. It is usually observed that objectives for achieving similar goals differ for state and informal activities. The ideal situation of state agencies learning from informal activities and considering them as their arms is yet to be achieved. As **Furedy (1989)** pointed out, in the case of resource recovery, there is little impact on municipal waste policies in terms of understanding the significance and role of resource recovery as a part of SWM strategies. **Furedy (1993a)** concluded that community based approaches face a lack of funds, volunteers and expertise which make it difficult for them to have an impact on official thinking.

**Shenk and Baud (1994)**, with a social and anthropological focus, wrote on solid waste management in Bangalore and other cities of India. They see the activities of NGOs not only as a catalyst and a signal of change for the better but also as an indication of the widening divisions within Indian society. They appreciate the activities of NGOs and individuals which have resulted in improvements to the working conditions of waste collectors. However, they also accept that fundamental changes in Indian society are necessary to create conditions in which waste collecting can be acknowledged as higher priority.

It seems that the account of the integration of informal and community based activities is a story of failure rather than of success, although a number of researchers are optimistic about successful outcomes in near future. There are also some examples of success attributable to political endorsement rather than to social or economic argument. For example, **Poerbo (1991)**, wrote about action research which was undertaken in order to develop alternative approaches to work within the scavenging communities. His paper mentioned that political will and commitment can play a major role in the integration process citing the example of the Indonesian president in 1988 the Indonesian president declared scavengers to be the self reliant army who contribute to waste reduction and earn their livelihood. Thus it became politically more acceptable to develop and implement integrated approaches to waste management.

**Mukoko (1994)**, reported that in a scheme, the streets of Surabaya, Indonesia are kept clean by an organisation of street sweepers called the 'yellow brigade'. There were 1500 workers in the yellow brigade, but only 1000 were directly paid by the city government with the remainder being paid directly under the supervision of NGOs with indirect financial participation by the city government. Members of the yellow brigade and their partner waste pickers generate income while

performing urban environmental improvement activities which are funded by the local people. However it is important that policy changes take such successes into consideration, while planning solid waste management strategies.

**Cointreau (1990)**, explained the innovative efforts to aid recyclers in different countries, without discussing the details of the systems. **Furedy (1993a)**, felt that friction between formal and informal activities increases once mechanisation was introduced to improve efficiency. **Shenk and Baud (1994)**, concluded that it was extremely difficult to develop specific and operationalised plans which respect social, economic and operational values. Consequently, their recommendations are restricted to the creation of more pilot activities.

**Beukering (1996)**, developed simulation and evaluation models to compare the two policy options:

- A western type separation system.
- An informal policy scenario which will integrate the informal recycling.

His paper is based on a case study of waste paper recycling in Bombay where the recovery of recyclable waste is an activity mainly performed by the informal sector. The study concluded that an informal policy of encouraging the public to separate their waste and market it personally to the informal network is a better option than the promotion of western type source separation. Considering the relatively high level of poverty found in low income developing countries households may not be willing to supply the separated waste free to the formal collector.

**Aziz (1984)**, studied the urban informal sector of waste separation and recycling in Bangalore, India. The focus of the research was the enterprise and labour. The study recommended that the informal recycling industry should get state support to increase their employment and outputs. It was also suggested that the state must minimise bureaucratic harassment and assist the informal industry in obtaining technology. The author also emphasised the need to strengthen the vertical integration of the formal and informal sectors.

**Bromley (1978)**, considers institutionalisation of the informal sector activities as dangerous and impractical. He found that informal activity is tied into complex social and institutional networks. He suggests that policy to effectively assist small enterprises must tackle the system as a whole and not just the lower levels of the hierarchy.



**Edwards and Hulme (1992)**, discuss the integration of NGOs' work in terms of linkages between their work at the micro-level and the wider systems and structures of which they form a part. They feel that the comparative advantages of NGOs lie in their flexibility of work and the quality of relationships which they develop and not on the size of their operation, impact and strategy. At the same time it is important to recognise that NGOs could not achieve their objectives in isolation from the national and international political process. A number of strategies are explained with examples such as:

- NGOs may foster appropriate and effective policies to benefit poorer people.
- The full utilisation of personalities and relationships within the structure.

**Klundert and Lardinois (1995)**, concluded their paper by analyzing the key constraints in establishing a partnership among various actors involved in municipal solid waste management. First the conventional financing arrangements are a constraint and a major barrier to the entry of small micro-enterprises and the informal sector. Banks and other formal credit facilities are reluctant to provide loans to private informal enterprises, due to the absence of assets and securities. The general attitude towards waste management problems is governed by the perception of the technology being a significant constraint. The private informal sector is also reluctant to change its status quo. The paper also notes the influence of donors as being another constraint. In general the paper supports a number of findings of this thesis. However the paper draws most of its conclusions from case studies and information and is not based on any organised research and data collection.

It seems that the present public sector institutions in the research country are not able or capable of developing a just partnership with either community based organisations (CBOs) or the informal activities. Some researchers strongly feel that a major change in the present institutional structure is the key factor in developing a service with an efficient mix of public and private provisions. For example **Roth (1988)** pointed out the need for alternative institutional arrangements which would actually work in practice. He concluded that difficulties in the provision of infrastructure and services by alternative arrangements are caused by weaknesses in government institutions and policies thus making such involvement risky.

This thesis defends the guiding hypothesis that a formal integration of informal activities is not possible within the present environment. The on-going private, informal activities develop their own internal and informal systems for their survival. Such informal systems are more sustainable and adaptable and have a remarkable capacity to resist adverse conditions. If the thrust of

integration from an external agency does not understand and take account of the internal structure of the informal activities it will not develop beyond pilot projects. As discussed above, experiments in integrated solid waste management also show signs of un-sustainability. However, there are some informal systems which operate within the official systems. Such systems may be more innovative, efficient, effective and sustainable: one such system is the sweepers' collection system discussed in Chapter 7.

## 2.6 Sweepers system

Municipal and self employed (private) sweepers are the lowest unit in the solid waste management organisation. They provide the crucial interface between the communities and the municipal systems. In developed areas of cities municipal and private sweepers perform the task of collecting waste from the houses and carrying it to the nearest transfer point i.e. the primary collection. This work is organised informally by sweepers but is extremely important for the residents and municipal corporations. A detailed discussion on the sweepers' system of primary collection is included as Chapter 7.

The informal collection system by sweepers has a considerable input in the solid waste management system. However this system has not been studied from a solid waste management point of view, although some research is available on sweepers conducted by other social science disciplines. For example **Prashad (1995)** and **Streefland (1979)** discussed the sweepers from a social-historical and anthropological perspective.

**Prashad (1995)**, in his paper on Capitalism, Colonialism and Feudalism, gives a comprehensive account of the waste collection system by sweepers. Although the focus of Prashad's discussion is not the improvement in solid waste management a comprehensive account of sweepers' collection systems is included. Consequently, this thesis is not in a position to argue with the basic theme of Prashad's paper. However, the most relevant part of that paper which is the historical records of sweepers and their systems of waste collection is discussed.

Prashad's subject is the municipal sweepers of Delhi. He studied the workers in the sanitation department who worked in a socio-economic system in which extra-economic relations (such as authoritarian work practices) worked simultaneously with labour relations determined by the strictest logic of capital. In this way extra-economic and social relations play a vital role in the organization of solid waste collection.

As early as 1871, Prashad quotes from an Urdu Akhbar: 'The haughty and overbearing behaviour of sweepers is another nuisance'. In all cities, they have divided mohallas (neighbourhoods) among them, so that each is the sole and hereditary lord of his circle, and troubles poor persons by refusing to remove filth from their houses, and in many cases leaving them un-cleaned for several days till his demands are satisfied. The people, knowing that they cannot change their sweepers, and fearing lest they should make false and calumnious reports against them to the police, and thereby involve them in troubles, tamely submit to their oppression. This conduct of sweepers is the cause of the houses constantly remaining in a dirty state'.

**Streefland (1977)**, discussed the absorptive capacity of the urban tertiary sector in third world countries. His focus was the organisation and work of the municipal sweepers' trade in Karachi, Pakistan. His primary argument concerned the informal sector where he found that the third world urban labour market had a large, though restricted, capacity to absorb additional labour. He found the sweepers' situation in Karachi as monopolistic, which he felt enabled sweepers to earn incomes that were quite high as compared to those of other similar unskilled labourers. Later he published (**Streefland, 1979**) details of conflicts and survival among the sweepers of Karachi. The book is an excellent account of the methodology required for this type of research and includes anthropological details of the sweepers' community.

His findings on the role of muccadam (supervisors) are similar to those observed by Prashad's in Delhi, India about 100 years ago and the findings of this thesis. Streefland noted that since muccadam play an important role in the recruitment of sweepers and their day to day affairs, so sweepers are dependent on their muccadam. Since muccadam also regulate the attendance of sweepers, so to get leave or to involve themselves in other part-time work sweepers pay a regular monthly amount to their supervisors. Streefland also mentioned the 'ownership' of streets. The sweepers in a way extend their rights to certain types of work, which may be the collection of excreta from a lane or the sweeping of a street.

The most important finding from Streefland's paper is his recognition of class structures which he feels not only mean that some people wield more power and earn more than others, but also that some people can prevent others from making a livelihood. However, most other researchers see the informal sector as being characterised by ease of entry.

In the concluding sections he focused his discussion on the four major factors which restrict, or may restrict, the absorptive capacity of urban tertiary sector: Control of Resources, The Urban

Environment, Government Policy and Capitalist Penetration. Streefland's concept of capitalist penetration also raises the question of certain recent policy and design changes, for example whether involvement of NGOs or the private sector may be considered as a capitalist penetration or not.

**Huysman (1994)**, although looking from a waste pickers angle, accepts Streefland's claim of monopoly. However he also suggests that, because of a number of factors, picking is one of the few income generating options open to pickers.

**Masselos (1981)**, studied sweepers of Bombay from a historical angle, both as a caste and an occupational unit. He connected present systems of sweepers and their so called corruption (i.e. through their *mucaddam*) with their rural background. He used the word 'jobber' for *mucaddam*, and described the *mucaddam* as the person responsible for hiring sweepers, for superintending their work, fining or dismissing them for infringement, and also for giving temporary leave. In 1889, sweepers came in contact with supervisors. Although an employee of the municipal establishment earning some twelve to 20 rupees per month the *mucaddam* levied the sweepers for the services they rendered him.

Masselos thinks that the payments to sweepers became institutionalised and took three forms. In order to get permanent employment the sweeper had to give the *mucaddam Dasturi*. In the year 1989, *Dasturi*'s rate were mentioned as Rs 20 to 30 Indian rupees (i.e. a single payment to acquire a job). The only way the sweeper could pay that kind of money was either by borrowing or through instalments over time, out of wages received. In this situation he ended up in a situation of continuous indebtedness. Thus *mucaddam* became a de-facto money lender. In discussing good and bad points of the *mucaddam*-system, the author considered it as form of payment for training received.

The system of sweepers is the area where some form of verifiable theory exists from another discipline. The sweepers' collection system is old and sustainable and supports a group of the poorest people in Indian society. This system is an established system within the official system and a livelihood. While discussing the sweepers' system we again go back to the basic question which **Sanyal (1991)** in his general discussion of the informal sector raised and rejects namely the common belief that the urban, informal sector and the government are antagonistic to each other. He saw some changes in government policies and found that at national level, politicians and policy favour informal sector activities as compared to local governments

## 2.7 Conclusion

The solid waste management problem in developing countries was understood and studied from a number of different perspectives. Solid waste management literature prepared for developing countries assumes that the accumulation of more resources and technology will be sufficient to achieve sustainable solutions. However, there is now a more developed understanding of a number of issues as compared to ten years ago. There is a literature consensus that the ideas and solutions suitable for developed countries are not appropriate for developing countries. The areas which need further attention are around understanding the diverse perceptions on the solid waste and utilisation of them in an integrated approach. There is more need to understand each stakeholder, his objective, his interest, his power and his risk. Most of the literature noted in some way the informal activities associated with the solid waste management.

The basic literature on the informal sector is based on theories of enterprise and labour. Other literature looked at the informal activities from the social and anthropological angles. The informal activities in solid waste management systems play a key role in the delivery of service in developing countries. There are different types and sizes of informal activities and they perform a number of functions. However boundaries around the informal and formal activities are blurred and few definitions occur in the literature. It has been suggested that the development of project or activity-specific definitions is required.

There is a whole set of literature developed for the participation and the role of non-government organisations (NGOs). Activities of NGOs in solid waste management are limited and their experiences are restricted in developing countries. In many cases their role is to create awareness and act as a pressure group within the municipal sector. In a few cases they also act as service-delivery organisations for the waste collection service, with a social and ecological goal. The literature has shown that the role of NGOs as a waste collection agency has some potential for success, since there is a service gap in the primary collection of waste. However, there is always a danger that NGOs would create another rigid organisation similar to state agencies or have adverse impacts on the other private informal activities.

A major concern mentioned in all the literature is that the private informal and community-based activities usually do not become a part of public policy. The reasons lie in the structures and nature of the informal sector itself, and also in the diverse objectives of the official and the informal sector. Through-out this thesis arguments are developed for the guiding hypothesis that the private informal and the official sector in solid waste management can not be integrated.

# Chapter 3

## Methodology

### 3.1 Introduction

This chapter explains the methodology adopted for the research. The methodology for scientific research is a system of explicit rules and procedures upon which research is based and against which claims for knowledge are evaluated. This system is neither closed nor infallible (Nachmias and Nachmias, 1990). The objectives of the research and the guiding hypothesis are stated and explained in the following sections of the chapter. The process of the field research and the gradual development of the research strategy is also explained. The analytical framework of the research is described in the concluding sections of the chapter.

An open ended, participatory, research approach was adopted at the inception of the research and when a certain level of understanding of the subject was developed, some structured techniques were used such as surveys, semi-structured interviews, non-participatory observations and rapid appraisals, and finally, different techniques were combined as the overall strategy for a multiple case study. Such an approach was useful since the basic knowledge about the topic was not available. The sections in this chapter reflect the various techniques of data collection which were combined as appropriate to the research question. Most of the data has been collected from the city of Karachi, Pakistan because of the familiarity of the author with that city, his fluency in the language and his previous research background in the city.

The system of informal recycling was studied at the beginning of the research process. This is followed by two programmes, where some interventions were tried in the primary collection of waste. A control area was selected to compare results from the intervention areas. An analytical framework was established and data analysis was performed. The results are presented around the primary hypothesis of integration.

## 3.2 Objectives

Solid waste management in developing countries is not merely an engineering or management issue. As discussed earlier, waste itself and related work from waste management are the livelihood of a number of the poor in developing countries and so there exists a number of social processes and economic activities within and besides the official waste management streams. The literature review revealed that the past research has focused on a few of those social processes: for example the livelihood of waste pickers, child labour and other similar topics.

This research focused on the systems of solid waste and so was concerned about more than one dimension of the problem. It focuses on the questions of why the private activities in solid waste management can not be formally integrated with the official systems. This research question is not explicit in the sense that it includes a number of actors and activities which are difficult to define clearly with the present state of knowledge about the subject. For this research, the private informal activities are defined as any activity in solid waste management which exists outside the scope of the municipal sector activity but depend on the waste or access to waste, such as waste picking, waste recycling, waste collection by sweepers for payment etc. One of the foremost characteristics of these activities is that, they are not recognised or registered with any official agency. However, there are certain grey areas between the boundaries of the private informal and the formal sector, a detailed discussion of these is included as Section 2.3. The term integration is used to define a set - up in which the official and the informal sectors recognise each other, accept each others role and avoid any practice which adversely effects the counterpart. The proposed theory will suggest why the integration of the two sectors is not possible with the present structure, then it identifies certain activities which are already integrated before moving on to suggest the advantages of integration and what could be done to achieve it. The goal in considering integration is primarily the improvement of the solid waste management, which may or may not directly address other social development goals such as increased income to waste pickers etc. The research objective was formulated in the form of a hypothesis which is discussed below:

### **3.3 Hypothesis**

The research objective is formed by a guiding hypothesis which is stated as follows:

*Private informal systems in solid waste management cannot be formally integrated with the official systems under the present structure.*

The term guiding hypothesis is used above since there are number of unknown variables and processes effecting the system. Whereas hypotheses are tentative answers to research problems and they are expressed in the form of a relation between independent and dependent variables (Nachmias and Nachmias, 1990).

### **3.4 Constraints**

The research is bound by certain constraints which are as follows:

- i) The research findings cover activities concerning household waste only, although there are private practices which are also involved extensively with the collection and recycling of commercial and industrial wastes, particularly at the wholesale stage and the final recycling.
- ii) Most of the data for the study is collected from the city of Karachi, in Pakistan. The known activities of the private informal sector were covered. There may be a number of unknown activities as well.
- iii) Some of the variables observed or measured may be affected by the local law and order situation in Karachi.

### **3.5 Assumptions**

The research objectives and hypothesis are based on a number of ‘already tested’ or ‘to be tested’ assumptions. The already tested assumptions can be supported by previous research whereas assumptions to be tested cannot be supported by any previous research. The assumptions upon which this work is based are:-

- i) The present official system of solid waste management in developing countries is inefficient, inadequate and in need of major changes.



ii) The private informal sector reduces the workload of the official solid waste management operations. The private sector activities may also have positive or adverse impacts on the official system

iii) The existence of a few private sector activities depends upon public systems.

iv) The present relationship between the private and public systems is complex and poorly understood.

v) Some private systems are operating in parallel to the official system and some of them are operating within the official system.

vi) Public sector interventions for the improvement of solid waste management often neglect wider social and economic impacts.

### **3.6 Menu of methods**

A combination of various research methods may be used to explore the research question. A number of those methods were used in social and anthropological research. The major ingredients of any such research are:

- Construction of Theory
- Design of Method
- Data Collection
- Verification of Theory

The research process can be viewed as the overall scheme of scientific activities in which scientists engage in order to produce knowledge; it is the paradigm of scientific inquiry. The research process consists of seven principal stages (Nachmias and Nachmias, 1990) :

- Problem
- Hypothesis
- Research Design
- Measurement
- Data Collection

- Data Analysis
- Generalisation

The process is described as a cyclic loop and generalisation at one stage may be the beginning of the next cycle. However most of the research process assumes that some form of basic knowledge is already available on the subject. Such basic data is normally available in most of the established research topics. However, in unexplored research in developing countries, official records and other basic research are usually not available (Bulmer and Warwick, 1983). Above this, the private informal activities exist well away from the boundaries of any official control, and so of any official record. Informal sector activity is one of those areas where basic data does not exist (ILO, 1989). Thus the actual research process can not be started through the construction of a theory and using the already verified methods, rather it must begin by selecting, combining or developing appropriate methods, often founded on a base-line survey. The suggested methods to deal such subjects are:

- survey and interviews
- various qualitative research methods deriving from ethnographic research including observational and rapid assessment procedures.

A number of such techniques were useful for dealing with the particular variables and will be written up as a case study for in-depth understanding. Rapid assessment procedures and particularly their participatory dimension were extremely useful in overcoming the communication gap between the researcher and the community. However, such methods have to date still made little impression in universities and training institutions (Chambers, 1993). The qualitative and quantitative researchers argue over issues of reliability (the replicability or representation of data) and validity (the extent to which one is measuring what one purports to measure). The rapid assessment methods using anthropological techniques proposed by the health sector would seem even more open to criticism. The type and purpose of information needed is an important consideration. There are number of important variables, information types etc. which require surveys and measurements. (Scrimshaw and Hurtado, 1987). Thus keeping in view the nature of the research question, the complex relationships between the informal and the official systems and the fact that very

little knowledge is available on the subject, it was decided not to rely on only one method or a single theory from the beginning of the research process.

### **3.7 Open - ended exploratory method**

The research was initiated as an open ended exploratory process to gain an understanding of the processes involved in terms of benefits, constraints and relationships. The informal sector of solid waste recycling was selected for initial exploration, since it is the most visible, extensive and established activity observed so far in the private informal sector. The private-informal activity was particularly suitable since a number of its components are informal in nature and directly involved in solid waste related activity. At that stage it was thought that the data and information collected would be used in the formulation of certain pilot activities.

In order to understand the actors and activities the saleable materials were followed from the household to the recycling industry. The actors involved at each stage were interviewed using semi - structured interview guides, to understand the process. The key variables required to understand the present level of integration and future prospects were chosen. The details of the objective of the study, methods used, indicators selected, validity and reliability of the indicators and conceptual links are discussed in the following sections:

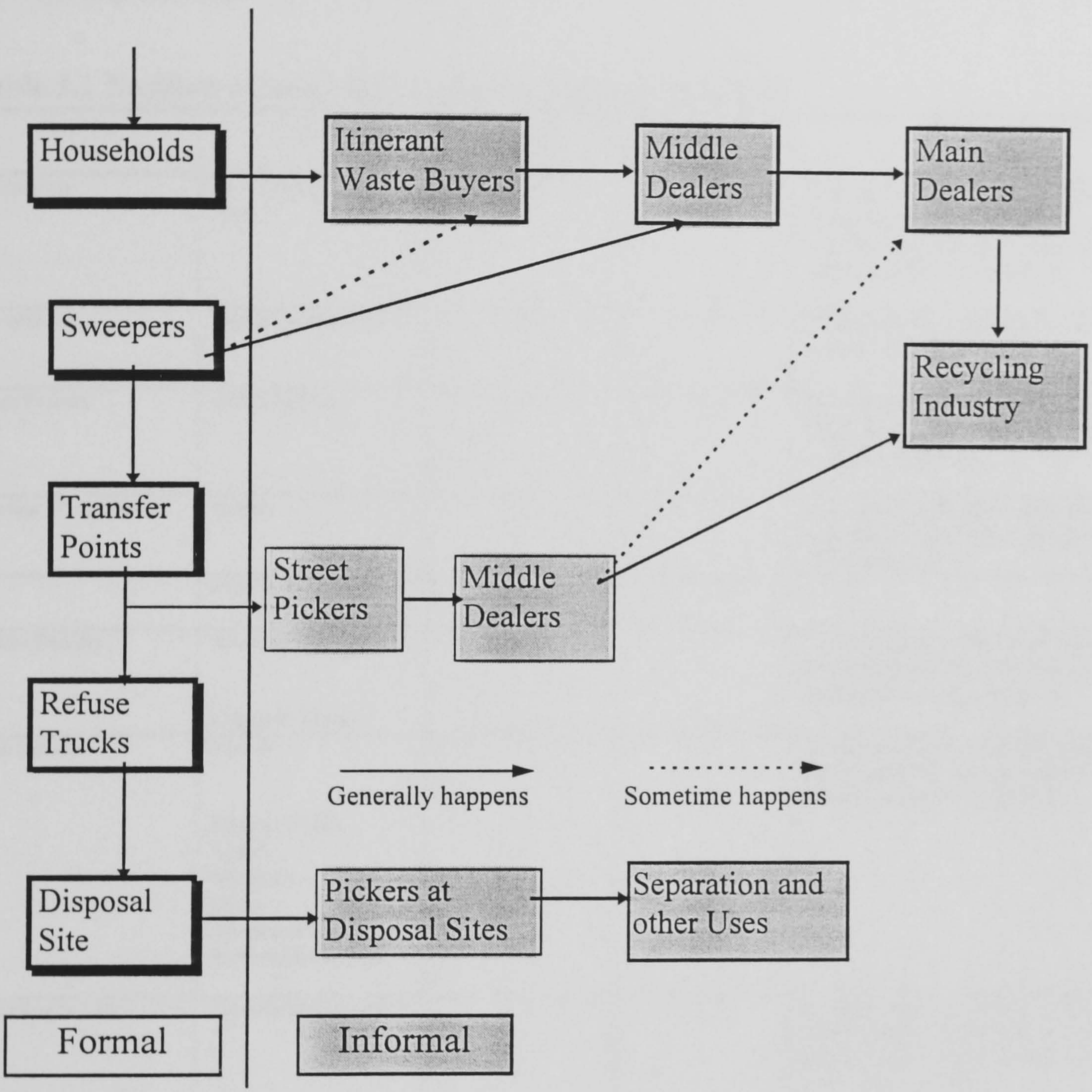
#### ***Key Point from previous discussion***

- 1. Research question was established before the data collection.*
- 2. A control hypothesis was established.*
- 3. Different possible methods were considered.*
- 4. Research was started as an open ended research process.*

### **3.8 Rapid appraisal of private informal recycling**

A cross-sectional appraisal covering activities and actors was conducted to understand the system of private informal recycling as it operates and emanates from a particular neighbourhood and concludes at recycling units. To understand the system, the separated waste materials were followed along the chain of recycling and a particular methodological combination was adopted. The field work for this part of the research was conducted in the months of January and February, 1994. The complete description of the groups involved in

different activities is given in Chapter 4. The complete chain is composed of a number of private, informal and formal activities as shown as Fig 3.1. A sample was selected from each group of actors and interviews were conducted.



**Fig 3.1 Interrelationships between the informal and formal sector in solid waste**

Based on the time and resources available and the required accuracy of data, a convenient and purposive number of samples was selected from each group of actors. In each group Semi-Structured Interviews (SSI) were conducted, supplemented with detailed discussions and triangulation surveys where and when required. This combination of methods was necessary, since each actor needed a different access mode, had different communication skills and different degrees of willingness to

participate. However, in all the cases triangulation was employed to cross-check the efficacy and reliability of particular methods. The number of semi structured and detailed interviews and case studies conducted are given in Table 3.1. The description of the field work methodology is given in the following sections:

**Table 3.1 Number of interviews and case studies conducted**

Actors	Type	Sample Interviews	In-depth Discussion	Objective
Housewives	In Middle Income Area	100	5	To understand the attitudes to private informal and public sectors. Also practice of separating re-saleables and motive behind those practices.
Sweepers	Municipal/Private	44	4	To understand practices of separating re-saleables and their marketing.
Street Pickers	Group Leader	1	3	To understand the operation, type of materials, quantities and linkages with official agencies.
Itinerant Waste Buyers	Buyers	-	1	To understand the operation, type of materials quantities and linkages with official agencies
	Barterers	-	1	
Middle Dealers	All materials	5	2	To understand the operation, type of materials quantities, processing and linkages with official agencies
	Chemical Drums	-	1	
Main Dealers	Plastics	2	-	To understand the operation, type of materials quantities, processing and linkages with official agencies
	Ferrous Metals	-	1	
	Textile	-	1	
	Machinery	-	2	
	Glass	1	-	
	Aluminium/Zinc Automobile Battery	- -	1 1	
Recycling Industry	Paper to Paperboard	-	3	To understand the operation, size of establishment, type of materials quantities, processing and linkages with official agencies
	Glass to Bottles/Marbles	-	2	
	Plastic to Packing Stripes.	-	1	
	Animal Horns to Fire Extinguishers	-	1	
	Plastics to Pad Cushions	-	1	
	Bones to Ornament	-	1	
	Plastics to Conduits	-	1	
Municipal Officers	Responsible for SWM Planning	2	-	To assess their attitude and knowledge of private-informal practices.
	Responsible for SWM Operations	4	-	

Joint Director O.P.P	Loans Programme to Informal Sector	1	-	To understand their programme to help private informal sector.
Representative	Main Dealers in Shershah	-	1	To understand their perception towards development of informal recycling activity.
Local Expert	Planning Consultant	1	-	General discussion on private-informal sector.

### 3.8.1 Structured interviews with the housewives

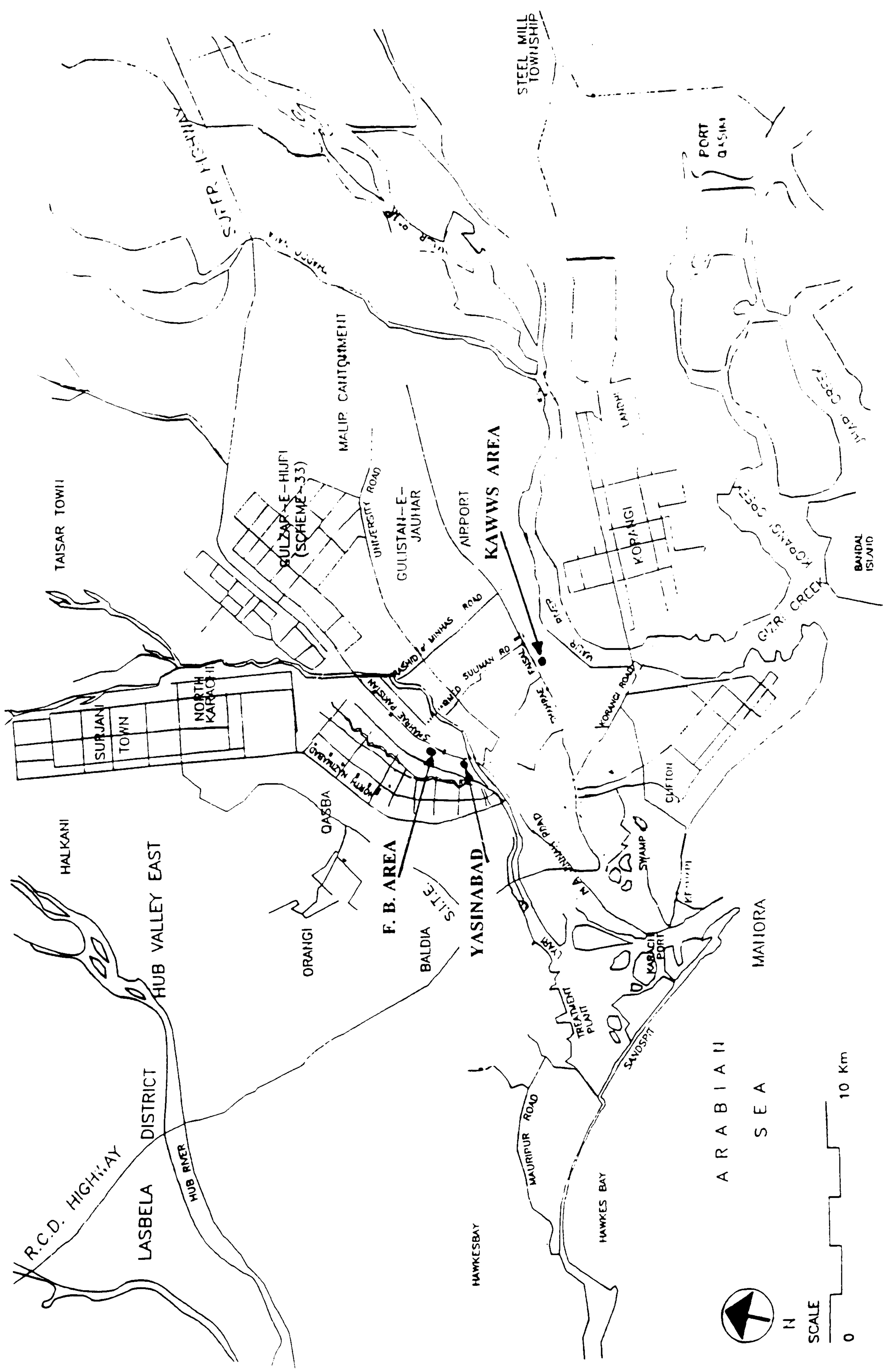
Structured interviews were conducted in Yasinabad, a lower middle income developed area situated in the central district of Karachi. The location of Yasinabad and other study areas is shown in Fig 3.2. The choice of area was based on criteria which were deemed important for the following reasons.

- the area was a developed residential area in the sense that all the streets were paved, there were no un-occupied plots and there were no mixed commercial or institutional activities. This helps in focusing on the household waste activity.
- the area represents a typical lower middle income area in the appearance similar to many other areas in Karachi; thus a representative area of the city.
- the area represents a typical lower middle income area in terms of the size of plot which is 200 sq.-yds.
- all the houses are constructed on the same size plot, which is important to understand similar activities within a homogeneous area.
- the majority of planned lower income residential areas in Karachi in terms of household size are similar to this area (AERC 1988).
- there were no access or language problems.

A pre-structured questionnaire was used and interviews were done by female surveyors asking housewives. First a pilot survey was conducted of 10 households and the questionnaire was then modified. Out of total 400 houses in the area, a random sample of 100 houses was drawn and survey was conducted. The parameters investigated are listed below and the questionnaire is attached as Annex 3.1

- Satisfaction over the existing level of service.
- Separation practices for re-sale at home.
- Knowledge on how and where sold materials are recycled.

Map of Karachi City Showing Research Areas



- Attitudes to street pickers.
- Willingness to do source separation.
- Opinion and comments.

After the survey another five in-depth interviews were conducted with the housewives in the same area to triangulate the findings of the house to house survey.

### **3.8.2 Itinerant waste buyers**

Itinerant waste buyers (IWBs) purchase recyclable materials from households, shops etc. and sell them to the middle dealers. Key informant interviews were conducted with two itinerant buyers. The parameters covered for the case studies are as follows and the interview checklist is attached as Annex 3.2:

- Area covered daily.
- Quantity of materials and type.
- Person to whom collected materials are sold.
- Frequency of sales.
- Prices for different materials.
- Problems due to official agencies.
- Support and favours from middle dealers.
- Attitude over source separation by residents.
- Any other suggestion or comments.

The IWBs also helped the researcher in providing information on the quantities and type of materials. The IWBs move with their four wheel push carts and purchase separated materials (after weighing) from households. To obtain details about the type and weights of materials purchased, the IWBs who agreed to provide data were given a simple pro-forma with sketches so that un-educated IWBs could also fill it in without much difficulty. As they purchased separated materials they recorded the weights in the respective columns. On the same sheet the IWBs were requested to enter the family size and the number of days since the households last sold the materials. This information was required to derive the per capita separation rates. A nominal payment was also offered to them to provide the requisite information. The pro-forma used for the purpose is attached as Annex 3.3.



During this phase of the study it was difficult to get the data from IWBs in Yasinabad since very few IWBs were willing to give interviews in that area. Also the purpose of the investigations was to probe the links in the system, so the information about the quantities of materials was collected from IWBs operating in different income groups. The data collected helped in getting information about quantities of materials purchased by IWBs daily, quantities purchased from each house and the average per capita separation rate in weight/time of individual and total. This exercise was continued for a period of 4 weeks and details from 68 houses in a low income area and 86 houses in a high income area were obtained. Similar exercises were conducted with some modifications in the 'area focused studies' discussed in Section 3.11 and 3.13. The proforma used to obtain quantities of materials from the IWBs is attached as Annex 3.3.

### **3.8.3 Middle dealers**

Middle dealers purchase the bought materials from IWBs, store them, sometimes process them, and sell them on to the main dealers. Middle dealers were interviewed in low, middle and high income areas of the city. A total of seven middle dealers were interviewed, out of which 5 were interviewed using a semi-structured interview technique with a check list. In-depth interviews were also carried out with two middle dealers who were key informants for the whole process. The key variables were kept the same for each interview. The interview parameters are given below and the questionnaire used is attached as Annex 3.4.

- Sources of materials.
- Average quantities obtained and prices paid to IWBs.
- Type of primary processing done.
- Quality criteria for material purchased.
- Person to whom the materials were sold.
- Selling prices obtained from main dealers.
- Seasonal variation in prices (if any).
- Attitude and opinion about official agencies.
- Expected support from official agencies.
- Services and support from them to IWBs
- Perceived benefits if source separation is done in houses.
- Any other suggestions or comments.

It is worth mentioning here that as the separated materials from the household waste were collected by IWBs they transport the material to the middle dealers who were located in the different areas. To get a better understanding of the process and links, middle dealers were interviewed in high, middle and low income areas of the city.

### **3.8.4 Main dealers**

Main dealers (or wholesalers) get materials from middle dealers and they usually deal in a single material. Most of them are settled in commercial or industrial areas of city and have links with the industry in need of recyclable materials. The main dealers may be classified on the basis of:

- i) Type of material they purchase, process and sell daily.
- ii) Quantities of materials purchased, processed or sold.
- iii) Processes they perform on the waste.

For the purpose of the case study, nine main dealers, dealing in different types of materials and quantities, were interviewed using a semi-structured technique with a check list. The selection of main dealers was done to select at least one main dealer of each major material. Only those main dealers were interviewed who were accessible and willing to be interviewed. The interview check list is given below:

- Sources of materials.
- Average quantities obtained and prices paid to middle dealers.
- Type of secondary processing done.
- Quality criteria for material purchased.
- Person to whom the materials are sold.
- Selling prices obtained from the recycling industry.
- Seasonal variation in prices (if any).
- Attitude and opinion about official agencies.
- Expected support from official agencies.
- Services and support from them to middle dealers.

For information about the prices and quantities of materials purchased etc. separate entry sheets were used. In-depth interviews were conducted with two main dealers as the key informants.

### **3.8.5 Recycling industry**

The recycling industries are those which convert waste materials into re-saleable products. These industries may be cottage based or a large formal industry, like those converting paper and ferrous metal. These industries may be classified on a number of features like raw materials, finished product, labour involved, registered or non-registered etc. Detailed discussions and semi-structured interviews were conducted from the manager/owner of ten industries as a part of rapid appraisal. Since the type, size and scale of the industries vary, and it is not possible to identify and cover at least one of each type, only those types of industry which were accessible and willing to be interviewed were covered. The interview check-list is given below and the separate sheets were used for quantities and prices of raw materials and finished products.

- Raw materials and products.
- Prices of materials purchased.
- Average quantities processed daily.
- Sources of raw materials.
- Quality criteria for raw materials.
- To whom are the finished products marketed ?
- Variation in prices.
- Interacting official agencies.
- Attitudes toward official involvement, if done ?
- Opinion and comments.

### **3.8.6 Street pickers**

The street pickers (waste pickers or scavengers) are those who move on streets and visit transfer points (katchra kundies) and pick up re-saleable components from waste. In Karachi most of the street pickers are immigrants from a neighbouring country and cannot speak local languages, in addition most of them are reluctant to talk to strangers, particularly during their work. Thus to directly interview pickers was not possible. The street pickers sell the

collected materials to their group leaders (or middle dealer) who sell it on to the main dealers or recycling industry. Since group leaders have a permanent place and can speak local languages and are comparatively more secure, so semi structured interviews were conducted with them. A total of 4 interviews were conducted with group leaders at different places; those group leaders were selected who were willing and accessible for the interview. The check list used is given below:

- Type of materials purchased.
- Average quantities obtained and prices.
- To whom the materials are sold.
- Average number of pickers who sell the material daily.
- Problems in marketing the materials.
- How frequently the materials are sold to main dealers ?
- Interaction of pickers with sweepers.
- Number of years involved in this work.
- Area covered by pickers.
- Satisfaction over current work.
- Perceived benefits if source separation is done.
- Interaction with official agencies.
- Attitudes and opinion about interacting agencies.
- Expected public and official support.
- Attitude towards official intervention.

### **3.8.7 Municipal sweepers**

In Karachi and most cities of South Asia, the municipal sweepers are assigned certain areas for street sweeping. A high number of them are involved in the collection of waste from the houses and its transport to the transfer points. This work is performed through a direct arrangement with the households under an agreed payment and can also be classified as private informal activity. Details of this system are discussed in Chapter 7. During this work sweepers were also observed to separate the re-saleable components such as paper, metals etc. from the collected waste. At the time of investigation there were about 12,000 municipal sweepers in Karachi and often they were reluctant to discuss any details about their work. Most of the sweepers suggested that the interviewers should talk to their supervisors or

officers. Ideally the interviews should be conducted through somebody whom sweepers know and trust. Thus interviews with sweepers were conducted with the help of social workers attached to a Catholic organisation in Karachi. A total of 48 interviews were conducted, including 4 detailed interviews and 44 short interviews. The parameters covered during the survey are given below:

- Types of material separated.
- Average quantities separated and prices.
- Variation in prices.
- Problems in selling the materials.
- Quality considerations by dealers who purchase materials.
- How often do they sell collected materials.
- Any competition/problems because of pickers.
- Satisfaction over present job.
- The area of operation.
- Perceived benefits from source separation.
- Ideas of government intervention and support.

### **3.8.8 Municipal officers**

The attitudes of municipal officers are important, since waste pickers in the informal recycling chain need access to the disposed waste, which is legally the property of the municipal corporation (Ordinance, 1979). Also for any formal integration between the informal and the formal activities in solid waste management the understanding of the present municipal attitudes is crucial. At the time of the survey there were four zones of operations in Karachi and a central department for planning. Therefore all the four health officers who were in charge of operations and the two officers in the solid waste planning department were interviewed. For these interviews it was assumed that the officers in charge possess some form of autonomy but in practice most of the decisions were prone to various types of political influences and other factors (Ali et. al, 1994). The interviews were based on selected variables which were discussed one-by-one during the interview. The important parameters used for the interviews are as follows and the questionnaire used for officers in planning and operation are attached as Annex 3.5 and 3.6 respectively.

- Departmental responsibilities.

- Level of satisfaction over existing services.
- Awareness about separation activities by sweepers.
- Attitudes toward pickers.
- Any idea of the weight or volume reduction through the informal practices.
- Past efforts towards recycling.
- Attitude on possible partnership with the informal sector.
- Future programmes of municipal corporations.
- Comments and suggestions.

### **3.8.9 Other information**

Beside interviews with the actors involved in the informal recycling, discussions with some other people were also conducted. The other interviews conducted are listed below:

- i) Discussion with a local expert on the private informal sector.
- ii) Discussion with the leader (representative) of main dealers in Shershah.
- iii) Discussion with the Director of Orangi Pilot Project's (OPP) loan programme, which offer loans to the informal sector.

In addition all the municipal reports, ordinances, budgets and other information were collected for the appraisal.

## **3.9 Lessons from Phase I of data collection.**

At the end of the first phase of the data collection various important conclusions were drawn, which compelled modification of the next course of action for research. It was soon recognised that pilot projects for recycling and source separation could not be initiated at this stage as planned at the beginning of the research process. The main reasons not to follow-up the pilot studies are as follows:

- i) The private-informal activities of recycling operate independently of any official control and would like to stay independent, without any official interventions.
- ii) The official attitudes towards the informal recycling sector do not encourage any sustainable change to accommodate or encourage private informal recycling.

iii) The households do not perceive the informal recycling activities as a part of the improved solid waste management system.

iv) The present interaction between the private-informal recycling and the official systems exists only up to the primary collection stage.

The first three conclusions reject the feasibility of any pilot project in the near future and the fourth conclusion directed the need for more study at the primary collection stage in the waste management stream. Thus to explore the integration aspect further, it was decided to explore the existing set-ups where an on-going private-informal activity or a decentralized approach is operating. As a result some other cases have been included, where an informal sector activity interacts with the official system. In the meantime another review of the possible methods was done based on the lessons learned from the rapid appraisal of recycling. Finally, to reduce the number of indicators, to provide a better focus for the study and because of other practical reasons, a multiple-case-study method was adopted, where each case study represents an in-depth analysis of the situation.

#### ***Key points from previous discussion***

- 1. The actors involved in the recycling chain were identified.*
- 2. A rapid appraisal of the recycling activity was conducted.*
- 3. The idea of pilot activities in the initial stage was rejected.*
- 4. Further area based studies were planned to understand the integration.*
- 5. The area based studies can be considered as case studies and combined as multiple case studies.*

### **3.10 Multiple case study**

As discussed above, the open ended research approach, adopted in the initial phases of the work, has gradually been transformed into a more established method, called the 'Multiple Case Study Method' (Yin, 1984) and (Yin, 1993). A case study is an in-depth study of the cases under consideration, and this depth has become an important feature of the approach (Hamel et. al, 1993). In a multiple case study the same phenomenon is studied in different set-ups which follows a replication logic to investigate the research question. This method is suitable and recommended for topics that are complex and involve too many actors to be addressed by interview surveys - as is the case when organisations, roles, interactions or events are the subject of the enquiry. The purpose of research is not only to measure 'how

much'? or 'how many'?, but why and how the private informal activities are operating. Some quantitative methods are required to measure the extent of the activity. On the other hand qualitative methods with the different level of explanatory power are needed to understand the processes. Multiple case studies provide an important alternative to the large scale sample surveys for certain research questions where there is a need to provide broad generalisation as well as to take into account of the complexity of the subject matter (Hakim, 1987).

The major advantage of conducting the selected case studies within certain propositions is that the 'how and why a certain activity is happening' question is answered more adequately as compared to other methods. A comparison table discussing the relevant situations for different research strategies is given below:

**Table 3.2 Relevant situations for different research strategies**

Strategy	Form of Research Question	Requires Control Over Behavioural Events?	Focuses on Contemporary Events
Experiment	how, why	yes	yes
Survey	who, what*, where, how many, how much	no	yes
Archival analysis (e.g. economic analysis)	who, what*, where, how many, how much	no	yes/no
History	how, why	no	no
Case Study	how, why	no	yes

\* "What" question, when asked as part of an exploratory study is relevant to all five strategies

Source: Yin R. K. (1984), Case Study Research, Design and Methods, Sage Publications

This method deals well with the operational links at a certain time rather than mere frequencies, quantities or number of incidences. Thus, at the time of completion of each case study, a rounded picture of a situation is usually obtained from the perspectives of all the persons involved through the use of a variety of methods (Hakim, 1987). These case studies hold an individual identity as well as a purpose within the overall scope of inquiry which may be used for a replication, comparison and generalisation logic.

Thus, different cases have been identified which are involved in private-informal practices in a certain area. The areas where some form of private-informal activity is operating such as the Suzuki and KAWWS systems (see Chapter 5 and 6), were compared with the area where only the official



system is operating; called the Control Area. The appraisal of the informal recycling and the study of sweepers' system helped significantly in understanding the integration. A combination of these different set-ups provide an ideal situation to study integration. Without studying a control area it was impossible to justify the findings of the other two case studies in terms of opportunities and constraints. All the case studies were conducted with the required surveys, interviews, discussions, participatory and non-participatory observations, and other tailor-made methods which were developed as per requirements. For example the private-informal practices involve a number of groups and the linkage between private-informal and public sector may be controlled by a number of known and un-known variables. These variables are located on a huge spatial scale and hence with the limited time and resources, it is not possible to cover them through surveys. The other important advantage of the case study method in this case is that, since all the case studies were not conducted at the same time, so each of them gave lessons to be learned for the next case study. The area based case studies are discussed in the order they were conducted.

### 3.11 Case Study I - The Suzuki system

The Suzuki system is a private-informal system of primary collection of the household waste operating in an area of Karachi. The detailed description of the programme is included as Chapter 5. The system was in operation since the year 1988. Various surveys, interviews and other techniques were used to understand the programme, its role and its linkage with the municipal corporation and other private informal activities. The users' attitude to the service and entrepreneurs' future plans were assessed. A list of all the surveys and investigations conducted for this study are given below. The total number involved (population) and the brief objectives of each data collection exercise are given below:

**Table 3.3 Summary of the surveys and investigations conducted in the area.**

Type of Investigation/Survey	Total Number (Population)	Sample Size	Objective of the Exercise
Semi-structured interview with the Programme Organiser (also ex-councillor)	1	1	To understand and assess the inception, organisation, problems, expenditures and income.
Semi-structured interview with the Pick-up drivers	2	2	To understand the operation, operational problems, field organisation and perceived options for improvement.
Semi structured interview with the sweepers on vehicles	2	2	To understand operational problems, separation practices of recyclable, field organisation, their own roles, income from this work and perceived options for improvement.

Semi-structured interviews with the pickers on vehicles.	4	4	To understand their own role, previous work, attraction in this work, income, operational problems and options for improvement.
House to house survey on pre-prepared structured questionnaire	1000	215	To measure satisfaction over official role, satisfaction over pick-up system, practices of separation of recyclable, payment to pick-ups etc.
Discussion with the Municipal Supervision Staff in the Area	2	2	To understand their attitude towards pick-up programme, official operation, control over official operation etc.
Discussion with District Level Health Officer and Chief sanitary Inspector.	2	2	To understand their attitudes toward the programme, constraints to replication, municipal budget etc.
Cordon Survey for Street Pickers and Itinerant Waste Buyers.	-	3 days	To count the number of them entering or leaving the area.
Cleanliness Assessment of the Area	-	2 days	As a performance indicator to determine the number and locations of scattered waste -piles in the area.
Quantities of Separated Recyclable Materials	1000	87 Houses	To get weights of materials separated during different stages
Transfer Point Monitoring.	2	2 days	To monitor the activities at the waste transfer point.
Route Survey of Pick-ups.	-	1 day	To note down the route and time involved in the various functions of collection.
Interview with Municipal Sweepers in the area.	-	22	To determine their attitude towards pick-up programmes, income and quantities of materials separated, payment made to purchase rights etc.

### 3.11.1 The programme discovery

The pick-up collection programme is informally organised and so there is no record, office or reports available. The programme was discovered during the author's discussion with the engineering university students in the year 1991, who used to live in the same area. When the field investigations were started, permission was sought from the programme organiser. During the investigations a number of 'invisible' elements of the programme were discovered. In the beginning the organiser of the programme, the Suzuki's drivers and collection crew were not sure about the purpose of the investigations or the role of researcher, and hence were reluctant to discuss a number of details. The repeated visits, open ended discussions, listening attitude, the avoidance of a 'them and us' attitude, a perceived seriousness of purpose and small payments against data and information provided gradually developed a trust and relationship between the researcher and the Suzuki team. Such attitudes are of the utmost importance for researchers conducting field research on the private-informal sector. Information derived from mechanically-organised long interviews, short visits,

failure to ensure confidentiality and trust and dominating attitudes, may bring statistically significant results, but may not describe a true picture, since the groups in the private informal sector feel insecure. The un-stable socio-political environment in Karachi has further complicated the task of data collection.

In this way there was a need for a more interactive research technique. Viewed in this light, rapid rural appraisal represented an alternative research technique for those concerned with development work. This could be situated somewhere between conventional, quick methods of rural research on the one hand, and social surveys and anthropological studies on the other. However, the label turned out to be misleading in the sense that it soon became obvious that the philosophy and techniques associated with it were relaxed rather than rapid, equally applicable to an urban situation and not just about appraisal but also useful for problem identification and solving, as well as for project planning, monitoring and evaluation.

Rapid rural appraisal represented a methodological shift that was part of a wider paradigmatic shift from a so called "blueprint" to a so called "process" approach to the development (Chambers, 1993). The main advantage of rapid appraisals over conventional survey research are their level of community participation, short duration, and low cost. While data collection by sample surveys sometimes requires less time, data analysis almost always takes more time. Survey research also suffers from the disadvantage of its inflexibility and potential superficiality. Its pre designed and fixed questionnaires do not allow progressive learning during data collection in the field, and make it difficult to gain a deep understanding of social processes (Joachim and Heather, 1992). Thus the main advantages of participatory appraisals i.e. its participatory dimension, learning to un-learn and the attitude of the researcher in the field were key factors in this research. However, since in urban areas, language and communication are not the major problem, a number of techniques which basically bridge the communication gap could be avoided. The most useful techniques adopted from participatory appraisals for this research are Semi-Structured Interviews (SSI) and Participant and Non-participant Observations. To understand attitudes and the extent of the activities, a number of surveys have also been conducted using a structured questionnaire. A description of different field strategies adopted is described in the following sections:

### **3.11.2 Semi structured interviews**

An SSI interview with the programme organiser (also ex-councillor) was conducted at his residence. A check list was prepared and a tape recorder was used with the permission of the respondent. The

purpose of the interview was to understand the inception of the programme, its organisation, income and expenditures, linkages with the official system and future plans. The overall attitude of the organiser was friendly, frank and patient. The SSI interview checklist used is given below:

- Inception and development of the programme
- Co-operation of residents during initial phases.
- Reasons for co-operation.
- Programme coverage, organisation, income and expenditures.
- Present official system.
- Method of money collection.
- Waste collection operation.
- Perceived benefits from the programme.
- Problems during operation.
- Interaction with the municipal supervision staff.
- Interaction with municipal officers.
- Present municipal attitudes.
- Experience of similar programmes in other areas.
- Problems due to itinerant waste buyers and waste pickers.
- Future programme.
- Comments and suggestions.

The findings from the interviews, particularly the figures given, were cross-checked through different surveys and field investigations.

The semi-structured interviews with the programme organiser also gave access to the programme crew. The role of each member of the crew is discussed in Chapter 5. The SSIs were conducted with each of the actors involved in the system. The interview parameters were almost same and the interviews were conducted at the transfer point where the collected waste was being disposed of. During the un-loading operation the collection crew used to have a rest and a chat with each other. The time was suitable for the detailed discussion. The purpose of the interview was to understand their involvement, the operational problems, the relationship with municipal sweepers, the collection of fees and problems during fee collection, the method of separating recyclable materials, the type of materials and selling practices. All the respondents were also interviewed separately so that the

answers were not influenced by the presence of others. A nominal payment of Rs 50 was made to each person who was interviewed. The interview check list parameters are listed below:

- When and how the interviewee acquired this job.
- Satisfaction over job.
- Previous job.
- Working conditions.
- Income.
- Problems during operation.
- Relationship with municipal sweepers.
- Mutual relationship among team members.
- Perceived benefits on different interventions e.g. source separation etc.
- Suggestion and comments.

An official system of street sweeping and waste collection also operates in the area where the Suzukis were operating. SSIs were conducted with the municipal supervision staff responsible for the study area. The purpose of the interview was to understand the interaction of the official system with the private-informal system of the Suzukis. The interviews were also conducted with the senior municipal officers of the zone in which the study area is located. The purpose was to assess and understand the attitudes toward replication of the pick-up programme. The interview parameters for both the interviews are listed below;

- Duties and responsibilities.
- Method of field operation.
- Deployment of new sweepers.
- Attitude to house to house collection with pick-ups.
- Problems/benefits because of pick-up system.
- Method of assigning the duty of sweepers.
- Power to transfer the sweepers.
- Perceived constraints on the replication of the pick-up programme.
- Comments and suggestions.

### **3.11.3 House to house survey**

Households were interviewed to understand the community satisfaction towards the programme, attitudes, the amount they contribute, perceived problems and solutions, options for the improvement and practices of separating recyclables. The interviews were done with the housewives or adult female representatives if the housewife was not available. The interviews were conducted by female surveyors who were postgraduate students in the Department of Social Work, University of Karachi. A pre-test was done before the survey and the questionnaire modified as a result. The questionnaire was prepared in the local language. A layout map and house numbers of the area were available and so sampled houses were marked. If a house was found locked or households were not willing to answer, the interview was conducted with the next house. Due to the high rates of crime, including armed burglaries in the city of Karachi, there were problems in getting access to the households, which resulted in a reduced number of interviews per unit time as compared to what was anticipated. The interview parameters are listed below and the questionnaire is attached as Annex 3.7.

- Level of satisfaction over official system
- Who collects household waste
- Extent of sweepers involvement in collection
- Works done by sweepers inside the house
- Payment to sweepers
- Arrangement with pick-up collection system
- Problems due to pick-up collection system
- Perceived benefits from the pick-up collection system
- Separation practices of re-saleable waste components
- Who sells what and takes money
- Attitude towards source separation
- Comments and suggestions

### **3.11.4 Interviews with municipal and private sweepers**

Since all the houses in the area do not dispose of their waste through the Suzuki's system, a number of municipal and private sweepers were also operating in the area collecting the waste from the houses. The municipal sweepers are also deployed to the area to perform the street sweeping. However it was very difficult to interview sweepers for several reasons. One possibility was to approach them through their officers or immediate supervisors; this usually resulted in a biased attitude because:

- i. They usually do not want to disclose their problems or their 'relationship' to the official agencies.

ii. Municipal sweepers are reluctant to inform their supervisors and outsiders about their part-time jobs and additional incomes.

The most common mistake made by other researchers and consultants was to reach sweepers through official agencies or charity organisations. Such access may significantly change the sweepers' attitudes. Hence interviewing sweepers is a sensitive and challenging job. This task was made easier for the research by the help of an educated young man, who belongs to a sweepers family and was living near the case-study area. The interview forms were explained to him, discussions were held, the surveys conducted and spot checks were made by the author and thus better quality and more reliable information was obtained. The interviewer was well aware of all the matters related to sweepers and also understood the purpose of the research. He was intelligent, frank and informative. A nominal payment was made to him for the work by the author. The questionnaire used is attached as Annex 3.8. The parameters covered in the interviews with the sweepers are given below:

- Job status i.e. municipal or private.
- Official duty area if municipal sweeper.
- Involvement in house to house collection of waste.
- Number of houses from where waste is collected.
- Other works done by sweepers in the house.
- Reduction in additional income after pick-up system.
- Charges for waste collection service.
- Separation practice of re-saleable components.
- Assistance from pickers for separation.
- Weights of components separated.
- How often does he sells.
- Involvement in any other part time job.

### **3.11.5 Cleanliness assessment of the area**

An independent, cleanliness-assessment survey of the area was conducted as one of the performance indicators of the programme. In this survey a surveyor walks in the area covering each street and notes down the locations of large (larger than 3 m. diameter.) fresh waste piles, garden waste, construction debris and aged waste piles. The surveyor uses different colour pens to indicate different types of waste piles on the map. The survey was conducted without any notification of the municipal staff or pick-up crew to avoid any chance of extra-ordinary arrangements. The survey was done on two different days, at different times of the day, with the help of different surveyors. to

avoid any further bias. This survey was repeated in different areas to understand the relative effectiveness of different interventions.

### **3.11.6 Cordon survey**

A Cordon survey was conducted to estimate the number of itinerant waste buyers, sweepers and street pickers entering or leaving the area. In this survey, observers were placed at all the entry and exit points of the area, with the survey forms. Whenever an itinerant waste buyer or picker entered or left the area, the movement was recorded in the form. From previous investigations it was known that the itinerant waste buyers and pickers generally make only one trip to the area. The pro-forma used for the cordon survey is attached as Annex 3.9.

### **3.11.7 Quantities of separated re-saleable materials**

In the case-study area the re-saleable materials from the waste are separated in three stages:

- i. Waste materials separated by housewives and sold to itinerant waste buyers.
- ii. Separation of re-saleable components by the street pickers at waste transfer points and selling to middle dealers on a weight basis.
- iii. Separation of re-saleable components by pick-up collection crews from the collected waste and selling to middle dealers on a weight basis.

To assess the type of material and the weights of re-saleable materials separated from the houses, different methods were used which are explained below:

In the first survey a sample pro-forma was prepared showing columns representing different materials' weights, a simple sketch signifying each material with names, a column to indicate how many days previously items had been sold to the IWB and the family size. The itinerant waste buyers, who were willing to supply information were provided with the pro-forma and asked to fill in details while purchasing materials and to ask family size. They were asked to enter the details of only the case study area on daily basis. The IWBs could not ask the households about family size and the days after which material is sold. After a period of two weeks ten IWBs provided the details, from eighty two houses.

In the second survey, which also helps in cross-checking the details of previous survey, a few surveyors were sent to the area. They stopped at the most probable approaches to the area. The same



pro-forma was provided to each surveyor. When an IWB entered the area, the surveyor, after asking permission, accompanied him and noted down the weights of materials under each category. The surveyor accompanied him till he left the area. This survey was conducted for two days with 3 surveyors and details of thirty six houses were collected from IWBs.

To assess the total quantity of waste picked up by street pickers from the area also proved to be a difficult part of the exercise. Unlike IWBs the street pickers only weigh the quantities at the middle dealers' yard, when they sell it. They move into different areas during their collection round. The other major problem is that most of them have no formal education and cannot speak local languages. After several visits to the area, the author came across with a group of young pickers who were able to speak local languages. Several discussions were held and finally some of them agreed to report the quantities. That group used to operate in the research area and other areas as well. Thus the total quantities which they weighed at the middle dealers' yard were the re-saleable items collected from the research area plus other areas. The pickers, when offered some incentives, agreed to first operate in the research area, weigh the materials at the middle dealers' yard and then go into other areas. The reporting system was further improved by requesting one of the Suzuki driver in the same area to note down the reported quantities, since pickers cannot come at specified times and places. A nominal payment was made to the driver and pickers for collecting and providing this information. The data so collected was cross-checked by directly asking pickers in another area about the weights and areas covered. The pro-forma provided to the driver who was recording the quantities is attached as Annex 3.10.

The waste collected from the houses by two Suzukis was transported to an open area. The re-saleable components such as paper, cardboard, bottles, plastics etc. are separated and sold to the middle dealers after weighing. The payment was made to the pick-up crew by middle dealers according to the weights of each material per kg. The driver of one of the pick-ups was given a pro-forma showing columns for different categories of materials. The driver provided the weights of separated components for a period of about eight weeks; the weights of different materials may be related to the total number and type of properties from which the waste was collected. The costs obtained for different categories of materials were asked and so the total income from the re-saleable items could be estimated. The pro-forma used to note down the quantities is attached as Annex 3.11.

### 3.11.8 Transfer point monitoring

To monitor the activities at transfer points a survey was conducted. Observers were placed near the waste transfer point (dump, dust bin etc.) at such a location that they may not affect the activities at the transfer point. They started observations from early morning to the late afternoon. The description of each person visiting, the time he spent and the activities he performed were noted down by the observers. The monitoring was conducted for 2 days each at 2 transfer points. The proforma used to monitor activities at transfer points is attached as Annex 3.12.

### 3.12 Case Study II - The KAWWS programme

This case study focuses on the activities of a community-based programme when a few housewives living in the same area had formed a group known as the Karachi Administration Women Welfare Society (KAWWS). The area is located in the district South of Karachi and known as Karachi Administration Employees Co-operative Housing Society (KAECHS). The group had also got themselves registered as a non-government organisation (NGO). A detailed discussion of the programme is included in Chapter 6. Various surveys, interviews, discussions and other techniques were used to understand the programme and its linkage with the municipal corporation. Since the NGO members were informed about the purpose of the research, they have provided their comments on the preliminary findings and the methodology adopted. In addition the NGO was contacted during the follow-up visits. The overall research strategy was similar to Participatory Action Research (PAR). The community attitude towards the programme and the effect of the programme on other private activities were assessed. The investigation parameters and methods were kept similar to those adopted for Case Study I. A list of all the surveys and investigations conducted, with the total number of people involved and the objective of the exercise are given as Table 3.4 and the description of the survey techniques used for each parameter are presented in the following sections:

**Table 3.4 Summary of all surveys and investigations conducted in the area.**

Type of Investigation/ Survey	Total Number (Population)	Sample Size	Objective of the Exercise
Semi-structured interview with the Office Bearer of KAWWS	4	1	To understand and assess the inception, organisation, relationship with the municipal agencies of the programme.
Semi-structured interview with private and municipal sweepers in the area.	15	10	To understand their roles, duties, additional income, practices of separation of recyclable etc.
Discussion with the municipal supervision staff in area	3	2	To discuss their roles, duties and attitudes toward the programme.
House to house survey on pre-prepared structured questionnaire	1298 houses	201	To measure impact of the programme, community satisfaction over official role and KAWWS programme, practices of separating re-saleable etc.

Discussion with District Level Health Officer	1	1	To understand his attitude towards NGOs programme and general discussion on city problems.
Cordon Survey for Street Pickers and Itinerant Waste Buyers	-	2 days	To count number of them entering or leaving the area.
Cleanliness assessment of the area	-	2 days	As performance indicator to determine location and number of scattered waste piles in the area.
Quantities of Separated Recyclable Materials	1298 houses	118	To get weights of different materials separated during different stages.
Transfer Point Monitoring	2 points	2	To monitor the activities at the waste transfer point.

### 3.12.1 Access to the programme

The programme was made known to the author through publications of that group and several contacts were established before this research. The well organised set-up of the NGO proved to be very helpful in getting data, figures and other information. It was also helpful in making contacts with the sweepers and other people working in the area. There was a risk of biased attitudes and perceptions in the behaviour of households if they were contacted through the NGO, the household surveys and other investigations were conducted without the active involvement of the NGO. However, sweepers were difficult to interview and to initiate discussions with them was also difficult, so an officer of the NGO accompanied the author for interviewing sweepers and official supervision staff, except that several interviews were conducted independently for the purpose of triangulation. There were disadvantages of doing sweepers interviews' in the presence of the NGO officer. However, there was no alternative in this case.

### 3.12.2 Interview with the programme organiser

An in-depth semi-structured interview was conducted with one of the office bearers of the Karachi Administration Women Welfare Society (KAWWS) at her residence. The purpose of the interview was to understand the inception and development of the programme. The questions were asked about problems, organisation, budget and expenditure, linkages with the official system, interaction with the municipal staff etc. The interview was audio-recorded with the permission of the interviewee. The parameters covered during the interview are listed below:

- Inception of the programme.
- Motivation to start the programme.
- Initial response from the community.
- Problems from the community.
- SWM programme.
- Components and organisation of the programme.
- Expenditure and income.

- Municipal attitudes.
- Future plans.

### **3.12.3 Interview with private and municipal sweepers**

The waste from the households is collected and disposed of by house helps (domestic servants), private and municipal sweepers etc. There are a number of municipal and private sweepers who visit the area and provide waste collection services. Interviews were conducted in the field during their early morning duty hours to understand their official role, their attachment with the NGOs programme, income and involvement in the primary collection of waste. The responses from sweepers were noted down on structured questionnaire forms. A total number of ten sweepers were interviewed, including seven private sweepers and three municipal sweepers. The parameters covered are given below and the questionnaire used was similar to that used in F. B. Area blocks 10 and 11, attached as Annex 3.7.

- Status of sweeper - municipal/private.
- Lanes/houses in the duty area.
- Number of houses attended.
- Other work performed in the houses.
- Monthly fee from each house.
- Charges for sweeping and in-house work.
- Charges for street sweeping if community is paying.
- Practice of separating recyclables.
- Selling practices of recyclable items.
- Comments and suggestions.

### **3.12.4 House to house survey**

To assess household involvement and satisfaction with the NGO's programme, satisfaction with the official system, payments they were making to the sweepers, their attitude toward the NGO's programme, the practices of separating and selling the re-saleable components etc., a house to house survey was conducted. The method used to conduct interviews was similar to that was explained in Section 3.11.3. A total number of 201 interviews were conducted from the randomly selected houses. The parameters used for the survey are listed below and the questionnaire is attached as Annex 3.13.

- Satisfaction over existing level of service.

- Person responsible for waste collection.
- Other work performed by sweeper.
- Payment to sweepers.
- Existence of lane level organisation.
- Form of lane level organisation.
- Attitude to KAWWS programme.
- Attitude to replication of KAWWS programme.
- Practice of separating recyclables.
- Person selling recyclables and taking money.
- Attitude towards source separation.
- Comments and suggestions.

### **3.12.5 Discussion with district health officer**

The official system of street sweeping and waste collection was also operating in the area. Interviews were conducted with the municipal supervision staff responsible for the study area. The purpose of the interview was to understand the interaction of the official system with the NGO's system under study. The interviews were also conducted with the senior municipal officers of the zone in which the study area was located. The purpose was to assess and understand the attitudes toward replication of the NGO's programme. The interview parameters for both the interviews are listed below;

- Duties and responsibilities.
- Method of field operation.
- Deputation of new sweepers.
- Attitude on NGOs programme.
- Perceived problems/benefits because of pick-up system.
- Method of assigning the duties of sweepers.
- Power to transfer the sweepers.
- Perceived constraints to the replication of the pick-ups programme.
- Comments and suggestions.

### **3.12.6 Other surveys and assessments**

In addition to the above mentioned investigations, cordon surveys, cleanliness assessment and transfer point monitoring were conducted on principles similar to those explained in Section 3.11.

### **3.12.7 Quantities of separated materials**

In the case-study area the saleable materials from the waste are separated in two stages:

- i. Waste materials separated by housewives and servants and sold to itinerant waste buyers
- ii. Separation of re-saleable components by the street pickers at waste transfer points and sold to middle dealers on a weight basis.

To assess the type of material and the weights of re-saleable materials separated from the houses, different methods were used.

Quantities of the materials separated at the household stage were assessed using methods similar to those explained in Section 3.11.6.

To assess the total quantity of waste picked up by street pickers in the area was the most difficult part of the whole exercise. Unlike IWBs, the street pickers only weigh the quantities at the middle dealers yard, when they sell them. They also cover a number of areas during their collection round. The other major problem is that, most of them have no formal education and, being immigrants, cannot speak local languages. After several visits to the area, the author came across a group of young pickers who were able to speak local languages. As in the F. B. Area there was no group operating which was willing to give details. Thus quantities from street pickers were only obtained through discussion with them at transfer points.

## **3.13 Control Area**

### **3.13.1 General**

A control area was selected, similar to the areas selected for Case Study II and III but with no intervention and thus only the municipal system was operating in the area. The purpose of studying this area was to understand and produce a chain of evidence to aid understanding of the impact of the interventions in the KAWWS and the Suzuki area. The area selected was similar to Case II and III areas in terms of physical planning, infrastructure and socio-economic characteristics of the residents. The area was selected to be used for comparison with the other areas. Initially the area, known as Block C of North Nazimabad, was selected as the control area. The decision was taken after the desk study of Karachi Development Plan 2000 (KDA, 1991) and layout maps of different areas. A reconnaissance survey was conducted of the area before the actual survey started. During the reconnaissance it was found that, although the area is similar to the Case Study II & III areas, it

differs in physical layout. There were narrow lanes at the back of two rows of houses where residents used to dispose of waste. Such back lanes do not exist in the case study II and III areas. Thus a change in physical pattern of housing has also affected public habits towards waste disposal. As a result, the initially selected area of North Nazimabad, Block C could not be used as the control area. Another desk study was conducted and it was found that block 6 of Federal B Area is similar to the other two case study areas. There are altogether 300 houses in the Control Area out of which 90 houses were interviewed. Finally block 6 was selected as the control area and investigations similar to the other two case study areas were conducted. The primary objective of this study was to study the private informal practices operating, the public attitudes toward solid waste management, their present disposal practices, the role of informal activities, expenditures on waste disposal etc. A summary of all surveys and investigations conducted for the purpose is given below.

**Table 3.5 Summary of all surveys and investigations conducted in the control area.**

Type of Investigation/Survey	Total Number (Population)	Sample Size	Objective of the Exercise
Semi-structured interview with private and municipal sweepers in the area.	23	23	To understand their roles, duties, additional income from waste collection, practices of separation of recyclable etc.
Discussion with the municipal supervision staff in area	3	1	To discuss their roles, duties and attitudes
House to house survey on pre-prepared structured questionnaire	300	90	To assess residents' satisfaction with official system, existing practices of disposal, expenditure and practices of separating re-saleable items etc.
Cordon Survey for Street Pickers and Itinerant Waste Buyers	-	2 days	To count number of them entering or leaving the area.
Cleanliness assessment of the area	-	2 days	As performance indicator to determine location and number of scattered waste piles in the area.
Quantities of Separated Recyclable Materials	300 houses	44	To get weights of different materials separated during different stages.
Transfer point monitoring	3	1 day	To monitor the activities at waste transfer point.

### 3.13.2 Interviews with private and municipal sweepers

In the absence of any NGO initiated or private system of solid waste management in the control area, the system of collection is through municipal and private sweepers. The sweepers charge a

monthly amount from the residents, collect waste and dispose it of to the nearest transfer point or open area. The problems in interviewing sweepers are discussed in Section 3.11.4. The same parameters and questionnaire was used for these interviews as given in Section 3.11.4 and Annex 3.8. During the survey of the control area and while having informal discussions with sweepers and supervision staff, it was discovered that the sweepers sell and purchase rights to collect waste from the group of houses. To further understand this phenomenon, short interviews were conducted with somebody who was known to the sweepers in various areas. The questionnaire is attached as Annex 3.14.

### **3.13.3 House to house survey**

A house to house survey was conducted to assess the public attitudes, present system, payments for service, practices of source separation etc. The survey was conducted by interviewing representatives of ninety households. The interviews were conducted with housewives, through an experience female surveyor, who is also a part time faculty member of the Department of Social Work at the University of Karachi. The author accompanied the surveyor during this survey. The map of the area was available and so randomly selected houses were marked on it. The parameters used for survey are given below and the questionnaire used is attached as Annex 3.15.

- Satisfaction with the existing system of waste management.
- Person who takes waste for disposal from the house.
- Payment to municipal/private sweeper.
- Other works performed in-house by that sweeper.
- Time at which he attends the house.
- Satisfaction over existing sweeper service.
- Attitude towards pick-up collection systems.
- Practice of separating recyclable.
- Who takes money.
- Willingness to further source separate materials.
- Other suggestion and comments.

### **3.13.4 Semi structured interviews with municipal staff**

At the time of the survey the field supervision staff in the control area were not available. The re-shuffling of local bodies was also taking place. It was very difficult to interview somebody in the area. The only person with whom an interview was possible was the chief sanitary inspector, who is in charge of the control area plus other areas. The interview was not very helpful in understanding the official attitudes.



### **3.13.5 Transfer point monitoring**

The monitoring of transfer points was conducted for one day each at three points. The technique used was similar to the technique used for Case Studies I and II.

### **3.13.6 Other survey**

A cordon survey was conducted to estimate the number of pickers, IWBs and sweepers in the area. A similar cleanliness survey was conducted. The survey was done on two different days during different times of the day with the help of two different surveyors. The technique used was similar to that used for the Case Studies I and II.

### **3.13.7 Quantities of separated materials**

The quantities of materials purchased by IWBs were obtained using a technique similar to one used for Case Studies I and II.

Based on the lessons learned from the two previous case studies, particularly chances of inaccuracies while entering data, only the 'surveyor accompanied' method was used with IWBs in the control area. The IWBs were stopped at the most probable approaches to the area. The same pro-forma was provided to each surveyor. When an IWB entered the area, the surveyor after asking permission, accompanied him and noted down weights of materials under each category. The surveyor accompanied him till he left the area. This survey was conducted for two days with 3 surveyors and details of 44 houses were collected from IWBs.

The quantities from street pickers were only assessed by asking them total quantities collected daily and the number of areas covered. The simple questionnaire is attached as Annex 3.16.

In this way the field data collection was concluded. The thesis chapters are organised in a similar way. The informal recycling is discussed as an introductory and exploratory chapter. Then the area-based studies are discussed in which comparisons are made with the control area. Finally the primary collection system through sweepers is discussed.

## **3.14 Analytical framework**

An analytical framework was established after the completion of basic data and information analysis. Field notes were written during the stay in the field and some quantitative data was analysed for

preliminary reports, which were submitted to the organisers of different private-informal activities for their comments. The organisation of data and planning for data analysis was started in October 1994 and continued till December, 1995. During the data analysis phase it was identified that in addition to the studies of the on-going systems and the interventions, the primary collection systems through sweepers is another extensive informal activity. The sweepers appeared as the key link between the community and the official system in solid waste management. The sweepers activities fulfil an important service gap and operate as an informal activity within the official system. The data and information obtained from sweepers in different areas is analyzed and included as a separate case. Since the key research question is related to the integration, so each chapter gives arguments in favour of and against the integration. This chapter describes the gradual development of the analytical framework from more general indicators in the beginning to groups of specific indicators later on.

### 3.14.1 Categories of indicators

The indicators used to understand the present integration of the private informal activities and the official system, and the future prospects for such an integration, were measured using different variables. For example, participation in the programme is an indicator; measured through monthly payments to the programme, attendance in the programme's meetings and use of the service. During the analysis phase of the research another closer look was taken at those indicators and it has been found that all the indicators may be placed in two broad categories:

**Benefits and Constraints;** The benefit indicators may be considered as the *opportunity* indicators for integration. The opportunities from the informal activities are in terms of material recycled, employment, service to a number of houses etc. Then there are *attitudes* of different groups toward each other. Some attitudes favour integration and some do not. Such variables are placed in both the broad categories, the benefits and constraints. Then comes the structural or operational linkages within those activities, mostly inter *dependencies* (between official and informal) or the intra dependencies (within the informal group). Such variables, although important for the existence and operation of the informal activity, may be a constraint to integration. There are certain problems associated with the activities which are also important for further development of that activity. These problems are classified under *constraints*. The actual benefits and constraints to integration will depend upon who initiates integration.

In all the four cases studied, the complete set of important variables was developed. A complete list of all the indicators, variables and the justification for their inclusion is included in Annex 3.17.

### **3.14.2 Research Questions**

It was felt important that the thesis will answer a number of questions around the guiding hypothesis. It is important to develop a list of such expected outputs at the beginning of the research process. Thus a list of research questions was developed at the beginning of the data and information analysis process. The list was again audited after the data collection phase and the data analysis phase to see how adequately the collected data answers the research questions. Each research question provides only a partial answer to the question of integration and the focus of the research. All the answers give an overall picture of the research topic and a rounded answer to the main hypothesis. The nature of the anticipated key findings from each of the case studies and the formulated research questions are given in Annex 3.18.

### **3.14.3 Analysis of qualitative and quantitative data**

The data obtained was both qualitative and quantitative in nature. The qualitative data was obtained from the open ended interviews, semi-structured interviews, news clippings, in-depth interviews with the residents etc. Most of the interviews were tape recorded or some notes were made in the field. The interviews were transcribed on the same evening that the interview was conducted.

The quantitative data was obtained from the waste quantities obtained from itinerant waste buyers, whilst the quantities and prices were obtained from the middle dealers, main dealers and the recycling industry. Also the charges for the pick-up system, quantities of separated materials from pick-up crews, different payments made, other price figures etc. were analysed. All the quantitative data and the household questionnaires were entered into the Statistical Package for Social Sciences (SPSS) for Windows and required statistical parameters were calculated. The chapters describing different case studies are rich in both qualitative and quantitative information.

## **3.15 Conclusions**

The research was started as an open-ended exploratory, process and gradually transformed into the multiple case study method. The established and recognised techniques of surveys and data collection were used. In addition a number of tailor made techniques were also used to supplement and cross-check the collected data.

The informal sector recycling, the Suzuki's programme, an NGOs programme and the municipal sweepers' systems were explored around the guiding hypothesis on integration. Upon conclusion of the data collection phase in all the sectors and geographical areas, it was found that the municipal and private sweepers (for description see Chapter 7) are hubs between the official systems and the community. Primary collection of solid waste is an important public need which is provided by sweepers. The informal recycling then appeared as an introductory and exploratory chapter. The area based studies are discussed in which comparisons are made with the control area. Finally the primary collection through sweepers is discussed. The arguments in favour of and against integration are discussed in Chapters 4 to 7.

# Chapter 4

## Informal recycling

### 4.1 Introduction

This chapter discusses the private-informal activities in solid waste recycling based on the rapid appraisal explained in Section 3.8 of the methodology conducted in Karachi, Pakistan. The interface of the recycling activity with the official system of solid waste management was explored around the guiding hypothesis which states:

*Under the present conditions private informal systems in solid waste management cannot be formally integrated with the official system.*

Where the term *integration* means in this case:

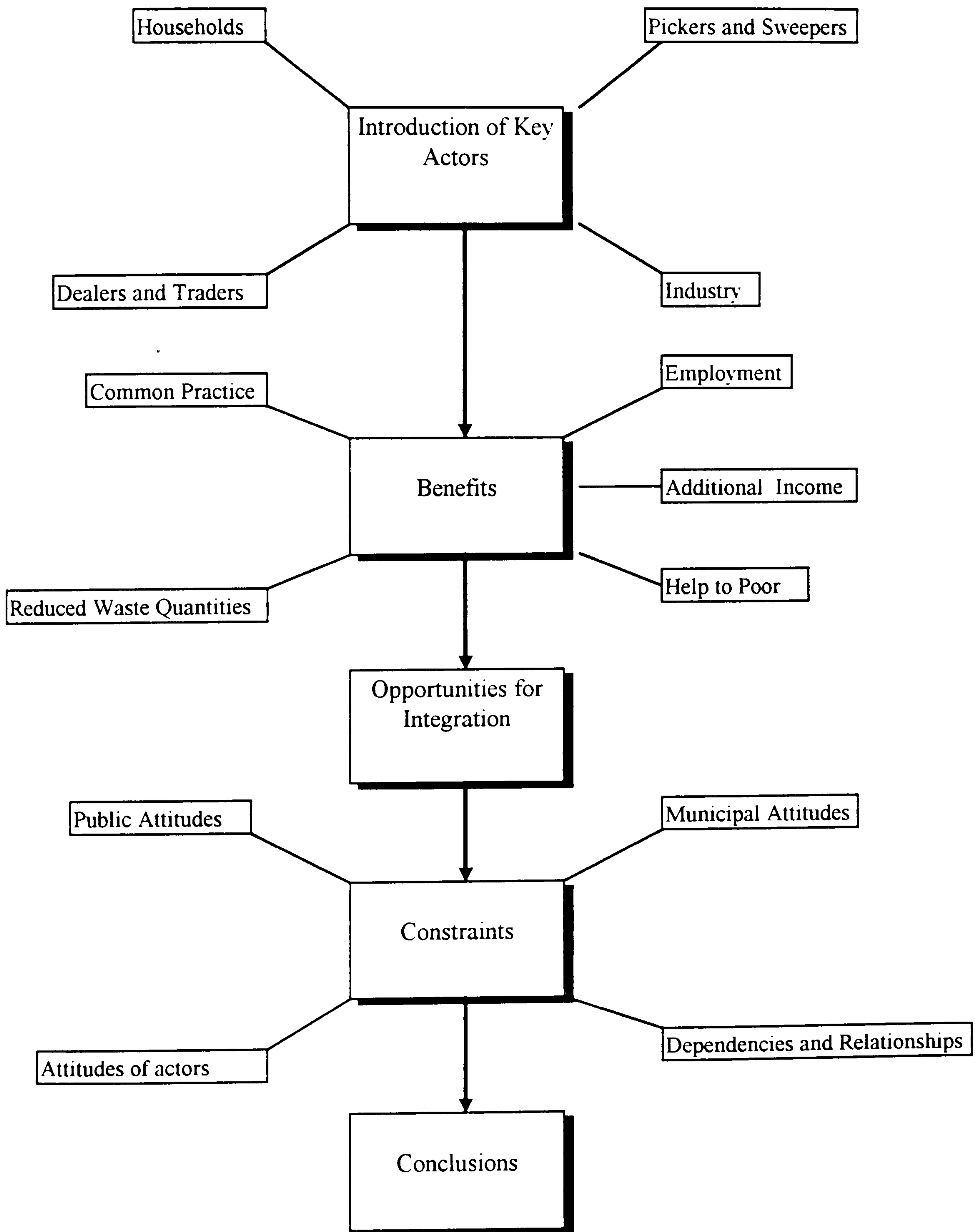
*The municipal sector formally accepts the activities as those which help the municipal corporation, give legal protection to the activities and protects the activities in future planning.*

This chapter initially introduces the actors involved in the recycling activity. This is followed by a description of the separation practices of re-saleable items by various groups. Since the separation practices are on-going, well established practices which benefit the groups involved, so they are considered as beneficial. The quality and quantity of separated materials are also discussed, since a reduction in quantity of the waste material is considered as the major, direct benefit to the solid waste management system. The description of the benefits of the recycling activity is followed by a description of the constraints which might make formal integration impracticable. Finally, conclusions are drawn about the integration of the informal activity with the official system. The concluding sections of the chapter also discuss the important lessons learned which paved the way for the next phases of data collection designed to further explore the question of integration.

### 4.2 Major groups and their activities

The Private Informal System of Recycling is composed of a number of activities and performed by different groups, as already shown in Chapter 3, Fig 3.1. The waste management stream starts from the households and ends with the disposal or reuse of the materials. The informal activities are attached with each step in the waste management chain. Fig. 4.1 presents a layout of the logical sequence of

various arguments, as they are presented and discussed in this Chapter. The titles of the main arguments are listed in the larger rectangular boxes and all the related points are shown around these boxes.



**Fig 4.1 Logical sequence of arguments.**

A description of some of the actors and activities, as previously described by other researchers, is included in the Literature Review.

In the city of Karachi, major quantities of re-saleable waste components are separated at source or at the stage when the waste is transported for disposal. In all these stages a number of groups are involved performing different types of activities. All these activities provide jobs or additional income to a number of people. Waste quantities, compositions and characteristics change and affect the official system of waste management in a number of ways. A number of these activities operate independent of the municipal system of SWM and the main thrust behind the operation of these activities is the existing market for the separated materials. Table 4.1 gives a brief description of the actors involved, the separation activity and the stage in the solid waste management stream.

**Table 4.1 Summary of actors and activities in the informal recycling process.**

Stages	Actors	Activities
Source	Households	Separate and store the saleable waste components. Sell the separated components to itinerant waste buyers.
Source	Domestic Servants	Separate and store the saleable waste components in high income areas. Sell the separated components to itinerant waste buyers.
Source Primary Collection	Sweepers	Collect waste from different sources. Separate and sell saleable components during primary collection of solid waste. The remaining waste is disposed of at transfer points or open plots.
Streets Transfer Points	Street Pickers	Separate the saleable components from waste on streets and transfer points and sell them to their group leaders or dealers.
Source	Itinerant Waste Buyers	Purchase separated waste from the households and other sources and sell it to middle dealers.
Source, Streets and Transfer Points	Middle Dealers	Purchase materials from itinerant buyers and sell it to the main dealers. Also process some materials to reduce the transportation cost.
Source, Streets and Transfer Points	Main Dealers	Purchase bought waste from middle dealers and sell it to the recycling industry. Process and sometimes categorise materials for further transportation.
Source, Streets and Transfer Points	Recycling Industry	Convert waste materials to other saleable products.

The largest group of people involved in informal recycling is the households. They do not allow the re-saleable waste components into waste and store them for resale. When sizeable quantities of materials accumulate the whole lot is sold to the itinerant waste buyers. The payment is made on the basis of the weight of each individual material. In high income areas domestic servants first access the re-saleable components which they sell, often from their own low income, residential areas.

Itinerant waste buyers move along the streets with a push cart, a donkey cart, on a bicycle or on foot (See Plate 2) and buy the separated materials. Most of the itinerant waste buyers buy waste. However, there is also a small group called 'Barterers', who exchanged waste components for goods such as tea mugs, confectionery, kitchen utensils etc. This research covers only those itinerant waste buyers who moved in the residential area with their push carts.

Middle dealers purchased all the collected components from itinerant waste buyers. They have permanent plots of land or shops from which they operate their business. A number of middle dealers get materials regularly from the itinerant waste buyers who are a major source of materials. However, they also get materials from households, shopkeepers and other sources. There is also a separate category of middle dealers called 'Group Leaders' who purchase materials only from street pickers rather than from itinerant waste buyers. The quality of material from pickers is inferior in quality and different in type as compared with that bought from itinerant waste buyers; thus it is traded by a different chain of dealers.

When the waste purchased and stored by middle dealers accumulates to the equivalent of a lorry load it is transported and sold to the main dealers (or wholesalers). A number of main dealers have established businesses, with a large piece of legally hold and facilities like water, power, telephone, weigh bridge etc. The main dealers deal in single materials and have established contacts with the industry who use waste material for recycling. The main dealers in paper and ferrous metals generally have large scale operations but for materials like plastics and glass the operations are relatively small. This distinction of scale exists because in Pakistan ferrous metal and paper are recycled by large industries. whereas small cottage-based industries are involved in the recycling of glass, plastics and other materials.

The informal recycling system depends upon its access to waste. Access is not an issue in the case of the separation of cleaner materials at source and its trade through the itinerant waste-buyers' chain. However, access is an important issue for waste pickers since the waste which they separate on the streets and at transfer points is municipal property.



The separated waste from the households and waste from commercial and industrial sources ultimately reaches the large and small scale recycling industries. The recycling industries not only vary in scale of production and number of employees but also in raw materials and final products. The waste materials are converted into re-saleable raw materials or finished products in the recycling industry.

### **4.2.1 Other Groups**

In addition to the groups mentioned in Table 4.1 there are other groups who play an indirect role in the informal recycling. For example officers responsible for the planning and operation of solid waste management may play an indirect role in the whole stream of waste recycling. However, in practice their role is restrained by various socio-political constraints. A detailed discussion of the role and attitudes of municipal officers is included in Section 4.4.2.

In Karachi there are also urban activists and community groups involved in the improvement of waste collection services in their area. There is also a well known Non-Government Organisation (NGO) known as Orangi Pilot Project (OPP) one of whose programmes offers loans to the informal sector including itinerant waste buyers and middle dealers. Although such agencies are not a part of the informal process, their views were sought to understand the process.

#### ***Key Points from previous discussion***

- 1. The private-informal system of solid waste recycling comprised a number of groups and activities.*
- 2. The groups and activities were inter linked and connected with each other.*
- 3. The nature of activities in the informal system varied from totally informal activities to large scale formal activities: all were private.*



Plate 1. A street picker



Plate 2. An itinerant waste buyer

## 4.3 Benefits

This section discusses the benefits of the informal recycling for integration. These benefits are considered as opportunities for integration. A number of benefits have been mentioned by researchers from different perspectives. They may be categorised into three major groups:

- 1) There are macro level benefits of the informal recycling. A number of them have been previously mentioned by many researchers. Some examples of such benefits may be government savings in foreign currency and less import of raw materials.
- 2) There are social and economic benefits. A number of economic arguments are often supported by social and ecological justifications such as extra income and employment for the poor, empowerment, saving forest etc.
- 3) Direct benefits to the solid waste management systems such as reduction in the waste quantities.

This section focuses mainly on the group 3 type benefits, in addition some information on the provision of employment is provided to show the extent of the activity.

### 4.3.1 Source separation

The separation of valuable components from waste is a common practice at the household level which gives a value to the waste products and an additional income to the households. The small enterprises of waste trading and recycling employ people and recycle waste. Most of these activities operate without any support from the government or any donor.

This section will discuss quantities of materials, composition of materials and income to the household from the separation. As shown in Table 4.1 the saleable components from the household waste are separated and sold to the itinerant waste buyers. The separation practices are well established and as a result quantities of certain waste components such as bottles, newspaper, bread, ferrous cans etc. are considerably reduced in the waste stream. The structured surveys were conducted in various areas of Karachi to understand the extent and nature of the separation activity. Table 4.2 reveals that more than 80% of the household respondents in all the sample areas admit that they separate and sell the re-saleable materials regularly. However, the quantities and types of materials vary significantly from one income group to another. On the other hand the percentage of

people regularly doing source separation on a voluntary basis in a developed country such as England is as low as 10% (IWM, 1990). The higher number of households separating and selling re-saleable materials in Karachi is mainly due to the financial incentives attached to the separation.

**Table 4.2 Percentages of responding population who regularly separate components from their household waste in Karachi.**

Area (Valid Sample)	Area Description (Plot size average sq-yds)	Percentage Regularly Separating
Yasinabad (86)	Lower Middle Income (200)	97
F. B. Area Block 10 & 11 (206)	Higher Middle Income (450)	83
F. B. Area Block 6 (80)	Higher Middle Income (685)	95
Administration Society (199)	Higher Middle Income (350)	97

Data collected in early 1993 and mid 1994.

### 4.3.2 Source separated quantities

The quantities of materials separated vary significantly from one household to other within the same income group. The quantities obtained from IWBs (as described in Section 3.8.2 of methodology) revealed that each household sold a whole lot of waste materials separated over a number of days to IWBs. The price paid for these materials is based on the individual price of each material in the whole lot. The mean weight of the lot from the sample areas range from as low as 2.76 kg to as high as 11.34 Kg. The lot also sometimes contains bulky items such as furniture, carpets, steel pipes etc. Such items are not bought on the weight basis. Weights of those lots which have been sold to IWBs in different areas are given in Table 4.3. For the purpose of generalisation data on this particular aspect has been obtained from various areas in Faisalabad by the author during his input for the ODA's study (ODA, 1994).

**Table 4.3 Details of waste lots (in Kg) as sold to itinerant waste buyers from different areas of Karachi.**

Area (Sampled Houses)	Area Description	Average Weight (Min. - Max.)	Standard Deviation
Administration Society (36) <sup>1</sup>	Higher Middle Income	2.76 (0.400 - 8.00)	1.91
F. B. Area Block 10 & 11 (39) <sup>1</sup>	Higher Middle Income	3.34 (0.400 - 8.10)	2.44
F. B. Area Block 6 (45) <sup>1</sup>	Higher Middle Income	3.43 (0.400 - 16.00)	3.22
F. B. Area Block 10 & 11(42) <sup>2</sup>	Higher Middle Income	6.45 (0.500 - 21.50)	4.08
Administration Society (50) <sup>2</sup>	Higher Middle Income	3.42 (0.250 - 10.50)	2.47
Orangi (56) <sup>3</sup>	Low Income	11.34 (3.00 - 29.00)	5.60
Gulberg, Faisalabad (52) <sup>1</sup>	Higher Middle Income	5.49 (1.50 - 17.00)	3.44
Douglaspora, Faisalabad (24) <sup>1</sup>	Low Income	10.27 (1.00 - 19.25)	4.65
Dogar Busti, Faisalabad (38) <sup>1</sup>	Low/ Middle Income	8.38 (1.50 - 66.00)	10.49

Notes: 1 = Supervised Surveys, 2 = Unsupervised Surveys, 3 = Unsupervised but low income so details obtained.

Please refer to Chapter 3 for details of surveys.

All the data is from Karachi, except where Faisalabad is mentioned.

Plot sizes and monthly incomes from secondary sources (AERC, 1988 and ODA, 1994) are used to describe the area. Data collected in early 1993 and mid 1994.

The variation in the quantities of materials was due to differences in the number of days for which materials were stored, available storage space in the houses and the consumption pattern of the households. It is important to note that the waste lots sold to IWBs are higher in weight in the low income areas as compared to the high income areas. Our observations and discussions with itinerant waste buyers revealed that residents in low and lower middle income areas are more resource conscious and do not dispose of any re-saleable waste components in the waste streams. The extent of separation is greater in low income areas as compared to high income groups. The other important factor is the presence of domestic servants and their access to the household waste in the high income areas. In depth discussions with the respondents revealed that domestic servants in high income areas separate and sell certain materials with or without the consent of the households.

To estimate the per capita separation rates, the number of days over which the separated waste was generated, the family members who generated that waste and the weight of the waste lot sold to the IWB were obtained. Information was obtained mainly from supervised surveys and a few un-supervised surveys. Such information could not be obtained in some unsupervised surveys since the IWBs were reluctant to ask about family size. In this way per capita separation rates were calculated by knowing the total weights of the waste lot sold to the itinerant waste buyers, family size and number of days after which waste was sold. The simple equation used to calculate per capita separation rates is:

$$\text{Per capita separation rates (kg/ person/ day)} = \text{Total weight of the lot (kg)/ family size/ number of days after which lot was sold.}$$

The per capita separation rates thus obtained from different areas are shown in Table 4.4.

**Table 4.4 Per capita separation rates in (kg per person per day) in different areas of Karachi.**

Area (Valid Sample)	Area Description	Mean Weight (kg/person/day)	Range (kg/ person/ day)	95% Confidence
Administration Society (36)	Higher Middle Income	0.0049	0.0006 to 0.012	0.0037 - 0.006
F. B. Area Block 10 & 11 (39)	Higher Middle Income	0.0178	0.0004 to 0.113	0.0112 - 0.0243
F. B. Area Block 6 (45)	Higher Middle Income	0.0092	0.0003 to 0.028	0.007 - 0.0114
Douglaspura, Faisalabad (24)	Low Income	0.0720	0.0074 to 0.1991	0.0522 - 0.0918
Dogar Busti, Faisalabad (38)	Low/ Middle Income	0.1038	0.0108 to 0.6663	0.0654 - 0.1415
Orangi (56)	Low Income	0.1214	0.0305 to 0.2952	0.1051 - 0.1377

Data collected in early 1993 and mid 1994.

The per capita separation rates vary significantly within different income groups. They are higher in low income areas as compared to high income areas. The reason is the separation and sale of materials by low income households directly to itinerant waste buyers.

The re-saleable components were separated at the household level reducing quantities which otherwise appear in the waste stream. It is important to compare waste separation rates with waste generation rates to estimate actual reduction in the weight because of separation practices. The per capita waste generation rates as measured at the house door level was 0.359 and 0.224 for F. B. Areas and Orangi respectively (NESPAK, 1992) and for Douglaspura and Dogar Busti as 0.226 and 0.375 respectively (ODA, 1994). The separation rates are compared with the waste generation rates in various areas to estimate actual reduction in the waste quantities and are given Table 4.5

**Table 4.5 Per capita separation and generation rates.**

Area Description	Generation Rates (kg/ person/ day)	Separation Rates (kg/ person/ day)	Percentage Reduction in Waste
F. B. Area Block 10 & 11	0.359	0.0178	5
Douglaspura, Faisalabad	0.226	0.0720	32
Dogar Busti, Faisalabad	0.375	0.1038	28
Orangi	0.224	0.1214	54

Data collected in early 1993 and mid 1994.

Variations in waste generation rates is a common phenomenon. Large variations have been obtained even in those cities where waste sampling is done regularly based on a large sample (Matsuto and Tanaka, 1993). Table 4.5 gives some idea about the proportion of waste separated at source. All the data from different areas of Karachi is combined to obtain a single mean value for the separation rate. The mean separation rate figure thus obtained for all the areas of Karachi was 0.0727 kg/ cap/day with a standard deviation of 0.1214 and the 95% confidence intervals of 0.0587 and 0.0867. The statistical test to check the distribution of data suggests that the data is skewed towards the lower values from the mean. The reason is the large representation of high income groups in the sample with the lower separation rate. Representative samples from all the income groups is required to estimate the separation rates for different income groups. Use of different statistical M-estimators suggest a separation rate of 0.04 kg/ cap/day for the middle and high income areas and a separation

rate of 0.08 kg/cap/day for the low income areas. Considering the generation rates in the two areas as shown above it may be estimated that a reduction of about 35% and 10% by weight takes place in the low and high income areas respectively. The separation rates in the high income areas do not take into account the separation by domestic servants, a factor which will take our estimates to the higher values. This reduction in waste quantities only considers separation at source. Further separation by street pickers takes place at transfer points and on the streets.

### **4.3.3 Composition of source separated waste**

The composition of different waste materials in the separated lot differs from one area to other. Waste materials which are easier to separate, comparatively cleaner, safe and non-biodegradable are usually separated in all income groups. An example of such a material is newspapers which is separated and kept in all the income groups. There are categories of materials which are comparatively dirty and because of sharp edges, higher volume and other reasons, difficult to separate and store. Such materials are usually not separated by a proportion of the households in high or middle income areas. An example of such material is metallic cans and broken glass. However, residents in low income areas take the risk and separate and sell such materials.

The composition of separated material also depends upon available value which further depends upon the markets. This is generally true but in some cases markets (or recycling industries) form because of separation practices. For example food waste, particularly bread, is not disposed of in the waste because of cultural and religious reasons among the Muslim population in Pakistan. Since such large quantities of bread are separated and kept so re-use and recycling practices have developed through a chain of itinerant waste buyers and middle dealers. However, in the case of other materials separation at source is done because of existing markets for the materials.

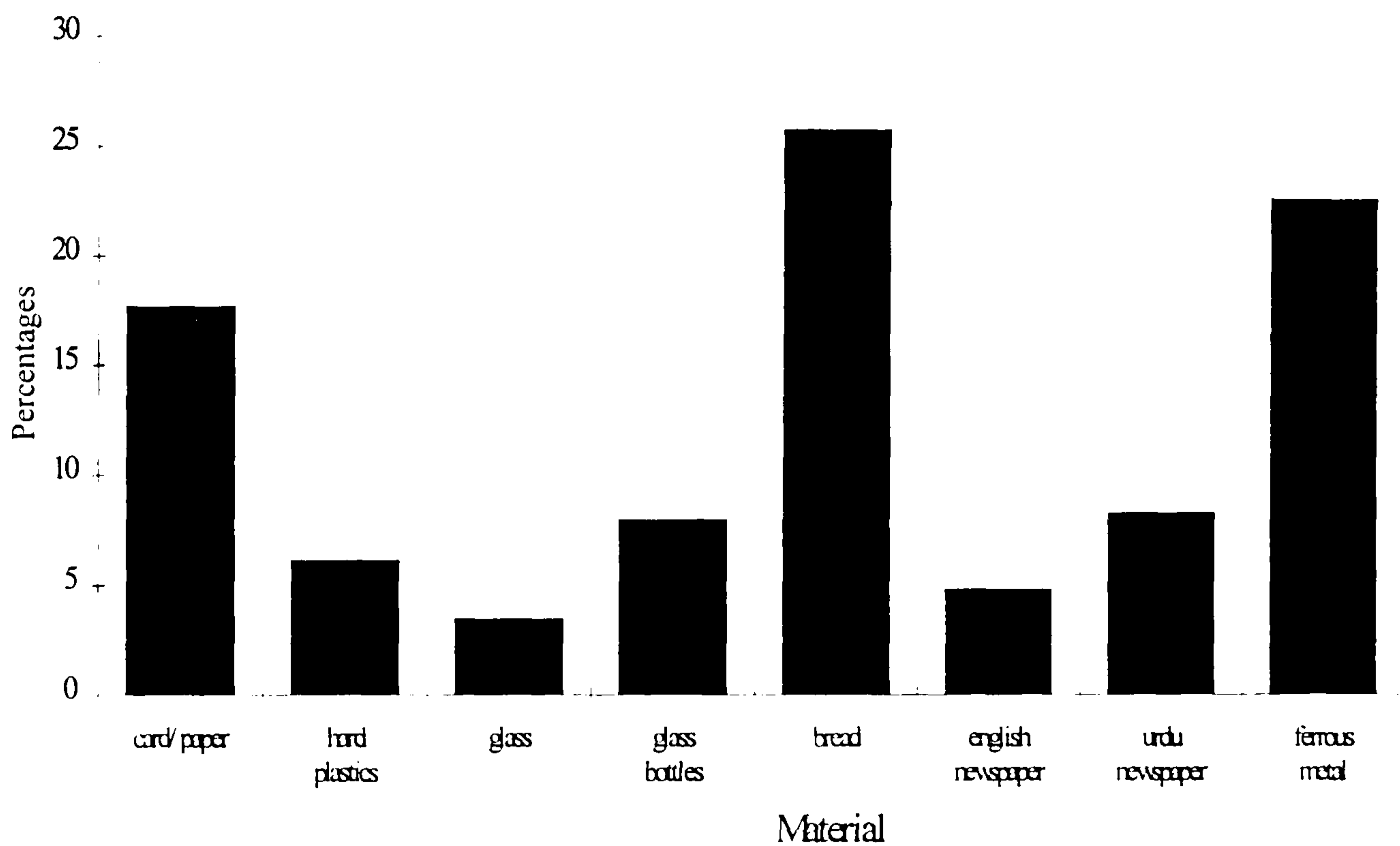
The percentage composition of the separated materials in different areas is shown in Table 4.6. Fig. 4.2 shows the average percentage composition of the major household waste components separated in all areas of Karachi. The most commonly separated materials in all income groups are newspapers, bottles, ferrous metals and plastics. There was some variation in materials such as newspaper and cardboard/paper between the high and low income areas, because of differences in the literacy rates and ease of separation. The weights of the English newspaper is higher in the separated waste from high income areas as compared to low income areas. The materials which appeared most in the quantities in all the areas were bread, cardboard/paper and ferrous metal. Other investigations revealed that the major sources of cardboard were shops and, probably details of materials from shops were included in the unsupervised surveys.

**Table 4.6 Percentage composition of materials separated by households**

Area	card/pap.	aluminium	copper	hard plas.	soft plas.	glass	glass bott.	bread	n pap eng	n pap urd	ferr. metal
KAS 1	30.47	1.76	2.01	2.61	0.30	2.51	5.13	13.07	7.44	11.46	23.23
CA	33.94	1.23	3.89	3.35	0.26	1.23	4.86	20.66	5.09	3.27	22.22
LIKAR	5.51	0.24	0.00	13.69	0.00	4.09	18.57	30.68	0.00	1.42	25.81
KAS 2	18.42	0.58	0.00	1.17	4.09	0.58	4.39	30.41	5.85	9.36	25.15
Average	17.70	0.63	0.82	6.16	1.23	3.49	8.02	25.90	4.84	8.36	22.85

**Details of Areas:**

KAS1 = Karachi Administration Society (un-supervised), FBA = Federal B. Area, CA = Control Area, LIKAR = Low income area in Karachi, KAS = Karachi Administration Society, FBA = Federal B. Area.  
Data collected in early to mid 1994.



**Fig 4.2 Percentages of major components in the separated waste at the household level in all areas of Karachi.**

**4.3.4 Income from source separation**

Additional income from the waste is a major benefit to the households in low and middle income areas and is again an opportunity to integrate the informal recycling with the formal system. This income may also go to the children, women and old people who do not have a great share in regular income sources at the household level. Discussions with IWBs confirm such findings when they observed that a number of their customers are children, women and old people. Further research is required to investigate the distribution of income from waste within the household. It may be concluded that a reduction in waste quantities at source is a major benefit to solid waste management.



The reduction in waste quantities is achieved because of established separation practices at the household stage. In addition such practices give an additional income to the households. All the materials are purchased on the basis of a per unit price. The prices paid to the households by IWBs for different materials are given in Table 4.7. Using random checks it was observed that these prices were same in all the areas of Karachi.

**Table 4.7 Prices paid to the households by itinerant waste buyers for different materials in Karachi (1994).**

Waste material (typical sources)	Prices in Rs per Kg
Urdu Newspaper	2.00
English Newspaper	2.50
Ferrous Cans (cooking oil etc.)	5.00
Ferrous Metals (pipes, fittings etc.)	6.00
Bottles (cold drinks, medicine etc.)	1.00
Glass (window glass, broken bottles etc.)	0.25
Plastics (soft)	6.00
Plastics (hard)	8.00
Paper, Magazines etc.	1.00
Bread (food waste)	1.00
Aluminium (foil, cold drink cans etc.)	30.00
Copper (old utensils)	20.00

Note: Rs 31 = 1 US \$ and Rs 48 = 1 UK Pounds in the year 1994.

The data on the number of days after which materials are sold by the households reveals that the frequency of sale was greater in low income areas as compared to high. The average number of days after which materials were sold was 15 days in low income areas of Karachi and more than 40 days in higher and middle income areas. The reason might be frequent need of money by the poor people as compared to the rich. The average amount of money obtained by the household per selling lot ranged between Rs 9.55 and 31.24. This amount gives an average per family per month income range of Rs 2.94 to Rs 60.9 over different income groups. The family income on the low income families is significantly supplemented by separating and selling re-saleable materials. The house servants, as discussed above, separate and carry waste components to sell. In addition, the possibilities that residents in the low income areas bring waste from offices and from houses in high income groups must not be discounted. Such details need further investigation. It may be concluded that the separation and sale of different materials provide significant additional income to the households.

### 4.3.5 Employment

Another major benefit of the informal recycling system is the provision of employment. Although this is not a major benefit from the standpoint of proper solid waste management it is an extremely important factor for a developing country like Pakistan where a high proportion of jobs are provided by the informal sector. It is extremely difficult to assess how much employment the sector provides because of its informal nature. Some simple exercises were conducted in Orangi to estimate number of itinerant waste buyers operating in the area.

Estimation of itinerant waste buyers operating in an area is difficult, since the IWBs are totally informal in nature and not registered with any agency. They also operate without any time tables of routes. The settlement of Orangi is predominantly a low income area. The geography of Orangi is such that it is very difficult for local IWBs to collect waste from other areas and similarly it is very difficult for the IWBs operating in other areas to enter into Orangi. Thus a basic assumption was formed: the IWBs operating in Orangi sell the collected waste materials in Orangi. The number of IWBs regularly selling purchased materials to the middle dealer was usually the same. Thus middle dealers were asked how many middle dealers there were in Orangi and how many IWBs were attached to each middle dealer. The information was cross checked by asking different middle dealers. The information obtained is summarised as follows:

There were 10 middle dealers in Orangi who use to purchase materials from about 80 itinerant waste buyers daily in addition to their contracts with industry and offices etc. There were 40 middle dealers in Orangi who purchased materials on average from 20 itinerant waste buyers each.

Thus the total number of IWBs operating in Orangi was 1600. The total population of Orangi was estimated at 800,000. Thus there were 20 itinerant waste buyers per 10,000 population and 0.63 middle dealers per 10,000 people operating in the low income area of Orangi. Other investigations revealed that the number of itinerant waste buyers operating per unit population are lower in middle and high income areas as compared to low income areas. The reason may be lower quantities of waste separated in the high income areas. Extrapolation of the information obtained from Orangi and from high income areas of Karachi suggest that there were around 800 middle dealers in Karachi getting material from around 15,000 itinerant waste buyers. In addition a very high proportion of people work as waste pickers in a city with an officially estimated population of 8.5 million.

The itinerant waste buyers and waste pickers provide the greatest employment in the recycling chain. In addition there are dealers and traders of waste and the workers employed by them. The recycling

industries also employ a large number of labourers. Generally the informal recycling sector is a major sector of employment.

### 4.3.6 Separation by sweepers

In the middle and high income areas of Karachi municipal and private sweepers collect waste from the houses. Detailed discussion on how this system operates is included in Chapter 7. When the sweepers collected waste they were also separating re-saleable materials from the waste. However, surveys and discussions revealed that this was not a regular activity performed by all the sweepers. It depended upon;

- the duty area of the sweeper;
- the number of houses from which the sweeper collected waste;
- the composition of waste from that area;
- opportunities available for other jobs;

If the duty area of a sweeper was on main roads, parks or playgrounds or any such area where there are limited opportunities to access the cleaner waste from households, he might not get involved in the separation of waste. Table 4.8 shows that if a sweeper was getting household waste from a considerable number of houses from which he can separate a saleable quantity of waste which is worth taking to a middle dealer then he would definitely establish a system for separation. In the table below the sweepers who collected waste from 11 to 30 houses were mostly involved in the separation. If the sweepers collected waste from a higher number of houses, i.e. more than 30, then they may not have time to separate resaleables but obtained a sufficient income from the waste collection service itself.

**Table 4.8 Number of houses from where sweepers collect waste and their practice of separating and selling waste.**

Number of Houses	Yes: Separate Re-saleables		No: Do not Separate Re-saleables	
	Number	Percentage	Number	Percentage
1 - 10	2	2.5	7	8.9
11 - 20	22	27.8	8	10.1
21 - 30	20	25.3	1	1.3
31 - 40	12	15.2	0	0
more than 40	7	8.9	0	0

Data collected in 1994

The composition of waste and particularly quantities of re-saleable materials, is important from the sweeper's point of view. Areas where quantities of re-saleable components in waste were significant are more attractive for sweepers. The other important factor is the availability of opportunities for additional income from other jobs such as waste collection services to the households. If there was more demand for a waste collection service, sweepers were not interested in the separation activities of waste and looked for more contracts for waste collection from the properties.

The survey revealed that about 80 % of sweepers admitted that they regularly separated saleable items from the waste in a sample of 79 valid cases. They were able to separate 2 to 4 Kg of waste components daily. The triangulation surveys to cross check quantities showed that the actual quantities may be higher than this. The composition of separated waste is inferior to that separated at the household stage. Further details about sweepers' practices of separating and selling waste are discussed in Chapter 7.

#### **4.3.7 Separation on streets and at transfer points**

The waste collected by sweepers was disposed of at streets corners, on vacant plots and at transfer points. The waste, whilst awaiting collection, was sifted through by street pickers who moved from one area to another area collecting re-saleable waste. Reduction in waste quantities is a major benefit, but it was difficult to estimate how much waste each waste picker collected, the area in which he operates and the composition of what he collected. The quantities of waste collected by a picker depend upon his age, sex, health and mode of transport (such as using a bicycle etc.). Different techniques were tried to find the weights that each picker collected as discussed in Sections 3.8.6 and 3.11.6. The most reliable results were obtained from the F. B. Area blocks 10 and 11, where young pickers regularly provided information about weights of materials which they collected from a specified area. The weights of material for 26 picker-days were obtained. The average weight collected by pickers was 16.5 kg per day, which ranged from 7 Kg to 26 kg. Pickers reported those quantities as the categories of materials which they sell. According to their reported categories, 90% by weight of their collected materials was paper and cardboard. There were two problems with the above method:

Firstly one cannot estimate separated materials per unit area or population, number of houses or any other denominator for generalisation.

Secondly, the other problem with such data is that the Suzuki collection trucks (refer Chapter 5) were also operating in the same area to collect waste and so household waste arising as observed were relatively low on the streets and at transfer points as compared to the other areas.

Consequently, a more realistic estimate of the waste materials separated by street pickers has come from quantities reported by the Suzukis crew who were also separating waste from the collected households waste. The quantities of saleable components separated by the Suzuki crew were similar to those which the pickers separated from waste because both groups had access to the waste at the same point in the waste stream, namely after initial separation at the household level. The separation by the Suzuki crew gave a mean value of 0.0355 kg/person/day with a standard deviation of 2.3526. The waste generation rate in the same area, as mentioned in Table 5.6 was 0.359 kg/person/day. This means that a further 10% by weight is separated at the transfer point by pickers in F. B. Area. As discussed in Section 4.3.2 the separation rate in F. B. Area was 0.05kg/ cap/ day. Adding the separation at transfer points it may be concluded that about 20% of waste by weight is reduced up to the transfer points. The quantities separated at transfer points in high and middle income areas are higher as compared to the quantities separated at the household stage. More detailed surveys are required to understand the dynamics of separation practices in relation to various income groups. Based on our limited investigations the following relationship matrix may be formed:

<b>Income Group</b>	<b>Separation by Households</b>	<b>Separation by Servants</b>	<b>Separation by Pickers</b>
<b>High</b>	Low	High	High
<b>Middle</b>	Medium	Medium	Medium
<b>Low</b>	High	None	Low

The above matrix explained the separation by households, servants and waste pickers in various income groups. Waste pickers in Karachi were organised and in many cases collectively transporting the waste by hiring a common mode of transport. Text box 1, gives some personal details about waste pickers in Karachi.

***Text Box: 1***

***Waste pickers - Abdul Rasheed and Ghulam Nabi's story.***

*Abdul Rasheed was operating as a waste purchaser on a piece of open land in the heart of the commercial area of Karachi City in Saddar. He had been doing the work for the past 8 years at the same place. He was regularly getting waste from 50 waste pickers who collect from the surrounding predominantly commercial area. He purchased mixed waste at the price of Rs 55 per 40 Kg. In addition to 50 regular waste pickers he also got waste from other street picker groups operating in other areas who brought waste to him in pick-ups. In this way he was getting about an additional 2,000 Kg of waste daily. He separated each component i.e. glass, paper, cardboard etc. He sold glass at the rate of Rs 60 per 40 Kg, paper at Rs 80 per 40 Kg, cardboard at Rs 100 and plastic at Rs 60 per 40 Kg. Besides his shop there were three other groups dealing in similar quantities with a total of about 150 waste pickers selling their waste at these places. He indicated that the total waste collected by each picker daily varied between 40 Kg to 150 Kg depending on the number of hours the pickers work, their health and age. He noted that pickers usually did not collect black plastic bags, since nobody purchased them. However, if black plastic bags are brought to him he could purchase them at Rs 0.50 per Kg and later sell them at the rate of Rs 0.75 per Kg.*

*Another group leader, Ghulam Nabi, was not a large scale dealer who purchased materials from pickers but rather he was a representative of a small group of 10 pickers. They operated in the commercial and residential area of PECHS bringing the waste to a single point and collectively transporting it to the dealer where they sold it as a mixed lot. On the average each picker collected about 80 Kg of waste daily. They sold the collected waste at the rate of Rs 50 per Kg. They started work at around 6 o' clock in the morning and worked until mid afternoon.*

*Abdul Rasheed and Ghulam Nabi were both refugees from Afghanistan. They have been in Pakistan for the last 10 years; Ghulam Nabi has become a Pakistani national whereas Abdul Rasheed was trying to obtain an identity card.*

*Information collected in 1994*

#### **4.3.8 Further trade and recycling of waste**

The waste components purchased by IWBs and the waste separated by street pickers are sold to dealers and ultimately reaches the recycling industries. The prices of separated components increase as the waste materials reach the recycling industry. A number of past research studies looked at the gradual increase in prices and concluded that the major profit was earned by main dealers, for example Huysman (1994) and Muttamara (1994). However, a more realistic estimate of profit earned at each stage may only be calculated by considering the economics including all the investments and

operating costs, at each stage i.e. from itinerant waste buyers to recycling industry. There are transaction costs involved at each stage. Table 4.9 and 4.10 give the increase in the prices of materials in the IWBs and waste pickers' chains respectively. From Table 4.10 it may be noted that the waste pickers' group leaders (middle dealers) purchased materials from pickers in two categories. One category was purchased at the rate of Rs 55 per 40 kg and the other category was purchased at Rs 5.00 per kg. The dealers separate the materials into different components such as cardboard, paper, plastic, glass etc. and sold it further to the main dealers.

**Table 4.9 Prices paid (Rs/kg) for major separated materials at various stages in the recycling chain of itinerant waste buyers. Percentage mark-up at each stage is shown in brackets.**

Materials	IWB pays to household	Middle dealers pay to IWBs	Main dealers pay to middle dealers	Main dealers sells at
Urdu Newspaper	2.00	2.50 (25)	3.00 (20)	Sold directly by middle dealers
English Newspaper	2.50	3.00 (20)	3.50 (17)	Sold directly by middle dealers
Ferrous Cans (cooking oil etc.)	5.00	5.25 (5)	5.50 (5)	6.00 (9)
Ferrous Metals (pipes, fittings etc.)	6.00	6.50 (8)	7.00 (8)	8.00 (14)
Bottles (cold drinks, medicine etc.)	1.00	1.25 (25)	1.50 (20)	1.75 (17)
Glass (window glass, broken bottles etc.)	0.25	0.50 (100)	0.75 (50)	1.25 (67)
Plastics (soft)	6.00	7.00 (17)	8.00 (14)	10.00 (25)
Plastics (hard)	8.00	9.00 (12)	10.00 (11)	12.00 (20)
Paper, Magazines etc.	1.00	1.25 (25)	1.50 (20)	2.00 (33)
Bread (food waste)	1.00	1.75 (75)	2.50 (43)	Sold directly by middle dealers
Aluminium (foil, cold drink cans etc.)	30.00	32.00 (7)	35.00 (9)	38.00 (9)
Copper (old utensils)	20.00	24.00 (20)	26.00 (8)	32.00 (23)

Information collected in 1994

**Table 4.10 Prices paid (Rs/kg) for major separated materials at various stages in the recycling chain of waste pickers. Percentage mark-up at each stage is shown in brackets.**

Materials	Middle dealers pay to pickers	Middle dealers sell for
Paper	1.375	2.00 (45)
Cardboard	1.375	2.50 (82)
Used Plastic Bags	1.375	1.50 (9)
Glass	1.375	1.50 (9)
Ferrous Metals	5.00	5.25 (5)
Plastics (hard)	5.00	6.00 (20)
Plastics (soft)	5.00	7.00 (40)

Information collected in 1994

There were a number of conversions and re-use of waste materials. Some of the common uses of the materials are given in Table 4.11. A number of components are sold directly to the consumers for reuse. For example newspapers are sold to vendors and food shops to wrap certain food items such as bread, salad, vegetables etc., bread is used as animal feed after it is purchased from the middle dealers shops.

**Table 4.11 Recycling and re-use of some common waste components in Karachi.**

Waste material	Common re-use and recycling
Broken Glass	Glass bottles
Bottles	Washed and used again
Bread	Livestock feed
Newspapers	Various types of packing
Ferrous Metal	Recycled in re-rolling mills
Paper	Cardboard, fluiding paper, etc.
Aluminium	Re-melt in moulds for various industries
Plastics	Uses / recycling depends upon type: toys, shoe soles, shopping bags, sandals, etc.
Car Batteries	Broken to extract Lead metals
Magazines, Digests, Books	Sold again at reduced prices
Old Furniture	Sold again at reduced prices

Information collected in early 1993 and checked in 1994 and 1995.

From the integration perspective it was clear that once re-saleable waste components had been separated from waste they were considered as raw materials and there was always a value added as materials moved from one dealer to another. Most of the activities after the IWB, picker and household stages were quite independent of the municipal sector. The dealers and recycling industries obtained the materials and trade them as raw materials. Thus, from the integration point of view, direct interventions are possible at the separation stage only in terms of supporting more source separation with a recognition of informal activities and avoiding any formalization of those practices. Text box 2 explains the impact of improved markets on the waste picking activities in a developed country.



**Text Box 2:**

***Waste picking in America***

*With improved marketing of separated materials municipalities were reporting a more serious problem with waste picking (scavenging) of curb side materials. Picking of re-saleable components has been reported in Los Angeles, New York City, Philadelphia and other cities and towns. In big cities, small scale scavenging has generally been tolerated because it was a source of income for homeless people. But when it becomes a business it has the potential to cut into a program's revenues and hence tolerance decreases.*

*Source: Biocycle, a journal of composting and recycling, April 1995.*

The above discussion highlights a number of benefits of the private informal recycling. The waste separation practices are regular and take place at the household level, at transfer points and during collection by sweepers. These practices give a reduction in waste quantities at the household stage and a further reduction at the transfer points. The informal recycling sector provides employment opportunities in the cities and a source of supplementary income for households.

***Key points from previous discussion***

- *Waste separation at the household level was a common and regular activity.*
- *Waste was also sorted by sweepers and waste pickers.*
- *The sale of separated waste provides an important source of income to a number of people.*
- *The trading and recycling of waste were independent of the municipal sector.*
- *The reduction in waste quantities had been identified as a key opportunity for integration.*

Reduction in the waste quantities has been identified as the key benefit from the solid waste management perspective. The future of the informal recycling practices after integration would depend on a number of factors such as how and by whom integration is initiated. However, there are a number of constraints to formal integration. Important constraints as measured through this research, are discussed below:

## **4.4 Constraints to integration**

As discussed above, there are a number of benefits of the informal recycling. The recycling was an on-going and sustainable activity and a source of income and employment for a number of people. The opportunities for its formal integration would depend upon the mode of integration. Looking back to the guiding hypothesis on the integration, as discussed in the Introduction of this chapter which states:

*The municipal sector formally accepts the recycling activities, gives a legal protection to them and protect the activities in future planning.*

In spite of a number of benefits of the programme the formal integration as described above is constrained by a number of factors. The major constraints identified are the attitudes of the groups involved, the social structure of recycling systems and certain un-acceptable practices such as trade of hospital waste etc. These constraints to integration are discussed below:

#### **4.4.1 Public attitudes**

Attitudes of key actors toward the integration of the informal recycling and official activities are important for any interventions towards integration. Such attitudes, if not understood at the outset of the project, may cause problems during the implementation phase. If attitudes are not favourable and the integration is imposed due to external influences, the project may not be sustainable and collapse when the external thrust is removed. The attitudes in this case are those perceived priorities which a respondent chooses under the present conditions with the available choices and with his own perception of the likely gain or loss. The following sections discuss the attitudes towards integration of the key actors: the public or the users, the municipal officers and the groups involved in the informal recycling. All the attitudes are representative of the present situation only and are open to influence by any future change.

The public attitudes were assessed through the methods described in Chapter 3. In the system of informal recycling the public was not only the user of the service but a client of the IWBs as they purchased materials. The major role of the households is to separate and keep the re-saleable components for selling to IWBs. It is important to understand the motive behind the present practices of waste separation since any future intervention would depend upon present motives. The public attitudes were first assessed by asking whether they were satisfied over the cleanliness of their neighbourhood and then by asking a series of questions on the motives behind separating re-saleable components from waste. They were questioned on their knowledge on what happens to the materials once they were sold and their attitudes to the usefulness of waste pickers and their possible role in future solid waste management. In this way their response and attitudes to the actors in the informal recycling system and their opinion on possible integration was assessed. The results are discussed below:

Firstly, households do not see any relationship between the informal recycling and the improvement in the existing solid waste management system. About 77 % of the households were not satisfied with

the present level of area cleanliness but their perceived solutions generally included to the effect that it was the responsibility of the municipal corporation to improve cleanliness. Table 4.12 gives the perceived solutions to the waste management problem from the respondents' point of view. The table clearly reveals that the idea of integrating the informal recycling is beyond the users imagination. The higher percentage of the respondents supporting recycling might be due to the influence of the questionnaire which had a number of questions on recycling.

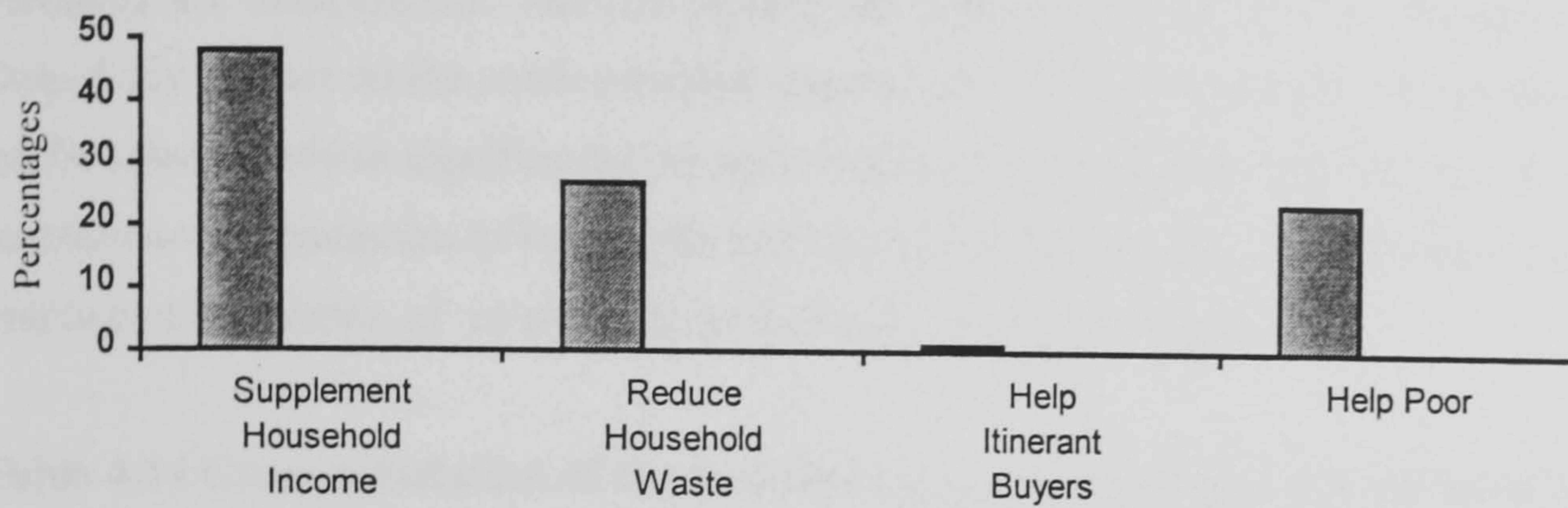
**Table 4.12 Perceived solutions to the problem of solid waste from households in Yasinabad (n = 100).**

Perceived Solutions	Percentage Suggested
Support private informal systems	2
Discourage private informal systems	5
Take some practical steps	2
Government should do it	5
Increase community education	35
Recycling is a good idea	30
No comments	2
Other ideas	19

Data collected in early 1993

Further detailed discussion with the housewives and surveys in other areas revealed that even in areas where housewives have organised their own systems of primary collection they only considered it as an ad-hoc arrangement (Ali and Saywell, 1995) until the official system improves. Thus it may be concluded that households do not perceive informal recycling as an integral component of the improved solid waste system.

As discussed in Section 4.3.1, households performed the selling and separation activities of re-saleable components. Households gave different explanations of their motives with respect to waste separation. Fig 4.3 gives percentages of respondents and the reasons behind their separation practices.



**Fig 4.3 Households motive behind the separation and selling activity in the sample area of Yasinabad (valid sample = 89).**

The survey results revealed that the main motive behind waste separation and selling activities was to earn extra income. A number of households did not know that what happened to the materials once they were sold. To support the argument further a cross tabulation of the two variables i.e. knowledge about what happens to the materials once they were sold and the motive behind waste separation is given in Table 4.13. In this way it was determined whether or not households' knowledge about recycling created an impact on their motives behind separation. Those respondents who know about what happened to their separated waste and those who did not gave similar answers when asked about their motives for waste separation. It may be concluded that knowledge of what happens to the materials once they are sold has very little impact on the motives behind recycling.

**Table 4.13 Cross-tabulation of frequencies of the knowledge about recycling chain and motive behind recycling.**

Posses Knowledge	Motive Behind Waste Separation and Sell			
	Income	Help IWBs	Reduce Waste	Help Poor
Yes	22	1	11	10
No	21	0	13	11
Pearson Chi Square	Value	Significance		
	1.2265	0.74667		

Note: Detailed note on the chi-square test is included as Annex 4.1

Information collected in early 1993

If the value of observed significance are very small (usually less than 0.05) the two variables are likely to be dependent on each other. Since the significance level is 0.74667 it is likely that the two variables are independent. The Chi-square test fails to identify that the households knowledge has caused any impact on the motive behind separation. The null hypothesis of independent variables can not be rejected which signifies that there is likely to be no relationship between the two variables.

Another cross-tabulation of household knowledge about what happens to waste once it is sold and the practice of separation of re-saleable components is shown in Table 4.14.

**Table 4.14 Cross-tabulation of the knowledge about recycling chain and practice of separating and selling waste components by households.**

Posses Knowledge	Practice Separation and Sale	
	Yes	No
Yes	39	1
No	44	2
<b>Pearson Chi-Square</b>	<b>Value</b> 1.12943	<b>Significance</b> 0.56852

Information collected in early 1993

The table, similar to Table 4.13 shows that those households which are un-aware of what happens to materials once they are sold are also extensively involved in the separation practices. The null hypothesis of the independent variables cannot be rejected. Thus it may be concluded that households are not concerned about the end use of materials. Those households who have knowledge about the recycling chain and those who do not, equally participate in the separation activity. Interviews and data from this typical lower-middle income area of Karachi revealed that the main reasons behind the separation and sale of waste by households was the opportunity to gain extra income. Environmental reasons seemed to play little part in the motivation to separate waste, instead the community had little awareness of the relationship between the separation aactivities, the reduction in waste quantities and any potential environmental benefit. Thus source separation activity is an on-going system with a basic motive to earn extra income. For any pilot activity in future, it seems more viable to incorporate, understand, protect and develop the current practices of source separation rather than initiating any new activities. Generally, more community commitment to the environmental reasons for waste separation at source seems difficult to acquire.

For the informal activities of waste pickers on streets and transfer points, households were the observers and they have a certain perception of the waste pickers' activity. The activities of waste pickers were common to all the transfer points and a number of households observed them. In the sample area, 99 % of the respondents admitted that they had observed street pickers. A total of 50%

thought that they were doing a useful job in some way. Responding to another question a total of 64% thought that the waste pickers contributed in reducing waste quantities and a total of 50% would like to help waste pickers to achieve a better livelihood.

Cross-tabulation of respondents' attitudes to helping waste pickers with their perceptions about the usefulness of pickers and their role in reducing waste revealed that the three variables are independent and so households who liked to help street pickers did not hold this view because pickers reduced waste. The results are shown in Table 4.15. Once again no dependencies was found in the variables.

**Table 4.15 Frequencies cross-tabulation of respondent's willingness to help street pickers and their perception of picker's usefulness.**

Think they are useful	Want to help pickers	
	Yes	No
Yes	28	17
No	26	17
Pearson Chi-Square	Value 0.02863	Significance 0.86563

Information collected in early 1993

Further in-depth discussions and interviews revealed that those households who would like to help waste pickers wanted to do so because they felt that pickers are poor and working in dirty conditions. Households did not see any link between the improved waste management system and the role of pickers in that system. Thus important conclusion about the attitude of the households towards the informal recycling can be drawn, which are summarised as follows:

- i. Households do not see waste picking as a part of the improved solid waste management.
- ii. Households like to help waste pickers because they are poor and working in hazardous conditions.

Finally households were asked about the suggestions of ways to support street pickers. Table 4.16 gives a list of suggested support programmes from the respondents. The table clearly shows that households do not perceive waste separation as a part of future solid waste management strategy. Only 10% proposed to initiate some form of source separation etc.

**Table 4.16 Perceived support programmes for pickers from households in Yasinabad (n = 100).**

Perceived Programme for Pickers	Percentage Suggested
Educational support	3
Health facilities	2
Financial support	6
Should be done by the government	6
Jobs should be provided	5
Organise more source separation	10
Other miscellaneous ideas	18
No idea	50

Information collected in early 1993

Some households also suspected that the pickers were thieves and should not be allowed in streets or near the houses. Often households complain that the pickers scatter waste and set it on fire. Similar attitudes noted by other authors in other cities such as Jakarta (Poerbo, 1991) and Bangalore, India (Shenk and Baud, 1994) lead to the conclusion that although support for waste pickers may be just, and best, that can be considered, given their position in society, are some temporary temporary 'relief' measures.

The present public attitudes are not favourable to the integration of the informal recycling effectively with the official system. Households do not consider waste picking a positive contribution to waste management. A number of policy changes and a change in attitudes is required to formally integrate waste picking with the official system.

#### **4.4.2 Municipal attitudes**

Current municipal attitudes are another constraint to integration. Municipal attitudes towards integration were assessed through semi structured interviews in Karachi, supplemented with some interviews from Indian municipal officers who visited WEDC for a training. Before we discuss the municipal attitudes it is important to understand that the municipal officers are usually not in a position to initiate changes in the current system. Most of the changes come through politicians or sometimes donors and loan agencies. (Ali et. al, 1994). Thus a common factor in all the municipal attitudes is that they like to support the status - quo which is in itself a major constraint. The municipal attitudes towards integration are discussed below:

- Municipal officers in Karachi did not rate their system of waste management as perfect. Most of them rate the system as very poor, or poor or fair on a scale which also contains ratings of good, very good or excellent. They perceive a range of shortcomings in the current system: lack of finances, growth of squatter settlements, low level of community awareness, shortage of vehicles, un-

availability of transfer point sites, shortage of staff, un-controlled commercial activity and no planning and training for solid waste management. They see more funds, proper systems, planning and training as the major areas which could improve the current system.

- Municipal officers were aware of the existence of the informal recycling sector but un-aware of its extent.

For example they have no idea what quantities the informal sector recycles and how many people earn a livelihood through these activities. They foresee no problems from the activities of itinerant waste buyers, dealers and the recycling industries in the municipal operation, however, they felt that waste pickers were a nuisance to their operation. They also felt that waste pickers scatter waste, burn waste and remove it from transfer points, which was causing problems in loading waste onto refuse collection vehicles. Only one municipal officer admitted that waste pickers were doing a useful job. The monitoring of transfer points was conducted as a triangulation exercise to verify municipal complaints against pickers. During secret monitoring of these transfer points only one group of pickers was suspected of setting fire to the waste. A municipal officer and sweepers themselves accepted that they burn the un-collected garbage to get rid of it, because of public pressure. Thus the complaints of municipal officers about waste pickers were not verified. In Karachi most of the municipal officers have a poor knowledge about the separation activities at the disposal grounds by pickers and separation practices by sweepers.

Most of the municipal officers get information about waste management operations from their field staff. There was no system to verify that information and there was no supportive research and development organisation.

On the question of intervention or initiating pilot activities which involved the informal sector of recycling, most of the municipal officers admitted that they were not in a position to initiate such steps. They felt such steps were dynamic and think that the steps should be taken by Non-government Organisations (NGOs) and not by municipal corporations.

The municipal attitudes clearly reveal that the municipal officers possessed a very narrow view of the problem of solid waste management and did not understand the broader social and economic impacts of their interventions. The understanding of the extent and the possibility of integration of the informal recycling with the official system was beyond their imagination. Such attitudes do not support the integration hypothesis and verify the thesis that the informal sector recycling could not be formally integrated with the municipal system if the present attitudes persist.



### 4.4.3 Attitudes of actors

The other major partner in integration are the groups involved in the informal recycling, whether they liked to be formally integrated with the official system or not. As already discussed in the foregoing sections a number of the recycling activities operate quite independently of the municipal sector, although they interact with other official agencies and so most of the actors have a general opinion about the official agencies. Based on their opinion about official agencies they also hold views about the possible future involvement of the municipal corporation in their business. During interviews some hypothetical situations of official involvement were described and the respondents were asked to give their opinion, for example would the recycling industry purchase raw material from a government agency or not ?, etc.

At the lowest end of the recycling chain there were pickers, IWBs and sweepers. The pickers usually did not interact directly with any official agency because waste in Karachi in the year 1993 was not contained at transfer points, and pickers did not need arrangements with the sweepers or municipal staff working at transfer points to get access to waste at transfer points. However, the situation changed in the year 1994. Communal containers were introduced which were likely to have led to a change in the relationship between the waste pickers and municipal staff. It was observed that some pickers worked in partnership with sweepers to get access to household waste whilst it was being collected. In another city of Pakistan, Faisalabad, the collected waste was contained at transfer points which were enclosed. Observations and Semi Structured Interviews in Faisalabad revealed that in such a situation pickers had to make an arrangement with the sweeper incharge of the transfer point. In several places in Karachi pickers moved with the municipal and self employed private sweepers and performed separation of waste as the sweeper collected it.

The IWBs did not interact directly with any official agency. Thus the actors at the lowest end of the informal recycling, like pickers, IWBs and sweepers, did not interact directly with any official agency, rather, sometimes, they had an arrangement with the representative of the official agency in the area. The representative may or may not be following the official policy, if any. The actors, like pickers and sweepers, are generally satisfied by this arrangement. They suspect that any formalization of their current arrangements would not bring any improvement to themselves and they would be the ultimate losers due to their low status in society and consequent lack of power.

At the upper end of the recycling chain there were large main dealers and the recycling industry. They were interacting with a number of official agencies formally. These groups are not worried by any official involvement since they have comparatively more power and resources to handle the official agencies.

In general most of the actors in the informal recycling sector do not like to have any official interference, their perception of an official agency is as a bunch of corrupt people. The nature of official agencies in Pakistan cannot be changed overnight and so under the present status it seems impossible that the informal recycling sector would be willing to accept the involvement of any official system of waste management without any incentive being provided. Table 4.17 gives some examples of the nature of interaction of a few middle dealers with the official agencies.

**Table 4.17 Nature of interaction between middle dealers and the official agencies.**

Sample Number	Nature of Interaction
1	No comments
2	Pay bribe to the local police around Rs 100 per month
3	Pay bribe to the local police around Rs 100 per month
4	No problem
5	Pay bribe to the local police around Rs 100 per month
6	Not many problems, only pay Rs 50 per month to police
7	Not many problems

Information collected in early 1993 and cross checked in mid 1994

***Key points from previous discussion***

- *Households did not accept waste pickers etc. as an integral part of an improved waste management system.*
- *Official plans for improvement did not include the integration of the informal recycling sector.*
- *The separation of waste at the household stage was done to earn extra money.*
- *The municipal officers did not understand the broader impact of the changes in municipal systems.*
- *The actors involved in the informal recycling would like to avoid any official involvement in their business.*
- *The municipal officers did not see any problem with IWBs.*

**4.4.4 Relationships and dependencies**

Relationships and dependencies exist among actors in the informal sector and between the formal and the informal actors. Certain forms of relationships and dependencies may be constraints to integration. These relationships among actors are necessary for the existence of certain activities. This section discusses some dependencies and relationships as identified during the research.

The IWBs were dependent upon middle dealers for selling the collected waste, for financial support and for any other social protection. In the absence of any social security from the official agencies, the middle dealers were acting as a safety net for IWBs, giving loans and forming social attachments which created some form of bond with the IWBs who, in return, they were selling the collected items to the same middle dealer. This system enables middle dealers to be able to get a minimum quantity of material from IWBs. The type of support which each of the responding middle dealers provides to the IWBs is given in Table 4.18.

**Table 4.18 Facilities and support offered by middle dealers to itinerant waste buyers.**

Case Number	Type of Support
1	Push carts, advance money and purchase bought waste material
2	Push carts, money to pay to households purchase of bought material
3	Loan for house construction, money to pay to households, money during sickness, dowry and purchase of bought material
4	Push carts, money to pay to households, loans, advance money, purchase of bought material and kitchen utensils to barter.
5	Push carts, advance money and purchase of bought material
6	Push carts, advance money and purchase of bought material

Information collected in early 1993 and cross checked in mid 1994.

The support provided by middle dealers to IWBs ranged from purely business support such as money to buy materials to the social support such as money during sickness etc. The more established middle dealers who were holding more capital, extended more support and so got more quantities of materials regularly, case 3 in the table above is one such dealer. The bond between IWBs and middle dealers also resulted in exploitation in the form of lower rates to IWBs etc. Both the groups felt the need for security and the official agencies could not provide such 'informal' security. Only long term social reforms at the grass roots level can replace such dependencies in future. Similar relationships and dependencies also exist between the waste pickers and their group leaders and between municipal sweepers and supervisors. The relationship between municipal sweepers and their supervisors is discussed in Chapter 7. From the integration point of view it is very difficult for the municipal sector or short term public policy intervention to understand and replace such dependencies, which are a social phenomenon. The weak institutions of the municipal sector cannot replace the stable and established informal institutions and their linkages, like the ones described above and this leaves very little room for formal integration.

### ***Key points from previous discussion***

- *The municipal officers and public attitudes do not favour integration.*
- *Groups involved in the informal sector do not favour integration.*
- *Relationships and dependencies were found to exist among the actors in the informal sector.*
- *The dependencies provided some form of social security to the one group against a number of external influences.*
- *The dependencies also cause some form of exploitation from one group to another.*
- *The municipal sector cannot understand, develop or replace such relationships without real social reforms.*

### **4.4.5 Other constraints**

A number of attitudes and dependencies discussed above are constraints to integration. In addition to the above constraints there were other operational problems faced by the official solid waste management systems. Some practices observed were hazardous to the environment and health. One similar constraint may be the activities of waste pickers as a perceived problem to the municipal operations. Our secret monitoring of the transfer points revealed that, by and large, waste pickers were not involved in scattering or burning of waste. On one occasion pickers were allowed to collect re-saleable materials by sweepers doing loading, later pickers helped sweepers to fill the container. A few pickers who separate metals from the waste would first burn it and then separate metals from the ash. Scattering of waste by pickers, was not observed during the secret monitoring when containers or bin enclosures are full of piled waste. There are practices of trading toxic and hazardous waste; for example trade in empty chemical drums, trade in hospital waste and heavy metals. Any formal integration would not readily accept such practices. Text box 3 give an example of some hazardous practices:

#### ***Text Box 3:***

##### ***Lead from automobile batteries.***

*If you purchase a new battery for your car in Karachi, the battery shop purchases the old car battery and give you a cash back or discount of Rs 30 on your new battery.*

*The used batteries were then collected by dealers and ultimately reached the main dealers or recyclers like Aslam in Shershah. These dealers break the batteries in their yards, takes out Lead plates from them and smelt them in the evenings. On the average Aslam was purchasing 300 to 400 Kg of batteries at the rate of Rs 6.50 per Kg. The weight of each battery was between 10 to 50 Kg. The smelted plates were then sold to other metal industries. They sold the smelted Lead metal*

*at the rate of Rs 14 per Kg. Often they also purchased scrap batteries from industries and workshops. He employed 12 people working in two shifts. He was doing this work with an investment of Rs 300,000, rolling and got credit from informal money lenders in the market. He paid Rs 1,500 per month for the place and his kiln was coal fed. He told us that there were 5 such units in Shershah.*

*Lead is a heavy metal and its inhalation can cause nervous problems and renal disorders. Aslam's yard was located in the centre of public activity. He often faced objections from the nearby population about the smoke. He, himself, felt that the smoke was not dangerous, unless inhaled in large volumes. He told us that most of his workers did not have any health problems.*

The above discussion identifies a number of constraints to the formal integration of the informal recycling. The attitudes of the public, who were users of some of the services provided by the informal recyclers, and the municipal officers attitudes are not favourable to the formal integration of the two sectors. There are constraints because of internal social relationships and dependencies. These relationships give a stability to the private informal systems, however it would be difficult for any intervention to replace those relationships and dependencies before any societal change take place. Some direct constraints, such as operational problems from pickers and trade of hazardous waste, are discussed and identified as major constraints to integration. All these constraints would be unacceptable for an integrated system.

## **4.5 Conclusion**

The chapter discusses a number of benefits of informal recycling. These benefits range from global-environmental to the local and social benefits. Separation of certain saleable items at the household level is an on-going activity and a source of regular income for the households. It also provides employment. The major benefit to the solid waste management is the reduction in the quantities of materials to be collected and transported. The whole activity is on-going and self-sustaining and takes place because there are established markets for the waste materials. The chapter also discusses a number of constraints to formal integration. The major constraint is the current public and the municipal attitude. The residents believe that waste picking could not be an integral part of the future solid waste management. Municipal officers feel that they are not in a position to initiate any change in the current solid waste management strategy. Some other problems from informal recycling such as operational problems created for the solid waste management sector and the trade of hazardous waste are also identified as constraints to integration.

# Chapter 5

## Integration of informal collection system

### 5.1 Introduction

This chapter presents a case study of the informal private programme of waste collection operating in an area of Karachi. The programme was initiated by a local leader in the year 1988 and its operation was financed by the residents of the area. The programme was studied in the year 1994 when it was operating in addition to the official system and providing a service for the primary collection of the household waste. Presently the service of primary collection is not provided by the Karachi Metropolitan Corporation (KMC).

In order to gather a full understanding of the programme, it is important to first understand the role of the KMC in such areas. Under the present official system, the municipal office designates a team of sweepers and sanitary supervisors, supervised by sanitary inspectors and chief inspectors. The area boundaries are usually defined by the limits of a councillor's ward. The sweepers are usually responsible for the cleanliness of a lane or a part of a main street and their work is checked by a sanitary supervisor (*muccaddam*), who supervises the work of a number of sweepers. Sanitary supervisors report to sub-sanitary and sanitary inspectors, who inspect the areas of 3 to 4 supervisors. Similarly one or two chief sanitary inspectors monitor cleanliness of a sub-division, which comprises a number of councillor's ward. Finally, a health officer looks after a zone (there are four zones of operation in the city of Karachi). In terms of population a zone is about 2 to 3 million people and a councillor's ward is 20,000 to 50,000 people.

The sweepers who are responsible for cleaning the streets also collect waste from properties (for details of this system see Ali et. al, 1996 and Chapter 7 of this thesis). Sweepers made an 'informal agreement' with the households to collect waste against an agreed monthly payment. Such agreements are more common in the areas which are fully developed, in the sense that they have very few un-occupied plots of land and paved roads. The waste collected by sweepers is brought to transfer points (locally known as *Katchra Kundis*): which may be officially designated sites or temporary places. When there are number of un-used plots in an

area, those spaces are also used as waste transfer points or as disposal places. There is a much more pressing need for a proper waste collection service once the area is fully developed, houses are inhabited, streets are paved and there are no open spaces on which to dispose of waste. These physical conditions generate a felt need for a proper waste collection service.

In a similarly developed area of Karachi as described above, a house to house collection system (*Suzuki system*) was started by an area councillor using Suzuki pick-ups as vehicles. The system was different from the common sweepers collection system found in other areas of Karachi. The description of this informal system of waste collection is discussed in the following sections of this chapter

This chapter discusses the pros and cons of the system and judges the guiding hypothesis about the formal integration of the Suzuki system with the municipal system. The discussion in the chapter is kept within the boundaries of the hypothesis which states:

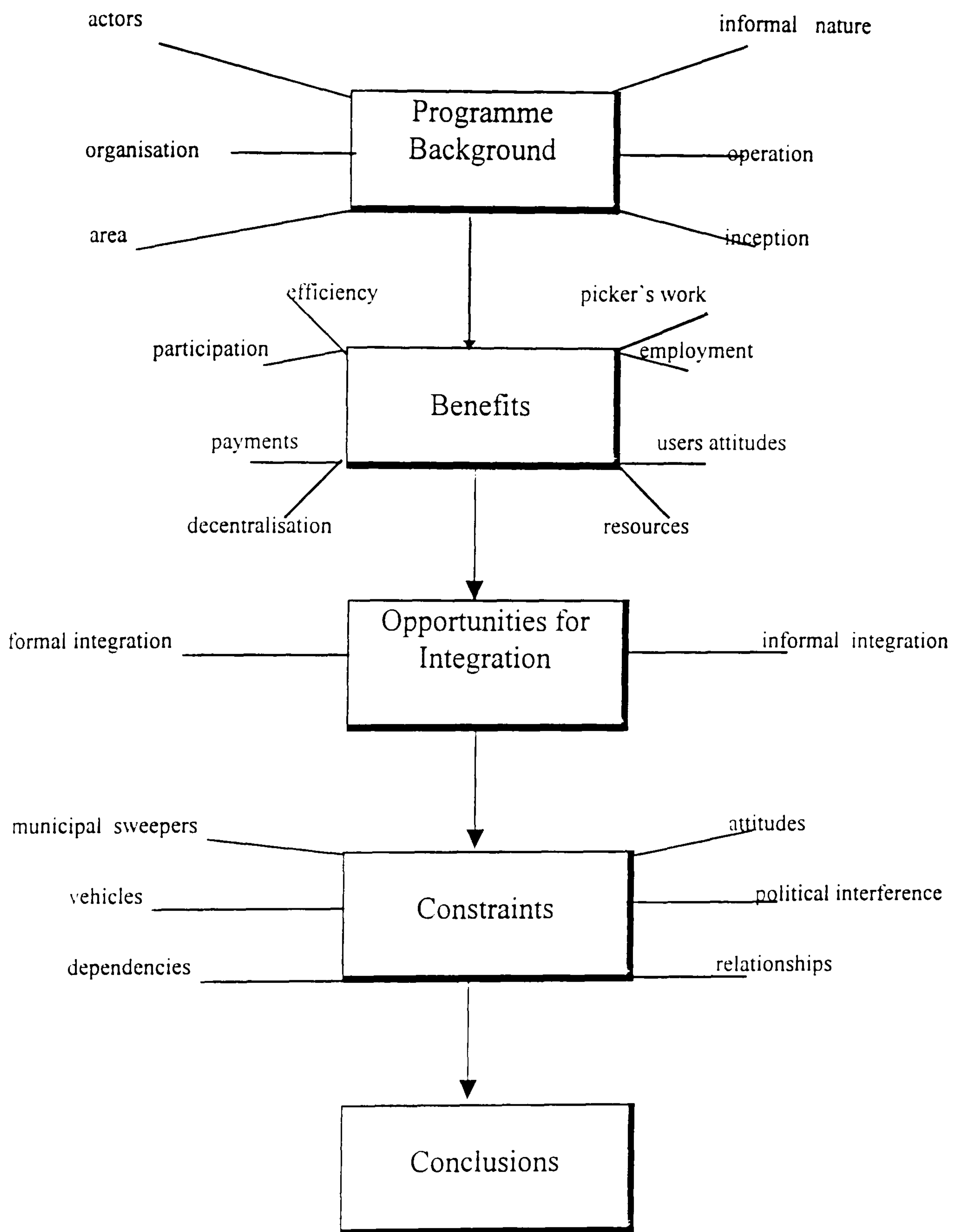
*Under the present conditions private informal systems in solid waste management cannot be formally integrated with the official system.*

First, a detailed **introduction** of the programme is given. The introduction is then followed by the benefits of the programme to the improvement of the solid waste management system. There are some direct and in-direct benefits and constraints of the programme in terms of employment and income generating opportunities and changes in attitudes. All these benefits are then assessed as the possible opportunities for integration of the programme, where the term **integration** is defined as:

*The municipal sector formally accept the project as the one which help municipal corporation, gives legal protection to the programme and protect the project in future planning.*

Once the opportunities for integration are discussed, the chapter presents **constraints** to the programme, some of which are also constraints to integration. Finally, **conclusions** are drawn from the previous discussions.

Fig. 5.1 presents a layout of the logical sequence of various arguments, as they are organised in the Chapter.



**Fig 5.1 Logical sequence of arguments in the case study.**



## 5.2 The Programme

### 5.2.2 Inception of the programme

The waste collection programme using Suzukis (a type of small truck common in the city) was initiated in the year 1988 by a local activist, named Pirzada Mohammad Rafi. In the year 1988 he was a member of '*Mushawarat Council*' (advisory council) an alternative representation from the area which replaced elected local councillors. However, later that activist has been elected as a councillor from the same area. According to Mr Rafi, there was a great demand for a cleaner neighbourhood environment from the residents at that time, and as an activist he had been receiving complaints about scattered waste and un-collected waste piles in the area. People were also requesting the shifting of transfer points from their vicinity. He thought that the transfer points and waste piles in the area could only be removed if all the waste was brought to a single place using vehicles. Thus the need for a house to house collection system arose to get rid of transfer points and scattered waste piles in the neighbourhood. This was the initial, primary motivation to start a house to house collection system of waste using Suzukis.

As the first step the programme organiser distributed a letter to all the 1,000 houses in the area, informing them about the proposed programme and the monthly fee that they would have to pay. In response, he received a go ahead reply from about 950 families out of the 1000 letters issued, as reported by the programme organiser. He purchased two small second hand Suzukis, one for Rs 20,000 and other for Rs 25,000, and made a few alterations to the bodies. In this way a collection service was started sometime in the year 1988.

The Suzuki system was not used by all the residents in the beginning and the system received waste only from 650 houses instead of 950 families who agreed in the first instance. Some houses were also reluctant to pay a monthly fee for the waste collection service, which was fixed at Rs 15 per month at that time. The programme organiser instructed the collection crew to collect waste from all the houses, whether they were paying monthly charges or not. When the programme started, the Suzukis used to dispose of, the collected waste at the official disposal area in the North of Karachi which is about 10 km away from the project area. However, after few months they found it un-economical to dispose of waste at the disposal site. There were also problems from traffic police on the major roads, and so the

programme organiser constructed a walled enclosure using his councillor's funds, in a playground within the programme area. The residents in the vicinity objected and finally a new place in another playground near some factories was fixed to dispose of waste in 1991. In the city, normally, there are no spaces allocated for waste transfer.

The programme soon developed and gained popularity among residents. In this way waste from 1,000 houses was brought to a single transfer point. Residents got a reliable service for which they were willingly paying.

The political rise and fall of the programme organiser took place during the period of 1988 to 1994 which affected the programme, however, in spite of all the problems, the programme operated till the year 1994, when this investigation was conducted. A detailed investigation was carried out for about seven months by the author in the year 1994. During the period of operation, people contributed a monthly payment and there was an overall cleanliness in the area. The only published document giving an account of the programme is a newspaper article by the author (Ali and Ahmed 1992).

### **5.2.3 The programme operation**

The area in which the collection programme was operating, located in the Central district of Karachi. This area was built over an area of 89,000 sq-yds (184 acres) with an estimated population of about 7,000 (KDA Layout Maps). The residents belong to the middle income group with an average income of more than Rs 5,000 per month for 48.3% of the households. This compares with an average income of Rs 4,930 per month in planned areas and Rs 2,158 per month in squatter settlements of Karachi (AERC, 1988). The project area was developed according to a plan prepared by Karachi Development Authority (KDA) and inhabited during the last 20 years. The dominant plot sizes are 400 sq-yds and 600 sq-yds with a small pocket of population occupying plot sizes of 120 sq-yds. Most of the plots were occupied, in use and served by paved roads. The break-up of different plot sizes and land use is given in Table 5.1.

**Table 5.1 Break-up of the residential plot sizes in the programme area**

Plot size (sq - yd)	Number of plots (percentage)
120	100 (9.5%)
400	558 (53.0%)
600	382 (36.0%)
1000	12 (1.5%)

Note: Plot sizes are generally considered as a crude criteria of the households well being in Karachi. people living in less than 120 sq.-yds plots are low income, between 120 and 600 is middle income, and more than 600 sq-yd may be considered as high income group.

Data and information collected from mid to end of 1994

The pick-up drivers, sweepers and pickers met daily at 9:00 a.m. near a mosque to start the trip. There was no office and administrative staff for this informal collection programme. The pick-ups took their specified routes, in different directions. Normally a crew of three persons walked with the Suzukis. One person moved ahead of the Suzuki, shouting to indicate their arrival, ringing the house bell and bringing the waste bin to the house door. The other two members un-loaded the waste into the Suzuki (Refer Plates 1 and 2). This system was developed in the light of experience and provided a flexible method of working.

To obtain some estimates of the time spent in collection, the Suzukis were accompanied and followed with and without informing the crew, as explained in Chapter 3. In one of the accompanied surveys a total of 425 houses were covered in a trip of 240 minutes. Thus an average time of 0.56 minutes per household was estimated from this survey. The un-loading of the waste at the transfer point was done in 30 minutes. The time for waste collection per house increased when the drivers collected their fee from the houses once a month. The average observed was 1.42 minutes per house during a 120 minutes observation when the money collection was in operation. The vehicle moved and stopped at several points in a street to cover 3-4 houses, moved further and continued the operation till it is full of waste. Since there are some double-storeyed houses, so at some houses more than one bins was collected. The proportion of houses with more than one bin was 16 %. The loaded vehicle was then driven to the waste collection point located within the same area. The entire route taken by the vehicles was noted and included as Annexe 5.1.



Plate 1. Primary collection by Suzukis in the case study area.



Plate 2. Collected waste being disposed of at the transfer point.

## 5.2.4 Programme organisation

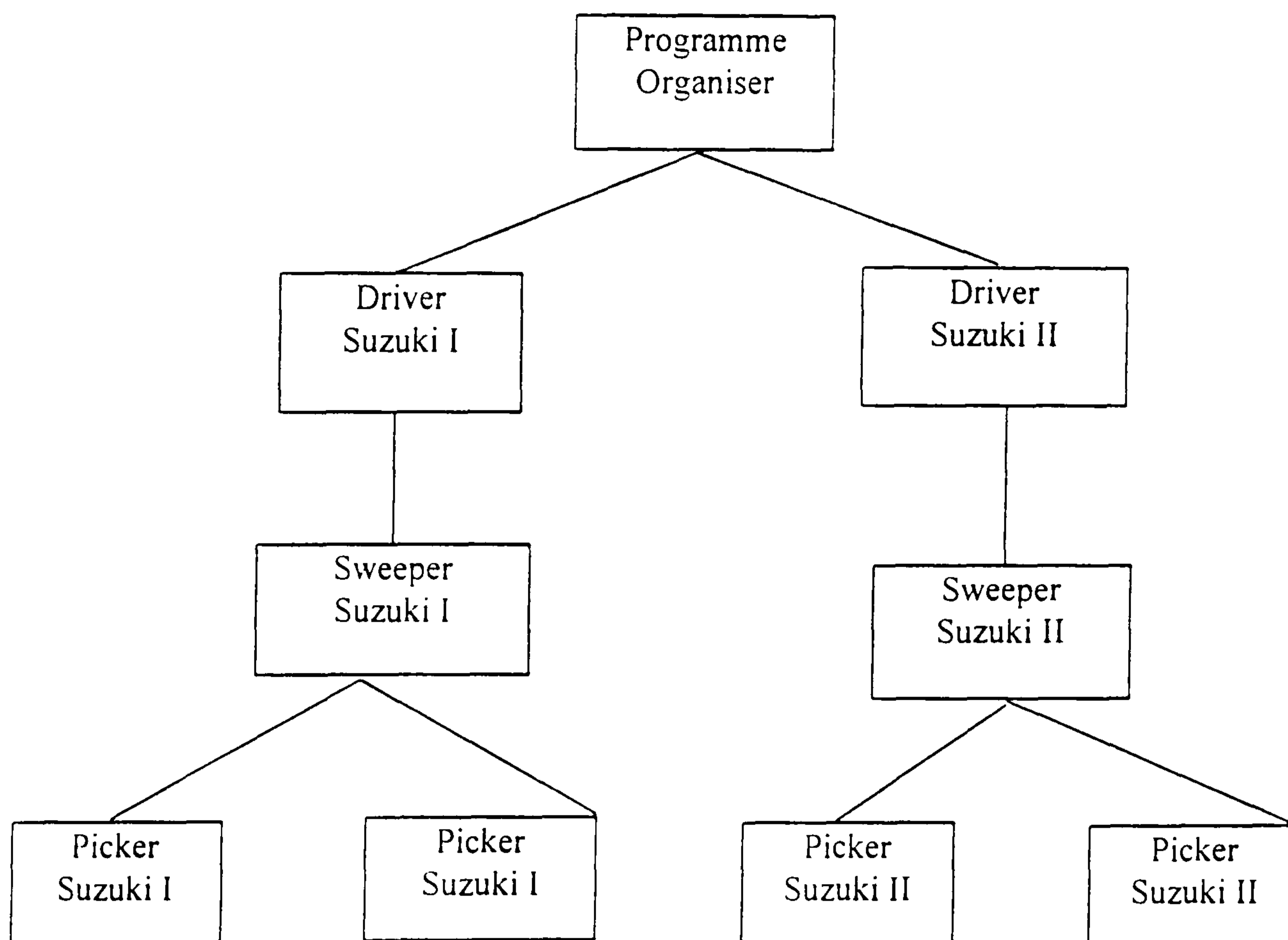
The programme founder and organiser, Mr Rafi acted as the patron of the programme. He looked after the accounting and administration himself with no written, formal records. Most of the day to day arrangements were informal and done at the level of drivers and sweepers on the Suzukis. The core team on the two Suzukis comprise two drivers who were brothers and two sweepers who were also brothers. When the pick-ups move for collection there were several pickers who moved with the vehicles and helped the Suzuki sweepers in waste collection. Thus on each vehicle there was a driver, a sweeper and two pickers (scavengers) who helped in the collection and got the money from the sale of separated components. Initially the collection fee was collected by a person appointed to do the work, but later in 1994 it became the responsibility of the Suzukis' drivers to collect money. The organisation for the two pick-ups is shown in Fig 5.2.

## 5.2.5 Main actors

The **programme organiser** has a political background inherited from his father. At the time of investigations (in 1994) all the local bodies in Pakistan were dissolved and he was not acting as area councillor, even though he was looking after the operation of the Suzukis system. Besides his political affiliations, he was an organiser of the Friday Markets (equivalent to weekend markets in the UK) in the city and known as a respected person in the area. The political affiliation and the personal background of the organiser gave him sufficient powers to control the area police which is generally perceived as corrupt, municipal supervision staff and the sweepers in the area (details are included in the following sections) at the inception of the programme.

The **households** in the area were not involved in the planning, development and day to day operation of the programme. Thus in a way, the residents saw the programme as a service delivery programme and paid a monthly fee. Whenever they had any complaint, they reported it to the Suzuki crew or to the organiser. However they had views about the programme.

Drivers were also responsible for vehicle maintenance, and the two sweepers were responsible for waste collection from the houses and making arrangements with the pickers to help in the waste collection. The two Suzuki sweepers also made contacts with the middle dealers to sell the separated components from the collected waste. The two drivers and the two sweepers were getting a salary from the monthly households contributions which was disbursed through the programme organiser.



**Fig 5.2 Organisational structure of the Suzuki programme**

The **waste pickers** moved with the Suzukis and helped the Suzuki sweepers in waste collection. The reward to pickers was a share of the money obtained through selling the separated components. Pickers were only paid by the Suzuki sweepers through the money obtained by the sale of re-saleable components and not by the programme organiser. The **municipal sweepers** working in the area were affected by the programme, since they lost their monthly payments from the houses. The **municipal supervisors and officers** accepted the programme and supported it, but it depended upon the political powers held by the programme organiser at any time. Details of such power structures are discussed in Section 5.5.2.

## 5.3 Integration in this context

The Suzuki collection programme may be considered important for the municipal sector for the following reasons.

- i. It was providing a service of primary collection of waste which is not provided officially.
- ii. It was operating in a specified physical area which is also defined as a councillor's ward thus the boundaries and responsibilities were well defined.
- iii. It was initiated by a municipal councillor, often the key link between the community and the official sector.

In principle, the formal integration in this case meant that the municipal corporation accepted the Suzuki collection programme as a service for household waste collection. The municipal corporation must assure the secondary collection i.e. from transfer point to disposal site. This also implied that legal protection should be provided to it and it may be replicated in other areas with the help of the municipal corporation.

### *Key points from previous discussion*

- *Suzuki programme operates as a private informal programme of waste collection*
- *Integration in this context is the formal recognition and acceptance of the programme.*

## 5.4 The programme's benefits

The programme has a number of benefits with its present operation. However, benefits which must be important from social angles may not necessarily be contributing to an improved solid waste management. Similarly an efficient service in terms of cost may reduce employment opportunities for the poor. The following sections discuss whether or not the Suzuki programme may be integrated with the official systems. The actual achievable opportunities at the time of integration depend upon how the integration takes place, by whom, when and why. The sections given below discuss some of the potential benefits of the programme.

### 5.4.1 Household participation

The house to house survey revealed that the Suzuki programme was getting waste from 68.6% of the sample houses in a total of 210 valid cases (those who responded). Waste from

the houses was also collected by municipal sweepers, a total of 23.3% of such cases were observed. There are a total of 1,000 houses in the area and the Suzukis system was also collecting waste from about 300 houses in another adjacent area. In this way the Suzukis were getting waste from a total of 1,000 houses when the investigations were conducted. In-depth interviews conducted with the households. Suzukis sweepers and pickers revealed that the municipal sweepers operating in the area are still competing with the Suzukis system to get the contracts for the waste collection from households. The reason for competition when the investigations were conducted was obvious, since the programme organiser was no longer a councillor and so had no means by which to control the municipal sweepers in the area (when the local councillors are working, sweepers are monitored by the area councillor). Table 5.2 gives percentages of the sample population in the Suzuki area who were using different modes for waste removal from their houses (i.e. primary collection) as compared to the Control Area (where only municipal system was operating).

**Table 5.2 System of waste collection and disposal in use by the sample households in the Control area (n = 79) and Suzukis area (n = 210)**

System in use	Percentage (Control)	Percentage (Suzuki)
Municipal sweepers	92.4	23.3
Szukis system	-	68.6
Servants	7.6	5.2
Others	-	2.9

Data and information collected from mid to end of 1994

In other areas of the city, similar to the Suzuki area, municipal sweepers were the main collectors of waste from the household. Investigations were conducted in Block 6 of F. B. Area, as the Control area, which is similar to the Suzuki area in term of physical layout, development and income status. It was found that more than 90 % of the households gave waste to the municipal sweepers under an agreed monthly payment. Thus the table shown above reveals that the Suzukis system has replaced the municipal sweepers collection system. One of the major successes of the programme has been the household participation in the Suzuki's system even in the presence of the sweepers systems in the year 1994. It may be concluded that, in terms of household participation rate, the contribution of the Suzuki system was remarkable.



About one third of the households were not using the Suzuki collection service. Out of those 32% who were not using the service, 40% had used it at some stage earlier, but decided not to use it further for several reasons. The households who were not using the pick-up service did not belong to a particular pocket but were located all over the area. The reasons for not using the Suzukis and the aspect of competition with the sweepers is further discussed in Sections 5.5.6 and Chapter 7.

### **5.4.2 Monthly contribution**

The other direct benefit of the programme was cost recovery. This type of participation was remarkable since the households were also paying taxes to the municipal corporation which included conservancy charges. The programme organiser informed the researcher that the monthly collection fee was fixed at Rs 25 (in the year 1994). However, the sample interviews from households revealed that most of the households i.e. 49.1 % pay Rs 30 per month, with 40.9 % paying Rs 25 per month and some paying more. The difference in the rate was due to a number of reasons:

- the Suzukis organiser wished to increase the rate but did not want to lose customers;
- some of the households were close friends of the programme organiser;
- the municipal sweepers in the area, because of competition, offered a low collection fee.

The reason for high rates like Rs 50 or 60 was because of a greater quantity of waste from some of the sources such as schools, marriage halls or cottage factories. Discussion with the Suzuki driver revealed that they were also collecting waste from a hospital with a payment of Rs 120 per month. Waste was collected from the two marriage halls (community centres) for Rs 50 per month and a school for Rs 60 per month.

Table 5.3 gives payments made by the sample household population to the Suzuki system and compares them with the payments in the Control area.

**Table 5.3 Payments in Rs per month made to the Suzukis system (n = 141) as compared to the payments made to the sweepers in the Control area (n = 73).**

Payment in Rs per month	Percentage of population in the Control Area	Percentage of population in the Suzuki Area
20	-	1.8
25	1.4	40.9
30	6.8	49.1
35	-	1.2
40	13.7	-
50	35.6	-
+50	42.3	7.1
	Mean value = Rs 82.260 Mode value = Rs 50.00 Standard deviation = 63.339 Standard error = 7.413	Mean value = Rs 30.88 Mode value = Rs 30.00 Standard deviation = 10.771 Standard error = 0.824

Data and information collected from mid to end of 1994

Table 5.3 shows that mean payments made to municipal sweepers in the control area are higher as compared to the Suzuki's area.

The information about payments indicate 3 major benefits of the Suzuki system:

- i. The scope of work is well defined i.e. collection of waste from the house. When sweepers operate they also perform a number of other household works and so scope of work and payments differ.
- ii. The collection fee is standardised compared to areas where only sweepers are collecting waste.
- iii. The average collection fee is low compared to areas where municipal sweepers are collecting waste.

The mean value of payments to the municipal sweepers was Rs 82.66 which is 166 % higher than the mean value of payments in the Suzukis area. The difference between the values of standard deviation suggest that the rates in the sweepers area vary more. The reasons for this variation is the municipal sweepers involvement in the cleaning of yards and driveways; an additional service which the Suzuki system does not offer. To judge this argument further, the households were also asked about the works performed by the municipal sweepers in the Control area. Table 6.4 gives percentages of the households using different services from the municipal sweepers.

**Table 5.4 Household percentages using different services from the municipal sweepers (n = 73).**

Service provided by the sweeper	Percentage of Houses
Only collection of waste	57.53
Sweeping court yard	23.29
Sweeping drive way	4.11
Cleaning inside of the house	2.74
Sweeping court yard and drive way	1.37
Sweeping court yard and drive way and inside house	1.37
Watchman <sup>1</sup>	9.59

1. In one of the lanes of the houses a group of 20 houses hired a self employed private sweeper for waste collection, the same person work as a watchman in the night.

Data and information collected from mid to end of 1994

The Suzuki programme has been successful in achieving participation through payments from the households. From the municipal point of view it may be important that any programme of this type is self financed. Whether the Suzuki system is a cost effective system or not is difficult to conclude from the above data. However, it offers a lower fee rate for the waste collection service and the transport of the waste to a central location away from residential area as compared to the sweepers collection system. The limiting scope of work (just to collect waste) would be beneficial for the population and for the municipal sector, but it may deprive municipal sweepers of additional income and additional work. This complex situation to balance efficiency with social considerations is further discussed in the following sections.

### **5.4.3 Resource generation and utilisation**

The Suzuki system like any other private enterprise is cautious in the utilization of its resources. The system not only generates income from the household collection fee but also from the sale of the re-saleable components from the collected waste. The re-saleable components are sold to a middle dealer in the same area. All the materials from non-domestic sources are rich in re-saleable components. Thus the second biggest proportion of income was from the sale of re-saleable components. The income from the re-saleable components varied; the data obtained over a month about the quantities sold to the middle dealers by the collection crews is included as Annex 5.2. When all the waste was brought to the transfer points the re-saleable components were separated by Suzuki sweepers and the

pickers to whom the Suzukis' sweepers allowed access. This means that the Suzuki system is cautious in utilising and generating resources in the following way:

- by involving willing pickers in house to house waste collection without additional expenditures on the income collected as the monthly fee.
- by separating and selling the resaleable components for additional income.

The major expenditures are salaries, fuel, repair and maintenance of the two Suzukis. In addition to their regular salaries, the Suzuki drivers also get an allowance of Rs 20 per day for petrol to transport the separated materials to the middle dealer's yard, and a share from the re-sale of separated materials. Table 5.5 gives average figures for the income and expenditures per month in the year 1994. Figs 5.3 and 5.4 give different flows of incomes and expenditures in different directions.

**Table 5.5 Income and expenditures on Suzukis system in Rs per month during the investigation period.**

<b>Income</b>	<b>Amount (Rs per month)</b>
1. Collection fee from 1000 houses @ of Rs 30 per house.	30,000
2. Sale of separated components from waste @ Rs 222 per day for 26 working days.	5772
3. Petrol subsidy from middle dealer to the Suzukis drivers @ Rs 20 per day for 26 working days.	1040
<b>Total Income</b>	<b>36,812</b>
<b>Expenditures</b>	
1. Drivers salary for two @ Rs 1200 per month.	2,400
2. Sweepers salary for two @ Rs 1000 per month.	2,000
3. Petrol and oil consumption	5,000
4. Regular maintenance as tyres, battery etc.	4,000
5. Major body repair due to corrosion	1,000
6. Depreciation and savings to replace vehicles (reducing capital expenditures)	5,000
<b>Total Expenditures</b>	<b>19,400</b>

Data and information collected from mid to end of 1994 and cross-checked in 1995

The collection fee is fixed for household waste, but is higher if the quantity of waste is more, particularly from some non-domestic sources such as schools, hospitals and marriage halls.

In the above table the income from the collection fee is based on the average fee of Rs 30 per month obtained from the sample. The average income from the sale of the re-saleables is Rs 222 per day. The collection fee and other income to the system only cover the primary collection cost and does not include any cost for transfer, haulage and disposal.

The Suzuki system began in the year 1988, and was due to close in the year 1995 when the author tried to contact it again. There were many social and political reasons for its closure. If we assume that the economic life cycle of the system was complete in the year 1995, a number of financial calculations can be made simpler.

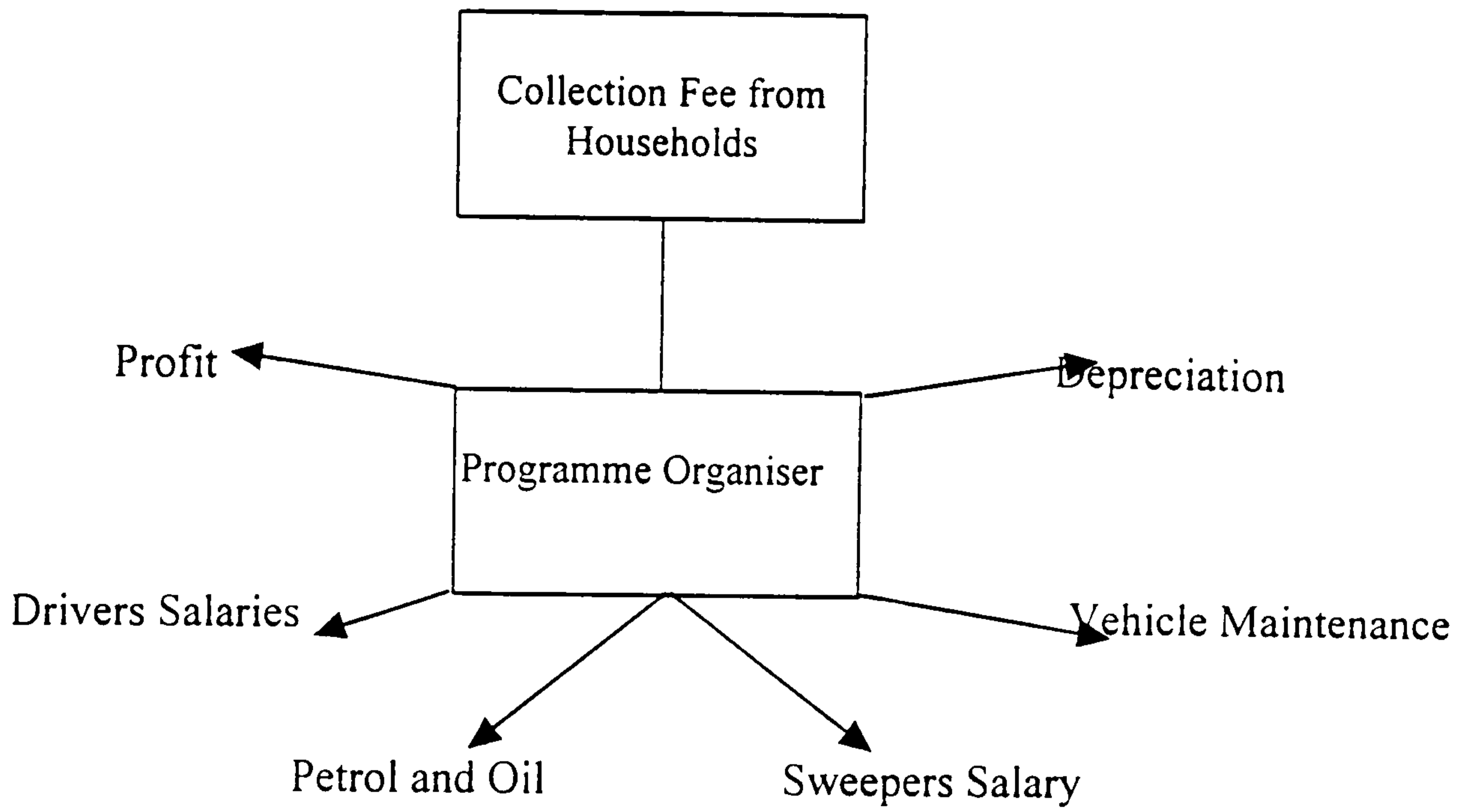
Table 5.6 gives the yearly incomes and expenditures over a period of 8 years, which is the total life cycle of the project. The table is based on a number of assumptions. The investment of Rs 80,000 from the municipal corporation on constructing a walled enclosure in the year 1988 is not considered as capital investment, as it was demolished after neighbourhood objections. Finally, since the system organisers did not keep any account books, the figures were obtained during interviews with different people like drivers, Suzuki, sweepers and pickers. Those figures so obtained were then cross-checked.

**Table 5.6 Annual cash flows (in Pak Rs) of the Suzuki system over the life cycle.**

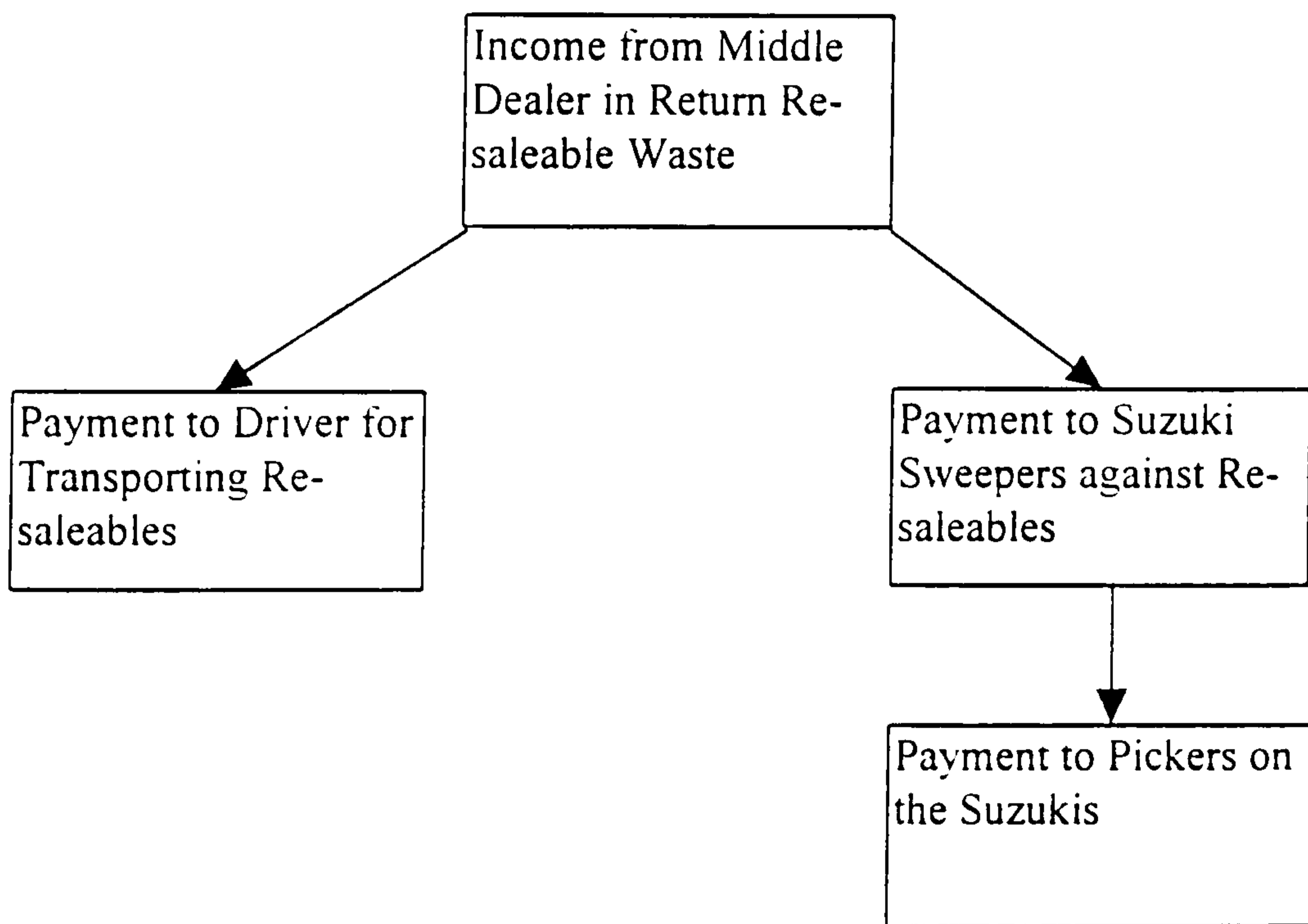
Year	1988	1989	1990	1991	1992	1993	1994	1995
<b>Income</b>	117000	180000	180000	300000	300000	300000	300000	300000
<b>Expenditures</b>								
Salaries Drivers	24000	24000	24000	28800	28800	28800	28800	28800
Salaries Sweepers	19200	19200	19200	24000	24000	24000	24000	24000
Fuel and Oil	48000	48000	48000	60000	60000	60000	60000	60000
Maintenance	24000	24000	36000	48000	48000	48000	48000	48000
Depreciation	5625	5625	5625	5625	5625	5625	5625	5625
<b>Total Expenditures</b>	120825	120825	132825	166425	166425	166425	166425	166425
<b>Net Income</b>	- 3825	+ 59175	+ 47175	+ 133575	+ 133575	+ 133575	+ 133575	+ 133575

**Notes:**

1. In the year 1988 only 650 houses were giving waste to the Suzuki system.
2. In the year 1991 the collection fee per house was increased from Rs 15 to Rs 25, because of an increase in the prices of fuel.
3. In the year 1991 the drivers' salaries were increased from Rs 1000 to 1200 per month and sweepers' salaries increased from Rs 800 to 1000 per month.
4. Depreciation is based on writing off the capital value over 8 years.
5. Data and information collected from mid to end of 1994 and corrected in 1995



**Fig 5.3 Income and expenditures from collection fee.**



**Fig 5.4 Distribution and flow of Income from transport and sale of re-saleable items.**

Table 5.6 shows that the average net income per year is more than the capital expenditure of Rs 45,000 spent on the purchase of two second hand Suzuki pick-ups. The Internal Rate of Return (IRR) is more than 40 % against prevailing loan interest rates between 15 to 20% in Pakistan. In addition to informal resource generation and expenditures by the Suzuki programme, the municipal corporation also expended resources in the area. Like any other area of Karachi, the municipal corporation assumed responsibility for street sweepings for a length of 15,000 meters including two main roads 3,300 m in length. The service provided by the municipal corporation and the Suzuki collection system and the resource input of the two sectors are presented in text box 4:

**Text Box 4 Municipal versus Suzuki System**

Municipal system	Suzuki system
<p>Street sweeping, sweeping main roads, cleaning any special waste as dead animals, animal dung, etc., transportation of waste from the containers to the disposal sites. Resources inputs are:</p> <p>22 sweepers 1 supervisor 1 sub-sanitary inspector 1 vehicle to carry roll-on, roll-off type containers (daily transportation)</p> <p>In addition, other resources and inputs from the more centralised sanitary inspector, health officer, administrative staff, vehicle workshops etc. are also provided.</p> <p>Estimated average annual establishment cost is Rs 650,000 which is basically paid in salaries, repair, maintenance and fuel etc.</p>	<p>Collection of waste from 1000 houses and disposing it at a transfer point in a play ground in the same area. Resources inputs are:</p> <p>2 sweepers 4 pickers 2 drivers 2 Suzuki vans</p> <p>In addition there are inputs from the programme organiser and vehicle repairs are done by a private workshop.</p> <p>Estimated average annual establishment cost is Rs 150,000 which is basically paid in salaries, repair, maintenance and fuel etc..</p>

The physical boundaries of the two areas are same.

The municipal sweepers also bring the waste collected from the streets to the refuse containers or collection points. The loading of refuse containers and the open refuse trucks is done by municipal loaders (coolies). Theoretically two containers of waste are transported daily from the area to disposal sites by municipal vehicles. In addition, an open refuse truck visits the area half full and collects waste from a few informal collection points. There is a deployed staff of 22 sweepers, 5 containers loaders, 1 sanitary inspector and 1 supervisor in the Suzuki area. The total salary paid to these staff by the official agency is about Rs 50,000 per month, which is several times the salary expenditure on the Suzuki's collection system.

In addition to the salaries of field staff, there are inputs from more central staff such as sanitary inspectors, health officers and administrative staff. The capital expenditure is in terms of refuse vehicles, containers and other equipment. A comparison of capital expenditure is not possible since municipal vehicles cover a number of other areas. The other benefits of the decentralised Suzuki's programme and further details of cost are included in the following sections and further discussed in Chapter 7 and 8.

#### 5.4.4 Operational efficiency

The operational efficiency of the programme was measured by observing the reduction in waste piles in the area and the public attitudes to the programme. Reduction in waste piles was observed through cleanliness assessment of the area as explained in Section 3.11.7, which gives an indication of the reduction in the waste piles in the programme area as compared to other areas. In addition, household surveys and in-depth interviews were useful in assessing the public attitudes to the programme. The programme efficiency in terms of reducing waste piles is discussed below, while public attitudes to the area's cleanliness and the programme are discussed in Section 5.5.1. The locations of fresh waste piles, garden waste, construction debris and transfer point enclosures were noted down. The survey was conducted by the same surveyor on two different days. The number of different types of waste deposits within the Suzuki area of 116,000 sq-yds was compared with the waste piles in a control area of 77,000 sq-yd. The results are given in Table 6.7 and their locations are attached as Annex 5.3.

**Table 5.7 Number of fresh waste piles garden waste piles, and construction debris in the Suzuki area as compared to control area.**

Type of Waste Pile	Suzuki Area	Control Area
Fresh Household Waste	12	22
Construction Waste	50	8
Garden Waste	8	5

Data and information collected from mid to end of 1994

The higher number of construction waste piles and garden waste was confirmed through non-participatory observations. Since construction waste is higher in density and garden waste occupies higher volumes per unit weight, the Suzukis crew was reluctant to pick-up that waste. It appears that the municipal sweepers system was more effective in removing construction debris from the area, since sweepers with a hand cart are better equipped and



have more time to remove construction waste, as compared to the more mechanised and faster Suzuki system. The sweepers with the hand carts can not walk long distances, particularly when they have to collect waste from a number of houses, and there were no designated places to dispose of the waste. However it is obvious from the above tables and other surveys, that the Suzuki system was more effective in reducing the number of fresh household waste piles in the area.

#### **5.4.5 Employment opportunities**

The Suzukis system has not only shown benefits in terms of cost reduction and efficiency but also provides private sector employment to at-least 8 persons including 4 waste pickers. This employment is set against a total capital investment of Rs 45,000 in 1988. The cost of providing employment in the private-informal sector in Karachi is relatively low, for example to become an IWB one only needs Rs 2,500 for a push cart and a rolling cash sum of Rs 100. During another visit in May, 1995 it was revealed that one of the pickers was working as a driver of a pick-up, implying a social upgrading. What pickers' speak about their work is in Text box 5:

##### ***Text Box 5:***

##### ***Pickers with the Suzukis***

*Khalid was one of those four pickers who were collecting waste with the Suzukis when the research investigations started. He was perhaps the youngest, aged only nine, and the most out spoken of all the crew. Young Khalid, a smoker, willingly agreed to talk with the author when the un-loading of waste was in operation at the transfer point. He had been picking waste in the same area, including the same transfer point, before joining the Suzuki team. He was offered work with the Suzukis by the sweeper on the Suzuki. Khalid said that his father was too old and sick (may a drug addict) and was un-able to work, so his mother and he worked as the only earners in the family. His mother worked as a house help (domestic servant) in the same area. Khalid has three brothers, the younger one looks after the youngest when the mother is out at work. Khalid was happy and satisfied with the work on the Suzuki and said that he earned a guaranteed amount of Rs 40 every day, paid when the day ends. When he was working as a picker he used to take advance money from the middle dealers; with the Suzuki system he can get an advance from the sweeper.*

*During the research investigations, Khalid left the Suzuki work, and started picking waste again. The reason he gave was that one of the drivers of the Suzukis misbehaved towards him and called him names. After that incident Khalid was not observed with the Suzuki crew, but talked frankly about his waste picking work at the transfer point. Majid was another young teenage picker and a nephew of a sweeper on a Suzuki . He was studying in the seventh level at a local school but left, since his family needed money for survival. Majid had no idea how their work could be improved, but he thought that further source separation of waste would not help him, since separated quantities would be taken away by servants before pickers got to it. Amjad had been trained as a tailor in a shop, but since there was very little work, he decided to start work with the Suzukis. His father had two wives and left Amjad's mother to earn and survive herself. He was also a relative of one of the sweepers on the Suzukis. He said that cuts and wounds were not very common, however, when he got a cut, he rubbed it with some brake oil, as suggested by one of the drivers. Abbass, aged twelve was another picker working with the Suzukis. His father was a construction worker and his mother a domestic servant. He worked as a street picker before this work and felt more satisfied working with the Suzukis.*

#### **5.4.6 Community's attitudes: as benefits**

Residents satisfaction over the programme's performance was assessed through the methods described in Section 3.11. The households selected through a random sample comprised both; the Suzukis users and those who were using other methods for waste collection. The attitudes were also assessed on similar variables in the control area where only the municipal system was operating i.e. the Control area. The residents were given a choice of four levels of satisfaction ranging from fully satisfied to totally un-satisfied. Table 5.8 compares the level of satisfaction of residents in the two area by showing the percentage of residents satisfied or not satisfied.

**Table 5.8 Satisfaction over area cleanliness in the two sample areas as percentage of residents.**

Level of Satisfaction	Suzukis Area (n = 212) %	Control Area (n = 79) %
Fully Satisfied	23.6	1.3
Satisfied	42.9	11.4

Not Satisfied	16.0	6.3
Totally Un-satisfied	17.0	81.0

Data and information collected from mid to end of 1994

A total of 66.5 % (23.6+42.9) of the residents in the Suzukis area are satisfied with the overall cleanliness in the area compared to only 12.7 % (1.3+11.4) in the area where only the municipal system is operating.

A cross-tabulation of the two variables i.e. the satisfaction over area cleanliness with the users of the different system was done to see the relationship between the two variables. Table 5.9 gives the result.

The chi-square test finds a weaker degree of association (significance 0.0804) between the two variables. Generally a value of less than 0.05 is considered adequate to make judgements about cause and effect in statistically drawn samples. Among the residents who are fully satisfied, 76 % use the Suzuki system and only 20 % use the sweepers system. The findings are not adequate to conclude that the increased level of satisfaction over area cleanliness in the Suzuki area is because of the Suzuki system. However users who were using the Suzuki system were more satisfied over the area cleanliness as compared to the users of other services.

**Table 5.9 Cross tabulation of the residents satisfaction over area cleanliness with the users of different systems in the Suzuki area (n = 209).**

Collection System / Satisfaction	Fully Satisfied	Satisfied	Not Satisfied	Totally Un-satisfied	Row Total
Sweepers	10	17	12	9	48
Row %	20.8	35.4	25.0	18.8	23.0
Col. %	20.0	19.1	35.3	25.0	
Tot. %	4.8	8.1	5.7	4.3	
Suzukis	38	66	20	20	144
Row %	26.4	45.8	13.9	13.9	68.9
Col. %	76.0	74.2	58.8	55.6	
Tot. %	18.2	31.6	9.6	9.6	
Servant	0	5	1	5	11
Row %	0	45.5	9.1	45.5	5.3
Col. %	0	5.6	2.9	13.9	
Tot. %	0	2.4	0.5	2.4	
Others	2	1	1	2	6
Row %	33.3	16.7	16.7	33.3	2.9
Col. %	4.0	1.1	2.9	5.6	
Tot. %	1.0	0.5	0.5	1.0	

Column Total	50 23.9	89 42.6	34 16.3	36 17.2	209 100
--------------	------------	------------	------------	------------	------------

Chi-Square = 15.40281, DF = 9, Significance 0.08045

Note: A brief write-up on the use and importance of the Chi-Square test is included as Annexe 4.1.

Data and information collected from mid to end of 1994

The other benefit of the project is the community's response and their feeling of owning the project as compared to the people living in the control area. The in-depth interviews with the residents revealed that they have a belief that the Suzuki system if operated efficiently and regularly, can solve the problem of the waste collection system in their area. When the residents were asked to give their suggestions about improvements to the waste management system in the area, a number of them gave more specific suggestions than the residents in the control area. For example the residents in the Suzuki area thought that the Suzuki system could be improved by making it more regular and that somebody should be responsible for the street sweeping. A total of 18 % of the respondents gave suggestions which referred to the Suzuki system and very few think that it is an ad-hoc arrangement. The residents suggestions range from improvement in the current Suzuki system to its replication in the other areas of the city. In comparison, the suggestions from the respondents in the control area were more general such as "government should do it, why do we pay taxes"?. Surprisingly, in the control area, which is a nearby area, residents are quite aware of the Suzuki system. A total of 67.5% of the residents in the control area thought that such a Suzuki system could also operate in their area. A total of 27.5% of the residents did not think that such a system could work in their area and only 5 % of the respondents did not know about the Suzuki system. It is concluded that the Suzuki system with its limited success, had at least contributed significantly in changing the public attitudes, not only in the area where the system was operating, but also in some of the adjacent areas.

***Key findings from previous discussion***

- *The Suzukis collection serves 68% of the houses in the area.*
- *The system has operated successfully for 6 years.*
- *The system not only generates its own funds but also earn a profit with an internal rate of return of more than 40%.*
- *The programme provides opportunities for employment and social upgrading for the poorest section of the population.*
- *The programme provides an improved environment in the area.*

## **5.5 Constraints to integration**

The Suzuki system has contributed in mobilising the community's involvement, generating monetary and non-monetary resources, improving cleanliness levels in the area, creating additional employment and changing the community's perception on their own role in getting better services for improved solid waste management. The municipal sector can take advantage of all these benefits. The key factor is whether or not the municipal sector with more controls will be able to retain all the benefits once integration is initiated. However, the following sections indicate that in addition to a number of benefits from the programme there are also constraints to it. Thus for formal integration to be achieved over the short to medium term seems unlikely, since the programme deprived sweepers (one of the poor group) of their additional income and the driving force of political will is absent. There are also constraints because of attitudes and certain complex relationships. The opportunities discussed above are important and interesting but formal integration can only be achieved when the constraints, caused by the attitudes and relationships discussed in the following sections have been overcome.

### **5.5.1 Community's attitudes: as constraints**

This section discusses those attitudes which are constraints to integration. Efforts to integrate the Suzukis collection with the official system or to replicate the programme in other areas need an in-depth understanding of the attitudes of the actors involved. The following sections discuss the attitudes of the key actors; the community (or users of the service), the municipal officers, supervision staff and the Suzukis crew and drivers. All the attitudes result from the past and present performance of the Suzukis system and any positive or negative change may influence those attitudes in future.

The respondents were asked about their satisfaction on the performance of the Suzuki's system. A number of non-users of Suzukis also responded to the question. The analysis found that a total of 24.3% of the users were fully satisfied with the system, 42.2% were only satisfied, 20.5% were not satisfied and 12.97% were totally un-satisfied with the current Suzuki system. In this way the satisfaction was assessed on four relative levels. The satisfaction was then compared with the users' satisfaction with the sweepers' system in the control area. This revealed that the levels of satisfaction over the sweepers service were

similar. This similarity in the satisfaction of the users of both the Suzuki system and sweepers' system may be attributed to the following reasons:

- the Suzukis system was quite irregular at the time of investigation because of maintenance problems.
- residents did not foresee problems in the sweepers system unless they had experience of an alternative waste collection system.

To further examine users' attitudes to the Suzuki system, they were asked directly about the contribution of the system to the overall cleanliness of the area. In this case again both users and non-users of the Suzukis system responded. Table 5.10 gives percentages of the population who feel that the Suzuki system contributed positively to the area's cleanliness and the idea that similar systems may benefit other areas. This is different from the respondents' satisfaction over the area cleanliness as presented in Table 5.8.

**Table 5.10 Level of satisfaction and percentages of the respondents on the satisfaction over Suzuki's system (n = 20).**

Level of Satisfaction	Percentage of Respondents
Yes: it contributed	24.5
Contributed: up to certain extent	55.0
No: not contributed	14.5
No: not at all contributed	6.0

Data and information collected from mid to end of 1994

A very high percentage i.e. 55 % of the respondents felt that it was an effective system but not a complete solution to the problem.

### 5.5.2 Municipal attitudes

The municipal sector interacts with the Suzuki system at two levels:

1. The municipal staff working in the area includes municipal sweepers and supervision staff.
2. The municipal officers in charge of operation who know about the programme (municipal officers in solid waste planning do not know about the programme).

Semi structured interviews were conducted with the Zonal Health Officer, Chief Sanitary Inspector of the Zone and the Supervision staff in the area. For the purpose of triangulation,

semi structured interviews were conducted with the Suzuki programme organiser. The programme organiser revealed that the municipal officers in operation co-operated when the programme started. In the same year the organiser also got a fund of Rs 80,000 from the municipal corporation to construct a walled enclosure for the transfer station. The reason for that was probably political pressure from the local party which was in power. However, even at that stage the municipal sweepers were not really in favour of the programme, since the programme was a direct interference with their additional income from the waste collection service. The programme organiser also mentioned the municipal officers' lack of interest in the programme, as he perceived a reduction in additional income for the officers through having fewer sweepers. The sweepers not only collect waste from a certain number of houses, but also sell and purchase waste collection rights among each other (Ali et. al, 1996). The reduction in sweepers' additional income is considered as a major constraint to integration, which creates a negative attitude among area sweepers. The programme organiser and the collection crew revealed that they had used some harsh and strict methods to control the area sweepers during the inception of the programme.

On the other hand the municipal officers incharge of operations did not believe that the programme may be replicated in other areas, because although it reduced municipal responsibilities it also reduced municipal authority. Thus the municipal officers were not in favour of accepting or replicating programmes such as the Suzuki system.

After a further discussions on the benefit of the programme, municipal officers admitted that the changes in the solid waste collection system through adoption of programmes like Suzukis, may be done by the non-government organisations and not by municipal corporations. Past experiences show that the thrust for decentralisation, decisions about municipal budgets and community involvement, in the social environment of Pakistan may only come from politicians or armed forces rather than municipal officers. Furedy concludes from her Indian experience that the municipal officers in developing countries do not have the power to address waste reduction, decentralisation or recycling directly (Furedy and Shivakumar, 1990). Mostly officers fear that 'open planning' which would allow residents to have a say in policy-making would be counter-productive for waste management. Most of them want to have a better capacity for regulation and enforcement. As discussed in Chapter 4, municipal officers like to retain the current status quo and do not initiate changes.

### 5.5.3 Attitudes of workers in the Suzukis system

Most of the crew and the drivers on the Suzukis are optimistic about the growth, development and replication of the programme. However, they think that it should be supported by 'an external force'. That external force may be a local councillor, a waste management enterprise or municipal legislation to protect the crew. They fully understand and explain that the municipal sector will not strengthen such a system, since they believe that it is:

- a reduction in municipal sweepers income.
- a reduction in the income of the municipal officers.

This overall view of the collection crew on the Suzukis was not much different from the programme organiser's point of view. The Suzukis drivers thought that such programmes of waste collection might be replicated in other areas, provided that the system got co-operation from the residents and community leaders like the Suzuki organiser and have appropriate vehicles. However, they foresaw a number of problems during the initial phase of the programme. When the Suzuki drivers were asked whether they could run the programme without the programme organiser, they simply said "no", probably because of their own lack of power. The drivers perceive that when residents are familiar with a certain system and have used it for many years, they are reluctant to adopt a new system.

#### *Key points from previous discussion*

- Residents perceive a cleaner neighbourhood environment in the area where Suzukis operate.
- Suzukis users also see a number of operational problems.
- Municipal attitudes and the attitudes of workers in the Suzukis system are not favourable for integration.

### 5.5.4 Relationship and dependencies

The programme organiser had a key role in planning and operating the system. He was acting as a patron of the programme and gave protection to the workers against adverse reactions from other stakeholders. The programme was informal in nature and so had no legal security. As a result it faced a number of problems from area police, traffic police, municipal staff and residents. Without the protection of the programme organiser it would have been difficult for



the programme to survive. Semi structured interviews with the municipal supervision staff revealed that a programme, similar to the Suzuki programme was forcefully stopped by the municipal sweepers with the help of area police in another part of Karachi. Thus the protection provided by the organiser was necessary for the successful operation of the programme. In depth interviews with the residents and the Suzuki crew revealed that the households would not participate in the programme if the organiser was not involved, since most of the residents personally knew him and he was a resident of the same area. During semi structured interviews the two drivers fully accepted the key role of the programme organiser and admitted that the programme could not run without his protection.

The sweepers working on the Suzukis were interested in running the programme independently, an attitude exactly opposite to that of the drivers. However, in the current social environment of Karachi it seems impossible to run a programme like the Suzukis without 'sustainable protection' as provided by the organiser. The role of the programme organiser is similar to that of the middle dealers discussed in Chapter 4. However the major difference between the two roles is that the Suzuki organiser is directly confronting the municipal system whereas middle dealers are not. Thus, if any integration of the informal and the official system takes place, the role of protector must be filled in the absence of institutional or legislative support. Whilst analysing the role of scavengers (waste pickers) in Indonesia, Sicular (1991) found that the social and productive relationships into which Indonesian scavengers enter are found to be structurally similar to peasant production. The more a waste picker is tied into a social network, the more secure is their existence, though their income is not necessarily higher. Such dependencies are one of the major constraints to integration and cannot be overcome without a number of long term interventions. This is a strong argument in favour of the present thesis i.e. that attempts to integrate such private interventions are difficult.

The relationship among the collection crew and with the drivers is not complex since neither group depends upon other and there is a clear cut demarcation of responsibilities. The relationship was also better as the two drivers were brothers and the two sweepers were also brothers. The involvement of pickers was totally directed by the Suzuki sweepers. However only two pickers were working regularly, while a number of other kept switching from the Suzukis to picking jobs and vice versa, as observed during the seven months duration of data

collection. The reasons for leaving the job were usually personal (see Section 5.4.5). The relationship of the collection with the other street pickers operating in the area and the itinerant waste buyers was normal. The reasons may be that pickers still depend mostly on the waste arising from the small factories and the commercial sources such as shops in the area.

The Suzukis system did not effect the itinerant waste buyers' system as the re-saleable components were intercepted at the household level (see Section 4.3.2). The average per capita separation rate in the Suzuki area was found to be 0.018 Kg/day, compared to 0.005 and 0.009 Kg/day in the Karachi Administration Society and Control Area respectively. To further see the impact of the Suzuki system on household separation activities, a cordon survey was conducted to observe the number of IWBs leaving and entering the area. Similar surveys were conducted in the other areas. The average number of IWBs who visited the Suzuki area was 25 per 1000 houses, as compared to 33 IWBs visiting the Control Area and 18 visiting the KAWWS area. Further discussions with the households, IWBs and middle dealers confirmed that the Suzuki system had not effected the household separation system.

The relationship between the users of the service and the collection crew was also straight forward. The users were by now familiar with the faces of sweepers and drivers working with the Suzuki system. In the first few years the Suzukis also used a siren or horn to warn the users in a lane of their arrival. However during participatory observation with the collection crew, unhelpful behaviour was observed from some of the users such as delays in opening the house doors to give waste and also in keeping various sizes and shapes of waste bins which were very difficult to un-load. This was a common problem mentioned by the all the Suzuki crew. No instruction or guidance had been issued to the users on the type or shape of bins from programme organiser. There was no agreement or understanding between various groups involved. In general, most of the households used the system as a service and ignored the hardships faced by the collection crew.

The key conclusion is that the programme organiser acts as a patron to the programme. The relationship between the municipal sweepers and the Suzuki crew is competitive and complex in nature.

### **5.5.5 Municipal transportation**

The waste collected by the Suzukis was brought to a transfer point for further transportation by the municipal vehicles. This practice also encouraged other waste generators, such as construction contractors, municipal and private sweepers and owners of small industries to dispose of their waste at the same place. The transfer point was in poor condition and it was obvious that the quantities of waste brought to that place were far greater than the quantities lifted by the municipal corporation for secondary transportation. The system clearly depended on the municipal corporation for further transportation of waste. There were various reasons for the failure of the municipal service to provide an adequate collection:

- i. Lack of interest in the programme from the municipal staff, particularly when the organiser was not an area councillor.
- ii. Increased waste quantities at the disposal place, as there were no places for transferring waste.
- iii. Residents were only interested in the removal of waste from their houses and so did not develop effective campaigns for the improvement of the neighbourhood environment. The reasons for this lack of motivation may be low level of awareness about the adverse effects of exposed waste.

This problem is very similar to what was observed in Madras, India. An organisation known as

Civic Exnora organised their own waste collection and street sweeping programme successfully, but failed to get municipal help for further transportation of waste from transfer points (Furedy, 1993).

### **5.5.6 Impact on municipal sweepers**

As we already know through our previous discussions the developed areas in cities like Karachi need two basic services for the solid waste collection:

- street sweeping i.e. collection of spread waste, dust, silt etc. from streets.
- collection of waste arising from the households.

The Suzuki system collects waste from the houses and leave the work of street sweeping to the municipal sweepers in the area. Theoretically, municipal sweepers are responsible for this work, but actually their interest in the area depend on their additional income from household

waste collection. Investigations were conducted to find the impact of the Suzuki system on the existing sweepers collection system (for more details of the sweepers system see Chapter 7);

The Suzuki system created adverse conditions for the municipal sweepers operating in the area which has deprived them of the additional income. The Suzuki system re-allocated the incomes in the sense that instead of a number of sweepers benefiting from it, it was going to vehicle maintenance, fuel and the few workers on the Suzukis. In a developing country like Pakistan people are always in search of some work for their survival. The discussion of the impact of Suzuki's waste collection system on the municipal sweepers can not be fully understood unless an understanding of the existing sweepers' collection system is achieved. Thus a detailed discussion is included in Chapter 7 of this thesis. How this aspect of income generation should ideally be balanced with efficiency, is further discussed in Chapter 8.

### **5.5.7 Problems with the Suzukis**

A other major problem is that the vehicles were not designed for waste collection and they become corroded by the fresh waste. There were maintenance problems, and there was no stand by vehicle. In a hot climate the waste rots in 24 hours and also residents like to have a daily collection system. Semi structured interviews with the Suzuki drivers revealed that Suzukis were out of order for increasingly longer times, as both the Suzukis were quite old (1979 model) and the mode of operation required stronger vehicles. The drivers and the collection crew understood that if the vehicles were out of order for a long time the households shifted back to the old system of collection through the municipal sweepers. The structured interviews with the residents revealed that 52 % of the respondents using Suzukis see irregular service as a major problem. Table 5.11 gives reasons of non-satisfaction with the Suzuki system as perceived by the responding population. It is interesting to note that a very small proportion of the respondents considered high charges as a problem, but they had observed the Suzukis leaving the garden waste and construction debris.

The unreliable collection service due to frequent vehicle maintenance and the reluctant attitude of the organiser to replace the vehicles or to make further investment may be due to the high risk of the programme, which he foresaw because of changes in the political scene. If the programme organiser, who is also a political worker lost power, the municipal sweeper and supervision staff would take over all the business in the area.

**Table 5.11 Reasons of non-satisfaction with the Suzuki system (n = 121)**

Reasons for Non - Satisfaction	Percentage of Population Complained
High rates of collection fee	1.65
Irregular service	52.07
Leave waste quantities	43.80
Other problems	2.48

Data and information collected from mid to end of 1994

### **5.5.8 Political interference**

The other major constraint to integration was political influence on the solid waste management system. The management of solid waste comes under municipal corporations, where major decisions are taken by a council of elected councillors and a mayor. When the local bodies are active, the area councillor acts as a link between the community and the municipal office. Residents complain to the councillor if there is any problem and the councillors try to solve it. The municipal staff for solid waste management are allocated according to councillor's wards and all the staff regularly report to the area councillor. There are definite advantages of this system, particularly in terms of decentralisation and public involvement in decision making. However, like many other institutions, the accountability of the local bodies is also in-effective in Pakistan. As a result, the solid waste management system comes under political influences, which affected the proper operation of the Suzuki system. The local bodies are often dissolved by federal governments and replaced by a non-elected system. The people representing their areas in the non-elected system, try to introduce their own system, as happened in the case of Suzuki (and in another case discussed in Chapter 6).

In late July 1992 the Karachi Municipal Corporation (KMC) was superseded and the elected mayor was replaced by an administrator. In September 1994, a 222 members advisory council for KMC was selected; one representative from each councillor's ward, as an alternative to the elected local bodies. The newly appointed advisors started to make changes in the current system, which affected the motivation of the organiser of the Suzuki programme. The person who was selected from the Suzukis area was from the party in opposition to the organiser's party. Improvement of solid waste collection was taken up as a priority area by all the new advisors, as it could create a favourable feeling among voters, in

the shortest time. Similarly, in the Suzuki area, the municipal staff was asked to report to the newly selected advisor. The Suzuki organiser lost all the powers to operate the system and to control the municipal staff. The Suzuki system stopped operating in April, 1995. Both the drivers took other jobs, one sweeper left and only one sweeper was operating Suzukis collecting waste from a few houses. A picker started to drive one of the Suzukis. Thus a **successful, decentralised and participatory model for waste collection came to an end after 6 years.** The dependency of the programme on the political changes is the most important point to mention in this section, which again supports the guiding hypothesis. However the rise and fall of the Suzuki system gives us important lessons about integration. The closure of the system is in itself the strongest argument in favour of the present thesis. Similar results were observed from other countries, for example Cointreau (un-dated) reported that local politicians naturally tend toward short - term and newsworthy actions, since their own terms are typically short and seldom repeated. It is tempting to succumb to 'vendors' pressure for large private contracts for collection and high technology disposal facilities. New construction is more appealing to politicians than plans to improve day to day operations and maintenance. Klundert and Lardinois (1995), reported that in Mali, political changes in the late 1980s and the fact that the government had to slash public sector jobs to meet the demands of the structural adjustment programme had the effect of encouraging private initiatives. Text box 6 contains what municipal officers in Karachi, speak about the political interference.

***Text Box 6:***

***Municipal officers speak about political interference***

*One of the Zonal Health Officers in Karachi said that the interference by the politicians caused a lot of problems to the solid waste management operations. All the public representatives like councillors, members of provincial and national assemblies etc. are elected to make decisions, prepare long term plans and effective legislation. But these public representatives involved themselves in administrative details. They forced illegal appointments of political workers; people who were not capable and forced the channelisation of resources for political gains.*

*Another Chief Sanitary Inspector said that the Health Departments who were responsible for solid waste management were more attractive to political workers, since there is more field work, and so they get opportunities to work for their political parties.*

*The findings from Karachi, on the political influences were confirmed in Faisalabad, during observations and discussion in the municipal offices.*

#### ***Key points from previous discussion***

- The Suzukis' system depends upon a patron for its existence, who could protect the system from external influences.*
- The Suzukis' system depends upon municipal corporation for further transportation of waste from transfer points.*
- The Suzukis' system is sensitive to the changes in political systems.*
- The Municipal sector is not in a position to provide a replacement for those relationships and some of the dependencies which keep the system running.*
- In addition to a number of constraints identified in the previous discussion the reduction in the sweepers income has been identified as another constraints to integration.*
- The external influences from politicians was also a constraint to integration.*
- The unreliability of the vehicles is also a major problem.*
- Most of the identified constraints support the guiding hypothesis.*

## **5.6 Conclusion**

The Suzuki system has contributed effectively in changing the attitudes of the residents from a 'municipal dependent' to a more 'self reliant' one. The residents in the area have experienced a new system of waste collection and started to think that the systems such as the Suzuki system might be replicated in other areas. The Suzuki system is a direct and clear support to the existing municipal waste collection system in the residential areas and fulfils the municipal objectives of 'improved waste management'. The overall benefits from the Suzuki's programme as discussed in the previous sections could form the basis of an improved solid waste collection system; to improve efficiency and generate income. Details of such a system and policy options to encourage such systems are further discussed in Chapter 7 and 8.

The Suzuki system of waste collection can also be seen as a successful model of enterprise development for primary collection of waste, a more decentralised approach and a model where the community is involved through paying the collection fee. The official integration of such a system needs liberalisation in the policy, where the municipal corporation may allow the grass root level contractors to collect waste and the municipal corporation to monitor and control the contracts.

The conclusion of this chapter raises some basic key issues on the operation of the municipal services. Since it is clear from the previous discussion that there was a public demand for the waste collection service, the Suzuki system operated well and resources were successfully generated for the system.

There are a number of constraints to the formal integration of the informal systems with the official system. One of the major constraint identified is that sweepers are deprived of their additional income from the household waste collection. This in a way increases unemployment and poverty at the cost of an improved waste collection system. The political influence and the technology used were also identified as inappropriate and so a major constraint. If all these constraints can be overcome, the prospects for the formal integration of the two sectors may improve. One question is whether to consider the waste collection service as a public good or a private good, leaving it to the users and providers to use the service and decide the charges. The concluding chapters of this thesis discuss the possible trade off for integration, keeping in view the efficiency, equity and controlling externalities.

The relationships and dependencies in the Suzuki system are well knitted social links, which take the present, appropriate form in the absence formal institutions. Such relationships and dependencies exist in any informal system, for example the relationship of the itinerant waste buyers and the middle dealers as discussed in Section 4.4.4. The key conclusion is that any pilot project or short term intervention can not replace such dependencies and relationships, unless sustainable changes take place in the political and social institutions. Thus under the current situation in cities like Karachi, the formal integration with the official system is not possible in the short to medium term. Primary collection of solid waste has emerged as a complex set of activities with different perceptions and objectives. These objectives may or



may not be equitable, efficient or profitable. The concluding chapters will take up this debate more deeply.

# Chapter 6

## Integration of a CBOs programme

### 6.1 Introduction

This chapter presents a case study of a community based system of primary waste collection which was operating in a residential area of Karachi during the period of study. The system was organised by a community based organisation (CBO) known as the Karachi Administration Women's Welfare Society (KAWWS) comprising housewives living in the area. The key theme of the chapter with respect to the guiding hypothesis is:

*a community based programme, in spite of more organisation and communication than informal sector activities, has very little potential for formal integration with the official system.*

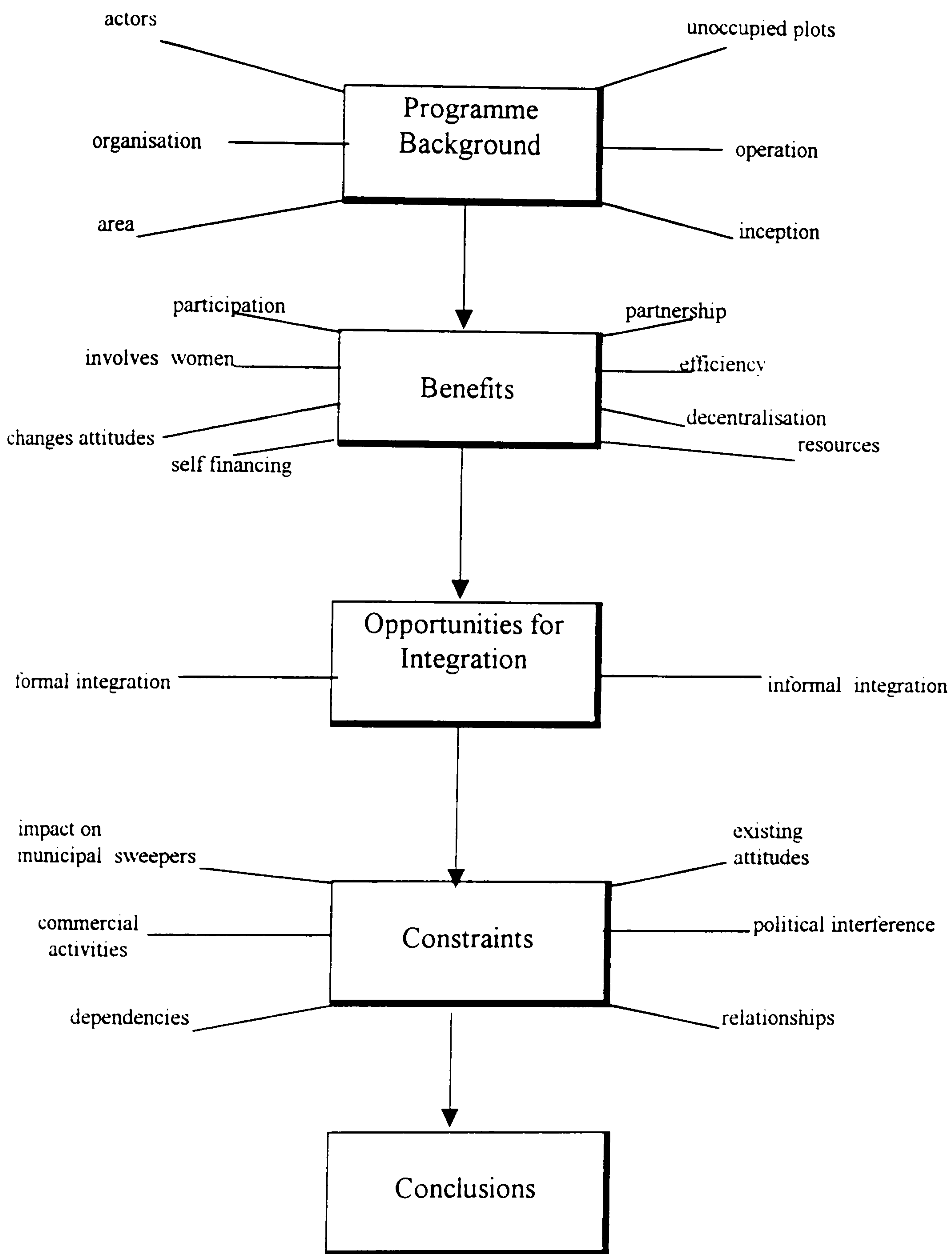
The chapter structure is similar to Chapters 4 and 5; basically it discusses the advantages and constraints of the system around the hypothesis on the potential for formal integration of the CBOs programme with the municipal system. The discussion in the chapter is kept within the boundaries of the guiding hypothesis which states:

*Under the present conditions, private informal systems in solid waste management cannot be formally integrated with the official system.*

An **introduction** to the programme is presented at the beginning of the chapter. This is followed by an assessment of the direct benefits of the programme for improvement of the solid waste management system. There are also indirect benefits of the programme such as the development of community management, and changes in attitudes. Together these benefits are assessed as possible opportunities for the integration of the programme. Here the term **integration** is understood to be where:

*The municipal sector formally accepts the project as the one which helps the municipal corporation, gives legal protection to the programme and protects the project in future planning.*

The chapter then discusses the **constraints** on the programme, including those which are constraints to formal integration. Finally, **conclusions** are drawn from the previous discussion. Fig. 6.1 presents a layout of the logical sequence of various arguments, as they are organised and discussed in the Chapter. The titles of the main arguments are listed in the rectangular boxes and all the related key points are shown around these boxes.



**Fig 6.1 Logical sequence of arguments in the case study.**

## 6.2 The KAWWS Programme

### 6.2.1 The physical area

The KAWWS programme operates in the Karachi Administration Employees' Co-operative Housing Society (KAECHS) which is a higher middle income settlement of the city. The society was planned about 35 years ago for the employees working in the administrative departments of Karachi. About 64% of the households have an income level of more than Rs 5,000 per month, against an average household income in similar areas of Karachi of Rs 4,930 per month (AERC, 1988). The proportion of larger plots in the area is also higher when compared to other areas of the city. The distribution of plot sizes in the area is given in Table 6.1.

**Table 6.1 Break-up of the residential plot sizes in the KAWWS area**

Plot size (sq. - yd)	Number of plots (percentage)
120	114 (9.0%)
200	539 (42%)
400	341 (26%)
600	261 (20%)
1000	43 (3%)

Note: Plot sizes may be generally considered as a rough criteria of the households well-being in Karachi: people living in less than 120 sq.-yd plots are low income, between 120 and 600 is middle income, and more than 600 sq.-yd may be considered as high income group.

Data and information collected in mid to late 1994

The plots in the KAECHS society were occupied gradually and over time, a number of residents sold their plots. As a result many families who were not part of Karachi's Administrative Departments moved into the area (Siddiqui, 1994). When the residents initially occupied the houses they found that they lacked a number of basic infrastructure facilities such as roads, water supply, sanitation, drainage and a system of waste collection. Thus a group of active housewives in the area made efforts to get those services and to work further for the improvement of the neighbourhood environment. This community based organisation is now formally constituted and run calling itself the Karachi Administration Women's Welfare Society (KAWWS).

### **6.2.2 Inception**

From its inception in the year 1988, KAWWS focused on activating civic agencies for urban development with special emphasis on the creation and maintenance of an un-polluted environment which they thought was a pre-requisite for a healthy life for families, especially women's and children (KAWWS, 1991). The women's group got itself registered with the Directorate of Social Welfare, Government of Sindh, in the year 1989. The reason for registration, according to a KAWWS representative, was because they handled public money, for which they liked to have proper accounts. The KAWWS, since its inception, has worked on a number of neighbourhood issues, such as development of parks, road repair, drainage, installation of water supply pumps and arrangements for solid waste collection. Discussions with the programme organisers revealed that Mrs Safina Siddiqui, president KAWWS, had a key role in mobilising the community during the inception of the programme. Her dedication and selfless efforts succeeded in bringing a number of housewives together. As the programme proceeded, the activity of the programmes became more and more organised. At present the programme is producing some regular publications and is well known in the city of Karachi.

### **6.2.3 Operation**

The KAWWS group's strategy was to act as a women's pressure group on civic agencies - with a conciliatory approach; it co-ordinated and facilitated different activities among these agencies and citizens' groups; played the role of a motivator/adviser for other women's groups to replicate appropriate projects; it also created awareness by arranging training workshops and lectures on health, sanitation, and project management (KAWWS, 1991 and KAWWS Briefing Sheet). The KAWWS was managed through an 'office' in the house of its President with a telephone, fax, computer and a photocopier. The KAWWS operations were looked after by its Executive Committee, headed by its President. The other office bearers of the committee were Vice President, General Secretary, Joint Secretary, Treasurer and a Joint Treasurer. In addition there was a team of 10 core members and an election committee. The KAWWS still holds annual elections for the office bearers.

The KAWWS relies on monthly contributions from its members. As the organisation grew there was more and more interest from external donors to support the programme. Gradually the KAWWS attained more formal organisational characteristics and attracted a number of donors. The KAWWS

group felt that the residents were the tax payers to a number of government departments for different services such as water, sewerage, roads, electricity and waste collection, and if a unified approach was adopted to common problems, the delivery of infrastructure might improve. When the group approached government departments concerning shared problems, they usually received a good response. In this way KAWWS tackled a number of problems such as broken sewerage lines, absence of roads and street lights, lack of garbage bins and stagnant sewerage in the un-constructed plots. The steps they take as an approach to address problems are usually as follows:

1. understanding the problem.
2. identifying the concerned departments and their roles.
3. identifying the bottlenecks in the proper delivery of that service.
4. mobilising the community to do what it can to remove the bottlenecks, be it advocacy, financial contributions, a court petition, technical support etc.
5. presenting to the department, the joint approach.

Thus the role of KAWWS is that of a catalyst for improved municipal services rather than to create a parallel system as happened in the case of the Suzuki system. The activities and working of the programme along with their activities with regard to waste collection are discussed in the following sections.

#### **6.2.4 Organisation for waste management**

The KAWWS initiative to improve waste management started in the first instance by lodging complaints with the municipal corporation about inadequate waste collection in the area. There were a number of open plots in the area and so households developed the habit of disposing of waste on the open plots. The responsibilities for collecting and disposing of waste were not clearly demarcated between the Karachi Administration Employees Co-operative Housing Society (KAECHS) and Karachi Municipal Corporation (KMC). Thus, during the struggle to understand the various roles and responsibilities for waste management, KAWWS discovered that the problem was extremely complex (Siddiqui, 1994). They also filed a court petition against KMC and the Provincial government as residents were paying conservancy taxes and not getting any services. As a result they got a team of 10 additional sweepers to keep the area clean. Considering the nature of the problem, the disposing of waste on open plots and the absence of municipal staff, the KAWWS team decided to concentrate further on three basic tasks for waste collection:

- containment of the waste by providing communal bins and organising street sweeping
- motivating lane residents to jointly organise street sweeping
- arrangement of regular and reliable collection of waste from the bins and removal to disposal sites

The containment of waste was initiated by placing circular bins at various places, so that residents, servants or sweepers could dispose of waste into them. The next step to contain waste was to organise a street sweeping system, whereby, in some cases, sweepers were paid by the KAWWS through monthly contributions from the housewives. In other cases the KAWWS asked lane residents to organise street sweepers and pay them directly. The regular secondary collection of waste was tried by paying an extra amount to the refuse collection vehicle driver and crew. At the time of investigation KAWWS was also paying additional sums of money to the municipal sweepers, lower level supervision staff, vehicle crew and the driver. The key hardware components of the KAWWS waste collection programme, as observed at the time of data collection, are summarised in Text box 7:

***Text Box 7 Provisions and Activities by KAWWS***

- *Provision of 30 communal bins in the area for the collection of waste, disposed of by the households.*
- *Regular contribution of money from households and shopkeepers.*
- *Payments to the municipal collection crew and refuse truck driver at the rate of Rs 50 per bin per month. Thus the total payment made to the driver and crew was Rs 1,500 per month.*
- *Payments to municipal sweepers for street sweeping in 10 streets. A total of Rs 1,000 per month was paid.*
- *Payments to the area supervision staff in the range of Rs 100 to Rs 300. A total of Rs 300 per month was paid.*

The KAWWS programme of waste collection was different from the Suzuki programme discussed in Chapter 5 in a number of ways. The major difference was in the organisation and approach of the programme: the KAWWS programme was more formal in structure and organisation as compared to the Suzuki programme. Another difference was higher participation by the housewives in planning and operating the system in the case of KAWWS as compared to the Suzuki programme. The Suzuki programme operated as a micro-enterprise with profit as an incentive, whereas the KAWWS

programme operated as a community based organisation. The major differences between the Suzuki programme and the KAWWS programme are highlighted in Text box 8:

**Text box 8 Suzuki Programme versus KAWWS Programme**

<b>Suzuki Programme</b>	<b>KAWWS Programme</b>
- Informally organised system with no office.	- Comparatively more formal structure.
- Operates as a micro-enterprise.	- Operates as a community based organisation.
- Capital investment is involved.	- Very little or no capital investment.
- Use vehicles to collect waste from the houses.	- Placed bins at various places to contain waste.
- Not registered with any government department.	- Registered with a government department
- System planned and operated by a local councillor, with a political background.	- System planned and operated by a group of housewives.
- The payments to the system made directly to the collection system.	- Payments to the system made through the KAWWS.
- Municipal sweepers lost all financial advantages from the area.	- Municipal sweepers have been paid additional money through KAWWS but have also lost some income from waste collection works. .
- No organised system of street sweeping, leaving it to KMC.	- Organised system of street sweeping in some lanes.
- Dependent on KMC for waste transportation by refuse trucks.	- Additional money paid to get a regular waste transportation service. Depends on KMC staff.

**6.3 Integration in this context**

The term integration in this context can also be defined explicitly as in the case of the Suzuki system. The KAWWS programme may be considered important for the improved solid waste management because of the following reasons:

- i. It was organising a system of primary waste collection.
- ii. It was operating in a specified municipal area, thus physical boundaries and responsibilities were



well defined.

iii. The programme was self financed.

iv. A group of residents was willing and ready to manage the programme.

In principle, the formal integration in this case meant that the municipal corporation accepted the KAWWS programme as an initiative for household waste collection. The municipal corporation must assure the secondary collection i.e. from transfer point to disposal site. This also implied that legal protection should be provided to the programme and it may be replicated in other areas with the help of the municipal corporation.

The formal integration around the guiding hypothesis, as defined in the introduction, could not be assessed without discussing the benefits and constraints of the programme.

#### *Key points from previous discussion*

- *The KAWWS programme was more formally organised as compared to the Suzuki system.*
- *The KAWWS programme was initiated because of felt need from the activists about certain infrastructure facilities and services.*
- *Housewives were involved in the planning and operation of the programme.*
- *The existing municipal system was not fundamentally changed by the KAWWS system.*
- *Formal integration may be more specifically defined in this case as compared to the integration of informal recycling.*

## **6.4 The programme's benefits**

There were a number of benefits of the programme, identified by the researcher and the programme organisers. Most of the benefits could be considered as the opportunities for the programme to be an officially integrated programme. However, not all benefits were perceived as opportunities by all the groups involved. For example, the decentralised approach adopted by the programme may assist the municipal corporation in effective delivery of services but they may also perceive it as taking a share in their powers. The residents and the actively-participating housewives were found to have a better understanding of the mode of delivery of infrastructure, particularly the roles and responsibilities of different municipal agencies. There were also opportunities for the official agencies through generation and efficient utilisation of resources. An optimistic view of looking at the case study

suggests that if programmes like the KAWWS are carefully developed and supported, they can contribute extensively towards the solution of the problem of the primary collection in the large urban areas of the developing countries. The lesson to be learnt from this case is that if such initiatives are going to foster integration, then careful efforts need to be made to build understanding, acceptance and co-operation between actors as well as the service itself.

#### **6.4.1 Household participation**

The participation of households with the KAWWS programme can be considered as an important benefit. However, actual participation is difficult to define and assess. There were financial contributors to the programme, along with common users and free riders of the services provided by the KAWWS. Participation in this case may be perceived in a number of ways for example, financial participation, active organisational co-operation, passive acceptance etc. In terms of assessing participation it was difficult to separate the perceptions of the programme organisers about role and achievements of the KAWWS programme from the realities of the situation. For example it was difficult to attribute street organisations for street sweepings to the KAWWS campaign, nevertheless such street organisations are not common in other middle income areas of the city. Various ways in which household participation in the KAWWS programme could be defined were:

- i. Participation by housewives as office bearer and members of the KAWWS. They also attended regular meetings and contributed to the routine working of the KAWWS. There were 20 housewives who participated in this way.
- ii. Participation by housewives through a regular financial contribution to the KAWWS. Such participants were not active enough to attend meetings, visit government offices and participate in the KAWWS elections. The number of such contributing members was estimated at 60, representing 60 families.
- iii. Those families who enjoyed free benefits of some common services such as families in the streets where a sweeping system was organised and households disposing of waste in the communal bins but not paying the charges. There was no exact figure available for the number of such users but KAWWS estimated it at 200 families.
- iv) Those households who got the benefit of comparatively more centralised services, such as a waste collection service by refuse vehicle. An improvement in the municipal services brought about by KAWWS agitation. The estimated number of beneficiaries from such a centralised service was 500 families.

In addition to the above four categories of contributors and beneficiaries in the neighbourhood, the KAWWS also advised a small number of other CBOs in the city.

A look at the above mentioned categories suggests that the first two categories really participated in the programme and understood their responsibilities, whilst the other two were only beneficiaries (or free riders). Discussion with the KAWWS office bearers revealed that in some lanes of the KAECHS, households adopted a system similar to the KAWWS and organised their own waste collection. Thus it was difficult to select a single parameter to assess participation. One possible measurable indicator is the contribution of the households to the collective fund for street sweeping organised in the lane. If collective payments are used as an indicator of the participation in the KAWWS programme, then in the responding population of 122 cases 31.1% participated. The proportion of the households who did not collectively arrange street sweeping was 68.9 %. Thus it may be concluded that the KAWWS programme had created an impact on at least one third of the population.

If participation rates are assessed on the basis of the 60 members who contribute to the KAWWS central fund then the percentage of participating members represents only 5% of the total households, located in the close vicinity of the KAWWS office. It appears that the participation rates in the KAWWS programme are not very high as compared to the Suzuki programme, where 68.6% of the sample households have given waste and regular fees to the Suzuki system for the last 5 years.

The KAWWS provided 30 bins in the streets, on vacant plots and other places in the area. The crucial problem of the households in getting rid of the household waste was solved and there may be no interest in organising street sweepings. There were also a number of vacant plots in the area which provided an opportunity to the households to dispose of their waste. Table 6.2 gives percentages of the households using different modes for disposing waste from their houses in the KAWWS area as compared to the other two case study areas. The difference between the control area and the KAWWS area was obvious. In the control area, more municipal and private sweepers were involved in the collection of waste from the houses than in the KAWWS area. A significant proportion of the population had its waste removed by domestic servants in the KAWWS area. In-depth discussions in the KAWWS area with the households revealed that the reason for the involvement of fewer sweepers was because of the number of open space/ un-used plots and availability of bins in the

vicinity of the houses to dispose of waste. However, as the plots become occupied in future, there will be fewer spaces to place bins. For this reason, the involvement of sweepers may increase in future. The KAWWS programme's impact on the municipal and private sweepers is further discussed in Section 6.5.1 and Chapter 7.

**Table 6.2 System of waste collection and disposal in use by the sample households percentages in different areas.**

System in use		Suzuki (n=210)	KAWWS (n=198)	Control (n=79)
Municipal/ Sweepers	Private	23.3%	29.4%	92.4%
Suzuki system		68.6	-	-
Self		-	29.4	-
Servants		5.2	36.8	7.6
Others		2.9	4.5	-

Data and information collected in mid to late 1994

The participation rate was estimated at 20% if measured in terms of how many people were disposing of waste in the bins provided. Recognising the problem of free riders, the KAWWS changed its strategy in the year 1995. Thus instead of providing bins at various places through their central funds, the interested residents in each lane were asked to collect money, find a place for a bin and purchase it from the market or from the KAWWS office. To empty the bin regularly, the KAWWS also asked the people to directly contact the municipal vehicle driver and the supervision staff. This system solved a number of problems, but created some others. The driver and supervision staff did not appreciate the arrangements, since they did not like to collect money from each lane. During the same period, the KAWWS asked the shopkeepers to contribute money, purchase bins and make regular arrangements with the refuse truck driver for further collection and transportation. Further investigation in the months of April and May 1995 revealed that the KAWWS had so far succeeded in motivating the residents and shopkeepers to purchase their own bins. Although the problem of primary collection was solved the problem of waste transportation from the bins was still there. The KAWWS were not reluctant to provide much assistance in this aspect. The problem of waste transportation from bins, which the KAWWS was facing was similar to that which Suzuki programme had faced. The point is further discussed in Section 6.5.2.

In primary waste collection there are different types of services which need different levels of participation and different types of arrangement with the municipal corporation. In the KAWWS system such services may be classified as:

- street sweeping
- installation of communal bins
- disposal of waste to the bins
- collection of waste from the bins by vehicles.

From the above categories, the KAWWS programme had achieved several levels of participation for various services. In depth interviews with the households suggested that most of the households were interested in the disposing of the household waste, few were interested in the regular sweeping of streets and very few felt that the collection of waste from bins by vehicles should also be paid for. The community could willingly accept certain responsibilities which exist within the primary collection. An effective system of waste management could only be achieved through a good partnership between the community, the CBO and the municipal corporation.

#### **6.4.2 Resource generation and utilisation**

The other benefit of the programmes like the KAWWS system, is generation and efficient utilisation of resources. This research identifies the resource generation in the KAWWS programme in the following ways:

- i. The voluntary time and efforts given by KAWWS core team and members.
- ii. The regular contribution to the KAWWS by the participating households at the rate of Rs 100 per month from 60 houses. Thus a total of Rs 6,000 per month was contributed.
- iii. The contribution which residents made as a one-time expenditure to purchase bins.
- iv. The direct payments (not through KAWWS) to the sweepers for street sweeping.
- v. The direct payments to the vehicle driver and collection crew.
- vi. The grants which KAWWS received from donors, for publications, pilot activities etc.

The generation of all the above-mentioned resources may be attributed as a benefit of the KAWWS programme. It may be argued on the basis of data presented in Table 6.2 that the KAWWS had reduced the few other methods of generating resources by the community through the introduction of

bins. Otherwise payments were made to the municipal sweepers for the collection of waste from the houses. At the time of investigation a significant percentage of the population were disposing of their waste through servants or were doing so themselves without the involvement of sweepers. It is also difficult to precisely desegregate the resource utilisation for KAWWS waste collection programme from other KAWWS activities, since the collected money is also utilised for the salary of a gardener, maintenance of parks, court cases and other casual expenditure. Table 6.3 gives regular income and expenditure by the KAWWS programme on the waste collection activities.

In addition to the KAWWS programme, the municipal sector was also operating in the area and had deployed a team of 30 sweepers, two supervisors and a sanitary inspector. There was a refuse truck to collect waste from the bins in the area, which was operating with a driver and 3 crew. The residents had also organised their own street collection programme in a few lanes. In the sample survey a total of 33 such cases who regularly contributed towards street sweeping were observed. The monthly contributions in Rs per month made by them for street sweeping are given as Table 6.4. The total expenditure of the Municipal Corporation is of the order of Rs 50,000 per month. In addition there are central services and capital costs. The work performed by the two sectors in Text box 9:

**Text box 9 Municipal System versus KAWWS System**

Municipal system	KAWWS system
Street sweeping, collection of waste from transfer points for further transportation by vehicles, supervision of sweepers.	Providing bins on streets through community contribution. Extra monthly payments to private and municipal sweepers for proper street sweeping. Extra monthly payments to the refuse truck driver and crew for a regular collection from the community bins and payments to the supervision staff.

**Table 6.3 Regular income and expenditures of KAWWS on the waste collection programme**

Regular Income	Amount (Rs per month)
1. Contribution from the housewives @ Rs 100 per month from 60 houses.	6,000
<b>Total</b>	<b>6,000</b>
<b>Expenditures on Waste Collection.</b>	
1. Payment to 10 sweepers @ Rs 100 per month.	1,000
2. Payment to supervision staff per month.	300
3. Payment to the collection vehicle driver and crew @ of Rs 50 per bin per month from 30 bins.	1,500
<b>Total</b>	<b>2800</b>
<b>Capital Expenditures.</b>	
1. Cost of bins at the rate of Rs 3,000 per bin for 30 bins <sup>1</sup> .	Rs 90,000 (not per month)

1. KAWWS also utilised a grant from the Ministry of Environment and Urban Affairs, Government of Pakistan, to purchase some bins.

Data and information collected in mid to late 1994

**Table 6.4 Payment per house contributing to street sweeping in the sample population (n = 33)**

Payment Rs per month	Percentage of houses
15	3.0
20	3.0
40	3.0
50	9.1
100	63.6
120	18.2

Data and information collected in mid to late 1994

It appears that the KAWWS programme had contributed significantly in the generation of extra resources for the improvement of solid waste collection in the area. Generation of additional resources depends on the type of programme, how it is delivered and who delivers it. Payments for purchasing bins, collective payments for street sweepings and to vehicle drivers are not common in the other areas of the city. It may be concluded that the KAWWS system has contributed in generating additional resources for the primary collection and transportation of waste. The research considers this contribution as an opportunity for integration. Generally, community based organisations in developing countries have shown remarkable capability in utilising and generating additional resources. Their performance is much better than the government sector.

### 6.4.3 Operational efficiency

The other important benefit of the programme observed was in terms of operational efficiency which was assessed as a reduction in the number of waste piles in the area. The waste piles were observed in the KAWWS area during different days of weeks. Figure 6.2 gives a comparison of the waste piles observed in the KAWWS area with other areas and locations of waste piles are shown in Annex 6.1. In the control area the total area covered was smaller, but a higher number of fresh waste piles was observed. It is also obvious that neither the Suzuki system nor the KAWWS system took care of construction and garden waste effectively. It seems that the number of fresh waste piles may also depend upon the number of sweepers operating in the area. Since sweepers can not carry waste to a distance as a result waste piles appear in the area. The non-participant observations in the Suzuki area and discussions with the KAWWS office bearers confirmed this observation. The reduction in fresh waste piles is more important from a health aspect and it seems that the KAWWS system has achieved some degree of reduction in waste piles as compared to the control area.

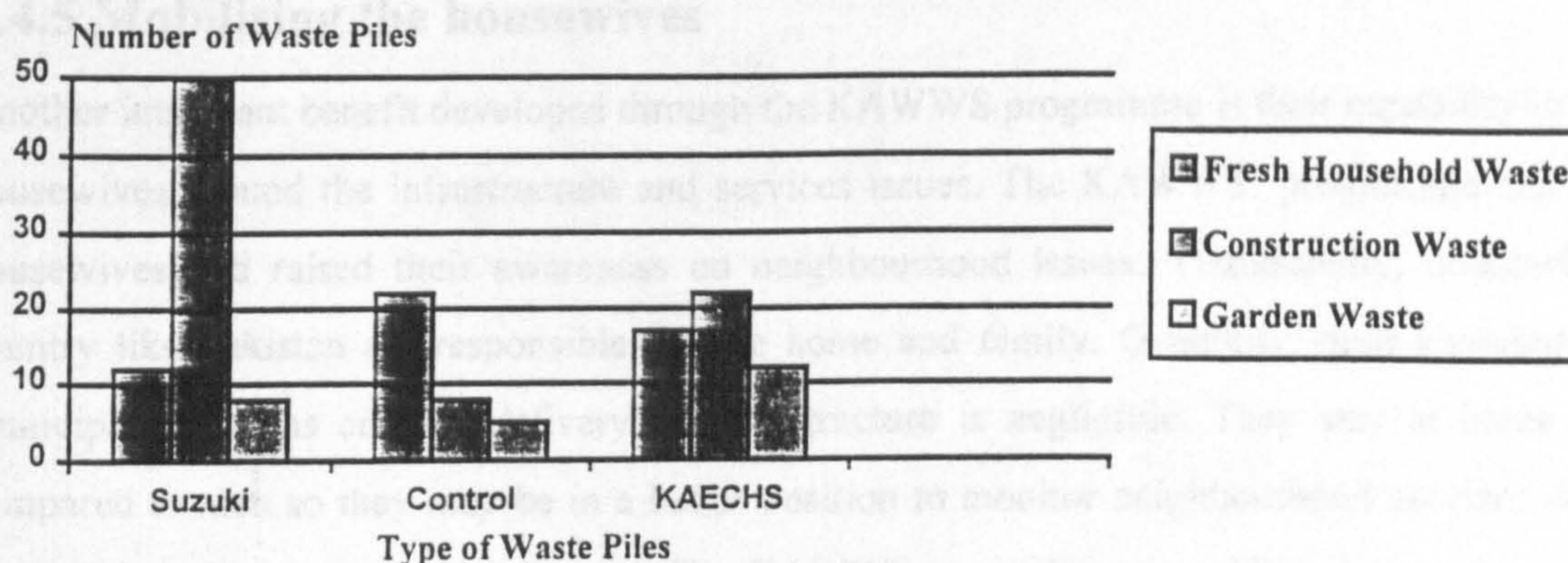


Fig 6.2 Number of waste piles observed in the case study areas.

### 6.4.4 Liaison with the government departments

Another benefit of the programme, and thus an opportunity for integration, was the ability of the KAWWS to begin communication with the official agencies responsible for the delivery of infrastructure. The KAWWS organisers perceived the reasons for the poor, slow or in-effective delivery of infrastructure from the official agencies to be; lack of interest, co-ordination and accountability, mal-administration, and resource constraints (KAWWS, 1991). In theory the KAWWS helped the official agencies to work more effectively by contributing an input from the



community. As an example, KAWWS requested an anti malaria campaign from the municipal corporation and assisted their field staff in identifying the breeding places in the area and helped them in the transportation of machinery for fumigation. They also paid a small honorarium to the field staff for this service. In the case of the waste collection service, KAWWS asked the municipal sector for a range of services but finally had to arrange a number of services by paying additional amounts of money to the municipal staff. The reason was the continuous operation and monitoring of the services required and the vested interest of the various groups. Thus we can conclude that the responsibilities which the community can take differ from one case to another, depending on the type of service and a number of other factors such as the requirements for operation and maintenance. However, in a number of cases, the KAWWS team assisted the official agencies in effective delivery of the service. Any contacts that the KAWWS has established with the government department are considered to be a major benefit of the programme for the community and for the official agencies involved.

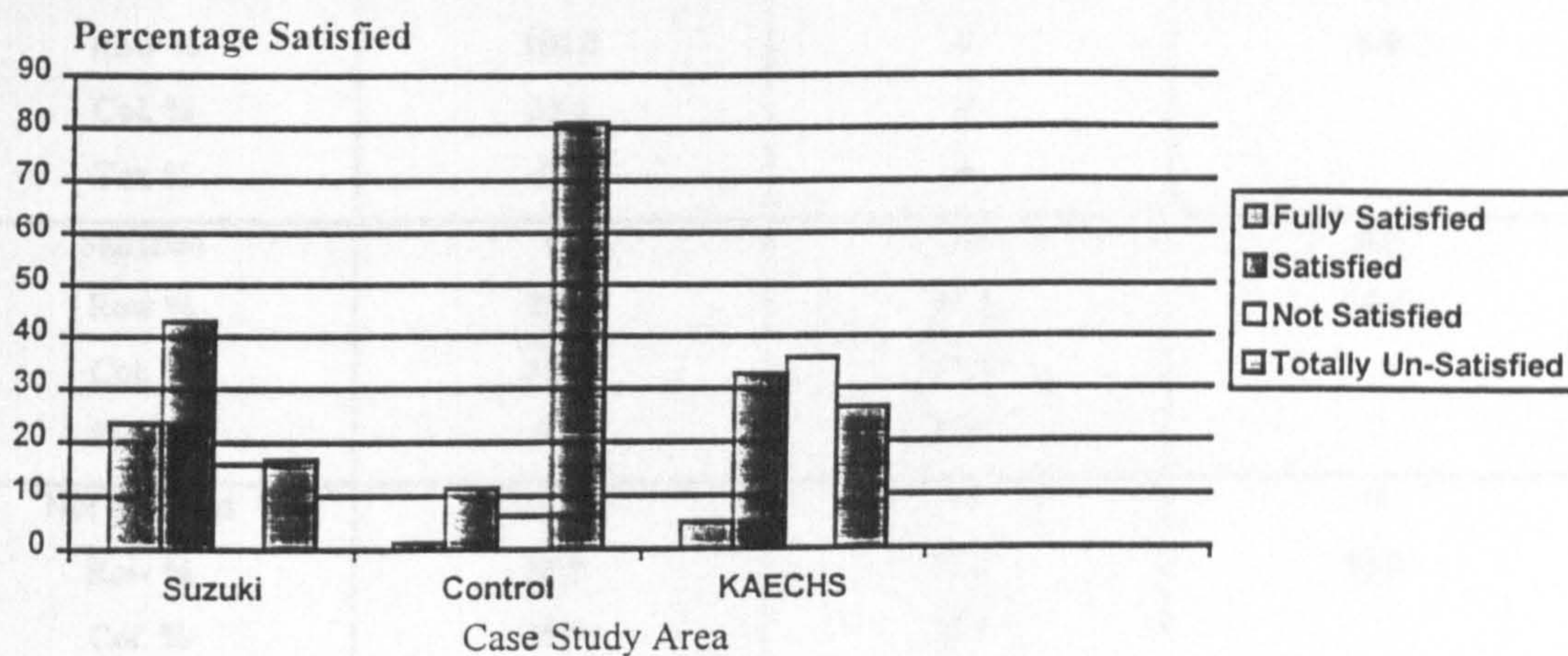
#### **6.4.5 Mobilising the housewives**

Another important benefit developed through the KAWWS programme is their capability to mobilise housewives around the infrastructure and services issues. The KAWWS programme has involved housewives and raised their awareness on neighbourhood issues. Traditionally, housewives in a country like Pakistan are responsible for the home and family. Generally, their knowledge about municipal functions and the delivery of infrastructure is negligible. They stay at home more as compared to men so they may be in a better position to monitor neighbourhood services like waste collection and maintenance of streets. The KAWWS capability to mobilise housewives has been identified as a key benefit for the community. Such benefits may help the municipal corporation in the effective delivery of infrastructure services if a formal integration takes place in the form of a partnership.

#### **6.4.6 Community's perception**

The KAWWS programme has not only contributed to reforming housewives' attitudes to the municipal services but also in changing their perceptions about the area's cleanliness. Such attitudes and perceptions were assessed through a series of variables included in the questionnaire and compared with the Suzuki and control areas.

Housewives were asked about their satisfaction with the overall cleanliness in the area. Figure 6.3 shows responses obtained from the KAWWS area, the Suzuki area and the control area. The percentage of respondents in the KAWWS area who responded as 'satisfied' and 'fully satisfied' is higher as compared to the control area where only the municipal system was working. It is difficult to conclude that the higher percentage of satisfied respondents is only because of the KAWWS programme, but as in Figure 6.2, we observed that the number of fresh waste piles was also lower in the KAWWS area. In addition the organised street sweeping system in some parts of the area might have contributed to the changed perception of the households.



**Fig 6.3 Satisfaction over area cleanliness in the different sample areas as a percentage of households.**

The three variables:

- satisfaction over area cleanliness
- payment of contributions for street sweeping
- mode of waste removal system

were cross-tabulated with each other to determine the relative dependencies.

First a cross-tabulation of the two variables: contribution to street sweeping and satisfaction over area cleanliness is shown in Table 6.5 to see the level of satisfaction of the respondents who pay for street sweeping with the overall area cleanliness as compared to the residents who do not pay for street sweeping. The table suggests that the null hypothesis for the independence of the two variables

can be rejected. The results suggest that the small number of contributing households do get a higher feeling of satisfaction as compared to the large number of households who depend and wait for the Municipal Corporation to come and do the job. This supports the idea of partnerships and community management.

**Table 6.5 Impact of the street sweeping contribution on the sample households perception of the area cleanliness in the KAWWS area (n=121).**

Satisfaction / Contribution	Pay Contribution	Do not pay Contribution	Row Total
Fully Satisfied	8	0	8
Row %	100.0	0	6.6
Col. %	21.6	0	
Tot. %	6.6	0	
Satisfied	12	30	42
Row %	28.6	71.4	34.7
Col. %	32.4	35.7	
Tot. %	9.9	24.8	
Not Satisfied	11	30	41
Row %	26.8	73.2	33.9
Col. %	29.7	35.7	
Tot. %	9.1	24.8	
Totally Un-satisfied	6	24	30
Row %	20.0	80.0	24.8
Col. %	16.2	28.6	
Tot. %	5.0	19.8	
Column Total	37	84	121
%	30.6	69.4	100.0

Chi-Square = 20.095, DF = 3, Significance 0.00016

Ho = Null hypothesis, that the two variables are independent can be rejected.

Data and information collected in mid to late 1994

Secondly, the residents' satisfaction about the area's cleanliness was cross-tabulated with the system in use by the household for waste collection from their houses. The results in Table 6.6, reveal that the residents who give their waste to the sweepers are more satisfied with the area cleanliness as compared to those who dispose of waste themselves or through servants. The reason is obvious, since sweepers are collectively hired persons who can collect waste and also do the street sweeping, thus

increasing the residents' satisfaction. In the areas, where household and servants dispose of the waste, there is likely to be less control over indiscriminate disposal of waste and responsibility for street sweeping. In-depth interviews revealed that due to cultural reasons households or servants were reluctant to take care of shared responsibilities for waste management such as maintaining bins.

The KAWWS system, through one of its components, encouraged the communal street sweeping. Households shared a system of street sweeping but used a different mode for the primary collection. Table 6.7 shows a cross-tabulation of joint street sweeping with different primary collection systems. The two objectives, communal street sweeping and hiring sweepers for the waste collection, can be combined effectively to improve the actual cleanliness and the community's perception of the cleanliness. Since in other areas such as the control area, residents generally do not pay jointly for street sweeping.

**Table 6.6 Cross tabulation of the residents satisfaction over area cleanliness with the users of different systems in the KAWWS area (n = 198).**

Collection System / Satisfaction	Fully Satisfied	Satisfied	Not Satisfied	Totally Un-satisfied	Row Total
Sweepers	7	25	19	8	59
Row %	11.9	42.4	32.2	13.6	29.8
Col. %	70.0	38.5	26.8	15.4	
Tot. %	3.5	12.6	9.6	4.0	
Servant	1	24	31	18	74
Row %	1.4	32.4	41.9	24.3	37.4
Col. %	10.0	36.9	43.7	34.6	
Tot. %	0.5	12.1	15.7	9.1	
Self	1	14	19	25	59
Row %	1.7	23.7	32.2	42.4	29.8
Col. %	10.0	21.5	26.8	48.1	
Tot. %	0.5	7.1	9.6	12.6	
Others	1	2	2	1	6
Row %	16.7	33.3	33.3	16.7	3.0
Col. %	10.0	3.1	2.8	1.9	
Tot. %	0.5	1.0	1.0	0.5	

Column	10	65	71	52	198
Total					
%	5.1	32.8	35.9	26.3	100

Chi-Square = 24.450, DF = 9, Significance 0.00364

Ho = Null hypothesis, that the two variables are independent is to be rejected at significance 0.00364

Note: A brief write-up on the use and importance of the Chi-Square test is included as Annexe 4.1.

Data and information collected in mid to late 1994

**Table 6.7 Impact of the street sweeping contribution on the type of waste collection system in use by the sample households (n=122).**

Collection System / Contribution	Pay Contribution	Do not pay Contribution	Row Total
Sweepers	12	28	40
Row %	30.0	70.0	32.8
Col. %	31.6	33.3	
Tot. %	9.8	23.0	
Servants	14	27	41
Row %	34.1	65.9	33.6
Col. %	36.8	32.1	
Tot. %	11.5	22.1	
Self	10	28	38
Row %	26.3	73.7	31.1
Col. %	26.3	33.3	
Tot. %	8.2	23.0	
Others	2	1	3
Row %	66.7	33.3	2.5
Col. %	5.3	1.2	
Tot. %	1.6	0.8	
Column Total	38	84	122
%	31.1	68.9	100

Chi-Square = 2.375, DF = 3, Significance 0.49831

Ho = Null hypothesis that the two variables are independent can not be rejected.

Data and information collected in mid to late 1994

Finally households were asked about the overall effectiveness of the KAWWS programme. To this question, both those who contributed money to KAWWS and those who did not, answered. Table 6.8

shows the results of a cross tabulation between the two variables. The Chi-Square test suggests that the variables are dependent. Thus the households who pay contribution for street sweeping in the KAWWS area also hold a positive view about the performance of the KAWWS programme, as compared to others. The KAWWS programme has effectively changed the perception of a small number of residents who contributed money for the street sweeping.

**Table 6.8 Impact of the street sweeping contribution on the sample households perception on usefulness of KAWWS (n=117).**

KAWWS useful / Contribution	Pay Contribution	Do not pay Contribution	Row Total
Not at all	3	3	6
Row %	50.0	50.0	5.1
Col. %	8.3	3.7	
Tot. %	2.6	2.6	
No	5	58	63
Row %	7.9	92.1	53.8
Col. %	13.9	71.6	
Tot. %	4.3	49.6	
Upto certain extent	25	16	41
Row %			35.0
Col. %	61.0	39.0	
Tot. %	69.4	19.8	
	21.4	13.7	
Yes	3	4	7
Row %	42.9	57	6.0
Col. %	8.3	4.9	
Tot. %	2.6	3.4	
Column Total	36	81	117
%	30.8	69.2	100.00

Chi-Square = 34.5019. DF = 3. Significance 0.00000

Ho = Null hypothesis, that the two variables are independent can be rejected.

Data and information collected in mid to late 1994

To further cross-check the changes in attitudes of the contributors in the KAWWS area, their attitude was checked with another variable. The responding households were asked about the usefulness of the programme at the city level. Table 6.9 gives results of the test: can KAWWS be useful at the city

level? It again shows that the people who pay for street sweeping also perceive that the programmes like KAWWS can contribute to the overall cleanliness at the city level.

**Table 6.9 Impact of the street sweeping contribution on the sample households perception on the usefulness of KAWWS at city level (n=115).**

KAWWS useful / Contribution	Pay Contribution	Do not pay Contribution	Row Total
Yes	36	29	65
Row %	55.4	44.6	56.5
Col. %	97.3	37.2	
Tot. %	31.3	25.2	
No	1	49	50
Row %	2.0	98.0	43.5
Col. %	2.7	62.8	
Tot. %	0.9	42.6	
Column Total	37	78	115
%	32.2	67.8	100.00

Chi-Square = 36.90771, DF = 1, Significance 0.00000

Ho = Null hypothesis, that the two variables are independent can be rejected.

Data and information collected in mid to late 1994

The residents were asked about their suggestions and ideas to improve the solid waste management in the KAWWS area. A total of 76 respondents gave some suggestions. The results, in terms of categories of suggestions are given in Table 6.10. It seems that the KAWWS programme has also influenced the residents' perception of an improved solid waste management programme, which is obvious from 18% of the respondents who suggested the need to place more communal bins, a solution already initiated by KAWWS, and a further 10% admitting that KAWWS work should be expanded. On the other hand interviews with the KAWWS office bearers and the community members revealed that in the lanes where there was an activist, there were organisations of lane people to arrange street sweeping. Most of the residents looked on the KAWWS as a service delivery organisation, who must take money and do the work (Siddiqui, 1994). The observed household attitudes were not such that they planned and operated the system independently and accepted all the hardships which they might face in dealing with the municipal corporations and other official agencies.

**Table 6.10 Suggestions from respondents to improve solid waste management system in the KAWWS area (n = 76).**

Suggestions	Percentage
We need more bins	18
Street sweeping should be properly done	8
We need a proper system	19
Vacant plot is a problem	7
Why we pay taxes	5
Need some action	3
Something should be done	2
It is pointless to make suggestions	4
KAWWS should expand	10
Others	23

Data and information collected in mid to late 1994

Table 6.11 gives the percentages of the responding housewives who felt that KAWWS had contributed to improving the overall cleanliness of the area. The percentage is compared with the respondents satisfaction over the Suzuki system, in the Suzuki area.

**Table 6.11 Perceived satisfaction in terms of percentages of the households on the programmes contribution.**

Level of Satisfaction	Suzuki (n=200)	KAWWS (n=186)
Yes: it contributed	24.5%	4.3%
Contributed: up to certain extent	55.0	32.8
No: not contributed	14.5	54.8
No: not at all contributed	6.0	8.1

Data and information collected in mid to late 1994

A greater percentage of residents in the Suzuki area felt that the programme had contributed towards area cleanliness. The reasons for this perception in the Suzuki area was further supplemented by the higher participation rate in the programme. However, in the KAWWS area, those households who were contributing money for street sweeping had a more positive perception about the effectiveness of the KAWWS programme as compared to those who did not. Comparing the KAWWS programme



with the Suzuki programme with respect to public attitudes, it is obvious that the Suzuki programme fulfilled the felt needs of the residents more effectively by organising a primary collection programme. The Suzuki programme, in terms of charges and mode of operation, was similar to the previous system of private and municipal sweepers. The Suzuki system provided an incremental development in the primary collection system by taking the collected waste to a single transfer point instead of a number of points. The importance of a service-providing programme such as the Suzuki system has emerged as an interesting model of community management programmes in the urban areas. The users' participation rate and attitudes emerged as useful criteria to assess the effectiveness of the community management.

### **6.4.7 Conclusions**

It may be concluded that there are a number of benefits, and thus opportunities for integration of the KAWWS programme. The major benefits identified are in terms of household participation, mobilising housewives, reduction in fresh waste piles in the area, changes in the attitudes of housewives and developing a liaison with the official agencies. However, all these benefits may not be important for the municipal sector. The following sections suggest that, in spite of all these benefits, the attitudes of residents and municipal attitudes are not favourable for integration. There are political influences on the programme and the programme has disturbed the future growth of a collection system by municipal sweepers.

#### ***Key points from previous discussion***

- *The KAWWS programme has involved at least 20% of the households in the area.*
- *The system developed by KAWWS was used by both the financial contributors and non-contributors to the KAWWS.*
- *The community generates resources in terms of time, effort and money.*
- *The area was comparatively cleaner than the control area as measured by the number of fresh waste piles.*

## **6.5 Constraints on integration**

As discussed in the previous sections there are number of benefits of the KAWWS programme. Whether or not such characteristics of the programme are important for the formal integration would depend upon a number of factors. Most important are the perspectives of different stakeholders. For

example, housewives' participation may not be important for the municipal corporation. The research has also identified a number of constraints on the formal integration of the KAWWS programme. There are some direct constraints and there are constraints in the form of attitudes, dependencies and relationships.

A number of constraints are identified and discussed below:

### **6.5.1 Impact on municipal sweepers**

One of the major constraints on the KAWWS programme was its impact on the municipal and private sweepers working in the area. Municipal sweepers are those who were allocated to the area by the municipal corporation whilst private sweepers are self employed persons who perform street sweeping and waste collection. As observed in Table 6.2, the proportion of the households disposing of their waste through municipal and the private sweepers is very low in the KAWWS area as compared to the control area. There may be various reasons for this low proportion, such as:

- The communal bins provided by KAWWS in the vicinity of the households, thus creating an opportunity for the households to dispose of their waste through servants or themselves.
- The presence of unused open plots in the area, which provide an opportunity to the households to dispose of their waste in those places.

However, it is very difficult to find the exact cause-and-effect relationship since there are a number of other factors involved. In future and with the passage of time, the spaces available for the communal bins will decrease and more households will hire sweepers to collect and dispose of their waste.

It appears that the provision of bins may be an impediment to the further development of a sweepers collection system for the household waste. The municipal sweepers were neither involved nor interested in working in the area, also because of a number of un-occupied plots which were used for waste disposal as we found from our observations and discussion. The waste collection service is pre-dominantly provided by private sweepers.

The sweepers were asked about the number of households from which they collect waste and other relevant questions. Table 6.12 gives the type of sweepers and their contribution to the waste-collection service in the area. It seems that the municipal sweepers in the area were least interested in the waste collection service and were concentrating on other part-time work. There seems a causal

relationship between the low opportunities for waste collection service in the area and the sweepers' lack of interest in the area. This finding is opposite to that in the Suzuki area where the sweepers actually competed with the Suzuki system and showed interest in working in the area.

**Table 6.12 Sweepers' status and their contribution to household waste collection in the KAWWS area.**

Sweeper's Status	Contribution
Municipal	Do not collect waste from the houses. Go to the motor workshop and work there after duty hours.
Municipal	Only do street sweeping and get Rs 100 per month. Learning the work of tailoring.
Municipal	No collection of waste from the houses.
Private	Collect waste from 12 houses; earns a total of Rs 650 per month.
Private	Collect waste from a building and sweeping of stair case. Gets an additional Rs 500 per month.
Private	Collect waste and provide other services to 10 houses. Earns a total of Rs 3,500 per month.
Private	Collect waste from 4 houses. Earns an additional of about Rs 1000 from the area.
Private	Collect waste and work for 5 houses, one mosque and a street to sweep. Earns more than Rs 1,500 per month.
Private	Collect waste from 10 houses and earn an additional Rs 600 per month.
Private	Collect waste and provide other services to 10 houses.

Data and information collected in mid to late 1994

**Text box 10:**

*Iqbal collects household waste and is happy!*

*Iqbal performs household waste collection as a profession (a private sweeper), and earns Rs 1500 per month. He is not an employee of KMC or any other department. In fact he dislikes working for the municipal corporation, as he said that one has to pay Rs 4000 to 5000 as a bribe to acquire the job and then has to pay Rs 300 per month regularly to the sanitary inspectors. Iqbal takes informal contracts for all type of works such as street sweeping,*

*household waste collection, cleaning mosques etc. He said that he has enough work to do is happy and can not handle any more work.*

The municipal sweepers were getting an additional monthly income of Rs 100 from the KAWWS for street sweeping, which was only a small proportion of their total additional income from the waste-collection work. The limited number of sweepers in the area were extensively involved in other work inside the houses, which was more than in other areas; this is demonstrated in Table 6.13. Thus payments made to the individual sweepers are also skewed upwards as shown in Table 6.14. Potential markets for a waste collection are important to keep them in the area.

**Table 6.13 Households percentage using different services from the municipal sweepers in the KAWWS and the control area.**

Service provided by the sweeper	KAWWS (n=59)	Control (n=73)
Only collection of waste	49.2 %	57.53 %
and sweeping court yard	-	23.29
and sweeping drive way	-	4.11
and cleaning inside of the house	10.2	2.74
and sweeping court yard and drive way	-	1.37
and sweeping court yard and drive way and inside house	37.3	1.37
and watchman <sup>1</sup>	-	9.59

1. In one of the lanes of the houses in the control area the group of the 20 houses hired a private sweeper for waste collection, the same person worked as a night watchman.

Data and information collected in mid to late 1994

**Table 6.14 Payments in Rs per month made to the sweepers by sample population in the KAWWS and the control area.**

Payment in Rs per month	Control (n=73)	KAWWS (n=59)
25	1.4%	1.7%
30	6.8	-
40	13.7	-
50	35.6	3.39
+50-100	30.1	11.9
+100	12.3	83.01

statistics	mean = Rs 82.26 mode = Rs 50.00 stdd deviation = Rs 63.339 stdd error = Rs 7.413	mean = Rs 203.629 mode = Rs 200.00 stdd deviation = Rs 140.538 maximum = Rs 17.848
------------	---	---

Data and information collected in mid to late 1994

The KAWWS system has not done much in developing markets for sweepers. This has been identified as a major constraint of the programme. More detailed discussion on the sweepers collection system is included in Chapter 7.

## 6.5.2 Relationship and dependencies

The other constraint of the programme is its dependence on the few dedicated activists. The programme was initiated because of the leadership and dedication of Mrs Safina Siddiqui, the president of KAWWS. The evolution of the programme took place because she was aware of certain problems, discussed them with the other housewives, and a group action took place. The general process from identification of the problem to the formulation of the project was as follows:

- The activists feel that a problem exists and understand that it is an important issue.
- The activist contacts the other people in the neighbourhood and discusses the problem.
- The group now formed, thinks and decides about the possible solutions, with the constant active involvement of the key activist.
- The process of implementation starts.

Since, at the time of investigations, the programme was in full swing it was difficult to assess whether problems on which the KAWWS was working were actually felt by the majority of the households or not. As far as the KAWWS efforts to raise the awareness of the housewives regarding the government responsibilities were concerned, ideally, housewives living in such an area should be aware of the functions of the civic agencies. The key question is whether they wish to acquire such knowledge or not. The low participation rate of housewives in terms of few financial contributors is an indicator that they did not want to be (or were not allowed to be) involved in the problems outside the house boundaries. Such findings were admitted by the KAWWS office bearers. This means that the KAWWS programme was dependant upon the efforts of the key activists. Such dependency upon leadership is not uncommon in community-based projects in developing countries (Furedy, 1992). Unavailability of dedicated activists is a constraint on the replication of the programme.

The other major dependency observed in the programme is on refuse collection-vehicles to collect waste from the bins, which is very similar to the dependency observed in the Suzuki system as discussed in Section 5.5.5. Such a dependency was also observed in the Orangi Pilot Projects (OPP's) low cost sanitation programme, where residents laid the lane sewers but depended upon the official agencies for secondary sewers (Hasan, 1994). It is a pity that residents who want to solve their neighbourhood problem, cannot even get a reliable service for the secondary collection. Recognition and support to the community's effort could only come from a political will and changes at the policy level. Under the present environment, absence of such will and co-operation has been identified as a major constraint.

It has been observed that the KAWWS programme has no impact on the activity of the itinerant waste buyers purchasing waste. There seems to have been an impact on the street pickers since waste was contained in bins. The non-participant observations of the bins and the exposed waste piles revealed that bins were visited by very few pickers in search of waste. The opportunities for waste pickers to separate waste were certainly reduced.

It may be concluded that the KAWWS system and similar programmes depend upon the active leadership present in the area. The system also depends upon the municipal corporation for the collection of waste and other similar services which could not be arranged by the community. These are some major constraint to the further development of the programme.

### **6.5.3 Municipal attitudes**

Current municipal attitudes are another constraint to the integration. Municipal attitudes in the case of KAWWS can be discussed at two levels, as with the Suzuki system:

- the attitudes of municipal supervision staff working in the area
- the attitudes of municipal officers responsible for the zones (senior officers), where the KAWWS system is operating

Semi structured interviews were conducted with both the groups. The municipal supervision staff were co-operating with the KAWWS within their available authority and powers. This co-operation may be attributed to two possible causes:

- i. The supervision staff were getting a regular amount of money from the KAWWS.

ii. The KAWWS programme did not reduce the income of supervision staff from municipal sweepers, since sweepers, at that time, were not involved extensively in the collection of waste from the houses.

If the second cause mentioned above is true, then there are chances as the vacant plots become occupied and as the market for more and more waste collection service develops, then the resistance from supervision staff against the programme will increase. The vehicle driver and crew were also getting a regular amount of money from KAWWS for waste collection from bins and there was a possibility that the Sanitary Inspectors were given a share in the amount paid to the driver. Thus supervision staff were co-operative since they were able to sell their services informally to the community through the KAWWS. In this way the KAWWS system kept the status quo for the waste collection service offered by the municipal corporation.

The attitude of municipal officers in operation towards the KAWWS was very similar to that which they exhibited towards the Suzuki system. They did not think that they were in a position to replicate the programme in other areas, in other words they felt that such initiatives should come from politicians and not from municipal corporations. Similar findings from other cities in developing countries are already discussed in Chapter 2.

#### **6.5.4 KAWWS organisers attitudes**

The KAWWS organisers have not only developed a model in their area but also involved themselves in other urban advocacy works. Discussion with them revealed that they were well informed about the urban issues of Karachi. The KAWWS organisers had positive attitudes about the replication of the programme in other areas. They also provided assistance and advice to other CBOs and neighbourhood groups in Karachi. However, they felt that the municipal corporation and local politicians were only helpful when they foresaw some political gains etc. The KAWWS representative also admitted that they had made mistakes in understanding the current community attitudes. A number of community members felt that once they had paid a certain amount to KAWWS they deserved certain services, although they were willing to pay for certain services, provided they were properly arranged. The KAWWS representatives found that the people in their area were typical middle class people who lived in isolation from each other. They were fragmented and did not want to share the problems and issues. Higher municipal officers did not appreciate the

programme and did not like the additional payments to the sweepers being institutionalised by the KAWWS. The officers felt insecure and could not justify their duties, as the KAWWS perceived.

### **6.5.5 Political interference**

Similar to the Suzuki system as discussed in Section 5.5.8, the KAWWS system had also faced a number of problems because of changes in the local government structure in Karachi since 1994. The newly appointed advisers to KMC (replacing area councillors) were very keen to improve the system in the shortest possible time. Their approach to improving waste management was very similar to that of the previous political representatives. They felt the involvement of municipal sweepers in the collection of waste from the houses and taking money was illegal and should be stopped. Thus, as a principle motive, the newly selected adviser from the KAWWS area also discouraged the payments by KAWWS of additional money to the sweepers and assured the KAWWS team that they would get all the services from the municipal corporation regularly. In this way the adviser's role has become central. The KAWWS team was reluctant to stop paying additional sums of money to the municipal staff, and to change the existing arrangement because of following reasons:

- i. The KAWWS did not want to break the relationship they had developed with the municipal staff over a number of years.
- ii. With the deeper understanding of solid waste management issues, the KAWWS felt that the improved system by the selected area adviser might be very short term and would be difficult to monitor.
- iii. The KAWWS felt that the selected advisers did not have the deeper understanding of the solid waste management issue, particularly its relationship with the poorer section of the population.

However, investigations conducted in May, 1995, revealed that the KAWWS system was still facing a number of problems because of changes in the local government structure.

The other form of political interference which may be important to discuss was the top down approach to selecting systems which were 'visible', 'large' and which could be 'publicised'. Such systems are usually perceived as appropriate by politicians. Because of low awareness of citizens such changes create a short term and favourable thinking among voters, irrespective of the long term effectiveness or efficiency of the system. Such decisions are usually taken to achieve political goals



and not the objectives of solid waste management. For example in the year 1994, the Prime Minister of Pakistan liked the idea of starting a “garbage train” to improve the transportation of waste. During the same period a large size notice was published in local newspapers about provision of solid waste management service through private contractors (Annex 6.2). The advertisement asked interested parties to submit their registration number, experience, details of machinery and a bank guarantee. Discussion with the KAWWS and other similar groups revealed that they perceived that a private system might improve the current status. However on the other hand community groups or existing informal sectors like sweepers may not have any role to play in the forthcoming privatisation strategy.

### **6.5.6 Commercial activities in the KAWWS area**

The other constraint was the presence of commercial activities in the KAWWS area. There were blocks of shops and a few offices in the area. It was difficult to involve shopkeepers in the on-going KAWWS programme since most of them did not live in the area and were male. Investigations conducted in May 1995 revealed that in late 1994 and early 1995, KAWWS focused their efforts on the commercial areas. After considerable efforts 25 shopkeepers in the area responded and purchased bins contributing Rs 6000. The KAWWS distributed leaflets informing shopkeepers about the municipal office in the area and arrangements with the refuse vehicle to empty bins. Since the bins were jointly owned they may be better maintained as compared to bins provided by the municipality.

## **6.6 Conclusions**

It may be concluded that the KAWWS programme has developed constructive thinking in a small group of housewives, where they feel their own responsibilities towards the solution of the solid waste management problem. The attitudes of housewives who are not participating or paying for street sweeping do not favour integration. The municipal supervision staff show co-operation, but this depends to their own vested interests. The municipal officers do not perceive the KAWWS system as sustainable, since further development of the system at the city level, may put their powers at risk.

The previous discussion has identified a number of constraints of the KAWWS programme. The impact of the KAWWS programme on municipal sweepers has been identified as one of the major constraint to integration. There is also a dependency of the community based system on the

municipal corporation staff for the secondary collection. Political interference at the local level and the presence of commercial activities in the area are also constraints to integration. Community based systems for waste collection should understand the importance of the existing collection system through the municipal sweepers and try to integrate them into the programmes they develop. Chapter 7 discusses further details of the sweepers collection system.

The next chapter is about a more sustainable system where the community needs of a collection system matches with group needs of earning extra income. The chapter is about the existing system of waste collection service provided by the municipal sweepers to the residents.

# Chapter 7

## Municipal sweepers in waste collection

### 7.1 Introduction

This chapter investigates the role of municipal sweepers in household waste collection. The primary collection system undertaken by municipal sweepers is different from the activities discussed in the previous case studies because:

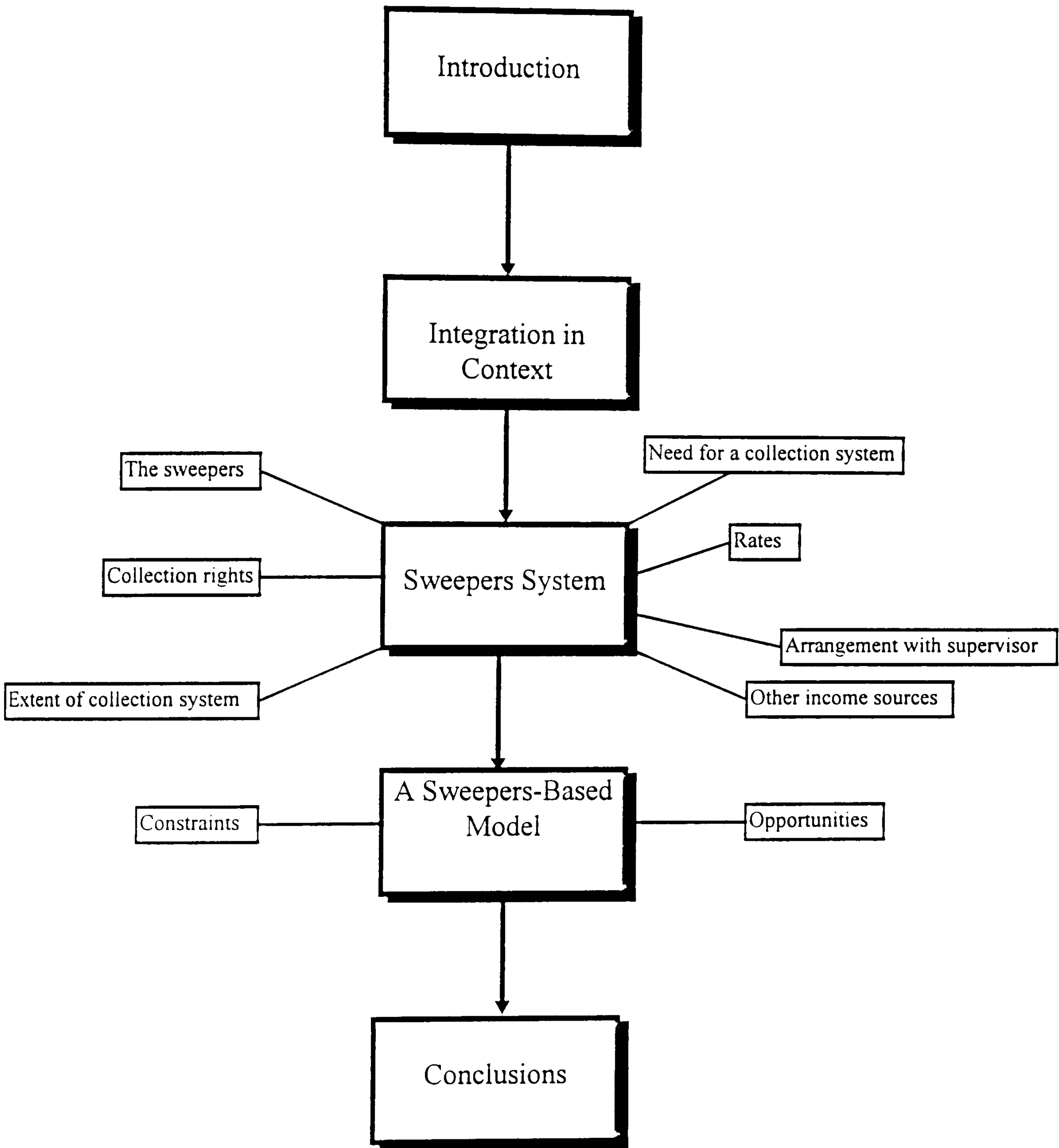
- municipal sweepers are employees of municipal corporations which are government bodies responsible for public sector management of solid waste.
- municipal sweepers provide an informal service for waste collection, which occurs outside the scope of their work as municipal employees.

The primary collection service by municipal sweepers may be seen as an informal activity which spans the public/ private interface. Municipal sweepers are the only official representatives which interact with the community. As explained in the previous chapters, municipal sweepers in the residential areas offer their services for waste collection to the households. It has been concluded in the previous chapters that any changes in primary waste collection, such as those introduced by the KAWWS and Suzuki systems, were beneficial to the community but adversely affected municipal sweepers in the area. We have also observed in the previous chapters that the KAWWS and the Suzuki systems were not replicable, participatory and sustainable. On the other hand, the informal recycling runs parallel to the municipal operations as a trade. The sweepers system, as discussed in the following sections, has operated for decades and has evolved because of a number of social and economic factors. The role of self employed, private sweepers is also important and could not be neglected in the primary collection of solid waste.

The theme of this chapter is that 'since the primary collection system by municipal sweepers is already integrated with the official system so there are better prospects for its further development'.

The introductory sections of this chapter provide the necessary background information. This is then followed by sections on the role of sweepers in waste collection, along with other factors influencing sweepers' roles. The final sections of the chapter present the concept of a model of integration through which the present sweepers system may be up-graded to a more organised and institutionalised system of primary collection. The pros and cons of such a system are discussed at length in the concluding sections.

Fig 7.1 shows the logical sequence of the various arguments as presented in this chapter.



**Fig 7.1 Logical sequence of arguments in the chapter**

## 7.2 Integration in this context

The existing primary waste collection service undertaken by municipal sweepers operates within a set of complex relationships between sweepers and the community, among sweepers, and between sweepers and their supervisors. The municipal jobs provide security to sweepers, whereas the collection service opens opportunities for additional income. Thus one way of viewing integration in this context is:

*that the municipal corporations accept the actual practices of sweepers in the primary collection, gives them legal protection and incorporate it in the future plans.*

The fundamental definition of the term 'integration' is not much different from those developed in the previous case studies. The chapter discusses how further development of the sweepers system could be achieved without unnecessary formalization.

Municipal sweepers are key actors in SWM, and integration of their roles into any changes to the waste management systems is important for a number of reasons:

- Municipal sweepers form the largest proportion of the work force in the municipal corporations in terms of number of employees. The salaries paid to the municipal sweepers are about 60% of the operational budget for solid waste management. For example in Karachi the total municipal budget in the year 1992-93 was about Rs 1200 million, the solid waste operational budget was Rs 350 million and sweepers salaries were about Rs 240 million. The number of sweepers and their total salaries in Karachi from the year 1991 to 1994 are given as Table 7.1.

**Table 7.1 Number of sweepers in the municipal staff and the total annual salaries paid to them in Karachi.**

Year	Number of Sweepers	Increase each Year	Total Salaries (Rs)
1991-92	9277	-	200,922,780
1992-93	10583	1306	241,303,310
1993-94	11629	1046	264,281,960

Data and information collected in 1993 and 1994.

- Any change in the primary collection system of waste may adversely effect the sweepers as a group, if their interests are not formally and acceptably integrated with the changes. However, at the same time there is evidence that sweepers also have a remarkable capability to adapt themselves to new initiatives (Streetland, 1977). On any institutional reform, such as privatisation, the major resistance often comes from the sweepers and their trade unions. Municipal corporations are not aware of the possible integrated approaches which may

benefit all the groups. Further development and integration of the sweepers collection system may provide the municipal corporations with an appropriate option for privatisation.

- Sweepers in Karachi and in other similar cities in developing countries consist of a minority group and often a group of the poor. They often have mutual support systems (Streefland, 1996) and other social safety-nets but not involved in main stream politics. They are strongly united as a minority group. The integration of existing practices may help in the upgrading of a neglected group of the population.
- New generations of sweepers are acquiring education and skills which often enable them to find a salaried job (Khalid, 1996). At the same time there are few groups who are interested in the stigmatising work of sweeping. The existing nature of the job gives an occupational and caste monopoly to sweepers. If the current working conditions improve, other groups might be interested in the work. Thus integration of the sweepers system may open prospects for jobs.
- The existing sweepers system has evolved because of a number of social and economic factors in society. It is not an imposed system. Thus studies of the sweepers system may suggest lessons for development priorities in other sectors.

It is extremely important to fully understand the dynamics of the sweepers collection system on the ground. The integration of the sweepers system may take the form of a more decentralised system with the creation and development of micro-enterprises, or a partnering approach with community groups. Details of such an integrated system are discussed in Section 7.4.

## **7.3 The Sweepers' system**

The following sections discuss various features of the existing system of primary collection by sweepers and give details about how and why the system operates.

### **7.3.1 Need for the primary collection system**

Households are generators of waste. They need to have their waste collected. Such a need usually arises primarily in the areas which are fully developed (those areas which have paved roads and no un-occupied plots). Chapters 5 and 6 give the extent of the sweepers involvement in the Suzuki, KAWWS and Control areas. Visits to a number of areas in Karachi and investigations in Faisalabad revealed that hiring municipal and private sweepers for waste collection was common in all fully developed areas, irrespective of income group. The need for a collection system also depends on a number of factors such as non-availability of open land in the vicinity

for household waste disposal and willingness to pay for such a service. The following sections discuss the relationship of the sweepers collection system with such factors.

### 7.3.2 The Sweepers

Under the present set-up in Karachi as observed from the years 1993 to 95, the municipal corporation employs a large team of sweepers (now officially called the Sanitary Health Workers). Teams of sweepers are designated in different areas to perform street sweeping. In most of the city, teams of sweepers are assigned to each councillor's electoral ward. There are particular lengths of streets called 'beats' in which a sweeper needs to perform street sweeping. There is usually a field Supervisor, with each team of sweepers called '*Muccadam*'. A Sub-Sanitary Inspector is in-charge of the number of Supervisors and finally a Sanitary Inspector supervises Sub-Sanitary Inspectors. This set-up, basically forms the field staff teams. The Sanitary Inspectors report to the Chief Sanitary Inspectors and ultimately this hierarchy of solid waste management operation ends up at the level of Health Officer, refer Fig 7.2.

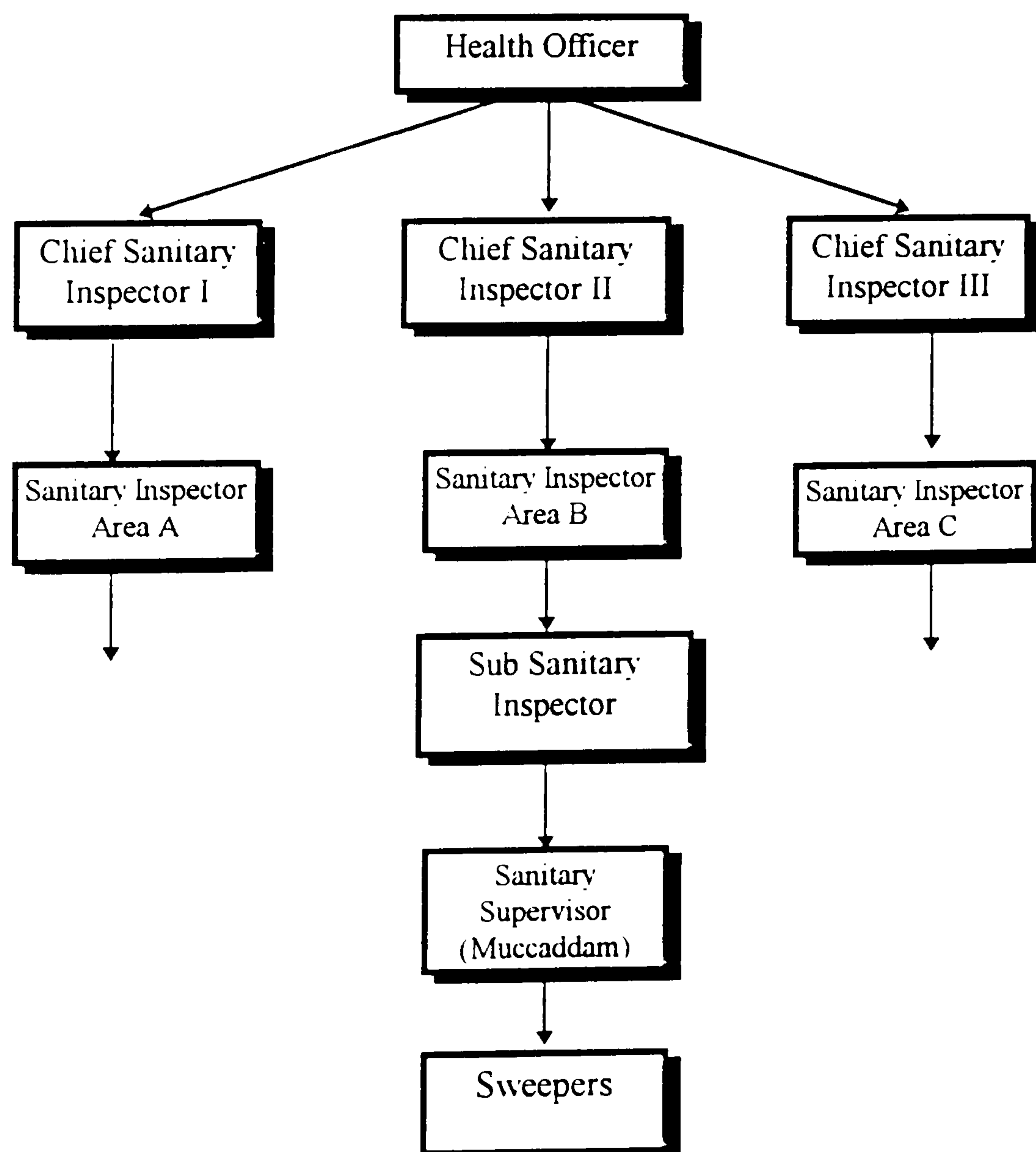


Fig 7.2 Position of sweepers in the solid waste management hierarchy.

Sweeping the streets is the sole official responsibility of municipal sweepers, whereas an additional service to remove household waste is required by the community. The sweepers deployed in the area agree to remove waste against a monthly payment. In this way each sweeper makes arrangements with several houses who in return get a service for the removal of waste. The waste, once collected, is disposed of to a nearby transfer point, common land, vacant land or sometimes burned.

The extensive role of municipal sweepers in waste collection has been neglected by previous researchers in solid waste management, even those who looked into decentralised and non-conventional approaches to solid waste management, for example Furedy (1992) and (Shenk and Baud, 1994).

The existence of sweepers and their indispensable and important role in the cities is not a recent phenomenon, although the nature of their work has changed as the cities developed and grew. A review of number of past research on sweepers is discussed in Chapter 2, Section 2.6. The focus of all this research is anthropological. Based on this research, it appears that the social structure of the sweepers' community remained the same during at least the last 100 years. The relationship with the other community members, community leaders (*muziz admi*) and with sanitary supervisors are still very similar. The sweepers have shown remarkable capability to defend their rights as an occupational and caste group. They have also shown capacity to adapt themselves to change.

### 7.3.3 Extent of sweepers system

As discussed above municipal sweepers provide primary collection services to the residential areas. The percentages of the sample households who utilised the sweepers system for waste collection in different areas are given in Table 7.2. Further investigations in other areas show that, in the developed areas, sweepers serve more than 90% of the houses for the collection of waste. As discussed in Chapters 5 and 6, the lower level of sweepers' involvement in the Suzuki and KAWWS areas was because of intervention in the Suzuki area and availability of open plots in the KAWWS area. It has been concluded from previous chapters that the common mode of primary waste collection in the developed areas is by sweepers and the system is sensitive to any change in the primary collection stage.

**Table 7.2 Percentage of households using the sweepers system for waste collection in different areas.**

Area	Type of Area	Percentages (valid sample)
F. B. Area 6 - Control area	Developed Middle Income	92.4 (79)
Suzuki Area - Intervention	Developed Middle Income	23.3 (210)



KAWWS Area - Intervention	Open Plots	29.4 (201)
Gulberg - Control other city	Developed Middle Income	75.5 (106)

Data and information collected in mid to late 1994

The sweepers who operate in the area target a certain minimum number of houses for the waste collection service and earn additional income. In the lower income areas, the plot sizes are smaller and payments to the sweepers are less as compared to middle or higher income areas. Opportunities to dispose of waste on open plots or in nearby areas are higher. The sweepers operating in the low income areas provide a service to a higher number of houses. In middle income areas the plot sizes are larger and payments were better so the sweepers were guaranteed a certain amount of income from fewer houses. The walking distances between the houses and to transfer points in low income areas were certainly shorter as compared to high income areas. Investigations were conducted in areas of different socio-economic pattern and different average plot sizes. Table 7.3 gives a cross-tabulation of the **average plot sizes in the area and number of houses** from where sweepers collect waste. As expected, there is a trend towards sweepers collecting waste from fewer houses in the larger plot size (middle and higher income) areas as compared to smaller plot size area. The chi-square test fails to reject the hypothesis that the two variables are independent and so there is a trend to provide service to more houses in the smaller plot size area as compared to larger plot size areas. In one low income area of Faisalabad it was observed that the households placed their waste outside the door and the municipal sweeper collected it in the morning as he cleaned the street. A sweeper-charge of Rs 10 per month for this type of collection was paid in this particular area, which may be the lowest among developed areas studied.

In the areas where plot sizes are larger sweepers also tried to involve themselves in other in-house work such as the cleaning of toilets, cleaning of court yards, drive ways etc. In this way they acquired more additional income. To understand the relationship between the type of areas and sweepers involvement in the house works, a cross tabulation is presented as Table 7.4. The table indicates that sweepers working in the middle and higher income areas were more involved in in-house works as compared to the low income areas. Thus from the two tables it may be concluded that sweepers in the middle and high income areas had contracts with fewer houses and were involved more in the in-house work as compared to sweepers in low income and under-developed areas.

**Table 7.3 Cross tabulation of the average plot area (in sq.-yds.) in the working area and number of houses from where sweepers collect waste.**

Number of House / Average Plot Area (sq-yds)	0 -10 Houses	11-20 Houses	21 - 30 Houses	31 - 40 Houses	More than 40 Houses	Row Total %
80	5	7	6	2	1	21
Row %	23.8	33.3	28.6	9.5	4.7	23.1
Col. %	25.0	23.3	27.3	14.3	14.3	
Tot. %	5.5	7.7	6.6	1.1	1.1	

120	0	1	3	3	1	8
Row %	0	12.5	37.5	37.5	12.5	8.8
Col. %	0	23.3	13.6	25.0	14.3	
Tot. %	0	1.1	3.3	3.3	1.1	
330	1	10	2	0	0	13
Row %	7.7	76.9	15.4	0	0	14.3
Col. %	5.0	33.3	9.1	0	0	
Tot. %	1.1	10.9	2.2	0	0	
350	6	3	0	0	0	9
Row %	66.7	33.3	0	0	0	9.9
Col. %	30.0	10.0	0	0	0	
Tot. %	6.6	3.3	0	0	0	
450	4	5	4	1	4	18
Row %	22.2	27.8	22.2	5.6	22.2	19.8
Col. %	20.0	16.7	18.2	8.3	18.2	
Tot. %	4.4	5.5	4.4	1.1	4.4	
685	4	4	7	6	1	22
Row %	18.2	18.2	31.8	27.3	4.5	24.2
Col. %	20.0	13.3	31.8	50.0	14.3	
Tot. %	4.4	4.4	7.7	6.6	1.1	
Column Total	20	30	22	12	7	91
%	21.9	33.0	24.2	13.2	7.7	100

Chi-Square = 136.993 , DF = 110, Significance = 0.04152

Ho = Null hypothesis, that the two variables are dependent can not be rejected at significance 0.04152

Note: A brief write-up on the use and importance of the Chi-Square test is included as Annex 4.1.

Data and information collected in mid to late 1994

**Table 7.4 Cross - tabulation of average plot size in the working area and sweepers involvement in the in-house works.**

Whether sweepers are involve in in-house work / average plot size sq.-yds	Yes: they are involved in in-house works	No: not involved in in-house works	Row Total
80	2	8	10
Row %	5.3	18.6	12.3
Col. %	20.0	80.0	
Tot. %	2.5	9.9	
120	9	11	20
Row %	23.7	25.6	24.7
Col. %	45.0	55.0	
Tot. %	11.1	13.6	
200	0	1	1
Row %	0	2.3	1.2
Col. %	0	100.0	
Tot. %	0	1.2	
300	1	1	2
Row %	2.6	2.3	2.5
Col. %	50.0	50.0	
Tot. %	1.2	1.2	
330	0	10	10
Row %	0	2.3	2.5
Col. %	0	50.0	
Tot. %	0	1.2	
350	4	1	5
Row %	10.5	2.3	6.2
Col. %	80.0	20.0	
Tot. %	4.9	1.2	

450	6	6	12
Row %	15.8	14.0	14.8
Col. %	50.0	50.0	
Tot. %	7.4	7.4	
685	16	5	21
Row %	42.1	11.6	25.9
Col. %	76.2	23.8	
Tot. %	19.8	6.2	
Column Total	38	43	81
%	46.9	53.1	100.0

Chi-Square = 22.1376, DF = 7. Significance = 0.00241

Ho = Null hypothesis, that the two variables are dependent can not be rejected at significance 0.00241

Note: A brief write-up on the use and importance of the Chi-Square test is included as Annexe 4.1.

Data and information collected in mid to late 1994

The collection service provided by the sweepers was not free and there were monthly rates for the service which were mutually agreed between the households and sweepers. The payment to sweepers by the households was sometimes supplemented by goods, tips on festivals and other things such as food, clothes etc. Sweepers were often reluctant to disclose the payments, as explained in Chapter 3 where the methodology of this study is discussed. However, average payments for the waste collection and other services were obtained and are discussed in Section 7.3.4 below:

### 7.3.4 Rates

The type of work and payments to sweepers vary within middle and higher income areas. Whereas work for sweepers in the low income areas was quite restricted, often only to the collection of waste. The lower ability to pay in the lower income areas and the household perceptions restricting 'sweepers of lower caste and different religion' from entering into the houses in such areas, resulted in less in-house work for sweepers. Such perceptions are less common in the educated, middle and higher income groups in Karachi.

The average payments stated by the sweepers in different areas and the range of those payments are given as Table 7.5. The range of payments in the Suzuki and KAWWS areas was higher since the sweeper system was not operating fully in those areas and sweepers were involved in a few more lucrative jobs. However, there is a general increase in the rates from lower to higher income areas. The minimum payment in Karachi was Rs 20 per month and Rs 10 per month in Faisalabad, possibly because of a higher willingness to pay in Karachi. Once again payments to sweepers for solid waste collection is not a recent phenomenon. Streefland, 1978, described the private work of the municipal sweepers in the year 1970 as emptying bucket latrines and septic tanks against certain payments. Prashad (1995) mentioned payments to sweepers in Delhi for nightsoil collection and sweepers' practices of selling nightsoil to the farmers, in the late 19th century.

**Table 7.5 Average of amounts charged by sweepers to collect waste and the services in different areas.**

Name of Area	Description of Area	Rate in (Rs/month)	Min and Max Charges (Rs)
DT Colony	Low income developed	37	20 - 80
F. B. Area Blocks 10 & 11	Middle income (Suzuki area)	81	20 - 600
F. B. Area Block 6	Middle income (Control)	42	35 - 50
F. B. Area Block 8	Lower middle income	21	20 - 25
Gulberg, Faisalabad	Middle income other city	17	10 - 20
Administration Society	Higher middle (KAWWS area)	200	40 - 1000
Musa Colony	Low income developed slum	23	15 - 40

Data and information collected in mid to late 1994

Additional work doubled or tripled the sweepers' municipal salary. However, additional works undertaken by sweepers are only possible with, and are dependent on co-operation from two groups: the municipal supervision staff and fellow sweepers. Details of such arrangements with the supervisory staff are discussed in the following sections.

### 7.3.5 Collection rights

The primary collection service by sweepers is respected among sweepers without written law or agreements. There are mutual understandings which are respected by all, because of the cohesive nature of the group. The collection rights, or in local term '*kaam*': are the informal ownership rights of a sweeper to collect waste and establish informal contracts with a certain number of households. Collection rights means that only the sweeper who holds a right will collect waste from the houses. Collection rights were respected and followed by all sweepers without any written agreement. There was a social bond but no mode of punishment for violating rules. The main reason for this discipline was perhaps the homogeneous nature of the sweeper community: being a minority, insecure and of different faith from the majority (most of the sweepers in Karachi are Christian and Hindu). This was a most interesting system, perhaps researched for the first time by this study. Past research only mentioned 'ownership' of a street based on rules that have validity within the sweepers' community (Streetland, 1978). The collection rights were sold and purchased amongst sweepers and the amounts paid for them depend upon:

- income potential from that group of houses:
- the number of houses:
- vicinity of transfer points and other physical features such as flats, houses etc.: and
- other factors such as the present co-operation by supervising staff and the local political situation at that time.

Collection rights might be in the same area where a sweeper was performing his official duty for the municipal corporation or in the neighbouring areas which sweepers could reach daily. Location of collection rights areas in Karachi and their duty area, with the distance between the two areas for the sample sweepers are given Table 7.6.

**Table 7.6 Official duty and collection rights area of municipal sweepers.**

Collection Rights Area	Official Duty Area	Approximate Distance (Kms)
F. B. Area blocks 19 & 20	Same	0
F. B. Area block 14	F. B. Area blocks 19 & 20	2
F. B. Area 6	Same	0
F. B. Area blocks 10 & 11	F. B. Area block 6	1
F. B. Area block 6	Same	0
F. B. Area block 6	F. B. Area blocks 12 & 13	2
F. B. Area blocks 10 & 11	F. B. Area blocks 6	1
F. B. Area block 8	F. B. Area block 7	1
F. B. Area blocks 10 and 11	Same	0
F. B. Area blocks 19 & 20	Same	0
F. B. Area block 9	F. B. Area block 6	2

Data and information collected in mid to late 1994 and cross-checked in 1995

If the collection rights area was away from their duty area then the sweepers either walked, used their bicycles or sometimes used public transport to reach it. In the middle income developed areas, purchasing collection rights in the vicinity was not a problem for sweepers, since such transactions were a routine among them, whereas those sweepers who work in the extremely low income or high income or underdeveloped areas, sometime find it difficult to obtain '*kaam*' in the vicinity. In such cases sweepers move longer distances. For this purpose they have to be away during their duty times for a longer duration. This time off is balanced by the lower priority of street sweeping in the less developed areas. Surveys conducted by this research were unable to find a conclusive strong relationship between the area of plots (as an indicator of income group) and the practice of sweepers moving into other areas to collect waste. However, it does seem that the sweepers movement is low in the middle income plot sizes i.e. 330 and 350 sq.-yds, since they find '*kaam*' in the same area. Table 7.7 gives a cross-tabulation of the plot sizes and the practice of sweepers to move into other areas. The table reveals that there is a weak level of dependency with a significance of 0.094.

The practice of sweepers' movement is also independent of the sex of the sweeper. It was found that male and female sweepers both move into other areas, to perform additional work. Table 7.8 gives cross-tabulation of the sweepers' movement practices and their sex.

**Table 7.7 Cross - tabulation of average plot size in the working area and sweepers movement to the other areas**

Whether sweepers move to other areas / average plot size sq.-yds	Yes: they move to other areas for work	No: do not move to other areas	Row Total
80	14	7	21
Row %	66.7	33.3	23.6
Col. %	30.4	16.3	
Tot. %	15.7	7.9	
120	5	3	8
Row %	62.5	37.5	9.0
Col. %	10.9	7.0	
Tot. %	5.6	3.4	
330	7	6	13
Row %	53.8	46.2	14.6
Col. %	15.2	14.0	
Tot. %	7.9	6.7	
350	2	7	9
Row %	22.2	77.8	10.1
Col. %	4.3	16.3	
Tot. %	2.2	7.9	
450	11	6	17
Row %	64.7	35.3	19.1
Col. %	23.9	14.0	
Tot. %	12.4	6.7	
685	7	14	21
Row %	33.3	66.7	23.6
Col. %	15.2	32.6	
Tot. %	7.9	15.7	
Column Total	46	43	89
%	51.7	48.3	100.0

Chi-Square = 9.4015, DF = 5, Significance = 0.09408

Ho = Null hypothesis, that the two variables are dependent can be rejected at this significance

Note: A brief write-up on the use and importance of the Chi-Square test is included as Annexe 4.1.

Data and information collected in mid to late 1994

**Table 7.8 Cross - tabulation of sweepers sex and their practice of working into other areas.**

Whether sweepers move to other areas / sweepers sex	Yes: they move to other areas for work	No: do not move to other areas	Row Total
Female	4	5	9
Row %	44.4	55.6	10.1
Col. %	8.7	11.6	
Tot. %	4.5	5.6	
Male	42	38	80
Row %	52.5	47.5	89.9
Col. %	91.3	88.4	
Tot. %	47.2	42.7	
Column Total	46	43	89
Total	51.7	48.3	100.0

Chi-Square = 0.21023, DF = 1, Significance = 0.64659

Ho = Null hypothesis, that the two variables are dependent can be rejected at this significance

Note: A brief write-up on the use and importance of the Chi-Square test is included as Annexe 4.1.

Data and information collected in mid to late 1994

The value of a collection right i.e. amount of money a sweeper pays to purchase collection rights depends upon a number of factors and has shown a gradual increase during the last few years. The value is sensitive to certain external factors such as the local political situation, and moves towards privatisation. For example, the value of collection rights reduced considerably in the year 1988-89. The reasons highlighted from the in-depth interviews were the rapid changes made by the local party in the urban services delivery, including primary collection of waste. A number of area councillors bound sweepers to mark their attendance in the councillor's office. In several areas a number of councillors and local activists started house to house collection of waste using small trucks (or Suzukis). The case of the Suzuki teams, as discussed in Chapter 5, is an example of such initiatives started in the year 1988-89. Thus sweepers rights of ownership were usually at risk. Table 7.9 gives details of some transactions of collection rights in different areas of Karachi. Since a number of sweepers were reluctant to give details of such a system so a very small number of responses was obtained from the sample.

**Table 7.9 Details of collection rights transaction among municipal sweepers.**

Income Group of Area	Average Plot Size in the Area (sq. - yds.)	Work Details	Year of Purchase	Amount Paid (Rs) at the Time of Transaction	Value of Collection Right in Rs per House
Lower Middle	120	90 houses	1993	17000	189
Lower Middle	-	55 houses	1990	6000	109
Lower Middle	120	60 houses	1992	10,000	167
Lower Middle	120	25 houses	1992	3000	120
Lower Middle	120	40 houses.	1991	12000	300
Lower Middle	120	20 houses	1993	4000	200
Higher Middle	685	15 houses	1990	800	53
Higher Middle	685	25 houses	1992	4000	160
Higher Middle	685	15 houses	1987	2000	133
Higher Middle	300	35 houses	1993	9000	257
Higher Middle	685	15 houses	1990	1200	80
Higher Middle	450	35 houses	1992	6000	171
Higher Middle	685	20 houses	1987	1000	50

Data and information collected in mid to late 1994

The table shows the amount paid to purchase collection rights and other relevant factors for each transaction. Once that amount is paid the previous owner of the area (the sweeper who was collecting waste in the area before) transferred his rights to another sweeper. It was assumed that the value of collection rights depended upon three independent variables: the number of houses in the deal, the year of purchase and the average plot size in the area. The higher the number of houses in the area the more valuable are the collection rights. The value of collection rights also

increases with time. It also depends upon the income group of the area since payments may be better in higher income area. Average plot size has been used as the criteria to indicate income group. A multiple regression was performed for the three variables and the results are discussed below:

Step 1: Year: year when work was purchased

Step 2: Number of houses in the area

Step 3: Average plot size in the area.

Multiple R = 0.95730

R Squared = 0.91643

Adjusted R Square = 0.88857

Standard Error = 1640.3779

F = 32.89615

Signif F = 0.0000

where, B = partial regression coefficient.

R = coefficient of determination.

Signif. F = observed significance level for F test.

F = F value.

Beta = standardized regression coefficient.

Signif. T = observed significance level for T test and T = T value.

#### Variables in the equation

Variable	B	SE B	Beta	T	Sig T
Houses	180.34478	26.4663	0.815359	6.814	0.0001
Plot area	4.271323	2.61757	0.223177	1.632	0.1372
Year	965.5062	269.0799	0.449916	3.588	0.0059
(constant)	-1924374	536110.7699		-3.590	0.0058

Thus the total value of a collection right in any year for a certain number of houses can be predicted if we know the average plot size in the area. The equation for total value of collection rights in the case of Karachi is as follows:

$$\text{Total Amount (Rs)} = -192,437.4 + 180 \text{ X (Houses)} + 4 \text{ X (Plot Area)} + 966 \text{ X (Year)}$$

This model may be useful in predicting the values of investments by sweepers in different areas of the city with a confidence level of 95%.



The purchase of collection rights provides an average income against a small investment, which is an appropriate and stable system from the sweepers point of view. This is important from a municipal and community point of view, since the system of primary waste collection provided by municipal sweepers is indispensable. Collection rights are respected because of the social structure of the sweepers' community. The practice has significant impact on the systems of primary collection of solid waste. Prasad, 1995, mentioned that sweepers in Delhi were controlling their own neighbourhoods (*mohallas*) in 1890. The householders could not hire outside sweepers to remove their waste without incurring the wrath of the *mohalla* sweeper. The *mohalla sweeper* hold an alienable right on the removal of refuse in his or her mohalla, a right which could be transferred by sale or mortgage. Such practices are still common in Delhi (Rao, 1994).

### 7.3.6 Arrangement with supervisory staff

As mentioned above the peaceful operation of the sweepers collection system would not be possible without the co-operation of the municipal supervisory staff. Sweepers work directly under a supervisor locally called '*mucaddam*' (meaning 'respectful') who is usually responsible for looking after the sweepers' work. In the afternoon, Supervisors mark the sweepers' attendance in the presence of sanitary sub-inspectors. Interviews and discussion with the sweepers and municipal supervision staff revealed that the sweepers unofficially pay a regular amount to their *mucaddam*. The amount is locally known as *Dastoori* (meaning 'tradition') and varies between Rs 200 to 300 per month from each sweeper. As a result the sweepers obtain certain favours, particularly the time to do primary collection from the houses (i.e. *kaam*). Supervisory staff generally accept sweepers' involvement in the primary collection but call such work 'private work'. Supervisors justify sweepers work by stating that the work of collection from the houses is done by sweepers after their duty hours. Householders were asked about the time at which the sweeper attended the houses. The times during which sweepers came and collected waste in the control area are given as Table 7.10.

**Table 7.10 Sweepers times to collect waste from the households.**

Time at which sweepers comes	Percentage (frequency)	Cumulative percentage
7:00 am	2.5 (2)	2.5
8:00 am	5.0 (4)	7.5
8:30 am	7.5 (6)	15.0
9:00 am	5.0 (4)	20.0
9:30 am	6.3 (5)	26.3
10:00 am	8.8 (7)	35.1
10:30 am	10.0 (8)	45.1
11:00 am	3.8 (3)	48.9
11:30 am	1.3 (1)	50.2
12:00 noon	3.8 (3)	54.0
1:30 pm	1.3 (1)	55.3
3:00 pm	1.3 (1)	56.6
Time Varies	32.5 (26)	89.1

No response	9 (10.9)	100
Data and information collected in mid to late 1994		

It seems that about one third of the sweepers attend houses in the official duty hours of the morning shift which are from 6:00 to 10:00 am. The results contradict the supervisor's claims.

The supervisor, as the person in charge of attendance and transfers, can make life very difficult for the sweepers. The total amount of money collected from the sweepers by supervisors through the *dastoori* system all over the Karachi is about Rs 2.5 million annually and the 'beneficiaries' are supervision staff and officers above the sweepers in the hierarchy. A few sweepers and their leaders claimed that one portion of money so collected is given to the Health Officers or City Mayor. However, this research was unable to discover who the real 'beneficiaries' from the money collected by sweepers are. The system of Dastoori and the role of mucaddam seems a century old phenomenon. Masselos (1981) described *muccadam* as the 'institution of jobber' in Bombay as in the late nineteenth century. Mucaddam, as described were responsible for hiring sweepers, for superintending their work, for firing them for infringements, and for giving temporary leave. He mentioned that, in order to get permanent employment, the sweepers had to give the mucaddam Dastoori. The only way the sweeper could pay that kind of money was either by borrowing or through instalments over time, out of wages received. In so doing, the sweepers ended up in a continued indebtedness and the mucaddam became a de facto money lender.

### **Box 11**

#### ***Nazeer - a union leader of sweepers speaks***

*Nazeer is not in favour of any privatisation, since he feels that sweepers have a number of benefits and job security while working with the municipal corporation:*

- *They have security and a number of benefits after their retirement, like pension etc.;*
- *Official timings for municipal work are such that they can also perform a number of private works;*
- *They have flexibility of work, since they can pay money to their supervisors for their privilege;*

*He feels that the house to house collection system may not be successful since there would be a need for an equal number of people for street sweeping. He indicated that it has been the policy of municipal corporations to place very few sweepers in the low income areas. Even if their duty is there, they move to other areas. He said that all the sweepers pay a regular amount ranging from Rs 150 to 200 per month to their supervisor. In return the supervisor marks his attendance regularly and allows him to do the work of house to house waste collection. Nazeer feels that this amount is justified and similar to the money that farmers pay to their land lords, since land owners are accountable for the area. Similarly, the municipal supervisor is accountable for his area. He feels that if a sweeper performs his duty and completes his work in 30 minutes instead*

*of 5 hours, then he has full right to go and do other works. He pays money for the purpose of getting this liberty. If a sweeper does not pay money to his supervisor, he cannot then undertake private works and will not get enough income to survive with his family. He feels that all the decision makers are well aware of this fact but they will not do anything since all, according to him, are corrupt. He further indicated that some sweepers refused to pay money in the past and have been punished.*

*On the idea of source separation he mentioned that if source separation is undertaken at the household level the waste might reduce but the separated components will be sold by residents or servants and sweepers may not benefit.*

The payment by sweepers and the security so obtained is a stable and complex process. Breaking up and controlling this process is unlikely in a society like Pakistan. However, looking back to Chapters 4, 5 and 6, it seems that this relationship is very similar to the relationship found between the organiser of the Suzuki system and the collection crew or between middle dealers and itinerant waste buyers as explained in the previous chapters. Under such a patronage system the poorer and weak need security from the stronger and more influential. Most of the sweepers and their leader feel that any change in the system of solid waste management would affect their security. An understanding of the history of caste and sweepers suggests that they used to practice a similar ethos in the agriculture lands (Masselos, 1981).

*Key points from previous discussion:*

- The need for a house to house collection of waste is greater in middle income developed areas as compared to other income groups with open plots;*
- Sweepers operate in the area with rules which are valid among their community;*
- Sweepers need an understanding from the supervision staff to undertake the waste collection work;*
- The municipal work and sweepers collection systems provide enough security and income to sweepers.*

### **7.3.7 Other sources of income**

As discussed in Chapter 4 the sweepers are also involved in the separation practices of the household waste. They separate re-saleable components and sell it to the middle dealers. However, as mentioned before, this practice is not done by all sweepers. To augment the income a number of sweepers also do other part time works such as driving rickshaws, running shops, selling vegetables and other evening works. In terms of additional opportunities, the sweepers may be categorised into two basic categories:

- i) Those sweepers who work only at their waste collection job. They collect waste from a considerable number of houses and also separate re-saleables from them.

ii) Those sweepers who earn extra income from other part time jobs, but like to keep the municipal job. They are not interested in waste collection or separation practices.

Table 7.11 gives percentages of sweepers who admit that they perform separation of re-saleable components and those who do not separate. A cross-tabulation is performed in Table 7.12 to look at the impact of the total number of houses available for waste collection on the separation practices of the sweepers. The chi-square test fails to reject the hypothesis that the two variables are dependent.

**Table 7.11 Practice of separating re-saleables by sweepers (valid cases = 86)**

Do the sweepers practice separation	Percentage
Yes	73.2
No	26.7

Data and information collected in 1993 and mid to late 1994

**Table 7.12 Cross - tabulation of number of houses from where collect waste with the separation practices of re-saleables by sweepers.**

Whether sweepers separate re-saleables / number of houses from which they collect waste	Yes: they separate re-saleables from waste	No: do not separate re-saleables from waste	Row Total %
0 - 10	2	14	16
Row %	12.5	87.5	18.6
Col. %	3.2	60.9	
Tot. %	2.3	16.3	
11 - 20	22	8	30
Row %	73.3	26.7	34.9
Col. %	34.9	34.8	
Tot. %	25.6	9.3	
21 - 30	20	1	21
Row %	95.2	4.8	24.4
Col. %	31.7	4.3	
Tot. %	23.3	1.2	
31 - 40	12	0	12
Row %	100	0	13.9
Col. %	19.0	0	
Tot. %	13.9	0	
more than 40	7	0	7
Row %	100	0	8.1
Col. %	11.1	0	
Tot. %	8.1	0	
Column Total %	63	23	86
	73.2	26.7	

Chi-Square = 49.1221, DF = 22, Significance = 0.00077

Ho = Null hypothesis, that the two variables are dependent can not be rejected at significance 0.00077

Note: A brief summary of the use and importance of the Chi-Square test is included as Annexe 4.1.

Data and information collected in mid to late 1994

Table 7.13 gives the number of sweepers involved in other part time jobs in different areas of Karachi. It seems that sweepers are less inclined to take on other part time jobs in the developed areas as compared to slums and high income areas and areas with many open plots. The sweepers observed in the Suzuki area are those who consider waste collection as their major income earner in spite of the presence of the Suzuki collection system. Where as in the KAWWS area, sweepers are unable to find enough waste collection jobs they concentrate on other part time jobs. In Faisalabad part time jobs are available but payments are generally low.

**Table 7.13 Sweepers involvement in the other part time evening jobs in different areas.**

Name of Area	Description of Area	Admits Involvement in Part Time Work	Do not Admits Involvement in Part Time Works
DT Colony	Low income developed	0	9
F. B. Area Blocks 10 & 11	Middle income (Suzuki area)	2	14
F. B. Area Block 6	Middle income (Control)	5	18
F. B. Area Block 8	Lower middle income	0	8
Gulberg, Faisalabad	Middle Income other city	8	5
Administration Society	Higher middle (KAWWS area)	2	8
Musa Colony	Low income developed slum	3	9

Data and information collected in mid to late 1994 and cross-checked in 1995

## 7.4 A model based around sweepers

It is clear from the previous discussion that municipal sweepers play a key role in the primary collection of waste. They get a basic security from their municipal job and an additional income from the house to house collection service or other works. The nature of the sweepers' work and their monopoly on the waste related services open a number of income opportunities for sweepers and hence they are not considered as the poorest of the poor. However they live in separate residential areas where the living conditions are congested. Streetland (1996) describes the poverty of South Asian poor, including sweepers through closely related elements of vulnerability; lack of dignity, little power to bargain or resist, lack of entitlements and weak coping capacity. Collection of waste from the houses is an additional service offered to the household with the comparative advantage of being officially deployed in the area for street sweeping. From previous discussion it is clear that sweepers have to acquire support from their municipal supervisors and the fellow sweepers to practice a collection. The dynamics of such a relationship are complex and not easy to replace by any external intervention unless a number of long term changes take place gradually. Comparing the system of sweepers collection with the systems of informal recycling, Suzuki and KAWWS it is clear that any sustainable model of integration which involves far reaching changes is not possible in the near future. Those models which can be developed through external influence will remain as models. The more realistic

proposal may be those where potential and existing practice may be recognised, institutionalised and developed leading to an improved system.

Thus it is proposed that the realities of sweepers collection system must be accepted and an enabling environment created to develop the existing primary collection systems into micro-enterprises. A number of steps at the policy level are proposed below and a conceptual framework for a stakeholder analysis is included in the following sections. If the sweepers system can be developed into a number of micro-enterprises, sweepers would be able to practice primary collection with more freedom. However, it is very difficult to predict at this stage that whether or not development of micro-enterprises would bring sustainable social and economic upgrading to the sweepers community. The major differences between the existing and proposed systems are explained in Text box 12:

**Text box 12 Existing Versus Proposed Systems**

Existing	Proposed
- indiscriminate dumping and house to house collection through sweepers.	- an organised house to house collection system of waste arising.
- individual payments to the sweepers and other waste collectors.	- joint payments to the collector (a municipal or a self employed worker) by the community.
- improper equipment and in-adequate health protection to sweepers.	- additional support to the collectors in terms of equipment, uniforms and shoes.
- waste generally disposed of on open areas or at the end of streets.	- removing the collected waste away from the area to the nearest official collection point.
- no understanding between the community, sweepers and the municipal corporation on the primary collection.	- some form of contract between the sweepers, community and the municipal corporation.
- no monitoring system for the primary collection service.	- community monitoring of the system.
- Municipal corporation does not have regular secondary collection service.	- pressurising the municipal corporation for the regular removal of garbage from the secondary collection points.

It is proposed that, initially, the changes to the sweepers collection system be initiated on an experimental basis. A few steps are proposed keeping in view the situation in the Karachi Municipal Corporation (KMC) as a typical institution. However it sets principals for other similar

experiments. The following steps are proposed in the policy to be initiated by the local municipal authority.

1. The Karachi Municipal Corporation (KMC) shall ask the sweepers in the pilot areas to provide details of their ownership of collection rights to the pilot project office.

2. The KMC in consultation with a NGO or area based CBO shall prepare guidelines to award contracts of primary waste collection in the pilot areas. A typical contract for such a service as attached as Annexe 7.1.

3. For old and developed areas where sweepers collection systems are established and the sweepers are permanent employees of the municipality there is a need for a 'golden shake hand' policy option. The corporation pay an amount as a golden hand shake from the present jobs and opt for a new arrangement of offering contracts for the primary collection service. Such offers have been made by government in a number of other sectors. This action is required once pilot activities are successfully implemented and thoroughly evaluated.

4. The municipal corporation shall prepare a short contract agreement and get it agreed with sweepers and the area-based organisation. The municipal corporation shall take the role of a monitoring agency with minimum supervision role. The quality of work and supervision shall be done by a committee consisting of a representative of a CBO and the municipal supervisor/sanitary inspector in the area.

5. A portion of the contract price shall be paid by the local community group and they would be one of the signatories of the contract. Thus households will pay their contribution to the sweeper collectively or through the area based organisations.

Once pilot activities are instigated, the impact studies may be conducted and, based on the results, the policy options may be prepared. There are a number of strong arguments in favour of upgrading the present sweepers collection system rather than introducing mechanised house to house collection. Some of those reasons have already been discussed in the preceding sections. Upgrading the current sweepers system may be considered a better mode of privatisation as compared to the centralised privatisation through a national or international level contractor. There is a need for such a system where the efficiency of the sweepers collection operation can improve and their work can be monitored at the neighbourhood level through area-based organisations. The system may be acceptable to all the stakeholders in the system.

### **7.4.1 The Sweepers' micro-enterprise model**

The social, economic and technical efficiencies of a realistic model may be summarised as follows:

- additional income to sweepers and so the poorer section of the population will get a share.
- the employment opportunities will remain similar, in contrast to the introduction of mechanised systems for door to door collection. There is scope for simple mechanisation like the use of tricycles, Suzukis etc. to enable sweepers to transport the waste away from residential areas.
- The female employees working as sweepers would not be affected. It is always a danger that the female employee would be replaced by a male, once more mechanised system is introduced.
- The system could be monitored by the neighbourhood groups; the municipal corporation having the responsibility of contract management only.
- The system is an intermediate route towards privatisation and decentralisation for efficiency.
- The municipal corporation is able to concentrate more on the development of transportation and the disposal of solid waste.

### **7.4.2 Economic opportunities**

The existing sweepers collection system involves the sale and purchase of collection rights. Thus, at any time of the year there is an invisible investment of millions of rupees by the sweepers in the city collection service. From the sweepers' point of view there is a high rate of return on small investments. Table 7.14 gives the years, investment, present value of the investment, nature of work and estimated income from the work from a sample of 13 sweepers. The estimated total income is based on a minimum collection rate of Rs 20 per month and the opportunity cost is estimated at an interest rate of 12% . The total income mentioned is the additional income from the household collection work before subtracting any amount paid to the supervisors etc.

Table 7.14 clearly shows that the sweepers get higher rates of return against their investment as compared to other opportunities available for investment for example a bank account or saving certificates. However there is a high risk involved from the sweepers' point of view. Any changes in the current primary collection practices can devalue sweepers investments to zero. There are also other un-accounted for costs such as payments to municipal supervisors by sweepers, which further reduces the returns from investments. This indicates that any model which changes the existing system has to provide good economic incentives for the sweepers if they are not to offer strong opposition to change.



**Table 7.14 Investment and income opportunities in the sweepers transaction of collection rights for individual sample transactions.**

Year of Purchase	Amount Paid (Rs)	Present Value (Rs)	Nature of Work	Opportunity Cost Rs /month	Present Total Income Rs/month
1987	2000	4420	15 houses	45	300
1987	1000	2210	20 houses	22	400
1989	800	1410	15 houses	14	300
1990	6000	9440	55 houses	95	1100
1990	1200	1890	15 houses	19	300
1992	10000	12540	60 houses	125	1200
1992	4000	5020	25 houses	50	500
1992	3000	3760	25 houses	38	500
1992	6000	7530	35 houses	75	700
1993	17000	19040	90 houses	190	1800
1993	9000	10080	35 houses	101	700
1993	4000	4480	20 houses	45	400
1994	12000	13440	40 houses	134	800

Data and information collected in mid to late 1994 and cross-checked in 1995

The municipal corporation spends more than half its budget on the sweepers' salaries. Also it is evident from the case studies discussed in Chapters 5 and 6 that the residents were willing to pay more if they get an improved service. Through the introduction of the proposed micro-enterprise model, municipal corporations can gradually reduce their expenditures on sweepers salaries and transfer it directly to the communities. The findings from the research, and particularly the example of the Suzuki system, clearly show that now there is more need for primary collection of waste, this developed market phenomenon can generate enough income to counter-balance the municipal support and spending.

### 7.4.3 Social opportunities

The major social opportunities are additional income and security to the sweepers. The present monopoly of sweepers will change to a more competitive system. The sweepers can come out of the patronage system offered by their supervisors and leaders in which regular payments are made. Through understanding and developing the present system of sweepers collection, the rights and incomes of female sweepers would be secured, as compared to the introduction of a mechanised system.

#### **7.4.4 Other opportunities**

The sweepers would be more responsible and accountable after being paid jointly by the communities for certain services as compared to the sweepers hired individually. Certain unacceptable practices of sweepers, such as the burning of waste in the residential areas, indiscriminate dumping of waste etc. can be controlled through more organised agreements with the sweepers. Compact collection areas can be allocated to sweepers, thus reducing the movement of sweepers to different areas and consequent loss of time. Similarly, charges can be fixed for certain services in the areas of a certain plot sizes. Sweepers could be provided with improved carts, equipment and hand tools through area-based organisations. Through organised work and additional support, it could be anticipated that the sweepers' involvement in in-house work is likely to reduce.

#### **7.4.5 Constraints to the micro-enterprise model**

There are a number of constraints to the micro-enterprise model. The major one is the reduction in the security, which sweepers otherwise get from their municipal job. This security is due to the conditions of the job, in which hiring and firing is not easy. The other security which sweepers enjoy is a retirement pension. Thus, when a sweeper retires from his municipal job, a regular income is guaranteed.

The other constraint is the loss of power by municipal corporation through a sharing of responsibilities with more autonomous sweepers groups. Whether or not municipal corporations like to have that sharing may be an important constraint.

At the community level there is a need for neighbourhood organisations to monitor and implement the agreements with sweepers. Often such neighbourhood organisations operate at the community level but in a number of areas such organisations do not exist at all. There is a possibility that the proposed micro-enterprise model will take a form of patron-client sub groups, with rich and strong sweepers taking leading roles.

##### *Key points from previous discussion*

- *The present system by sweepers can be institutionalised into an integrated model of primary waste collection.*
- *There are number of opportunities and constraints to the proposed model.*

### **7.5 Testing the model**

The proposed model has been partially tested in Faisalabad, Pakistan in late 1996. The Overseas Development Administration (ODA) funded Faisalabad Area Upgrading Project (FAUP) was trying to assist area based organisations in low income areas to initiate primary collection

activities. The model was successfully adopted by a community organisation where a self employed sweeper was hired to collect waste from 80 houses. The support to the sweeper was gradually increased and after just 8 weeks the sweeper was collectively hired by another area based organisation in the vicinity of the project area. This is enough to demonstrate the success of a model. The community organisation was keen to expand the model further on the condition of profit sharing with the sweeper. There were problems of secondary collection (transportation) of waste. It appears that the model is successful at one stage where the sweeper and the area based organisation are involved. However, at this stage, the pilot activities was not yet mature enough to be demonstrated to the municipal corporation for replication and inclusion in future policy. It appears that the micro-enterprise model has some potential for success and is worth trying.

## **7.6 Conclusion**

The municipal sweepers collection system is an integral part of the current waste management process in the city of Karachi. The sweepers perform the primary collection of waste from the houses under an informal agreement with the households. The current practices of households waste collection are extensive and increasing with the growth of developed residential areas. Such practices can be developed and institutionalised as an integrated sustainable model for the primary collection of waste.

# Chapter 8

## Conclusions and Recommendations

### 8.1 Introduction

Informal activities in solid waste management have made a major contribution in the low income developing countries, in waste recycling and collection. A body of past research studies explains the extent and nature of those informal practices, as discussed in Chapter 2. However, questions have been raised about the sustainability, integration and replication of those informal activities and approaches. As mentioned in Chapter 2, there is an acute need for further research on the constraints and problems of integration which is based on studies carried out in the field. This thesis is an attempt to study constraints to integration from a grass roots perspective. Four different informal activities were discussed in Chapter 4 to 7. Each activity was studied as a case to assess whether the integration of those activities with the public sector 'official' solid waste management was possible or not. Mainly the benefits and constraints were discussed, primarily in the context of improved solid waste management. All the informal activities were judged from the aspect of formal integration in which the official and the informal sector recognised each other, accepted each other's role and avoided any practice which adversely affected the counterpart. This formal integration relates to vertical integration and to public-private partnership as explained in Chapter 2. Further, integration means that the informal activities find an appropriate place in the future projects, plans and policies on solid waste management. The major conclusion drawn from this thesis explains that official integration is not possible under existing conditions. The following sections explain the key conclusion of the thesis.

### 8.2 Constraints to Integration

8.2.1 A major constraint to integration is the current public attitudes. For example, although the households separate and sell materials, they do not see any relationship between the waste separation and improved solid waste management. The households do not understand any environmental benefit from the source separation practices. Whether it is the idea of involving waste pickers in primary waste collection or upgrading the sweeper system, the public do not consider such activities a part of an improved waste management system. Thus any system of improved solid waste management which seeks to integrate informal activities may not get support from the public.

8.2.2 We conclude from the KAWWS and Suzuki systems that households only consider those systems as temporary relief measures. The KAWWS system has been limited to less than 25% of the residents in terms of participation. Most of the residents in the area started considering the community based organisation as a service delivery agency, which could take the money and deliver the service. It may be concluded that any improved system of primary waste collection which will integrate programmes like KAWWS and the Suzuki may not be immediately acceptable to the community, who still believe that the government is responsible for the effective delivery of the services. The cases of Suzuki and KAWWS are from middle income areas; community attitudes in low income area might be different.

8.2.3 The other major constraints to integration are the municipal procedures and attitudes of municipal managers. The municipal managers feel that there is a need for a master plan to improve the city waste management and so the community initiatives and private-informal activities could not be integrated with the official system. In other words they feel that integration will not provide long term and sustainable solutions. As we observed, the on-going systems and interventions usually did not receive municipal co-operation. The Suzuki and the KAWWS systems succeeded in removing waste to a few points, but the municipal corporation could not provide a reliable service of secondary collection from transfer points. In general, orthodox municipal procedures do not have a place for the community initiatives and decentralised approaches described and municipal officers do not see them as a part of an integrated solid waste management system.

8.2.4 The other major constraint to integration is the internal structure and dependencies within the informal organisations. These structures and dependencies exist because of the informal nature of the organisation and the security provided from one group to the another. Examples which we observed included the relationship between the itinerant waste buyers and middle dealers; between sweepers and their supervisor; and between the Suzuki crew and the programme organiser. The existing nature of formal institutions or short term pilot projects could not replace those dependencies and so provide security to the people involved unless sustainable social security systems develop.

8.2.5 We found that the political interference which we observed has been a constraint to the growth and further development of informal activities. This has been found to be particularly true in the primary collection programmes, where local and national level political changes and the

vested interests of politicians adversely affected the KAWWS and Suzuki programmes. The local level politicians inevitably used solid waste collection and cleanliness for their political gains and may not be able to view sustainable and independent programmes in a politically neutral way..

8.2.6 Finally, there are a number of constraints associated with specific activities. For example: problems created for the municipal operation: health hazards with informal recycling: and creation of a monopoly in the sweepers collection system. Choice of inappropriate collection vehicles and placement of communal bins have also been identified as the major constraints in the Suzuki and KAWWS systems respectively.

We conclude that the informal activities may not be integrated with the official system under the present situation. This may conflict with the common assumption that the pilot activities run by community groups, who assume that they will become part of the official policy and will be integrated with the official system. We conclude from Chapter 7 on the sweepers' system that there are already integrated informal systems within public sector activities, such as the sweepers' system of primary collection where further development is possible and seems viable. There is a need for more research on the further development of the integrated systems like the sweepers collection systems, where the concepts of efficiency and effectiveness are naturally balanced with the social benefits.

### **8.3 Benefits of Integration**

8.3.1 The first benefit identified in all the case studies is the level of participation. Although the level of participation varied from one case to other, participation in all the cases was relatively more than in the areas where only the municipal system was in operation. In the case of the Suzuki system the level of participation has been measured by the number of people providing waste regularly to the Suzukis, and paying regular fees and in the case of the sweepers system, the proportion of the population utilising the services of the sweepers system for primary collection of waste has been observed. The separation of waste for re-sale is also a simple and popular type of participation. The participation was more difficult to define in case of the KAWWS system, where only a small proportion of housewives was fully motivated and actively participating in the KAWWS programme. It is important to conduct further research on the extent and nature of participation in urban solid waste projects. Participation may provide a major benefit for integration since it enhances trust between various groups and makes users more responsible towards the operation and maintenance of the service.

8.3.2 We conclude that the informal activities address the felt needs of the community effectively. For example the KAWWS and Suzuki's programmes contributed in improving the overall cleanliness in the area. The operational efficiency was measured by counting the number of waste piles in the area which was much lower in the programme areas as compared to the areas where only the official sector was operating. In addition, both the programmes contributed in changing public attitudes. Instead of assuming that the municipal corporation would come and improve waste collection in their area, the community assumed their responsibilities and initiated a number of activities up to a certain extent, but with certain limitations explained in Conclusion 8.2.2.

8.3.3 Some informal activities have a remarkable capability to create employment. For example the informal recycling provides employment to a large group of the people and thereby enhances household income.

8.3.4 The community based activities like the KAWWS programme could strengthen the links between the official agencies and the community where, generally, the elements of public consultation do not exist in developing countries. The KAWWS programme has also involved housewives in the process, who are in a position to monitor the performance of some programmes more effectively as compared to male household members.

8.3.5 It may be concluded that all the informal activities generate more resources and utilise the available resources consciously. They operate with a flexible organisation which is capable of generating and utilising resources very effectively. Involvement of waste pickers in the Suzuki collection system and the separation of re-saleables by the Suzuki crew and sweepers are excellent examples of efficient utilisation of resources. Such a spirit is usually absent in the public sector centralised systems where ownership of property rights is often blurred. Integration of the informal activities may clearly define the roles and responsibilities at the grass root level, as we found in the cases discussed. Similarly, all the groups involved in the informal recycling generated and utilised additional resources. The voluntary work in the KAWWS system is another example of resource generation. All the four decentralised activities generated and utilised additional resources.

We conclude that there are a number of benefits of the programmes. A number of those benefits exist because of the existing nature of the programmes which may or may not be transferred to an

integrated system as described in Section 8.4. Ideally these benefits must transfer to an integrated programme even if the official sector is involved. The sweepers' collection system is an ideal example of an appropriate system, where a regular service is provided by a poor group of the population.

## 8.4 Integrated Systems

Keeping in view the constraints and benefits of the informal activities, we could develop criteria for the integrated programmes. Traditionally, integrated solid waste management has been defined as the system which include all the elements of a 'proper solid waste management' from collection to disposal. It must also include the related tasks such as the management of hospital and hazardous waste etc. Integrated solid waste management as defined in this thesis is a system in which the informal activities could continue to play a positive role in the developed system. The criteria for integration must consider:

- Recognising and accepting the existing role of informal activities
- Supporting the informal activities where they meet the objectives of improved solid waste management without formalizing the informal activities
- Incorporating the informal activities in the design and policies wherever it is possible, for example accepting and integrating sweepers' collection system
- Involving the community under a precise definition of participation which could be measurable
- Promoting the partnership between the community, private informal activities and the public sector
- Having the capacity to resolve conflicts and differences through mutual consultation
- Avoiding any adverse social effects on the groups involved
- Having a neutral political stance.

Whilst these criteria for integrated solid waste management are based on findings in Karachi, Pakistan, the author's experience in other countries of the Indian Sub-continent where the institutional framework is similar suggests that they are also likely to be valid in these countries because of similarities in social, cultural and economic factors. However, it is beyond the scope of this thesis to conclusively prove this assertion. For other developing countries the public and institutional attitudes may differ. Most of the literature reviewed in Chapter 2 presents little useful information on major constraints to integration. It only suggests benefits of integration



through public-private partnership, community participation or sub-contracting. This thesis is therefore a major contribution to the body of practical knowledge available about integration. The basic findings on institutional constraints and dependencies within informal organizations as found in this thesis may also be valid in other developing countries. This thesis support such findings from other literature. In addition, this thesis provides an applied research framework to achieve integrated solid waste management applicable in a number of low income developing countries. Such a framework has the potential to assess fully the social and economic benefits of any intervention.

## **8.5 Further research needs**

Chapters 4 to 7 show that in each of the informal activities a number of groups are involved. Groups have an interest in the activity or are sometime affected by the activity. Thus any intervention which is beneficial for one group may adversely affect the other. It is important to develop a stakeholder's analysis around each informal activity as adopted in the methodology of current research and given as Table 3.1 for the informal recycling. Current stakeholder theory assigns values and powers to all the actors involved. This seems a useful way to incorporate all the groups along with their perceptions of the problem. However, a good stakeholder analysis is only possible once the objectives and purpose of any intervention are transparent.

Stakeholder analysis is a technique to understand the value and powers of each group (or person) involved. Values are assigned on the basis of how the stakeholder values their interest in the project. Powers are the numbers which describe the ability of the stakeholder to affect the project. By multiplying the values of each stakeholder with their power, it may be judged how important the stakeholder is for the project. In addition, it helps decide that what actions are required to support future development.

The other area worth exploring is how the current sweepers' system could be upgraded into a series of micro-enterprises. The sweepers' micro-enterprises may be used as an alternative to the centralised privatisation of solid waste management, currently moving up the policy agenda. In a number of developing countries cities found the privatisation of the primary collection systems difficult because of the resistance from the sweeper unions. As discussed in Chapter 7 and recently experimented in Faisalabad, Pakistan by the author, the primary collection could be effectively handled through a partnership between the community organisations, municipal and private sweepers and the municipal corporation. There is a need to further explore the idea of sweepers' micro-enterprises through more experimentation and policy changes in other cities in

developing countries. Appropriate models of partnerships may be evolved for other infrastructure and services. Each model may be developed in the local environment and understanding of the institutions involved.

There is a need to study prospects of integration in relation to different models of government. How may governments get the best advantage of the on-going and established informal systems for the effective delivery of infrastructure and services.

## **8.6 Recommendations**

8.6.1 It is recommended that pilot projects in solid waste management must focus on the design and policy changes which overcome the constraints to integration highlighted in Section 8.2. Some constraints need long term efforts if they are to overcome, but if the goal and purpose are set in the light of research findings, progress could be made in that direction.

8.6.2 By and large, neither community groups nor users of the solid waste service are aware of the important role being played by informal activities in solid waste management. Their current perceptions about the waste pickers and sweepers could only change through appropriate and long term education campaigns.

8.6.3 In solid waste management projects, particularly those which target recycling and the primary collection in low income developing countries, there is a need to develop an in-depth understanding of the on-going private informal activities as part of the project preparation phase. Such activities generally have a potential to further develop and benefit the existing solid waste management. Chapter 7 highlights how an on-going activity might be developed to contribute to improved solid waste management. Similarly a number of benefits of informal recycling are highlighted in Chapter 4. It is recommended that short booklets and workshops should be arranged in the cities of low income developing countries to disseminate the findings of this research.

8.6.4 There is a need to develop organisational and management techniques which take into account the broader impacts of the solid waste management projects in developing countries. This may be founded on the methodology developed and adopted for this thesis. It is

recommended that further research be done to develop the application of stakeholder analysis for specific applications to solid waste management.

8.6.5 There is a need to initiate some pilot activities which attempts to integrate the informal activities. Those activities must build and further develop on the existing structure of the informal activities. The impact of those activities must be assessed and policy guidelines prepared to replicate those activities.

8.6.6 There is a need to look at the entire set of informal activities from a private enterprise perspective. Proposals may be developed for entrepreneurs to initiate primary collection and recycling activities, which could vertically integrate the on-going informal systems. Such proposals may be disseminated through Chamber of Commerce, Industrial Development Banks and Bureau of Infrastructure Financing.

## REFERENCES

- AERC (1988), 'Socio- Economic Profile of Planned Areas in Karachi'. Applied Economic Research Centre, University of Karachi, Pakistan.
- Agenda 21 (1993), 'The Earth Summit'. First text of agreement negotiated by governments at the United Nations Conference on Environment and Development (UNCED). UN Publications.
- Ali M. et. al (1996), 'Municipal and the Informal Systems in Solid Waste Management'. In Educating for Real, Nabeel Hamdi and El Sherif A. (eds.). Intermediate Technology, Publications, UK.
- Ali S. M. et. al (1994), 'Informal Recycling and Municipal Attitudes'. Paper Presented at the Seminar, Whose Environment ? New Directions in Solid Waste Management, at School of Public Policy, Birmingham University, UK.
- Ali S. M. and Saywell D. (1995), 'Community Initiatives in Solid Waste'. Paper presented in 21st WEDC Conference, Kampala, Uganda. Proceedings pp 199-202, Pickford J. et. al (ed.). Water, Engineering and Development Centre, Loughborough University, UK.
- Ali S. M. and Saywell D. (1996), 'Public/Private Municipal Sweepers Valued in Karachi, Pakistan'. Voices from the City, newsletter of urban environmental issues. Environmental Health Project (EHP), USA.
- Ali M. and Ahmed R. (1992), 'A Systemised Way of Disposal'. Friday Magazine 18th September. daily DAWN, Herald Publications, Pakistan.
- Arrossi S. et. al (1995), 'Funding Community Initiatives'. Earthscan Publications Ltd, London.
- Aziz A. (1984), 'Urban Poor and Urban Informal Sector'. Ashish Publishing House, India.

- Batley R. (1992), 'Cooperation with Private and Community Organisation'. The Institutional Framework of Urban Management. Working Paper No. 6. Development Administration Group (DAG), The University of Birmingham.
- Beede D. N. and Bloom D. E. (1995), 'The Economics of Municipal Solid Waste'. The World Bank Research Observer Vol. 10 No. 2 pp 113-50. The World Bank.
- Beukering P. et. al (1996), 'The Informal Sector and Waste Paper Recovery in Bombay'. Collaborative Research in the Economics of Environment and Development (CREED), Working Paper No. 5. Institute of Environment and Development (IIED), UK.
- Biocycle (1995), 'Scavenging Becomes Bigger Problem'. Biocycle p 12. Vol. 36 No. 4.
- Blore I. (1994), 'Understanding and Managing Solid Waste Systems'. Research Proposal for a Grant to Undertake Economic and Social Research for the Benefit of Developing Countries. Submitted to Overseas Development Administration (ODA), UK.
- Bose A. and Blore I. (1993), 'Public Waste and Private property - An Inquiry into the Economics of Solid Waste in Calcutta'. Public Administration and Development, Vol. 13, 1-15. John Wiley and Sons, UK.
- Brett E. A. (1993), 'Voluntary Agencies as Development Organizations: Theorizing the Problem of Efficiency and Accountability'. Development and Change, Vol. 24 No. 2. pp 269-303.
- Bromley R. (1978), 'Organisation, Regulation and Exploitation in the So-Called 'Urban Informal Sector': The Street Traders of Cali, Colombia. World Development, Vol. 6 No. 9/10 pp 1161 -1169.
- Bulmer M. and Warwick D. P. (1983), 'Social Research in Developing Countries'. John Wiley and Sons.
- Chambers R. (1993), 'Challenging the Professions: Frontiers for Rural Development'. Intermediate Technology (IT) Publications, London.

Charlton Roger and May Roy (1995), 'NGOs, Politics, Projects and Probity: A Policy Implementation Perspective'. *Third World Quarterly*, Vol. 16, No. 2. UK.

Clark John (1995), 'The State, Popular Participation, and the Voluntary Sector'. *World Development*, Vol. 23 No. 4. pp 593-601. Pergamon Press, UK.

Cointreau S. J. (1990), 'Recycling from Municipal Wastes: How do Industrialised and Developing Countries Compare ?'. Paper Presented at the World Congress of Local Governments for a Sustainable Future held at United Nations, New York, NY, USA September 5 to 8, 1990.

Cointreau S. J. and Kradt M. (1991), 'Living with Garbage: Cities Learn to Recycle'. *Development Forum*, January-February, 1991.

Cointreau S. J. (un-dated), 'Improving Solid Waste Management'. *National Development* Vol. 31 No. 5.

Cointreau (1982), 'Environmental Management of Urban Solid Wastes in Developing Countries - A Project Guide'. Urban Development Department, The World Bank.

Cointreau S. J. (1994). 'Private Sector Participation in Municipal Solid Waste Services in Developing Countries, Vol. I. The Formal Sector'. Urban Management Programme. The World Bank, Washington D. C.

Cook P. and Kirkpatrick C. (1988), 'Privatisation in Less Developed Countries'. Wheatsheaf Books, Sussex, UK.

Dudley E. (1996), 'Educating Field Workers'. In *Education for Real*, Hamdi N. and El-Sherif A. (Eds.). Intermediate Technology Publications.

Edwards M. and Hulme D. (1992), 'Making a Difference - NGOs and Development in a Changing World'. Earthscan Publications Ltd, London.

- Fernandez A. L. (1993), 'Public-Private Partnership in Solid Waste Management'. *Regional Development Dialogue* Vol. 14 No. 3, August 1993. United Nations Centre for Regional Development, Nagoya, Japan.
- Furedy Christine (1993a), 'Working with the Waste Pickers'. *Asian Approach to Urban Solid Waste Management. Alternatives* Vol. 19 No. 2, 1993. Canada.
- Furedy C. (1993b), 'Personal Communication' Associate Professor, York University, Canada.
- Furedy Christine (1984), 'Socio-Political Aspects of the Recovery of Urban Waste in Asia'. *Conservation and Recycling*, Vol. 7 No. 2. Pergamon Press, UK.
- Furedy Christine (1991), 'Source Separation in Developing Countries'. *Warmer Bulletin*, August 1991. UK.
- Furedy Christine (1992), 'Garbage: Exploring Non-Conventional Options in Asian Cities'. *Environment and Urbanisation*, Vol. 4 No. 2, October, 1992. UK.
- Furedy Christine (1989), 'Social Considerations in Solid Waste Management in Asian Cities'. *Regional Development Dialogue*, Vol. 10 No. 3. UNCRD, Nagoya, Japan.
- Furedy Christine and Shivakumar K. (1990), 'Reforming Solid Waste Management Perspectives of Concerned Citizens'. Paper Presented at the International Workshop on Solid Waste Management and Resource Mobilisation. Kathmandu, Nepal.
- Furubotn E. G. and Pejovich S. (1972), 'Property Rights and Economic Theory: A Survey of Recent Literature'. *Journal of Economic Literature*, Vol. X No. 4.
- Grown C. A. and Sebstad J., (1989), 'Introduction: Towards a Wider Perspective on Women's Employment'. *World Development*, Vol. 17 No 7. Pergamon Press, UK.
- Hakim C. (1987), 'Research Design', *Strategies and Choices in the Design of Social Research*. *Contemporary Social Research* - 13. Allen and Unwin, London.

Hamdi N. (1996), 'Education for Real'. Intermediate Technology Publications, UK.

Hamel J. et. al (1993), 'Case Study Methods'. Sage Publications.

Hart K. (1973), 'Informal Income Opportunities and Income in Ghana'. Journal of Modern African Studies, Vol. 11 No. 1 pp 61-89.

Harrigan K. R. (1983), 'Strategies for Vertical Integration'. Lexington Books.

Hasan A. (1990), 'Community Groups and Non-Government Organisations in the Urban Field of Pakistan'. Environment and Urbanization Vol. 2 No. 1 April, 1990. UK.

Hasan A. (1994), 'Personal Communication'. Researcher in Planning and Development, Karachi, Pakistan.

Haynes K. E. and El Hakim S. M., (1979), 'Appropriate Technology and Public Policy: The Urban Waste Management System in Cairo'. Geographical Review, No. 69, 1:101:8.

Holmes J. (1993), 'Waste Management Practices in Developing Countries'. Wastes Management, June 1993. Institute of Waste Management, UK.

Huysman M. (1994), 'Waste Picking as a Survival Strategy for Women in Indian Cities'. Environment and Urbanisation, Vol. 6 No. 2, October 1992. UK.

ILO (1972), 'Employment, Incomes and Equality: A Strategy for Increasing Productive Employment in Kenya'. ILO, Geneva.

ILO (1989), 'Urban Informal Sector Information: Needs and Methods: World Employment Programme. ILO, Geneva.

ILO (1992), 'The Urban Informal Sector in Asia: An Annotated Bibliography. ILO, Bibliography No. 13, ILO, Geneva.



IWM (1990), "Bury Hits Government Targets". *Wastes Management* Vol. LXXX No 8, p-629. Institute of Waste Management. UK

Joachim G. and Heather M. (1991), 'Participatory Rapid Appraisal for Community Development: A training manual based on experiences in the Middle East and North Africa, Institute of Environment and Development (IIED), London.

KAWWS (1991), 'Success Story'. Paper presented at The Global Assembly of Women and the Environment Nov. 1991, Florida, USA.

KDA (1991), 'Karachi Development Plan 2000'. Karachi Development Authority, Karachi, Pakistan.

Khalid I. (1996), 'Personal Communication'. Iftikhar Khalid, Urban Anthropologist, Faisalabad, Karachi.

Klundert A. V. D. and Lardinois I. (1995), 'Community and Private (Formal and Informal) Sector Involvement in Municipal Solid Waste Management in Developing Countries'. Background paper for the Urban Management Programme (UMP), Ittingen 10-12 April, 1995.

Matsuto T. and Tanaka N. (1993), 'Data Analysis of Daily Collection Tonnage of Residential Solid Waste in Japan'. *Waste Management and Research*, Vol. 11 No. 4.

Masselos J. (1981), 'Jobs and Jobbery: the Sweepers in Bombay under the Raj'. *The Indian Economic and Social History Review*. Vol. 19 (2), pp 101-139.

Mazumdar D. (1976). 'The Urban Informal Sector'. *World Development* Vol. 4 No. 8.

Meyer C. A. (1995), 'Opportunism and NGOs: Entrepreneurship and Green North-South Transfers'. *World Development* Vol. 23 No. 8, pp. 1277-1289.

Mukoko S. (1994), 'Poverty Alleviation and Urban Environmental Management: Lessons from Surabaya, Indonesia. UNCRD Newsletter, No. 38 Autumn 1994.

Muttamara S. (1994), 'Solid Waste Recycling and Reuse in Bangkok'. Paper Presented at the Seminar, Whose Environment ? New Directions in Solid Waste Management, at School of Public Policy, Birmingham University, UK.

Nachmias C. and Nachmias D. (1990), 'Research Methods in the Social Sciences'. Edward Arnold, London.

Nath K. J. (1994), 'Future of Recycling of Urban Solid Wastes in Developing Countries'. Paper Presented at the Seminar, Whose Environment ? New Directions in Solid Waste Management, at School of Public Policy, Birmingham University, UK.

NESPAK (1992), 'Detailed Design and Preparation of Tender Documents for Solid Waste Management'. Interim Report, National Engineering Services Pakistan (pvt.) Limited, Karachi, Pakistan.

ODA (1994), 'Solid Waste Management Strategy for Faisalabad, Pakistan'. Draft Final Report, Overseas Development Administration (ODA), UK.

Ordinance (1979), 'Local Bodies Ordinance Government of Pakistan'. Government Publications, Pakistan.

Poerbo Hasan (1991), 'Urban Solid Waste Management in Bandung: Towards an Integrated Resource Recovery System'. Environment and Urbanization Vol. 3 No. 1 April, 1991. UK.

Prashad V. (1995), 'Marks of Capital: Colonialism and the Sweepers of Delhi'. International Review of Social History, Volume 40 Part 1, pp 1-30.

Rahman P. and Rashid A. (1995), 'Partnertship in Development - Role of Actors, Constraints, Good Practices and Lessons Learnt'. Paper Presented to the SKAT/SDC Aguasan Workshop, June 1995, Gersau, Switzerland.

- Rao V. P. (1994), 'Personal Communication'. Zonal Municipal Commissioner, Delhi, India.
- Rosario A., (1994), 'A Decentralised Approach to Solid Waste Management'. *Appropriate Technology*, Vol. 21 No. 3. Intermediate Technology, UK.
- Roth G. (1988), 'The Private Provision of Public Services'. Economic Development Institute (EDI) Series, Oxford University Press.
- Rutledge G. L. and Vogan C. R. (1994), 'Pollution Abatement and Control Expenditures, 1972-1992. In 'Survey of Current Business', 74 (May): 36-49.
- Sanyal B. (1991), 'Organizing the self employed: The Politics of the Urban Informal Sector'. *International Labour Review*, Vol. 130, 1991, No. 1.
- Schertenleib R. and Meyer W. (1992), 'Municipal Solid Waste Management in Developing Countries: Problems and Issues: Need for Future Research'. *International Reference Centre for Waste Disposal (IRCWD) News* No. 26, March 1992.
- Schrimshaw S. C. M. and Hartado E. (1987), 'Rapid Assessment Procedures for Nutrition and Primary Health Care'. The United Nations University, Tokyo, Japan.
- Schubeler P. (1996), 'Participation and Partnership in Urban Infrastructure Management'. *Urban Management Programme* 19. The World Bank.
- Shenk H. and Baud I. (1994), 'Solid Waste Management in Bangalore: Reflections, Assessments and Suggestions'. In I. Baud and H. Shenk (eds.) *Solid Waste Management: Modes, Assessments, Appraisals and Linkages in Bangalore*. New Delhi, India: Manohar Publishers.
- Sicular D. T., (1991), 'Pockets of Peasants in Indonesia: The Case of Scavengers'. *World Development*, Vol. 19 No. 2/3. Pergamon Press, UK.

Siddiqui S. (1994), 'Personal Communication'. President Karachi Administration Women Welfare Society (KAWWS), Karachi, Pakistan.

Silver M. (1984), 'Enterprise and the Scope of the Firm - The Role of Vertical Integration'. Martin Robertson and Company, UK.

Streefland P. (1977), 'The Absorptive Capacity of the Urban Tertiary Sector in Third World Countries'. *Development and Change*, 8 (1977), pp 293 - 305, UK.

Streefland P. H. (1978), 'The Social Organisation of Night Soil Collection'. in *Sanitation in Developing Countries*. Arnold Pacey (ed.). John Wiley and Sons, UK.

Streefland P. (1979), 'The Sweepers of Slaughterhouse'. Van Gorcum, Assen, The Netherlands.

Streefland P. (1996), 'Mutual Support Arrangements Among the Poor in South Asia'. *Community Development Journal*, Vol. 31 No. 4, October 1996 pp-302-318.

Tendler J. (1989), 'What Ever Happened to Poverty Alleviation?'. *World Development* Vol. 17 No. 7. Pergamon Press, UK.

Theis J. and Grady M. H. (1991), 'Participatory Rapid Appraisal for Community Development'. International Institute for Environment and Development (IIED), London, UK.

Thompson M.(1994). 'Blood, Sweat and Tears'. *Waste Management and Research*, Vol. 12 pp 199-205.

UNCHS (1992), 'Improving the Living Environments for a Sustainable Future'. Nairobi, Kenya: UNCHS (Habitat), HS/270/92 E.

Weaver-Mitchell C. and Manning B. (1990), 'Public Private Partnership in Third World Development'. The 20<sup>th</sup> Normal Wilkinson Memorial Lecture. Department of Geography, University of Reading, UK.

Weeks J. (1975), 'Policies for Expanding Employment in the Urban Informal Sector of Developing Countries'. *International Labour Review*, January.

Williamson O. E. (1985), 'The Economic Institutions of Capitalism'. The Free Press, New York.

World Development Report (1994). *Infrastructure for Development*. Oxford: Oxford University Press for the World Bank.

Yin R. K. (1984), 'Case Study Research, Design and Methods'. *Applied Social Research Methods Series Vol. 15*. Sage Publications, London, UK.

Yin R. K. (1993), 'Application of Case Study Research'. *Applied Social Research Methods Series, Vol. 34*. Sage Publications, London, UK.

## BIBLIOGRAPHY

Acharya Sarthi (1983), 'The Informal Sector in Developing Countries - A Macro Viewpoint'. *Journal of Contemporary Asia*, No. 4, Oct-Dec, 1983 pp 432 - 445.

Ali I. and Ali S. M. (1993), 'Solid Waste Recycling Through Informal Sector in Developing Countries'. *Journal of Resource Management and Technology*, Vol. 21 No. 2. June 1993. USA.

Baldisimo J. M. et. al (1988), 'Scavengers of Municipal Solid Waste in Bangkok, Jakarta and Manila'. *Environmental Sanitation Review*, No. 26, Environmental Sanitation Information Center (ENSIC), Asian Institute of Technology (AIT), Bangkok, Thailand.

Batley R. (1993), 'Urban Management in India'. Development Administration Group (DAG), The University of Birmingham, UK.

Batley R. (1993), 'Co-operation with Private and Community Organizations. . The Institutional Framework of Urban Government: Case Study No. 6. Development Administration Group (DAG), The University of Birmingham.

Beukering P. and Badrinath G. D. (1995), 'Recycling in Nepal'. *Warmer Bulletin* 46, August 1995. UK.

Birkbeck C. (1978), 'Self Employed Proletarians in an Informal Factory: The Case of Cali's Garbage Dump'. *World Development*, Vol. 6 No. 9/10. Pergamon Press, UK.

Blore I. (1991), 'Calcutta - Two Small Municipalities in a Large Metropolis'. *The Institutional Framework of Urban Government: Case Study No. 4. Development Administration Group (DAG), The University of Birmingham.*

Cointreau S. J (1987), "Solid Waste Recycling: Case Studies in Developing Countries" (Unpublished). Water and Sanitation Technologies Unit. Infrastructure and Urban Development Department. The World Bank.

- Cotton A. and Franceys R. (1993), 'Infrastructure for the Urban Poor in Developing Countries'. Proceedings, Institution of Civil Engineers, UK, Municipal Engineer pp 129-138.
- Fielding N. G. and Fielding J. N. (1986), 'Linking Data'. Sage Publications, London, UK.
- Fernandez A. L. (1993), 'Public Private Partnership in Solid Waste Management'. Regional Development Dialogue, Vol. 14 No. 3 Autumn 1993. UNCRD, Nagoya, Japan.
- Forbes D. (1995), 'The Two Sides of Solid Waste Management in Indonesia'. Wastes Management, July 1995. Institute of Waste Management, UK.
- Furedy C. (1990), "Women and Solid Wastes in Poor Communities". Proceedings 16th WEDC Conference, Hyderabad, India. Smith M. (ed.). Water, Engineering and Development Centre (WEDC), Loughborough University of Technology, UK.
- Ghaus A. (1990), 'Municipal Finances - A Case Study of Karachi'. Applied Economic Research Centre, University of Karachi, Pakistan.
- Guentena Nemat (1994), 'Impact Assessment of the Zabaleen Environment and Development Program'. Paper Presented at the Seminar, Whose Environment ? New Directions in Solid Waste Management, at School of Public Policy, Birmingham University, UK.
- Gilbert Nigel (ed.) (1993), 'Researching Social Life'. Sage Publications, London, UK.
- Guibbert J. J. and Maghreb E. (1994), 'Living Differently in the Town'. October 1994
- Hamdi N. (1996), 'Inventing a new orthodoxy in education for development practitioners: an introduction'. In Education for Real. Intermediate Technology Publications. UK
- Hawkins P. (1995), 'Primary Collection of Solid Waste at Community Level: A Summary of Case Studies from Five Developing Countries, EAWAG/IRCWD, Recife, Brazil and Duebendorf. Switzerland (unpublished).

- Huysman M. and Baud I. (1994), 'Solid Waste Recovery, Re-use and Recycling: Formal and Informal Aspects of Production and Employment in Indian Cities'. Urban Environment in Developing Countries. Faculty of Architecture, Eindhoven University of Technology, Netherlands.
- Kolsky P. and Cotton A. (1996), 'Educating Engineers in Water and Sanitation'. In Education for Real. Intermediate Technology Publications, UK
- Kungskulniti Nipapun (1991), 'Solid Waste Scavenger Community: An Investigation in Bangkok, Thailand'. Asia-Pacific Journal of Public Health 1991-Vol. 5 No. 1.
- Leurs R. (1993), 'A Resource Manual for Trainers and Practitioners of Participatory Rural Appraisals'. Papers in the Administration of Development No. 49, Development Administration Group (DAG), The University of Birmingham.
- Lohani et. al (1984), "Recycling of Solid Waste". Environmental Sanitation Review No 13/14, Environmental Sanitation Information Centre, Asian Institute of Technology, Bangkok.
- Mascarenhas J. (1991), 'Participatory Rural Appraisal - Proceedings of the February 1991 Bangalore PRA Trainers Workshop, International Institute of Environment and Development (IIED), London.
- Miles Derek (1994), 'Developing Private Sector Capacity'. Proceedings of 20th WEDC Conference, Colombo, Sri Lanka.
- Moser C. (1978), 'Informal Sector or Petty Commodity Production'. World Development Vol. 6 No. 9/10 pp 1041-1063.
- Pfammatter Roger and Schertenleib Roland (1995), 'Micro-Enterprises: A Promising Approach for Improved Service Delivery'. SANDEC News, No. 1, May 1995, Switzerland.
- Pfammatter Roger (1994), 'Small-Enterprises for the Collection (and Transport) of Domestic Refuse'. Findings of a Mission to Latin America, 24 November - 20 December 1994. EAWAG/IRCWD, CH-8600 Dubendorf, Switzerland.



Reinke W. A. et. al (1993), 'Efficient Methods for Data Collection and Analysis'. WASH Field Report No. 391. Water and Sanitation for Health Project, Washington.

Rudqvist Anders (1991), 'Fieldwork Methods for Consultations and Popular Participation'. Popular Participation Programme, Department of Social Anthropology, Stockholm University, Sweden.

Sanyal B. (1991), 'Organising the Self Employed: The Politics of the Urban Informal Sector'. International Labour Review Vol. 130, 1991 No. 1. International Labour Organisation.

Sanyal B. (1988), 'The Urban Informal Sector Revisited'. Third World Planning Review, (Liverpool), Vol. 10 No. 1 pp 65-84. UK.

Scheu M. and Coad A. (1992), 'Solid Waste Management in K - Ward Bombay'. Water, Engineering and Development Centre (WEDC), Loughborough University, UK.

Sethuraman S. V. (1985), 'The Informal Sector in Indonesia'. International Labour Review Vol. 124, 1985 No. 6 pp 719-735.

Sicular D. T. (1992), 'Scavengers, Recyclers and Solutions for Solid Waste Management in Indonesia'. Center for South Asia Studies, University of California at Berkeley, USA.

Taylor K. and Cotton A. (1993), 'Urban Upgrading'. Options and Procedures for Pakistan'. Water, Engineering and Development Centre (WEDC), Loughborough University, UK.

Tchobanoglous (1993). "Integrated Solid Waste Management, Engineering Principles and Management Issues", Mc-Graw Hill, Inc. Singapore.

The Economist (1991), 'Recycling'. April 13th, 1991.

Theis Joachim and Grady Heather M. (1991), 'Participatory Rapid Appraisal for Community Development'. International Institute for Environment and Development and Save the Children Federation, London.

UNCHS (1993), 'A Synopsis of City Studies on Waste Recycling and Reuse in Bangkok, Jakarta, Kanpur, Karachi and Manila'. UNCHS (Habitat), Nairobi, Kenya.

UNDP/ World Bank (1993), 'Community Based Solid Waste Management'. Panaji Case Study. UNDP India.

URC (1991), 'Informal Sector in Solid Waste Management'. A Part of City Net Study on The Urban Environment for UNESCAP. Urban Resources Centre, Karachi, Pakistan.

Venkateswaran S. (1994), 'The Wealth of Waste - Waste Pickers, Solid Waste and Urban Development'. Friedrich Ebert Stiftung, New Dehli, India.

**Questionnaire Used in Yasinabad, Karachi**  
**Informal Waste Recycling in Karachi**  
*Interviews with Housewives*

Name of Interviewer \_\_\_\_\_ Date \_\_\_\_\_  
House No. \_\_\_\_\_ Area \_\_\_\_\_

*Note: A Urdu translation was used in the field.*

1. Are you satisfied with the existing service of solid waste collection in your area ?
2. Do you separate and sell re-saleable materials such as paper, plastics etc. from the waste?
3. Do you know what happens to the material after you sell it?
4. Can you give some advantages of selling re-saleable materials?
  - \* Supplement income
  - \* Help itinerant buyers
  - \* Reduce pollution
  - \* Help poor
  - \* Any other
5. Have you observed street pickers collecting materials from waste?
6. Do you think that street pickers are useful in any way?
7. Do you think that street pickers help reduce the environmental pollution?
8. Do you think that street pickers are helpful in reducing waste volumes?

9. Do you want to help street pickers for a better livelihood?

10. As a part of street pickers help and to reduce pollution if you are asked to separate dry and wet waste into two bins would you do it? If no please give reasons.

11. In your opinion what type of improvement programs can be launched for itinerant waste buyers and street collectors?

12. Any other suggestion or comment on the subject

<p style="text-align: center;"><b>Itinerant Waste Buyers</b> <b>Checklist for Semi Structured Interviews</b></p>
--

1. Areas of operation
2. Collection route taken daily
3. Materials purchase from the households and shops
4. What prices Rs/kg do you pay for each of the material
5. To whom sell the collected materials
6. Selling the collected material to the same or different persons
- 7 Any other support from the itinerant waste buyers as loans, push carts, protection from police etc.?
8. Ever considered selling the materials directly to main dealers, forming a cooperative
9. If waste is source separated, would you get any benefit?
10. Any other idea, suggestion etc.





5. Do you have any quality criteria for raw materials? If yes please explain.

6. To whom do you sell the processed materials?

7. What are the usual seasonal variations in prices and demand of materials? On what factors it depends?

8. Who decides the prices of raw materials, is it always in demand or short?

9. To which official agency do you interact?

- \* Police
- \* Water and sanitation authority
- \* Power authority
- \* KMC
- \* Councillors
- \* Small industries
- \* Large industries
- \* Any other agency

10. Based on previous experience what is your opinion about them?

- \* They are helpful
- \* They are corrupt
- \* Some are corrupt but rest are honest
- \* Some are honest but rest are corrupt
- \* No comment

11. If govt. sector decides to purchase/sell you the raw materials, will you accept it?

12. If they launch any programme for your improvement e.g loan schemes, plots etc. what shall be your reaction?

- \* I will participate
- \* I will not participate
- \* First I will study the programme
- \* I will not only participate but ask others to participate
- \* Any other

13. What type of support or help do you expect from official agencies?



14. What type of support or help do you expect from large industry owners/ or to your market?

15. What type of support or help do you expect from public?

16. Any other suggestion or comment.

**Informal Waste Recycling in Karachi**  
*Interviews with Senior Municipal Officials (Planning)*

Name of Interviewer \_\_\_\_\_ Date \_\_\_\_\_  
Name of Person \_\_\_\_\_  
Designation \_\_\_\_\_

1. Nowadays solid waste management is becoming a challenging problem for municipal authorities. What is your opinion on the existing level of solid waste management service in Karachi?
2. What are the future plans of KMC regarding improvement of SWM in the city?
3. In your opinion which areas need immediate improvement as far as SWM in Karachi is concerned?
4. Presently there is an international trend towards waste minimization and waste recycling? Do KMC has any plan for recycling waste?
5. Comparing with developing countries we are fortunate to have an existing informal system of waste recycling? What is your opinion about that? Can we use it for the improvement of SWM?

6. The group of people involved in ISSWR is under exposure to severe health hazards? Do you have any plan for their health protection as senior municipal official?

7. Is your collection and transportation staff also involved in waste separation practices?

8. Are you aware of the waste separation and recycling practices at waste dumping ground? Do you think that it should continue or stopped?

9. Do you think that ISSWR could be of any help for the improvement of SWM in your city? If yes how?

10. In Egypt, Indonesia, Phillipines and China ISSWR has been efficiently used for collection and recycling of solid waste. What is your opinion on such experiments?

11. Any other suggestion or comment on improvement of ISSWR.

**Informal Waste Recycling in Karachi**  
*Interviews with Officials in KMC (Responsible for Operations)*

Name of Interviewer \_\_\_\_\_ Date \_\_\_\_\_  
 Name of Person \_\_\_\_\_ Designation \_\_\_\_\_

1. What are the major functions and responsibilities of your department?
  
2. How do you rate the existing level of services of solid waste management in your zone?
  - \* It is excellent      \* It is good      \* It is O.K      \* It is improving
  - \* It can not improve      \* Any other
  
3. Do you think that vehicle crew and drivers loose a considerable time in sorting activities? If yes what percentage of their useful time?
  
4. What problems do your staff face due to scavenging activities at transfer points? How do they tackle it?
  
5. What are the problems due to resident scavengers at dumping ground?
  
6. Do you and your staff also face problems due to street collectors, middle dealers and main dealers? If yes what?

7. Do you agree that ISSWR contributes a lot in volume reductions? If yes how much.
8. Have your ZMC ever made any effort for recycling of solid waste? What is your policy towards recycling?
  
9. Can we use ISSWR for waste collection upto community bins and loading into vehicles?
  
10. Can ISSWR be useful to solid waste operations in any other way? For example upgrading middle dealers shops into recycling centers etc.
  
11. Are there any future programmes of zones for recycling?
  
12. In your opinion how can the efficiency of ZMC in SWM be improved?
  
13. In Egypt, Indonesia, Phillipines and China ISSWR has been efficiently used for collection and recycling of solid waste? What is your opinion on such experiments? Are they possible in Karachi .
  
14. Any other suggestion or comment on improvement of ISSWR?

**Federal B. Area, Block 10 and 11**  
**Interviews with Housewives**  
**Questionnaire (English Translation)**

To be filled in by the interviewer:

Date: \_\_\_\_\_ Area: \_\_\_\_\_ Name of Surveyor: \_\_\_\_\_

House No. \_\_\_\_\_

*Note: A Urdu questionnaire was used in the field.*

1. Up to what extent are you satisfied with the overall cleanliness in your neighbourhood?

Fully Satisfied \_\_\_\_\_ Satisfied \_\_\_\_\_ Not Satisfied \_\_\_\_\_

Totally Un-satisfied \_\_\_\_\_

2. Who collects and disposed of waste from your house?

Sweeper \_\_\_\_\_ House help \_\_\_\_\_ Yourself \_\_\_\_\_ Vehicles (Pick-ups) \_\_\_\_\_

Any other arrangement \_\_\_\_\_

3. Have you engaged any sweeper who perform sweeping of house yard and front space?

Yes \_\_\_\_\_ No \_\_\_\_\_

4. If yes - then what type of work does he/she perform?

Sweeping of court yard \_\_\_\_\_ Sweeping of garden \_\_\_\_\_ Cleaning of toilets \_\_\_\_\_

Cleaning of house floor \_\_\_\_\_ Any other \_\_\_\_\_

5. How much do you pay to sweepers for this work?

Amount in Rs \_\_\_\_\_ per month.

6. If pick-ups (Suzuki) are collecting waste from your house, how much do you pay for this service?

Amount in Rs \_\_\_\_\_ per month.

7. If you are not using pick-up collection system now, have you ever engaged it before?

Yes \_\_\_\_\_ No \_\_\_\_\_

8. Upto what extent are you satisfied with the pick-up collection system?

Fully satisfied \_\_\_\_\_ Satisfied \_\_\_\_\_ Not satisfied \_\_\_\_\_

Totally un-satisfied \_\_\_\_\_

9. If not satisfied in Q. 8, what are the problems?

Costly \_\_\_\_\_ Irregular \_\_\_\_\_ Any other problem \_\_\_\_\_

Q10. Do you think that pick-ups collection system has contributed positively to the overall cleanliness of the area?

Yes \_\_\_\_\_ Upto certain extent \_\_\_\_\_ No \_\_\_\_\_ Not at all \_\_\_\_\_

If No. Reasons \_\_\_\_\_

Q11. Do you think that such system can improve cleanliness in other areas of the city?

Yes \_\_\_\_\_ No \_\_\_\_\_

12. Do you separate certain re-saleable items as bottles, newspaper, bread etc. to re-sale them?

Yes \_\_\_\_\_ No \_\_\_\_\_

13. If yes. then who sells them and take money?

Yourself \_\_\_\_\_ House help \_\_\_\_\_ Sweeper \_\_\_\_\_ Someone else \_\_\_\_\_

14. If you are requested to keep two bins in the house one for wet waste as food waste etc. and other for dry waste as paper, plastics, metals etc. Are you willing to do it?

Yes \_\_\_\_\_ No \_\_\_\_\_

15. Any other comments, suggestion or observation:











**Karachi Administration Employees Co-operative Society**

**Interviews with Housewives**

**Questionnaire (English Translation)**

To be filled in by the interviewer:

Date: \_\_\_\_\_ Area: \_\_\_\_\_ Name of Surveyor: \_\_\_\_\_

House No. \_\_\_\_\_

*Note: A Urdu Questionnaire was used in the field.*

1. Up to what extent are you satisfied with the overall cleanliness in your neighbourhood?

Fully Satisfied \_\_\_\_\_ Satisfied \_\_\_\_\_ Not Satisfied \_\_\_\_\_

Totally Un-satisfied \_\_\_\_\_

2. Who collects and disposed of waste from your house?

Sweeper \_\_\_\_\_ House help \_\_\_\_\_ Yourself \_\_\_\_\_

Any other arrangement \_\_\_\_\_

3. If the same sweeper also perform other works such as sweeping court yard, drive way etc.

Yes \_\_\_\_\_ No \_\_\_\_\_

4. If yes - then beside waste collection, what other works does he perform?

Sweeping of court yard \_\_\_\_\_ Sweeping of garden \_\_\_\_\_ Cleaning toilets \_\_\_\_\_

Cleaning of rooms etc. \_\_\_\_\_ Any other work \_\_\_\_\_

5. How much do you pay to the sweeper?

6. Do you also pay contribution for street sweeping?

Yes \_\_\_\_\_ No \_\_\_\_\_

7. If yes then how much contribution do you pay and from how many houses this amount is collected?

Amount Rs \_\_\_\_\_ per month, from \_\_\_\_\_ houses.

8. Who collects money for the street sweepings?

Women Association (KAWWS) \_\_\_\_\_ Somebody from lane \_\_\_\_\_

I/we collect \_\_\_\_\_ Any body else \_\_\_\_\_

9. Do you think that the efforts from the women welfare society (KAWWS) in your area has contributed positively for the cleanliness?

Yes \_\_\_\_\_ Upto certain extent \_\_\_\_\_ No \_\_\_\_\_ Not at all \_\_\_\_\_

10. Do you feel that such community efforts could improve cleanliness in other areas?

Yes \_\_\_\_\_ No \_\_\_\_\_

11. Do you separate certain re-saleable items as bottles, newspaper, bread etc. to re-sale them?

Yes \_\_\_\_\_ No \_\_\_\_\_

12. If yes, then who sells them and take money?

Yourself \_\_\_\_\_ House help \_\_\_\_\_ Sweeper \_\_\_\_\_ Someone else \_\_\_\_\_

13. If you are requested to keep two bins in the house one for wet waste as food waste etc. and other for dry waste as paper, plastics, metals etc. Are you willing to do it?

Yes \_\_\_\_\_ No \_\_\_\_\_

14. Any other comments, suggestion or observation:

**Various Areas of Karachi**  
**Discussion with Sanitary Health Workers (Municipal and Private Sweepers)**  
**List of Questions**

*Note: A Urdu translation was used in the field.*

1. In which area do you have a group of houses (i.e *kaam*) from where you collect waste?
  
2. How much money have you paid to acquire rights to collect waste from the houses?
  
3. In which year have you purchased those rights (*kaam*)?
  
4. From whom have you purchased the work?
  
5. Please give details of your work, for which you have paid?  
Number of houses \_\_\_\_\_ Number of shops \_\_\_\_\_ Other properties \_\_\_\_\_
  
6. What is your own job status as a sweeper?  
Municipal \_\_\_\_\_ Private (self employed) \_\_\_\_\_ Municipal (retired) \_\_\_\_\_  
Any other (e.g part time work etc.) \_\_\_\_\_

**Federal B. Area Block 6 (Control Area)**

**Interviews with Housewives**

**Questionnaire (English Translation)**

To be filled in by the interviewer:

Date: \_\_\_\_\_ Area: \_\_\_\_\_ Name of Surveyor: \_\_\_\_\_

House No. \_\_\_\_\_

*Note: A Urdu translation was used in the field.*

1. Up to what extent are you satisfied with the overall cleanliness in your neighbourhood?

Fully Satisfied \_\_\_\_\_ Satisfied \_\_\_\_\_ Not Satisfied \_\_\_\_\_

Totally Un-satisfied \_\_\_\_\_

2. Who collects and disposed of waste from your house?

Sweeper \_\_\_\_\_ House help \_\_\_\_\_ Yourself \_\_\_\_\_

Any other arrangement \_\_\_\_\_

3. If sweeper collect and dispose of waste from your house, how much do you pay him/her?

4. Does the same sweeper also perform other work in addition to collection of waste? If yes please explain:

Sweeping of garden \_\_\_\_\_ Sweeping of drive way \_\_\_\_\_

Cleaning of rooms and house floors \_\_\_\_\_ Cleaning of toilets \_\_\_\_\_

Any other work \_\_\_\_\_

5. At what time does the sweeper comes to collect waste from the house?

6. Are you satisfied with the present system of waste collection?

Yes \_\_\_\_\_ No \_\_\_\_\_

If No, what are the problems:

High charges \_\_\_\_\_ Irregular \_\_\_\_\_ Any other problem \_\_\_\_\_

7. Do you think that the system of house to house waste collection as operating in blocks 10 and 11 of F. B. Area can also operate in your area?

Yes \_\_\_\_\_ No \_\_\_\_\_ Do not know \_\_\_\_\_

If no, then reasons \_\_\_\_\_

8. Do you separate certain re-saleable items as bottles, newspaper, bread etc. to re-sale them?

Yes \_\_\_\_\_ No \_\_\_\_\_

9. If yes, then who sells them and take money?

Yourself \_\_\_\_\_ House help \_\_\_\_\_ Sweeper \_\_\_\_\_ Someone else \_\_\_\_\_

10. If you are requested to keep two bins in the house one for wet waste as food waste etc. and other for dry waste as paper, plastics, metals etc. Are you willing to do it?

Yes \_\_\_\_\_ No \_\_\_\_\_

11. Any other comments, suggestion or observation:



**Federal B. Area Block 6 (Control Area)**

**Discussion with Street Pickers**

**List of Questions**

To be filled in by the interviewer:

Date: \_\_\_\_\_ Area: \_\_\_\_\_ Sex: Male/Female \_\_\_\_\_

Bicycle/Walking/Donkey Carts: \_\_\_\_\_

1. Which areas do you visit usually to separate re-saleables from the waste?
2. To whom do you sell paper, cardboard, bottles etc.? and where his shop is located?
3. On the average how much quantity of re-saleable waste components do you separate from the waste?
4. If you use a bicycle, is it yours or does it belong to the middle dealer?
5. Why the use of bicycles was not common among street pickers few years ago?

## Analysis Sheet for Primary Data/Information

**Type of Survey/Investigation:** Structured Interviews with Housewives for Case Study I

**Location:** Yasinabad (a lower middle income area) - Karachi

**Size/Quantity of Data:** 100 Housewives

Parameter No.	Parameter Description	Variables	Purpose
3.2 Q1	Satisfaction over municipal system for solid waste management	Level of satisfaction	To measure level of satisfaction on existing municipal service and to assess scope for intervention through private informal sector.
3.2 Q2	Practice to separate re-saleables from waste.	Yes/No	To assess the extent of practising separation of re-saleables.
3.2 Q3	Knowledge about separated and sold materials	Level of knowledge	To understand the motivation behind the activity of source separation activity. To see how these motivations can be integrated with the future official policy to promote recycling.
3.2 Q4	Perceived advantages of selling re-resaleables	income, help IWB, pollution, help poor, others	To understand the motivation behind the activity of source separation activity. To see how these motivations can be integrated with the future official policy to promote recycling.
3.2 Q5	Observations about street pickers	Yes/No	To assess attitude of housewives towards private-informal practices.
3.2 Q6	Perception on the usefulness of street pickers	Yes/No	To assess attitude of housewives toward street pickers and perceptions on their usefulness.
3.2 Q7	Perception on the usefulness of street pickers	Yes/No	To assess attitude of housewives toward street pickers and perceptions on their usefulness.
3.2 Q8	Perception on the usefulness of street pickers	Yes/No	To assess attitude of housewives toward street pickers and perceptions on their usefulness.
3.2 Q9	Willingness to help street pickers	Yes/No and Description	To understand that how far housewives can be involved in pilot schemes to integrate private informal activities.
3.2 Q10	Attitude if asked to do source separation	Yes/No and Description	To understand, based on parameters Q5 to Q10 that what roles housewives can take in pilot projects for integration.
3.2 Q11	Perceived improvement schemes for street pickers and itinerant buyers.	Descriptive	To understand mainly from pilot projects point of view that how housewives see the integration of private and public practices.
3.2 Q12	Further comments and discussion	Descriptive	N.A

## Analysis Sheet for Primary Data/Information

**Type of Survey/Investigation:** Semi-Structured Interviews with Itinerant Waste Buyers for Case Study I

**Location:** Various Areas of Karachi

**Size/Quantity of Data:** 4 Itinerant Waste Buyers

Parameter No.	Parameter Description	Variables	Purpose of Analysis
3.3 Q1	Area of operation	Name of area	To understand the operation of IWBs.
3.3 Q2	Route taken daily	Description and length of route	To understand the operation of IWBs.
3.3 Q3	Type and quantities of materials.	Names of materials purchased and average quantities.	To get an idea about the type of materials and average quantities.
3.3 Q4	Prices of materials paid to households.	Prices paid in Rs per kg.	To get an idea about the prices of materials at this stage to assess incomes of IWBs and price mark-ups at different stages.
3.3 Q5	Person to whom selling materials.	Category	To understand the operation of IWBs.
3.3 Q6	Selling to same person or is it different.	Same or different	To understand that why the materials are sold to the same or different person. Help in understanding the market and to see possibility of pilot projects.
3.3 Q7	Other supports from the person to whom selling materials.	Type of supports	To understand the market and relationships in the operation of the process.
3.3 Q8	Attitude on the formation of co-operative.	Type of attitude	To understand the attitude towards changing the trade pattern and to understand its reasons.

3.3 Q8	Perceived benefits if provided source separated materials.	Benefits and problems	To understand the attitude on any change.
3.3 Q9	Further comments and discussion	Descriptive	N.A

### Analysis Sheet for Primary Data/Information

**Type of Survey/Investigation:** Quantities of Different Materials Purchased from Households by Itinerant Waste Buyers for Case Study I

**Location:** Various Areas of Karachi

**Size/Quantity of Data:** Details of Materials Sold by 68 Houses in Low Income Areas and 86 Houses in High Income Areas.

Parameter No.	Parameter Description	Detailed Analysis to Perform	Purpose of Analysis
3.4 Q1	Quantities of different materials purchased by IWBs from households.	Relate it with parameters no. 3.4 Q2 and 3.4 Q3 to obtain per capita separation rates. Also see variations in different case study and income group areas.	To understand the role of IWBs in reducing waste quantities, income to the IWBs, income to the households, composition of separated materials, and derivation of unit figures for this activity. May also be used to see variations in different case studies and control areas to relate it with causal explanations if any.
3.4 Q2	Family size of the household selling waste.	Relate it with parameters no. 3.4 Q1 and 3.4 Q3 to obtain per capita separation rates. Also see variations of unit separation rates in different case study and income group areas.	To understand the role of IWBs in reducing waste quantities, income to the IWBs, income to the households and derivation of unit figures for this activity.
3.4 Q3	Number of days after which material was sold.	Relate it with parameters no. 3.4 Q1 and 3.4 Q2 to obtain per capita separation rates. Also see variations of unit separation rates in different case study and income group areas.	To understand the role of IWBs in reducing waste quantities, income to the IWBs, income to the households and derivation of unit figures for this activity.

### Analysis Sheet for Primary Data/Information

**Type of Survey/Investigation:** Semi-Structured Interviews with Middle Dealers for Case Study I

**Location:** Various Areas of Karachi

**Size/Quantity of Data:** 8 Middle Dealers

Parameter No.	Parameter Description	Variables	Purpose of Analysis
3.5 Q1	Type of materials purchased by them	Name of materials	To understand the operation of middle dealers and their role in reducing different type of materials.
3.5 Q2	Person from whom purchasing materials.	Category of person.	To understand the operation of middle dealers and to know their sources of materials.
3.5 Q3	Type, quantities and prices paid to IWBs for materials.	Names of materials, prices in Rs/kg and average quantities.	To get an idea about the type of materials, turnover and average quantities and also mark-up in prices at different stages.
3.5 Q4	Processes performed by middle dealers on different materials.	Description of processes.	To understand the operation and to change the inputs in the processes to economic terms to get value of materials at each stage.
3.5 Q5	Quality criteria for materials	Description of	To understand the operation and to see how these quality

	purchased from IWBs.	criteria.	criteria may be incorporated into any pilot project.
3.5 Q6	Selling prices obtained from main dealers.	Prices of materials in Rs/kg	To assess the prices at different stages.
3.5 Q7	Description of price variations if any.	Descriptive	To understand the market variations and business risks.
3.5 Q8	Decision of fixing prices.	Person fix prices.	To understand the overall market.
3.5 Q9	Name of official agencies with whom often interact.	Names	To understand the nature and attitude of interaction with the official agencies to further explore the question of integration.
3.5 Q10	Opinion about interacting official agencies.	Category of opinion	To understand the attitude of middle dealers towards the official agencies and to further explore the question of integration.

### Analysis Sheet for Primary Data/Information

**Type of Survey/Investigation:** Semi-Structured Interviews with Main Dealers for Case Study I

**Location:** Various Areas of Karachi

**Size/Quantity of Data:** 9 Main Dealers

Parameter No.	Parameter Description	Variables	Purpose of Analysis
3.6 Q1	Type of materials purchased by them	Name of materials	To understand the operation of main dealers and their role in reducing different type of materials.
3.6 Q2	Person from whom purchasing materials.	Category of person.	To understand the operation of main dealers and to know their sources of materials.
3.6 Q3	Any idea of number of main dealers dealing in this material.	Numerical	To assess the total quantities dealt by main dealers and their role in reducing the local and imported wastes.
3.6 Q4	Existing association or co-operation among dealers.	Yes/No - descriptive	To understand the nature of existing association or co-operation among dealers and perception of problems and solutions.
3.6 Q5 and Q6	Type, quantities and prices paid to IWBs for materials.	Names of materials, prices in Rs/kg and average quantities.	To get an idea about the type of materials, turnover and average quantities and also mark-up in prices at different stages.
3.5 Q7	Processes performed by middle dealers on different materials.	Description of processes.	To understand the operation and to change the inputs in the processes to economic terms to get value of materials at each stage.
3.5 Q8	Selling prices obtained from recycling industry.	Prices of materials in Rs/kg	To assess the prices at different stages.
3.5 Q9	Average selling quantities sold to recycling industries.	Quantities of materials sold in kg/week etc.	To understand the operation and demands for different materials.
3.5 Q10	To whom selling the processed materials.	Type of Industry	To understand the process, relate quantities with the type of selling establishment.
3.5 Q11	Practice of selling materials to other cities and countries	Yes/No Descriptive	To understand the overall process and market.
3.5 Q12	How often interact with the official agency	Frequency - Very Frequently to Never	To see that interaction with the official agencies depend upon what factor and what type of attitude it causes.
3.5 Q13	Name of official agencies with whom often interact.	Names	To understand the nature and attitude of interaction with the official agencies to further explore the question of integration.
3.5 Q14	Opinion about interacting official agencies.	Category of opinion	To understand the attitude of main dealers towards the official agencies and to further explore the question of integration.
3.5 Q15	Attitude on participation in any official programme	Degree of agreement from participate to not participate.	To understand the attitude of main dealers towards the official agencies and to further explore the question of integration.
3.5 Q16	Expected support from official agency.	Categories of supports	To understand the attitude of main dealers towards the official agencies and to further explore the question of integration.
3.5 Q17	Expected support from formal private sector.	Categories of supports	To understand the attitude of main dealers towards the formal private sector and to further explore the question of integration.
3.5 Q18	Expected support from citizens.	Categories of supports	To understand the attitude of main dealers towards the help from citizens and to further explore the question of integration.

3.5 Q19	Any other suggestion or comment	List of suggestions (if any)	To understand the attitude and perception of main dealers towards integration.
---------	---------------------------------	------------------------------	--

### Analysis Sheet for Primary Data/Information

**Type of Survey/Investigation:** Semi-Structured Interviews with the Managers of Large and Medium Size Industry

**Using Waste as Raw Material for Case Study I**

**Location:** Industrial Areas of Karachi

**Size/Quantity of Data:** 4 Industries

Parameter No.	Parameter Description	Variables	Purpose of Analysis
3.7 Q1	Major quantities of waste components from the industry.	Name and quantity of materials	To understand which waste materials are produced and utilise by the industry.
3.7 Q2	Practice of reusing the produced materials.	Name and quantity of materials	To understand the practices of such industries in conserving resources.
3.7 Q3	Practice of selling waste materials to other secondary industries.	Name of materials, industry and quantity.	To understand the practices of recycling adopted by the industries.
3.7 Q4	Practice of purchasing waste raw materials.	Yes/No - descriptive	To understand the practices of such industries to purchase and utilise the waste materials.
3.7 Q5	Person from whom purchase the waste raw materials.	Category of person i.e. main dealers to street pickers.	Basically to understand the process and to see when and what materials industries get from informal actors and on what factors it depend. To further explore question of integration of formal industries and informal sector.
3.7 Q6	Type and quantity of materials purchased for parameter 3.7 Q5.	Name and quantity of materials	To understand that what type of materials, which quantities and purchased from whom are common.
3.7 Q7	Prices of materials purchased.	Prices of materials in Rs/kg	To assess the prices at different stages and price mark-ups.
3.7 Q8	Assessment of the seasonal variation in the prices.	Qualitative	To understand the market stability.
3.7 Q9	Whether raw material is imported or purchased.	Yes/No Qualitative	To assess the roles of industries in reducing local and imported waste.
3.7 Q10	Person decides prices of raw material.	Type of person	To understand the overall process and market.
3.7 Q11	Quality criteria for raw materials.	Criteria description	To understand the process, market and criteria for different materials. to further explore question of pilot projects of source separation and other assumptions.
3.7 Q12	Frequency of rejecting materials on quality grounds.	Yes/No Descriptive	To further explore the quality criteria.
3.7 Q13	Perceived advantages of using waste as raw material.	Category of opinion	To understand the motivation behind using the waste as raw material and the attitudes.
3.7 Q14	Attitude on purchasing materials from middle dealers or itinerant waste buyers.	Description of opinions and problems	To explore the possibility of avoiding middle men to benefit the poor. Understand the perceived problems.
3.7 Q15	Present links with the informal chain (if any)	Description of linkages.	To understand the present links of industry with the informal actors.
3.7 Q16	Opinion about informal sector.	Helpful or causes problems	To further understand the present attitude of industry to the informal actors to explore question of integration.
3.7 Q17	Opinion on possibility of integration to improve quality and reduce prices.	Description of opinion and problems.	To understand the attitude of main dealers towards the help from citizens and to further explore the question of integration.
3.7 Q18	Attitude on the possibility of govt. sectors supplying raw materials.	Categorisation of attitudes.	To understand the attitudes on official intervention.
3.7 Q19	Any expected support from the govt. sector	Description of support	To understand the perceived and expected support from govt. agencies.
3.7 Q20	Opinion about increasing	Opinion	To understand the perceived support from govt. agencies.

waste quantities used.

3.7 Q21	Comments and suggestions	Description of comments and suggestions.	To relate the comments and suggestions with the overall theme of the discussion.
---------	--------------------------	--	--

### Analysis Sheet for Primary Data/Information

Type of Survey/Investigation: Semi-Structured Interviews with Informal Recycling Industries for Case Study I

Location: Various Areas of Karachi

Size/Quantity of Data: 6 Industries

Parameter No.	Parameter Description	Variables	Purpose of Analysis
3.8 Q1	Major products	Names of products	To understand the range of products produced by the informal recycling industries.
3.8 Q2	Type and quantities of materials purchased by them	Name of materials and quantities	To understand the operation of informal recycling industries and their role in reducing different type of waste materials.
3.8 Q3	Person from whom purchasing materials.	Category of person.	To understand the operation of recycling industries and to know their sources of materials.
3.8 Q4	Quality criteria for raw materials.	Criteria description	To understand the process, market and criteria for different materials, to further explore question of pilot projects of source separation and other assumptions.
3.8 Q5	To whom selling the finished products.	Type of establishment	To understand the process and chain of materials.
3.8 Q6	Seasonal variations in prices and demand also description of factors.	Description	To understand the market.
3.8 Q7	Person decides prices of raw material.	Type of person	To understand the overall process and market.
3.8 Q8	Name of official agencies with whom often interact.	Names	To understand the nature and attitude of interaction with the official agencies to further explore the question of integration.
3.8 Q9	Opinion about interacting official agencies.	Category of opinion	To understand the attitude of recycling industry towards the official agencies and to further explore the question of integration.
3.8 Q10	Attitude on the possibility of govt. sectors supplying raw materials.	Categorisation of attitudes.	To understand the attitudes on official intervention.
3.8 Q11	Attitude on participation in any official programme	Degree of agreement from participate to not participate.	To understand the attitude of recycling industry towards the official agencies and to further explore the question of integration.
3.8 Q12	Expected support from official agency.	Categories of supports	To understand the attitude of recycling industry towards the official agencies and to further explore the question of integration.
3.8 Q13	Expected support from formal private sector.	Categories of supports	To understand the attitude of recycling industry towards the official agencies and to further explore the question of integration.
3.8 Q14	Expected support from citizens.	Categories of supports	To understand the attitude of recycling industry towards the official agencies and to further explore the question of integration.
3.8 Q15	Any other suggestion or comment	List of suggestions if any	To understand the attitude and perception of recycling industry towards integration.

### Analysis Sheet for Primary Data/Information

Type of Survey/Investigation: Open Ended Interviews with Street Pickers for Case Study I

Location: Various Areas of Karachi

Size/Quantity of Data: 2 Street Pickers

Parameter No.	Parameter Description	Variables	Purpose of Analysis
Q1	Type of materials separated	Name of materials	To understand the operation of street pickers and their role in

	by them		reducing different type of materials.
3.9 Q2	Person to whom sell separated materials.	Category of person.	To understand the operation of street pickers and their linkage with other actors.
3.9 Q3	Type, quantities and prices obtained by street pickers.	Names of materials, prices in Rs/kg and average quantities.	To understand the quantities
3.9 Q4	Any problem in selling the materials	Description of problem.	To understand the operation, market and perceived problems.
3.9 Q5	Frequency of selling the separated materials.	Frequency in days daily to monthly	To understand the operation.
3.9 Q6	Perceived problems from the sweepers.	Description of problems.	To understand the process and problems.
3.9 Q7	No. of years involved in this business.	Numerical	To explore the assumption that the people are doing this work temporarily.
3.9 Q8	Description of area of operation.	Description of the size of area	To understand the overall process and number of working hours.
3.9 Q9	Satisfaction over job.	Want to change or not.	To understand their satisfaction with the work.
3.9 Q10	Perceived benefits from source separation.	Benefits	To understand the perceived benefits and problems on some of the pilot activities.
3.9 Q11	Expected support from official agency.	Categories of supports	To understand the attitude of street pickers toward the official agencies and to further explore the question of integration.
3.9 Q12	Expected support from citizens.	Categories of supports	To understand the attitude street pickers towards the help from citizens and to further explore the question of integration.
3.9 Q13	Any organisation or association.	Type of co-operation	To understand the existing group activities among street pickers.
3.9 Q14	Any other suggestion or comment	List of suggestions (if any)	To understand comment in overall theme.

### Analysis Sheet for Primary Data/Information

**Type of Survey/Investigation:** Open Ended Interviews with Street Pickers Group Leaders for Case Study I

**Location:** Various Areas of Karachi

**Size/Quantity of Data:** 2 Group Leaders

Parameter No.	Parameter Description	Variables	Purpose of Analysis
3.10 Q1	Type of materials collected by them from street pickers.	Name of materials	To understand the operation of street pickers and their role in reducing different type of materials.
3.10 Q2	Person to whom sell separated materials.	Category of person.	To understand the operation of street pickers and their linkage with other actors.
3.10 Q3	Type, quantities and prices paid by street pickers group leaders.	Names of materials, prices in Rs/kg and average quantities.	To understand the quantities
3.10 Q4	Any problem in selling the materials	Description of problem.	To understand the operation, market and perceived problems.
3.10 Q5	Quality criteria for raw materials.	Criteria Description	To understand the process, market and criteria for different materials, to further explore question of pilot projects of source separation and other assumptions.
3.10 Q6	Frequency of selling the separated materials.	Frequency in days daily to monthly	To understand the operation.
3.10 Q7	Perceived problems from the sweepers.	Description of problems.	To understand the process and problems.
3.10 Q8	No. of years involved in this business.	Numerical	To explore the assumption that the people are doing this work temporarily.
3.10 Q9	Description of area of operation of your pickers.	Description of the size of area	To understand the overall coverage area.
3.10 Q10	Perceived benefits from source separation.	Benefits	To understand the perceived benefits and problems on some of the pilot activities.
3.10 Q11	Expected support from official agency.	Categories of supports	To understand the attitude of street pickers toward the official agencies and to further explore the question of integration.
3.10 Q12	Expected support from	Categories of	To understand the attitude street pickers towards the help from



	citizens.	supports	citizens and to further explore the question of integration.
3.10 Q13	Any organisation or association.	Type of co-operation	To understand the existing group activities among street pickers.
3.10 Q14	Present collective activities	Description of activities	To understand the existing group activities among street pickers which may be utilised for pilot projects.
3.10 Q15	Name of official agencies with whom often interact.	Names	To understand the nature and attitude of interaction with the official agencies to further explore the question of integration.
3.10 Q16	Opinion about interacting official agencies.	Category of opinion	To understand the attitude of street pickers toward the official agencies and to further explore the question of integration.
3.10 Q17	Attitude on the possibility of govt. sectors purchasing raw materials.	Categorisation of attitudes.	To understand the attitudes on official intervention.
3.10 Q18	Attitude on participation in any official programme	Degree of agreement from participate to not participate.	To understand the attitude of street pickers toward the official agencies and to further explore the question of integration.
3.10 Q19	Do they use any safety device.	Yes/No	To understand the working conditions and risks to health.
3.10 Q20	Awareness about hazards from handling waste	Description	To understand the working conditions and risks to health.
3.10 Q21	Acceptance if given task of separating waste at transfer points and maintaining them.	Degree of agreement	To further understand the attitude on various pilot activities.
3.10 Q22	Any other suggestion or comment	List of suggestions (if any)	To understand comment in overall theme.

### Analysis Sheet for Primary Data/Information

**Type of Survey/Investigation:** Semi Structured Interviews with Municipal and Private Sweepers for Case Study I

**Location:** Various Areas of Karachi

**Size/Quantity of Data:** 48 Municipal Sweepers

Parameter No.	Parameter Description	Variables	Purpose of Analysis
3.11 Q1	Type of materials separated by them	Name of materials	To understand the practices of municipal sweepers and their role in reducing different type of materials.
3.11 Q2	Person to whom sell separated materials.	Category of person.	To understand the operation municipal sweepers and their linkage with other actors.
3.11 Q3	Type, quantities and prices obtained by sweepers.	Names of materials, prices in Rs.kg and average quantities.	To understand the quantities and so income from this practice. It can be related with the type of area and other factors covered in other case studies.
3.11 Q4	Person decides prices of raw material.	Type of person	To understand the overall process and market.
3.11 Q5	Any problem in selling the materials	Description of problem.	To understand the operation, market and perceived problems.
3.11 Q6	Person decides quantity of raw materials.	Type of person	To understand the process.
3.11 Q7	Frequency of selling the separated materials.	Frequency in days daily to monthly	To understand the operation.
3.11 Q8	Perceived problems from the street pickers.	Description of problems.	To understand the process and problems.
3.11 Q9	No. of years involved in this work and level satisfaction.	Numerical	To explore the assumption that the people are doing this work temporarily.
3.11 Q10	Description of area of operation.	Description of the size of area	To understand that if there is any attraction for materials depending upon the type of area.
3.11 Q11	Perceived benefits from source separation.	Benefits	To understand the perceived benefits and problems on some of the pilot activities. If we relate it with the same question asked from other actors, we can find the perceived benefits from all actors.
3.11 Q12	Expected support from official agency.	Categories of supports	To understand the attitude of sweepers toward the official agencies although they are official employees.
3.11 Q13	Expected support from citizens.	Categories of supports	To understand the attitude sweepers toward the help from citizens and to further explore the question of integration.

3.11 Q14	Attitude on the possibility of govt. sectors purchasing raw materials.	Categorisation of attitudes.	To understand the attitudes on official intervention.
3.11 Q15	Attitude on participation in any official programme	Degree of agreement from participate to not participate.	To understand the attitude of sweepers toward the official agencies and to further explore the question of integration.
3.11 Q16	Do they use any safety device.	Yes/No	To understand the working conditions and risks to health.
3.11 Q17	Awareness about hazards from handling waste	Description	To understand the working conditions and risks to health.
3.11 Q18	Any other suggestion or comment	List of suggestions (if any)	To understand comment in overall theme.

### Analysis Sheet for Primary Data/Information

**Type of Survey/Investigation:** Semi Structured Interviews with Municipal Officials in SWM Planning for Case Study I

**Location:** Karachi Municipal Corporation

**Size/Quantity of Data:** 2 Interviews with the Director and Chief Engineer of SWM Department

Parameter No.	Parameter Description	Variables	Purpose of Analysis
3.12 Q1	Opinion about existing level of SWM service in city.	Perceived level of service from good to poor.	To understand the official perception of the level of service.
3.12 Q2	Future plans of municipal corporations to improve SWM.	Description of plans if any.	To understand the official perception of problems and to see whether official plans address the actual problems.
3.12 Q3	Perceived areas of immediate improvement.	Description of perceived improvement	To understand the official decision making for the improvement of solid waste management.
3.12 Q4	Municipal plans for waste minimisation and recycling.	Description of plans if any.	To assess the official plans and to see how do they understand and incorporate the private-informal sector.
3.12 Q5	Opinion about the private-informal practices of recycling.	Opinion and perception on integration	To assess that whether municipal sector is ready to recognise and integrate the private-informal recycling.
3.12 Q6	Idea of health exposures and protection for informal recyclers.	Description of plans	To further assess whether municipal sector has any level of understanding of private informal activity.
3.12 Q7	Knowledge of sweepers and vehicle crew involvement in separation of recyclables.	Level of knowledge	To understand what is the knowledge of municipal officers about actual practices. They might also do not want to admit.
3.12 Q8	Knowledge and attitude about waste separation and recycling practices at disposal sites.	Attitude and knowledge	To understand what is the knowledge of municipal officers about actual practices. They might also do not want to admit.
3.12 Q9	Attitude on integration of official and informal sector	Description of attitude	To understand the perception of municipal officers towards integration of official and informal sector.
3.12 Q10	Perception on examples of integration from other countries.	Opinion on examples	To understand the perception of municipal officers towards integration of official and informal sector.
3.12 Q11	Any other suggestion or comment	List of suggestions (if any)	To understand comment in overall theme.

## Analysis Sheet for Primary Data/Information

**Type of Survey/Investigation:** Semi Structured Interviews with Municipal Officials in SWM Operations for Case Study I

**Location:** Four Zones of Karachi Municipal Corporation

**Size/Quantity of Data:** 4 Interviews with the Zonal Health Officers

Parameter No.	Parameter Description	Variables	Purpose of Analysis
3.13 Q1	Description of major functions and responsibilities	Description	To start discussion and to understand the roles of various officials in SWM.
3.13 Q2	Opinion about existing level of SWM service in city.	Perceived level of service from good to poor.	To understand the official perception of the level of service.
3.13 Q3	Knowledge about vehicle crew and drivers lost time in scavenging.	Level of knowledge.	To understand what is the knowledge of municipal officers about actual practices. They might also do not want to admit.
3.13 Q4	Perception of problems due to scavenging activities at transfer points.	Description of problems.	To understand the official perception of problems due to informal practices of recycling.
3.13 Q5	Perception of problems due to scavenging activities at disposal sites	Description of problems.	To understand the official perception of problems due to informal practices of recycling.
3.13 Q6	Perception of problems due to IWBs, middle dealers and main dealers.	Description of problems (if any).	To understand whether the other chain of informal recyclers also causes problems to the official system.
3.13 Q7	Agreement on the assumption that informal sector reduces the waste volumes.	Yes/No - descriptive	To assess the knowledge and understanding of municipal officers about informal recycling activities.
3.13 Q8	Municipal efforts and policy for waste minimisation and recycling.	Description of - past efforts if any.	To assess the official efforts and policy and to see, do they understand and incorporate the private-informal sector.
3.13 Q9	Opinion on the use of informal actors in waste collection and loading.	Opinion and attitude	To understand that what initiatives zonal officers can take for integration of informal activities.
3.13 Q10	Opinion on any other use of informal activities.	Opinion and attitude	To understand the perception of municipal officers towards integration of official and informal sector.
3.13 Q11	Municipal plans for waste minimisation and recycling.	Description of - plans if any.	To assess the official plans towards improvement and to see how do they understand and incorporate the private-informal sector.
3.13 Q12	Opinion towards improvement of efficiency of zones.	Description of ideas	To assess the official attitude towards improvement and to see how do they understand and incorporate the private-informal sector.
3.13 Q13	Perception on examples of integration from other countries.	Opinion on examples	To understand the perception of municipal officers towards integration of official and informal sector.
3.13 Q14	Any other suggestion or comment	List of suggestions (if any)	To understand comment in overall theme.

## Analysis Sheet for Primary Data/Information

**Type of Survey/Investigation:** Open Ended Discussion with the Representative of Main Dealers for Case Study I

**Location:** Shershah, Karachi

Parameter No.	Parameter Description	Variables	Purpose of Analysis
3.13.A Q1	To understand the present co-operation and perceived problems and solutions.	Description	To understand the present association of main dealers and their attitude to the development. How does their perceptions relate with the municipal, NGOs and public attitudes.

**Type of Survey/Investigation:** Open Ended Discussion with the Representative of OPP.s Loans Programme for Case Study I  
**Location:** Orangi Pilot Project Office, Karachi.

Parameter No.	Parameter Description	Variables	Purpose of Analysis
3.13B Q1	To understand the loans programme which are provided to the informal sector, how the approach is different from the commercial bank and other informal loans system.	Description	To understand that what type of developments can informal sector do once given loans on easy terms. This discussion was conducted from the point of view of pilot projects.

**Type of Survey/Investigation:** Open Ended Interview with Mr. Arif Hasan, a Local Expert on Private Informal Sector for Case Study I  
**Location:** Arif Hasan's Office, Karachi

Parameter No.	Parameter Description	Variables	Purpose of Analysis
3.13C Q1	To understand various definitions, municipal attitudes etc.	Description	To understand the terms and definitions and his idea on the question of integration. Also based on his experience, the official attitudes etc.

#### Analysis Sheet for Primary Data/Information

**Type of Survey/Investigation:** Structured Interviews with Housewives for Case Study II  
**Location:** Yasinabad (a lower middle income area) - Karachi  
**Size/Quantity of Data:** 215 Housewives

Parameter No.	Parameter Description	Variables	Purpose of Analysis
3.14 Q1	Satisfaction over municipal system for solid waste management	Level of satisfaction	To measure level of satisfaction on existing cleanliness and to assess performance of private informal sector.
3.14 Q2	Person collect and dispose waste from the house.	Type of person	To understand the existing arrangement of waste collection from the house.
3.14 Q3	Additional works performed by sweepers	Yes/No	To understand the sweepers activity of in-house cleaning works and charges.
3.14 Q4	Description of works in addition to waste collection	Type of works	To understand the sweepers involvement in other type of works and their comparison with the informal collection system.
3.14 Q5	Payments per month to sweepers.	Numerical	To understand how much payment is made to sweepers for different services related to waste.
3.14 Q6	Payments per month to the informal pick-ups collection system.	Numerical	To know what are the payments made to the informal pick-up collection system. also to find total payments from households on waste disposal. Comparing with the informal recycling some unit costs and other models may be developed.
3.14 Q7	Used pick-up collection system in past.	Yes/No	To assess attitude of housewives toward street pickers and perceptions on their usefulness.
3.14 Q8	Satisfaction over pick-up system	Level of satisfaction	To measure level of satisfaction on existing collection system and to assess performance of private informal sector.
3.14 Q9	If low level of satisfaction in Q8 what are the problems.	Description of problems	To understand the perceived problems in the system.
3.14 Q10	Assessment of pick-up systems in making the area clean from users point of view.	Yes/No and Description	To measure level of satisfaction on existing collection system and to assess performance of private informal sector.
3.14 Q11	Opinion about replication of the programme.	Yes/No	To measure level of satisfaction on existing collection system and to assess performance of private informal sector.
3.14 Q12	Practice to separate re-saleables from waste.	Yes/No	To assess the extent of practising separation of re-saleables.
3.14 Q13	Who takes money obtained from	Type of person	To understand the system of separation of resaleables and its

	resaleables.		economics.
3.14 Q14	Attitude if asked to do source separation	Yes/No and Description	To understand, based on other parameters, what roles housewives can take in pilot projects for integration.
3.14 Q15	Further comments and discussion	Descriptive	N.A

This survey was repeated in the other areas: 1) Case Study III (n=201), Control Area (n=90) and Faisalabad (n=103) with more or less similar parameters. **Analysis Sheet for Primary Data/Information**

**Type of Survey/Investigation:** Semi Structured Interviews with Municipal and Private Sweepers for Case Study II

**Location:** Federal B. Area Blocks 10 and 11.

**Size/Quantity of Data:** 22 Sweepers

Parameter No.	Parameter Description	Variables	Purpose of Analysis
3.15 Q1	Status of sweeper	Type of status from private to municipal	To understand the present composition of sweepers in the area and to relate it with other economic interests.
3.15 Q2	No. of years working in this area.	Numerical	To explore that how the introduction of pick-up system has affected the sweepers income and their interest in the area, since pick-up system only started in the year 1988.
3.15 Q3	If municipal, then how many houses, streets etc. are assigned.	Numerical	To understand the official duty of municipal sweepers.
3.15 Q4	From how many houses including all areas do you collect waste.	Numerical	To understand whether sweepers are working in the same area, have they moved to other areas, income etc.
3.15 Q5	Charges per month just to collect waste from the house	Numerical	To understand the income of sweepers and charges nousehold pays for waste collection service.
3.15 Q6	Charges per month for other services etc.	Numerical	To know the charges for other services.
3.15 Q7	Practice of separating resaleables from waste	Yes/No	To understand why and when sweepers separate certain resaleables.
3.15 Q8	Person to whom sells separated materials.	Type of person	To understand the process and problems.
3.15 Q9	Also do certain part time works.	Yes/No Description	To understand the sweepers reaction if they are not assigned lucrative area.
3.15 Q10	Any other suggestion or comment	List of suggestions (if any)	To understand comment in overall theme.

This survey was repeated in the other areas: 1) Case Study III (n=10), Control Area (n=23) and Faisalabad (n=23) with more or less similar parameters.

### Analysis Sheet for Primary Data/Information

**Type of Survey/Investigation:** Semi Structured Interviews with the Programme Organiser for Case Study II

**Location:** Federal B. Area Blocks 10 and 11.

**Size/Quantity of Data:** 1 Interview

Parameter No.	Parameter Description	Variables	Purpose of Analysis
3.15A Q1	Description of the inception and development of the programme.	Description	To understand the inception and development of the programme.
3.15A Q2	Attitude of residents during the initial phases of the programme.	Description	To understand the community response as perceived by the programme organiser.
3.15A Q3	The present organisation, income and expenditures.	Description and some cost figures.	To understand the programme and its income and expenditures.

3.15A Q4	Linkages with the official system of street sweepings in the area.	Description	To understand the integration/acceptance of the programme from official actors in the area.
3.15A Q5	Opinion about failure of similar programmes in other areas.	Description	To understand why the system in F. B. Area is operating and why similar efforts have failed.
3.15A Q6	Other parameters on programme operating details, interaction with the municipal staff, problems due to informal recycling etc.	Description	To fully understand the programme.

This survey was repeated in the other areas: i.e. Case Study III with more or less similar parameters.

### Analysis Sheet for Primary Data/Information

**Type of Survey/Investigation:** Semi Structured Interviews with the Pick-ups Drivers, Pickers on Pick-ups and Sweepers for Case Study II

**Location:** Federal B. Area Blocks 10 and 11.

**Size/Quantity of Data:** 8 Interviews (2 drivers, 2 sweepers and 4 pickers)

Parameter No.	Parameter Description	Variables	Purpose of Analysis
3.15B Q1	Description that when and how acquired the job.	Description	To understand the operation of the private-informal system and working of different actors.
3.15B Q2	Satisfaction over the job.	Description	To understand the working condition and satisfaction of workers.
3.15B Q3	Working conditions and problems.	Description	To understand the problems in the programme.
3.15B Q4	Relationship with the municipal sweepers in the area.	Description	To understand the integration/acceptance of the programme from official actors in the area.
3.15B Q5	Mutual understanding in the team.	Description	To understand the attitudes and development due to programme.
3.15B Q6	Perceived benefits from various pilot activities.	Description	To explore the scope of interventions.
3.15B Q7	Other comments and suggestions	Description	To see the comments and suggestion in the context of overall discussion.

### Analysis Sheet for Primary Data/Information

**Type of Survey/Investigation:** Semi Structured Interviews Municipal Supervision Staff and Zonal Officers for Case Study II

**Location:** Federal B. Area Blocks 10 and 11.

**Size/Quantity of Data:** 2 Interviews

Parameter No.	Parameter Description	Variables	Purpose of Analysis
3.15C Q1	Official duties and responsibilities in the area.	Description	To understand the official system in the area and its relationship with the private-informal system.
3.15C Q2	Deputation of municipal sweepers in the area.	Description	To test the proposition that whether the informal-private system has affected the informal system by sweepers.
3.15C Q3	Attitude on house to house collection system in the F.B. Area.	Description	To understand the relationship between the private informal system and the official system.
3.15C Q4	Perceived constraints to the replication of pick-up programmes.	Description	To further understand the municipal attitudes and perceptions on the informal system.
3.15C Q5	Other comments and suggestions	Description	To see the comments and suggestion in the context of overall discussion.

### Analysis Sheet for Primary Data/Information

**Type of Survey/Investigation:** Quantities of Different Materials Purchased from Households by Itinerant Waste Buyers for Case Study II

**Location:** F. B. Area Blocks 10 and 11

**Size/Quantity of Data:** Details of Materials Sold by 87 Houses.

Parameter No.	Parameter Description	Variables	Purpose of Analysis
3.15D Q1	Quantities and compositions of different materials purchased by IWBs from households.	Weights of each material in KGs. (Numerical)	To understand the role of IWBs in reducing waste quantities in F. B. Area blocks 10 and 11, income to the IWBs, income to the households, composition of separated materials, and derivation of unit figures for this activity. May also be used to see variations in different case studies and control areas to relate it with causal explanations if any.
3.15D Q2	Family size of the household selling waste.	Numerical	To understand the role of IWBs in reducing waste quantities, income to the IWBs, income to the households and derivation of unit figures for this activity.
3.16D Q3	Number of days after which material was sold.	Numerical	To understand the role of IWBs in reducing waste quantities, income to the IWBs, income to the households and derivation of unit figures for this activity.

This survey was repeated in all other case study areas.

### Analysis Sheet for Primary Data/Information

**Type of Survey:** Cordon Survey to Count Number of Pickers, Itinerant Waste Buyers and Sweepers Entering and Leaving Area for Case Study II

**Location:** F. B. Area Blocks 10 and 11

**Size/Quantity of Data:** 3 days.

Parameter No.	Parameter Description	Variables	Purpose of Analysis
3.16 Q1	To note down the number of sweepers, pickers and itinerant waste buyers entering and leaving the area.	Number with times of the day	To understand the role of IWBs in reducing waste quantities in F. B. Area blocks 10 and 11, income to the IWBs, income to the households, composition of separated materials, and derivation of unit figures for this activity. May also be used to see variations in different case studies and control areas to relate it with causal explanations if any. May be used to compare the impact of interventions on the informal activities.

This survey was repeated in all other case study areas.

### Analysis Sheet for Primary Data/Information

**Type of Survey/Investigation:** Quantities and Composition of Different Materials Sorted and Sold by Pick-up Crew for Case Study II

**Location:** F. B. Area Blocks 10 and 11

**Size/Quantity of Data:** Details of Sorted Materials for 50 days.

Parameter No.	Parameter Description	Variables	Purpose of Analysis
3.18 Q1	Quantities and composition of different resalable materials separated by pick-up crew daily.	Weights of each material in KGs. (Numerical)	To understand the role of pick-up crew in reducing waste quantities F. B. Area blocks 10 and 11, income to the IWBs, income to the households, composition of separated materials, and derivation of unit figures for this activity. May also be used to see variations in different case studies and control areas to relate it with causal explanations if any.

3.18 Q2	Details of the area.	Number of houses, shops etc.	To understand the role of pick-up crew in reducing waste quantities, income to the IWBs, income to the households and derivation of unit figures for this activity.
---------	----------------------	------------------------------	---

### Analysis Sheet for Primary Data/Information

**Type of Survey/Investigation:** Monitoring of Transfer Points for Case Study II

**Location:** F. B. Area Blocks 10 and 11

**Size/Quantity of Data:** 2 Transfer Points for 2 Days.

Parameter No.	Parameter Description	Variables	Purpose of Analysis
3.19 Q1	Description of the activity performed at the transfer points.	Description	To understand the type of activities performed by different actors at transfer points. The problems caused by those activities.
3.19 Q2	Person doing that activity	Type of person	To understand the activities by different people at transfer points etc.
3.19 Q3	Result of that activity	Description and categorisation	To understand different type of activities and the impact of those activities.

This survey was repeated in all other areas.

### Analysis Sheet for Primary Data/Information

**Type of Survey/Investigation:** Cleanliness Assessment of Area for Case Study II

**Location:** F. B. Area Blocks 10 and 11

**Size/Quantity of Data:** 2 Days.

Parameter No.	Parameter Description	Variables	Purpose of Analysis
3.19A Q1	The type of waste pile in the area.	Type of waste pile	To assess the performance of different programmes as indicators
3.19A Q2	Number and location of piles.	Numerical	To assess the performance of different programmes as indicators

This survey was repeated in all other areas.



---

## Case Study I: The Informal Sector Recycling

---

*Key Findings: The case study will discuss the organisation and structures of the private informal recycling activities. The role of each activity, the attitudes of the actors involved and the constraints to the integration. The data and information available may conclude that although the present role of private informal activities is extensive, the sustainable integration is not possible without the structural changes and changes in attitudes and priorities, which are more societal phenomenon.*

The role, attitudes and perceptions of the households:

**1. The practice of separating and selling re-saleables is a regular activity common in all the income groups area.**

A common variable asked in all the areas: the 3 case study areas, 1 area in Faisalabad and 1 lower middle income area in Karachi. A total of 709 respondents were asked this question.

**2. Households separate and sell components from waste to earn an extra income.**

From 100 structured interviews with the housewives, through their practice of selling the re-saleables, knowledge about materials once sold and perceived advantages, each asked as a separate question.

**3. The separation practices by the households and the quantity of the materials given is independent of the income group.**

Through quantitative data obtained from the itinerant waste buyers consisting of 400 households in different income groups.

**4. Households perceive that the waste pickers are helpful and can be utilised for the improvement of the solid waste collection in the area.**

From 100 structured interviews with the house wives, through their perception of the street pickers activity. The variables measured are their observation, perceived usefulness, perceived reduction in waste quantities and further the proposed help for pickers, each asked as a separate question.

**5. Most of the households are willing to do further source separation of waste.**

A common variable asked in all the areas: the 3 case study areas, 1 area in Faisalabad and 1 lower middle income area in Karachi. A total of 709 respondents were asked this question.

The municipal officers attitude:

**1. Municipal plans for the improvement of SWM include the integration with the waste pickers and itinerant waste buyers.**

Through the variables future plans, plans for recycling, attitude and knowledge of informal separation and recycling and perception on the examples of integration from the other countries.

**2. Municipal officers perceive the informal activities of waste pickers as beneficial to the waste management.**

Through 6 interviews from Karachi, measured on the variables, any idea of quantities, attitude on integration and attitude on the examples of integration from other countries. More interviews done from the 10 Indian officials who came to WEDC for training.

The attitudes and perceptions of the informal actors:

**1. The itinerant waste buyers, middle dealers, main dealers and the recycling industry do not appreciate any official involvement in their business.**

Through a total of 27 interviews with the middle dealers, main dealers and recycling industry. Measured through attitude on proposed intervention through any official agency.

**2. The attitude towards official agencies is more encouraging in the partly-formal or registered activities as compared to the totally informal activities.**

Through a total of 27 interviews by cross-comparing the results.

**3. The waste pickers do not expect and can not perceive any official support in their work.**

The role of itinerant waste buyers in reducing quantities

**1. In the absence of the itinerant waste buyers system of waste purchase and trade the quantities of domestic waste appearing as the waste may increase to 10 to 15%.**

Through quantitative data obtained from the itinerant waste buyers consisting of 400 households in different income groups.

**PAGE  
NUMBERING  
AS ORIGINAL**

**5. The operation of itinerant waste buyers and waste pickers do not depend on any official agency.**

Through a total of 4 interviews with IWBs, 2 street pickers and 3 group leaders in Karachi and Faisalabad. Measured through three variables, i.e. whether or not interact with any official agency interact with them.

**6. The operation of middle dealers, main dealers and recycling industries depends upon some official agency.**

Through a total of 27 interviews with the middle dealers, main dealers and recycling industry. Measured through variables type of interacting official agencies, opinion about them and attitude on proposed intervention through them.

**7. The main dealers capture a major proportion of profit as the value of separated waste materials increase from source to the recycling industry.**

Through comparing prices at different stages, and an economic analysis in terms of direct input to that material as processing, land, power etc. and in-direct input as loans to the buyers, risk involved, bribes and pay-off etc.

**14. The relationship between the itinerant waste buyers and middle dealers is exploitative in nature.**

Through 4 interviews with the IWBs and 8 interviews with the middle dealers. Measured through the variables of selling it to the same person or different, assessing the type of support and attitude on alternative channels of trade.

**20. The nature of relationship between the waste pickers and sweepers is competitive.**

Through interviews with 50 sweepers, the problems from the street pickers to sweepers, interviews with the street pickers and the nature of operation.

## Other Constraints and Opportunities to the Integration:

**1. Street pickers are a major nuisance to the municipal waste management operation.**

Partly through the transfer point monitoring, where all the activities were observed. Supplemented through the interviews and discussions with the municipal officers.

**2. Waste pickers and sweepers can be given the responsibility of managing the transfer points.**

More data is required from the existing situation. Some data is available from the interviews with the two pickers.

**3. Municipal officers perceive that the present system of SWM in Karachi is adequate.**

Through 6 interviews with all the senior officials of SWM operation and planning in the Karachi Municipal Corporation.

**4. The waste pickers and itinerant waste buyers could sell the collected materials directly to the large recycling industry.**

Through interviews with the waste pickers, itinerant buyers and managers of the large and medium size recycling industry.

---

## Case Study II: The Informal System of House to House Waste Collection (Suzuki).

---

*Key Findings: The system has been studied as a possible mode of integration for the private informal and official systems. The informal house to house collection system through Suzukis has contributed significantly in solving the problem of municipal waste collection at the cost much less than what municipal corporation spend. The study of organisation of Suzuki programme reveals that the relationship between the programme organiser (ex-area councillor) and the Suzuki collection crew is similar to the relationship between IWBs and middle dealers, where dealer behaves as a patron. The public satisfaction is higher and area is cleaner as compared to the other similar areas in Karachi. The household separation practices of waste persist as usual, where as the pickers practices are effected. The programme has significantly effected the practices of informal house to house collection through municipal sweepers, as a result there is a huge resistance from them. The results clearly signifies that such system are more efficient, closer to the users, cost effective and involve informal activities. Such mode of privatisation if introduced are far more better than the mechanised contractor's system. In the concluding section policy options to promote informal sector for solid waste collection may be prepared.*

### The role, attitudes and perceptions of the households:

1. The present satisfaction over cleanliness in the Suzuki area as perceived by the housewives is higher as compared to area where only official system is operating.

Through interviews with the housewives, measured by variable on the level of satisfaction in 215 cases, compared with 90 interviews in the control area measured on the same variable.

2. The household who are using Suzuki collection are completely satisfied with its service and believe that it may be replicated in the other areas of the city.

Through 215 interviews with the households, measured on the variables present satisfaction on the Suzuki system, problems with the system and attitude on the replicability of the system.

**3. Residents perceive a number of operational problems in the Suzuki collection system.**

Through 215 interviews from the households using or used Suzuki collection system. List of perceived problems.

## The Role of Suzuki Collection System:

**1. Suzuki system contributed in the overall cleanliness of the area.**

Through public perceptions, the independent area cleanliness surveys by author and comparison with the control areas.

**3. The present system of Suzukis is serving more than 75% of the houses in the area.**

Through interviews with the housewives, measured on the variable 'who collect and dispose of waste from 215 cases.

**4. The Suzuki system of waste collection is cost effective as compared to what people usually pay for waste collection and disposal.**

By comparing the statistics of amount of money, what people are paying to the Suzuki system as compared to the people paying to the sweepers system.

**5. Suzuki collection system is totally informal in management and operation.**

Through interviews with the programme organiser and the collection crew working on the Suzuki.

**6. Suzuki system is a profit making enterprise.**

By comparing cost and applying financial analysis as IRR etc.

**7. Suzuki system if modified can be more efficient and cost effective as compared to the municipal system.**

By comparing municipal cost and Suzuki cost of collection.

## The municipal officers attitude:

**1. The municipal official perceive that Suzuki system is an appropriate system which can be duplicated to other areas.**

Through interviews with the health officer and organiser of the Suzuki system.

## Relationships, Inter and Intra Dependencies

**1. Municipal sweepers are not attending the area for street sweeping because of introduction of Suzuki programme.**

Assessed through interviews with the sweepers and suzuki collection crew. Also from secret monitoring of sweepers entering the area.

**2. The relationship between the municipal sweepers operating in the area and the Suzuki system is competitive in nature.**

Through interviews with the sweepers operating in the area. discussion with them and reduction in the total number of houses from where they have been collecting waste before Suzuki system was introduced. Also comparing the rates of services charge by sweepers with the charges in other areas.

**3. The activities of waste pickers operating in the area are effected by the Suzuki system.**

Through monitoring of waste dumps, pickers entering and leaving the area (through cordon survey) and short interviews with the pickers visiting remaining transfer points. Also comparing the number of transfer points as compared to the control and other areas. Also discussing the new role of pickers as they now move with the Suzuki.

**4. The separation practices at the household level and the separated quantities are un-affected by the Suzuki collection system.**

By comparing the interviews data with the control area and the separated quantities obtained from IWBs.

**5. The Suzuki programme depends upon its organiser and the workers need a protection.**

Through results from discussion with the workers. on the variable are they willing to run the programme themselves.

**6. The Suzuki programme depends upon municipal corporation for waste collection from the single transfer point.**

Only through discussion and observation.



---

## Case III: The KAWWS Programme of Waste Collection and Street Sweeping.

---

*Key Findings: The KAWWS model of integration is another popular option nowadays. The programme although with sincere efforts of the programme organiser on one hand, could not gain a popularity among the residents who like to have solid waste collection as a service, like they get water, electricity etc., willing to pay for it and are not interested in giving further time and effort for it. Thus useful findings from user's perceptions (attitude) were obtained through this study. On the other hand the programme has not effected the itinerant waste buyers and pickers activity, but due to placement of containers effected the activity of sweepers collection system. Such systems if modified can be replicated in other similar areas of city. At the conclusion, based on the results, a modified model of such a system of integration would be presented.*

### The role, attitudes and perceptions of the households:

**1. The present satisfaction over cleanliness in the KAWWS area as perceived by the housewives is higher as compared to area where only official system is operating (R).**

Through interviews with the housewives, measured by variable on the level of satisfaction in 200 cases, compared with 90 interviews in the control area measured on the same variable.

**2. The KAWWS programme is popular among housewives and most of them take part in the programme.**

Through interviews with the housewives, measured on the variable, know about the programme, involved in the programme, seen programme suitable for other areas.

**3. Residents perceive a number of operational problems in the KAWWS collection system.**

Through 200 interviews from the households using or used KAWWS collection system. List of perceived problems.

**4. The household who are using KAWWS collection system are completely satisfied with its service and believe that it may be replicated in the other areas of the city.**

Through 200 interviews with the households, measured on the variables present satisfaction on the KAWWS system, problems with the system and attitude on the replicability of the system.

**5. The residents would like the solid waste collection service only as users and do not want to contribute efforts and time.**

Through the comments and suggestions variable in the household questionnaire. Also through interview with the KAWWS programme organiser.

## The Role of KAWWS Collection System:

**1. KAWWS system contributed in the overall cleanliness of the area.**

Through public perceptions, the independent area cleanliness surveys by author and comparison with the control areas.

**2. The KAWWS system of waste collection is cost effective as compared to what people usually pay for waste collection and disposal.**

By comparing the statistics of amount of money, what people are paying to the KAWWS system as compared to the people paying to the sweepers system.

**3. KAWWS collection system is totally informal in management and operation.**

Through interviews with the programme organiser and an understanding of the system.

**4. Municipal sweepers are not attending the area for street sweeping because of introduction of bins through KAWWS programme.**

Assessed through interviews with the sweepers.

**5. The activities of waste pickers operating in the area are effected by the KAWWS system.**

Through monitoring of waste dumps, pickers entering and leaving the area (through cordon survey) and short interviews with the pickers visiting remaining transfer points. Also comparing the number of transfer points as compared to the control and other areas.

**6. The separation practices at the household level and the separated quantities are un-affected by the KAWWS collection system.**

By comparing the interviews data with the control area and the separated quantities obtained from IWBs.

System is a non-profit making system and need further resources for its

cost and applying financial analysis as IRR etc.

### Municipal officers attitude

Municipal officials perceive that KAWWS system is an appropriate system which can be extended to other areas.

Discussions with the health officer and organiser of the KAWWS system.

### Dependencies, Inter and Intra Dependencies

1. Programme depends upon its organiser NGO.

From discussion with the workers, on the variable are they willing to run the system themselves.

2. Programme depends upon municipal corporation for waste collection and transfer points.

Discussion and observation.

### Constraints and opportunities for integration

Municipal policy in theory and practice, accepts and supports programme like

Analysis of the present policy of municipal corporation for integration.

System if modified can be more efficient and cost effective as compared to present system.

Municipal cost and KAWWS cost of collection.

---

## Case IV: The Sweepers System of House to House Collection.

---

*Key Findings: The informal role of municipal sweepers has been studied first time in this study. Most of the residents in the developed areas depend upon this service to get rid of their waste. The sweepers are the poorest section of the population and supplement their income through this practice. Although the system in itself is not very efficient and accountable to the residents. The constraints to further development of this sector are also studied. A modified model for the waste collection through sweepers may be presented based on the findings of the case study. Similar interventions in Surabaya and Madras have been studied.*

---

### The role, attitudes and perceptions of the households:

#### 1. Residents using sweepers collection service are satisfied with it.

Through interviews with the households on the existing level of satisfaction with the sweepers system and reasons if not satisfied.

#### 2. Once the streets are paved and there are no vacant places (developed areas), residents need someone to collect and dispose of their waste.

Comparing the interviews conducted in different income groups and areas, on the variable who collects and dispose of waste.

### The role of sweepers in collecting waste

#### 1. Most of the residents in the developed areas depend upon sweepers collection system.

Through interviews with the residents and with the sweepers. On the variables who collects and dispose of the waste and from sweepers on the variable 'from how many houses do they collect and dispose of waste'.

#### 2. The sweepers perform the household waste collection work after the duty hours.

Through household interviews in the control area, on the variable at what time the sweeper come and collect waste.

#### 3. Sweepers are also involved in the waste separation practices.

Through interviews with the municipal sweepers in various areas.

**4. Charges for sweepers service depend upon the additional services provided by the sweepers.**

Through household interviews in various areas and measured on the variable charges and additional works.

**5. The rates of waste collection service varies from one income group area to other.**

Based on the household interviews, on the variable what they pay for the service and cross comparison with the income group or plot size.

**6. The area where sweepers system (official system) is operating is cleaner as compared to the area where KAWWS or Suzuki systems area operating.**

Through environmental cleanliness survey in the three areas.

## Relationships and dependencies

**1. Sweepers transact the rights to collect waste from the houses among each other.**

Based on the interviews from sweepers and information on the terms of transactions, obtained from 50 sweepers in different areas.

**2. The sweepers collection system depend upon the area municipal supervisor.**

Through understanding the process.

## Other constraints and problems

**1. Sweepers also move away from their official duty area to other areas to collect waste from the houses.**

From sweepers interviews and a comparison between the duty area and the area, where the houses are located from where they collect waste.

**2. The sweepers if not collecting waste from the houses depend upon other part time jobs.**

From interviews with the sweepers on the variable collecting waste from the houses and doing other part time job.

**3. The existing sweepers collection system is the major constraint to any intervention upto the collection stage.**

Through the understanding of the process.

# Opportunities to integration

1. The existing informal collection system through sweepers may be organised to an organised and efficient system of waste collection.

Through recommending on the findings.

## Common sets of variables in the four case studies

Recycling	Suzuki	KAWWS	Sweepers
The role, attitudes and perceptions of the households:	The role, attitudes and perceptions of the households:	The role, attitudes and perceptions of the households:	The role, attitudes and perceptions of the households:
The municipal officers attitude:	The municipal officers attitude:	The municipal officers attitude:	
The attitudes and perceptions of the informal actors:	The attitudes and perceptions of the informal actors:		
The role of itinerant waste buyers in reducing quantities	The role of Suzuki collection System:	The role of KAWWS collection System:	The role of sweepers in collecting waste
The role of waste pickers in reducing quantities:			
The role of sweepers in reducing quantities:			
Relationships, inter and intra dependencies in the informal sector:	Relationships, inter and Intra Dependencies	Relationships, inter and intra Dependencies	Relationships and dependencies
Other Constraints and Opportunities to the Integration:	Opportunities to integration	Other constraints and opportunities for integration	Opportunities to integration

## Detailed note on the Chi-Square test

The Chi-Square test is used to check whether the two variables are independent of each other or not. Chi-square test is generally recommended for categorical data, where frequencies are measured instead of numbers. The procedure tests the fit or match between the theoretically expected and observed frequencies and it is often referred to as a goodness of fit test. The test basically checks whether the observed frequencies that occur in each category differ significantly from the frequencies you would have expected under the null hypothesis.

The value is a statistics calculated by summing over all cells the squared residuals divided by the expected frequencies:

$$\chi^2 = \sum_{ij} \frac{(O_{ij} - E_{ij})^2}{E_{ij}}$$

Where O and E are observed and expected frequencies respectively.

The calculated chi-square is compared to the critical points of the theoretical chi-square distribution to produce an estimate of how likely (or unlikely) this calculated value is if the two variables are in fact independent. If the two variables are independent, the probability that a random sample would result in a chi-square value of at least that magnitude is very low. This probability is known as observed level of significance. If the probability is small enough (usually less than 0.05 or 0.01), the hypothesis that the two variables are independent (null hypothesis) is rejected.

The value of chi-square depends on the number of rows and columns in the table being examined. The degree of freedom can be viewed as the number of cells of a table that can be arbitrarily filled when the row and column totals (marginal) are fixed. Thus for a table containing "r" number of rows and "c" number of columns: r x c table, the degree of freedom are (r - 1) x (c - 1).





## Quantities and Prices of Separated Material from the two Suzukis

Data from the first Suzuki

S.No	Category I Kg Paper, Cardboard, Glass etc.	Category II Kg Plastic, Metals etc	Total I and II Kg	Population Covered	kg/cap/day	Income (Rs)
1	80	20	100	3500	0.029	200
2	100	15	115	3500	0.033	200
3	100	18	118	3500	0.034	215
4	60	9	69	2800	0.025	120
5	100	12	112	3500	0.032	185
6	40	4	44	1750	0.025	70
7	113	19	132	3500	0.038	236.25
8	100	13	113	3500	0.032	190
9	150	23	173	3500	0.049	302.5
10	80	25	105	3500	0.030	225
11	90	13	103	3500	0.029	177.5
12	120	23	143	3500	0.041	265
13	50	7	57	3500	0.016	97.5
14	80	20	100	3500	0.029	200
15	90	14	104	3500	0.030	182.5
16	120	90	210	3500	0.060	600
17	100	80	180	3500	0.051	525
18	120	21	141	3500	0.040	255
19	90	15	105	3500	0.030	187.5
20	120	17	137	3500	0.039	235
21	90	16	106	3500	0.030	192.5
22	100	18	118	3500	0.034	215
23	140	22	162	3500	0.046	285
24	200	42	242	3500	0.069	460
25	130	26	156	3500	0.045	292.5
26	163	29	192	3500	0.055	348.75
27	60	12	72	3500	0.021	135
28	80	19	99	3500	0.028	195
29	119	17	136	3500	0.039	233.75
30	80	12	92	3500	0.026	160
Total	3065	671	124.533	avg.	0.036	239.542
%	82.040	17.960				





### Location of Waste Piles in the Suzuki Area

**Key**

- + fresh waste pile
- construction waste pile
- △ garden waste



Key

-  fresh waste pile
-  construction waste pile
-  garden waste
-  KAWWS communal bin

Location of Waste Piles in the KAWWS Area



**A SIMPLE CONTRACT FOR COMMUNITY BASED ORGANISATIONS (CBOs) TO ESTABLISH PRIMARY COLLECTION OF SOLID WASTE PROJECTS IN THEIR AREAS.**

**Community Based Organisations (CBOs) Responsibility**

- a) An organisation may be at lane level or a larger scale Community Based Organisation (CBO). The organisation will represent the community.
- b) The CBO shall be responsible for the overall management of the primary collection programme. Which will consist of hiring a sanitary worker, assure regular and timely payments to the sanitary worker and monitoring performance of the sanitary worker.
- c) A sanitary worker may be a municipal sweeper or a self employed private sweeper.
- d) The CBO shall provide appropriate carts, tools and equipment to the sanitary worker.
- e) In case of disputes the CBO and the sanitary worker could request for a meeting of the advisory committee which will consist of the sanitary inspector and a member from the CBO.
- f) In case of more than 5 complaints from the households in a month, the CBO shall call the meeting of the proposed advisory committee, which could make the decision about the replacement of the sweeper.
- g) In case the sanitary worker faces any problem in disposing of waste at the transfer point, the CBO will seek advise from the area sanitary inspector or KMC to solve the problem.

**Sanitary Workers Responsibilities:**

- a) The sanitary worker will collect solid waste (only household waste excluding cow dung) from the individual houses at least 6 days a week.
- b) The sanitary worker will clean the drains twice a week and remove the solids away from the drain.
- c) The sanitary worker will not dispose of waste in the area or in the close vicinity. He will carry the waste to the nearest KMC transfer point.
- d) The sanitary worker will not burn any waste in the area or away from the area.

**Households Responsibilities:**

- a) Each household will pay a monthly fees of Rs ..... to the sanitary worker (or CBO as mutually agreed) on or before the 5th of every month.
- b) Collection of extra quantities of waste (more than one bin per house) shall be additionally charged by the sanitary worker as mutually agreed between the sanitary worker and the households. Similarly additional quantities of cow dung shall be removed on the additional charges made to the sweeper.
- c) If the households are not satisfied with the performance of sanitary worker they should report the matter to the CBO as per attached form.
- d) Households will keep a waste bin inside the house. The bin shall be handed over to the sanitary worker upon his arrival. Households will not dispose of any waste on the street once the sanitary worker has collected waste from the house.