

**Private Sector Participation in Municipal Solid Waste Management
in Indian Cities and its Implications**

Author

Sandhu, Kirandeep

Published

2017

Thesis Type

Thesis (PhD Doctorate)

School

Griffith School of Environment

DOI

[10.25904/1912/1803](https://doi.org/10.25904/1912/1803)

Downloaded from

<http://hdl.handle.net/10072/366262>

Griffith Research Online

<https://research-repository.griffith.edu.au>

**Private Sector Participation in Municipal Solid Waste Management in
Indian Cities and its Implications**

Kirandeep Sandhu

MSc. Geography (India)

Master of City and Regional Planning (India)

MSc. Development and Planning (United Kingdom)

Cities Research Centre, Griffith School of Environment, Griffith Sciences,

Griffith University

Submitted in fulfilment of the requirements of the degree of
Doctor of Philosophy

November, 2016

Abstract

The most visible outcome of the increasing pace of urbanisation, along with the rise in the spate of consumerism in the liberalised economic setup, has been the sharp increase in municipal solid waste generation across the urban centres in the developing countries. As the challenge of providing this service becomes more and more pressing, municipalities are turning to the private sector to fill the gap and become the prime service providers. Privatisation of solid waste management services has thus emerged as 'the' alternative and, as such, several municipalities have taken hasty steps to introduce private sector participation in solid waste management services, treating it as a panacea for the municipal solid waste management woes of the cities. The logic of private sector participation in municipal solid waste management services hinges on the assertion of it performing more efficiently on all fronts.

While there is a flurry of rhetoric and excitement around private participation in municipal solid waste management services across Indian cities, there is an acute lack of empirical evidence and research (MoUD, 2010, Anderson, 2011) assessing the impacts of private sector participation in municipal solid waste management. Moreover, none of these studies, to the best knowledge of the researcher, have been conducted explicitly and in detail in conjunction with the principles of sustainability of municipal solid waste management systems.

Set against a background of serious concerns from inadequate municipal solid waste management on one side and the impetus given to private sector participation, this study critically examines and generates empirical evidence on the implications of private sector participation in municipal solid waste management through the lens of a sustainability assessment framework that is specifically constructed for this purpose. The research questions and challenges the perceptions of private sector participation as leading to sustainability outcomes in municipal solid waste operations in Indian cities. The research employs the single case study research design using the city of Amritsar as the case for application of the sustainability assessment framework. Amritsar, the city of the Golden Temple in India and a major tourist attraction, also joined the bandwagon to involve the private sector to deal with its waste woes. With robust evidence emerging from the four-cornered sustainability assessment framework, i.e. social, economic, environmental and institutional, the study offers valuable insights for retrospection and policy correction, while also making a humble claim to be one of the first and few studies of this nature in the Indian context.

Statement of Originality

“This work has not previously been submitted for a degree or diploma in any university. To the best of my knowledge and belief, the thesis contains no material previously published or written by another person except where due reference is made in the thesis itself.”

Kirandeep Sandhu

November, 2016

Acknowledgement

Nothing grows in the shadows of want, without the sunlight of acceptance of all that made it real.

(Modified from Bryant Macgill)

My journey into the world of waste began with my tryst with the waste pickers in Amritsar city nearly a decade ago. What began as an attempt to understand chronic poverty from a socio-spatial perspective amongst the bottom rung of recyclers, i.e. the waste pickers, gradually transited into a forage in the garbage land and life. What is waste all about and why is it the way it is? This question led me to associate myself with waste complexities and follow its trails closely in terms of both theoretical and empirical contexts, and especially in the city of Amritsar.

It was perhaps only natural that when the private sector began operations in the city, I was immediately concerned about the livelihood issues of the informal waste pickers and other related aspects, and hence the seeds of this research began to germinate in my mind. Therefore, first and foremost, I wish to make this acknowledgement to the informal waste pickers who have led me on to this path of learning and discovery.

My journey, I must admit, was not without its share of challenges. My personal and professional trials and tribulations posed a formidable challenge. At this juncture, I most gratefully thank my worthy supervisors, Dr Paul Burton and Dr Aysin Dedekorkut-Howes. Their immense support anchored and encouraged me to carry forward this journey to its logical culmination. Words may not be enough but the truth is that I could have never come this far but for them. Undoubtedly, their constructive comments and advice helped detangle many a dilemma and has shaped the research to its current form herein.

My benevolent thanks are due to the administrative staff members at Cities Research Centre, Merrill Bowers and Mariola Rafanowicz, for their incredible support and to Griffith University for its outstanding resources and services that have facilitated all my interactions and endeavours in this direction.

I am blessed with an incredibly supportive and loving family, where I stand today in my life could not have been possible without them. My wonderful friends and also my research mates at the Cities Research Centre, for your support and motivation, let me claim the right of togetherness to say thank you.

Research Publications

Peer reviewed core publications (included in full or part in the body of the thesis)

1. Sandhu, K, Burton, P & Dedekorkut-Howes, A 2016, 'Between hype and veracity; privatization of municipal solid waste management and its impacts on the informal waste sector,' *Waste Management*, <http://dx.doi.org/10.1016/j.wasman.2016.10.012>.
2. Sandhu,K, Burton,P & Dedekorkut-Howes,A 2016, 'A comprehensive sustainability assessment framework for ex-post evaluation of private sector participation in municipal solid waste management,' *Journal of Environmental Assessment Policy and Management*,vol.18, no.1, pp.1-27.
3. Sandhu,K 2014, 'Historical trajectory of waste management; an analysis using the health belief model', *Management of Environmental Quality, An International Journal*, vol.25, no.5, pp.615-630.

Peer reviewed side publications

4. Sandhu,K 2015, 'Vulnerability dimensions and access to affordable housing: the case of the waste picker community in Amritsar, India', *Journal of Poverty and Public Policy*, vol.7, no.4, pp.382-405.
5. Sandhu,K 2015, 'The invincible waste pickers: An occupational analysis and case for integration in municipal solid waste management in Amritsar city, India,' *Sri Lanka Journal of Real Estate*, vol.8, pp.1-15.
6. Sandhu,K & Sekhon, H.S 2015, 'Municipal solid waste management interventions in a developed country; Australia and lessons for India,' *Journal of the Institute of Town Planners, India*, vol.12, no.2, pp.9-27.
7. Sandhu,K 2014, 'Municipal solid waste management dynamics in a burgeoning African metropolis; Addis Ababa, Ethiopia', *Journal of the Institute of Town Planners, India*, vol. 11, no. 1, pp.54-62.
8. Sandhu,K 2012, 'Public-private partnerships in infrastructure development in India; a retrospective overview', *Dialog: A Journal of Planning and Building in a Global Context*, vol. 3, pp.22-31.

Non-peer reviewed publications

9. Sandhu,K 2016, *The invisible environmentalist*, The Tribune, <http://www.tribuneindia.com/news/comment/the-invisible-environmentalist/238792.html>
10. Sandhu,K 2016, *Don't fight the war against waste in my backyard*, The Tribune, <http://www.tribuneindia.com/news/comment/don-t-fight-the-war-against-waste-in-my-backyard/255002.html>

Contents

Abstract.....	1
Statement of Originality	2
Acknowledgement	3
Research Publications.....	4
List of Figures.....	11
List of Tables	12
List of Abbreviations	14
PART A Research Problem and Background	18
Chapter I Introduction.....	19
1.0 The research setting.....	19
1.1 Private sector participation in municipal solid waste management.....	21
1.2 Contextual setting: India	21
1.3 Case study overview.....	27
1.3.1 Municipal solid waste management prior to private sector participation	28
1.3.2 The shift to private sector participation	28
1.4 Research aim	30
1.5 Key research question	30
1.5.1 Working hypothesis	31
1.5.2 Sub-questions and their rationale.....	31
1.6 Justification of the research.....	33
1.7 Methodological framework of research	34
1.8 Conclusion.....	35
Chapter II Municipal Solid Waste Management: A Literature Review	36
2.0 Introduction.....	36
2.1 Literature review methodology	36
2.2 Municipal solid waste: exploring conjectural perspectives.....	39
2.2.1 Sifting through the waste pile	39
2.2.2 Contemporary approaches to municipal solid waste management	43
2.2.2.1 The waste management hierarchy	45
2.2.2.2 The zero waste concept	47
2.2.2.3 Integrated sustainable waste management.....	48
2.2.2.4 Polluter pays principle and its variants.....	51
2.3 Private sector participation: a municipal solid waste perspective	53
2.3.1 Privatisation, private sector participation or public-private partnerships: clearing the terminological mist	54

2.3.2 Private sector participation: arguments of rationality and pitfalls	57
2.3.3 Impacts of privatisation: evidence from practice	59
2.4 Private sector participation in municipal solid waste management: a review	61
2.4.1 The public good status of municipal solid waste	61
2.4.2 Main assumptions behind private sector participation in MSW	63
2.4.3 Private sector participation forms in MSW	64
2.4.4 Pre-requisites for private sector participation in municipal solid waste management	66
2.4.5 Implications of private sector participation in municipal solid waste management: empirical observations	69
2.5 Determining the lens of sustainability, assessment criteria and indicators	72
2.5.1 The concept of sustainability and its dimensions	72
2.5.2 The prism of sustainability	74
2.5.3 Sustainability assessment measures	76
2.6 Criteria and indicators in the private sector participation literature	77
2.7 Private sector participation in municipal solid waste management; assessment of criteria and indicator choices.....	80
2.8 Sustainability assessment framework for case study evaluation.....	83
2.9 Neo-institutionalism and evaluation of inter-organisational relationships.....	84
2.9.1 Agency theory.....	85
2.9.2 Information asymmetry.....	86
2.9.3 Transaction costs theory	87
2.10 Sustainability assessment framework.....	88
2.11 Conclusions	90
Chapter III Research Design and Methods.....	93
3.0 Introduction.....	93
3.1 Revisiting the key research question.....	93
3.2 The sustainability assessment framework for research	95
3.3 Of ontological and epistemological premises: detangling the paradigm web	98
3.3.1 Putting research in perspective: assuming a position.....	99
3.4 Research design.....	101
3.4.1 A case study as research design	101
3.4.2 A single case study	103
3.5 Of reliability and validity	104
3.5.1 Triangulation as a validity tool	106
3.6 Case study protocol	106
3.7 Methods employed for data collection	107
3.7.1 Documentary and archival evidence	108
3.7.2 Semi-structured interviews	110
3.7.3 Direct observation and field notes	111
3.7.4 Household questionnaires	112

3.8	Sampling methods	113
3.9	Data analysis	117
3.10	Research ethics	119
3.11	Conclusions	120
PART B Empirical Analysis and Outcomes		121
Chapter IV Amritsar: A Waste Trajectory and Chronicle of Privatisation.....		122
4.0	Introduction	122
4.1	Amritsar: a spatial-demographic brief.....	123
4.2	The waste trail	124
4.3	MSW characteristics and composition	127
4.4	MSW management operations	130
4.4.1	Bricolage practices and waste segregation at source	131
4.4.2	MSW storage, collection and transportation.....	132
4.4.3	Waste disposal practices	133
4.4.4	Recovery of recyclables.....	135
4.5	Community perceptions of MSW management	136
4.6	An account of waste litigations	137
4.7	Romancing privatisation; on shaky grounds?	139
4.7.1	Amritsar’s neo-liberal cityscape and tryst with waste privatisation.....	144
4.8	Inferences and conclusions.....	147
Chapter V Sustainability Assessment of the Social Dimension.....		149
5.0	Introduction	149
5.1	A brief review of social sustainability benchmarks	149
5.2	Informal waste management operations in the city.....	152
5.3	Local government policy towards informal waste sector integration	156
5.4	Impacts of privatisation on the informal sector	158
5.4.1	Impact on access to waste	159
5.4.2	Impact on income	160
5.4.3	Impact on relationship with other stakeholders	161
5.5	Impact on AMC sanitary workers	162
5.5.1	Employee layoff and retrenchment	165
5.5.2	Effect on employees income	165
5.5.3	Absorption of contract sanitation workers by private company.....	166
5.5.4	Transfer or adjustment to alternate municipal departments	166
5.5.5	Freeze on AMC recruitments	167
5.5.6	Impact on working conditions	167
5.5.7	Unionisation post-privatisation	167
5.6	Impacts on sanitation workers of Antony Waste Handling Cell Private Limited	168

5.6.1 Employee wages and service benefits.....	168
5.6.2 Labour turnover and downsizing	170
5.6.3 Provision of safety gear	171
5.6.4 Working conditions	171
5.6.5 Termination modalities in the event of private company suspending operations	172
5.7 Equitable access to service.....	173
5.8 Community participation in MSW post-privatisation	174
5.9 Inferences and conclusions.....	176
Chapter VI Sustainability Assessment of the Economic Dimension.....	180
6.0 Introduction.....	180
6.1 A brief review of economic sustainability benchmarks	181
6.2 Economic efficiency.....	188
6.2.1 Production efficiency.....	188
6.2.2 Allocative efficiency.....	191
6.2.3 Implicit factors.....	194
6.3 Labour productivity.....	195
6.3.1 Explicit factors.....	195
6.3.2 Implicit factors.....	199
6.4 Vehicle productivity.....	200
6.4.1 Explicit factors.....	201
6.4.2 Implicit factors.....	206
6.5 Inferences and conclusions.....	207
Chapter VII Sustainability Assessment of the Environmental Dimension	212
7.0 Introduction.....	212
7.1 A brief review of environmentally sustainable MSW practices.....	213
7.2 Waste generation.....	219
7.3 Waste storage and segregation	220
7.4 Waste collection and transportation	225
7.5 Waste treatment.....	230
7.6 Waste disposal.....	233
7.7 Environmental and occupational risk.....	237
7.8 Inferences and conclusions.....	240
Chapter VIII Sustainability Assessment of the Institutional Dimension	245
8.0 Introduction.....	245
8.1 A brief review of institutional sustainability dynamics.....	246
8.1.1 Pre-requisite framework for private sector participation	246
8.1.2 Key contract specifications	248

8.2 Pre-requisites framework	252
8.2.1 Appropriate regulatory and policy framework.....	252
8.2.2 Local government capacity	253
8.2.3 Private sector capacity	254
8.2.4 Political commitment and support	255
8.2.5 Stakeholder support	255
8.2.6 Technical and fiscal clarity	257
8. 3 Key contract specifications	259
8.3.1 Risk allocation	259
8.3.2 Dispute resolution procedures	263
8.3.3 Sustainable waste management components in contract agreement	265
8.3.4 Timeframe of operations.....	265
8.3.5 Contract amendment provisions	266
8.3.6 Performance requirements for waste system elements	266
8.3.7 Review and monitoring mechanism.....	267
8.3.8 Inclusion of key stakeholders	268
8.3.9 Provision for appropriate labour welfare	269
8.3.10 Service disruption and termination modalities.....	270
8.3.11 Fiscal and tariff modalities	272
8.4 Inter-organisational relationships	273
8.4.1 Agency theory; the principal and agent’s impasse.....	274
8.4.2 Information asymmetry.....	275
8.4.3 Transaction costs theory	276
8.4.4 Mutual institutional capacity building and knowledge transfer	277
8.5 Inferences and conclusions.....	278
PART C Conclusions.....	284
Chapter IX Findings, Reflections and Recommendations.....	285
9.0 Introduction.....	285
9.1 An analytical summary of findings	286
9.1.1 Social sustainability dimension	287
9.1.2 Economic sustainability dimension	288
9.1.3 Environmental sustainability dimension.....	290
9.1.4 Institutional sustainability dimension	291
9.2 Contribution of the research.....	292
9.3 Critical reflections.....	295
9.4 Propositions for future research	297
9.5 Recommendations for progression towards MSW sustainability	300
9.5.1 Enhancing social sustainability.....	301
9.5.2 Enhancing economic sustainability.....	302
9.5.3 Enhancing environmental sustainability	303
9.5.4 Enhancing institutional sustainability	304
9.6 Conclusions	308
References.....	310

Appendix I Supplementary Figures and Tables	328
Appendix II Interview Protocols and Survey Instruments	343
Appendix III Research Ethics Documentation	370

List of Figures

Figure 1 Urbanisation trends in India, 1971-2021	22
Figure 2 India's growth of municipal solid waste, 1947-2030.....	23
Figure 3 India's privatisation and municipal solid waste trajectory.....	24
Figure 4 Methodological framework of research	35
Figure 5 Key literature review domains	37
Figure 6 The waste hierarchy according to the European Union Directive	47
Figure 7 Integrated sustainable waste management (ISWM)	49
Figure 8 The ISWM framework by UNEP.....	51
Figure 9 The sustainability prism	74
Figure 10 Specific research procedure	95
Figure 11 The research philosophical continuum.....	100
Figure 12 Methods employed for data collection	108
Figure 13 Data analysis spiral	117
Figure 14 Amritsar, a spatial visage (1849, 1947).....	123
Figure 15 Amritsar landuse, 2012	124
Figure 16 MSW storage infrastructure in the city	133
Figure 17 Bhagatanwala landfill and adjoining area	135
Figure 18 Institutional governance structure, Punjab	142
Figure 19 Institutional structure for private sector participation in MSW management	143
Figure 20 MSW privatisation stimulants	143
Figure 21 Distribution of city wards between AMC and Antony Waste Handling Cell Private Limited.....	146
Figure 22 Informal waste management pyramid	153
Figure 23 Policy towards informal waste management sector	157
Figure 24 Human resources, AMC and Antony Waste Handling Cell Private Limited	163
Figure 25 Status of social sustainability post-privatisation of MSW.....	177
Figure 26 Total cost per tonne per day, AMC and PC (2008-2012).....	190
Figure 27 Comparative labour costs, AMC and PC (2008-2012)	197
Figure 28 Worker/tonne, AMC and PC (2008-2012).....	197
Figure 29 Waste clearance per worker, AMC and PC (2008-2012).....	198
Figure 30 Vehicle costs per day per tonne.....	201
Figure 31 Dumping conditions at the landfill site	203
Figure 32 MSW tonnes per vehicle per day	203
Figure 33 Status of economic sustainability.....	209
Figure 34 Technological options for MSW treatment	216
Figure 35 Overflowing waste bin and illegal dumping by private company	229
Figure 36 Comparison of GHG emissions.....	232
Figure 37 Comparison of energy savings	232
Figure 38 Weighbridge surrounded by a sea of garbage and location adjacent to residential area	234
Figure 39 Status of environmental sustainability post-privatisation of MSW.....	242
Figure 40 Penalty types and counts over the operational lifespan of privatised operations	268
Figure 41 Status of institutional sustainability	280
Figure 42 Conceptual framework for MSW management.....	307
Figure 43 The sustainability triangle	328

List of Tables

Table 1 Prominent key words for literature search.....	38
Table 2 Classes of waste.....	40
Table 3 The waste management hierarchy.....	45
Table 4 Definitional understandings of privatisation.....	55
Table 5 Private sector participation forms in MSW activities.....	66
Table 6 MSW performance benchmarks.....	82
Table 7 Sustainability dimensions, criteria and sources.....	89
Table 8 Sustainability assessment framework for assessing private sector participation in MSW management.....	96
Table 9 Schedule of interviews.....	114
Table 10 MSW generation trends (2001-2015).....	127
Table 11 MSW generation based on land use.....	128
Table 12 Physio-chemical analysis of MSW.....	129
Table 13 MSW collection and transportation infrastructure.....	130
Table 14 Household bricolage and waste segregation practices.....	131
Table 15 Post-partition (1947) landfills.....	134
Table 16 Waste recycling by informal sector.....	136
Table 17 Household perspectives of MSW in the city.....	137
Table 18 Waste picker modus operandi.....	154
Table 19 Benefits from informal waste management sector.....	155
Table 20 Pre- and post-privatisation scenario.....	159
Table 21 Income loss incurred post-privatisation.....	160
Table 22 Minimum wages (in Rupees) ^a for Punjab State (2009-2012).....	163
Table 23 Household access to privatised waste service.....	173
Table 24 Household participation in MSW management post-privatisation.....	175
Table 25 Scale of social sustainability.....	176
Table 26 Factors impacting MSW management costs ^a	182
Table 27 Factors impacting vehicle productivity in MSW.....	186
Table 28 Optimal trip rates.....	187
Table 29 Cost of MSW tonne/day to AMC and PC (2008-2012).....	189
Table 30 Allocative efficiency (%), AMC and PC (2008-2012).....	192
Table 31 Comparative labour costs ^a , adequacy and waste clearance per worker (2008-2012).....	196
Table 32 Total comparative vehicle costs ^a and MSW tonnes per vehicle (2008-2012).....	200
Table 33 Vehicle adequacy as per norms.....	204
Table 34 Vehicle trip rate.....	206
Table 35 Out of order vehicles of private company as on 24 July 2012.....	207
Table 36 Scale of economic sustainability.....	208
Table 37 Compliance criteria and benchmarks for MSW system elements.....	214
Table 38 Household attitude towards waste generation post-privatisation.....	220
Table 39 Primary and secondary storage and segregation practices in the privatisation milieu.....	222
Table 40 Storage infrastructure norms and provisions.....	224
Table 41 Coverage and collection efficiency.....	226
Table 42 Schedule of penalties.....	229
Table 43 Proposed treatment methodology.....	231
Table 44 Estimation of derived product from MSW components.....	232
Table 45 Landfill compliance conditions, pre- and post-privatisation.....	236
Table 46 Health impacts from the landfill.....	239

<i>Table 47 Scale of environmental sustainability</i>	241
<i>Table 48 Risks in a MSW collection and transportation project</i>	249
<i>Table 49 Financial breakup for privatised MSW management project</i>	257
<i>Table 50 Proposed user charges</i>	258
<i>Table 51 Theoretical contractual requirements and their compliance in contract design in the case study</i> ..	259
<i>Table 52 Risk accumulation factors and impacts</i>	261
<i>Table 53 Default actions by AMC and private company</i>	263
<i>Table 54 Privatised waste system elements and its operational status</i>	267
<i>Table 55 Demands of the employees of private company</i>	270
<i>Table 56 Contractual default components and status, AMC and PC</i>	271
<i>Table 57 Scale of institutional sustainability</i>	279
<i>Table 58 Labour laws</i>	329
<i>Table 59 Public health risks associated with MSW management plant components</i>	330
<i>Table 60 GHG emissions from traditional and proposed MSW treatment</i>	331
<i>Table 61 Energy savings from traditional and proposed treatment/disposal approach</i>	332
<i>Table 62 Comparative analysis of MSW technologies</i>	333
<i>Table 63 Landfill specifications (MSW Rules, 2000)</i>	334
<i>Table 64 Monetary units</i>	335
<i>Table 65 Depreciation of vehicles, AMC and PC (in rupees)</i>	336
<i>Table 66 Comparative vehicle operating costs^a (energy) (in rupees)</i>	337
<i>Table 67 Vehicle operation costs (repair and maintenance) (in rupees)</i>	338
<i>Table 68 Comparative vehicle capacity and tonnage</i>	339
<i>Table 69 Comparative equipment number, depreciation and maintenance cost (in rupees)</i>	340
<i>Table 70 Schedule of payments by AMC to PC (2009-2012) (in rupees)</i>	341
<i>Table 71 Summary of costs to private company</i>	342

List of Abbreviations

ADB	Asian Development Bank
AMC	Amritsar Municipal Corporation
AU\$	Australian Dollar
BOO	Build Own Operate
BOOT	Build Own Operate Transfer
BPL	Below Poverty Line
BTU	British Thermal Unit
C:N	Carbon Nitrogen Ratio
CAA	Constitutional Amendment Act
CAGI	Comptroller and Auditor General of India
CBD	Central Business District
CBO	Community Building Organization
CH ₄	Methane
CITU	Constitution of the Centre of Indian Trade Unions
CO ₂	Carbon dioxide
CPCB	Central Pollution Control Board
CPHEEO	Central Public Health and Environmental Engineering Organization
Cu.m	Cubic metres
CWP	Civil Writ Petition
DBOO	Design Build Own Operate
DBOT	Design Build Operate Transfer
DPR	Detailed Project Report
EPF	Employees Provident Fund
ESI	Employees State Insurance

EWS	Economically Weaker Section
FIR	First Hand Report
GAIA	Global Anti-Incinerator Alliance
GDP	Gross Domestic Product
GHG	Green House Gas
GOI	Government of India
GTZ	German Technical Cooperation Agency
HDPE	High Density Polyethylene
HIG	High Income Groups
II&FS	Infrastructure Leasing and Financial Services
ISSWM	Integrated Sustainable Solid Waste Management
ISWA	International Solid Waste Association
ISWM	Integrated Solid Waste Management
IWM	Integrated Waste Management
JBIC	Japan Bank of International Cooperation
JCB	JC Bamford
JNNURM	Jawaharlal Nehru National Urban Renewal Mission
Kcal	Kilocalorie
Kg	Kilograms
LIG	Lower Income Groups
LDPE	Low Density Polyethylene
M/S	Messieurs
MIG	Middle Income Groups
MoEF	Ministry of Environment and Forests
MoF	Ministry of Finance
MoU	Memorandum of Understanding

MoUD	Ministry of Urban Development
MSC	Mohalla Sudhar Committee
MSW	Municipal Solid Waste
MSWM	Municipal Solid Waste Management
MTCO ₂ E	Metric Tonnes of Carbon Dioxide Equivalent
N ₂ O	Nitrous Oxide
NGO	Non-Governmental Organisation
NHRC	National Human Rights Commission
NIMBY	Not in My Backyard
NIUA	National Institute of Urban Affairs
n.d	No date
n.p	No page number
PC	Private Company
PCC	Pollution Control Committee
PET	Polyethylene Terephthalate
PIDB	Punjab Infrastructure Development Board
PMIDC	Punjab Municipal Infrastructure Development Company
POM	Post-Monsoon
PPCB	Punjab Pollution Control Board
PPP	Public Private Partnership
PRM	Pre-Monsoon
PSHRC	Punjab State Human Rights Commission
PSP	Private Sector Participation
PUDA	Punjab Urban Development Authority
PWSSB	Punjab Water Supply and Sewerage Board
RDF	Refuse Derived Fuel

RFQ	Request for Qualification
RFP	Request for Proposal
Rs	Rupees
RTI	Right to Information
SDG	Sustainability Development Goals
SUDA	State Urban Development Authority
TPD	Tonnes Per Day
ULB	Urban Local Body
UNEP	United Nations Environment Programme
UNESCAP	United Nations Economic and Social Commission for Asia and the Pacific
UN-Habitat	United Nations Human Settlement Programme
UNCSD	United Nations Conference on Sustainable Development
VIP	Very Important Person
WTE	Waste to Energy
WCED	World Commission on Environment and Development
WEIGO	Women in Informal Employment Globalising and Organising

PART A

RESEARCH PROBLEM AND BACKGROUND

Sometimes, questions are more important than the answers

(Nancy Willard)

Chapter I

Introduction

“There is nothing more personal and local and nothing more inadvertently global than an individual’s garbage”

(Royte, 2005, p.294)

1.0 The research setting

Coming events cast their shadows before and this adage well applies to the global trends of urbanisation, having witnessed an unprecedented increase over the last five decades. The proportion of urban population is expected to rise from the current figure of 50.5 percent to 67 percent by 2050 and what is more alarming is that almost all of the expected growth in world population will be concentrated in the urban areas of developing countries, whose population is projected to increase from 2.7 billion in 2011 to 5.1 billion in 2050 (United Nations, 2012, p.3). Unrelenting urbanisation accompanied by persistent globalisation is posing grim challenges in the provision of infrastructure services in the cities of the developing world.

Under the neo-liberal economic paradigms, the push towards privatization in developing countries was exerted primarily through aid institutions such as the World Bank and International Monetary Fund ¹(Jamali, 2004; Post & Obirih-OPAREH, 2003; Kessler & Alexander, 2005; Batley 2001; Walsh, 1995). Privatization came to be seen as an effective policy to address their goals and thus the interest of aid institutions in helping developing countries to support public sector reforms in favour of privatization of public services (Shirley, 1992, p.60). Throughout the 1990s, service privatization became the key pillar of the World Bank’s approach to development with the Bank directing the governments to limit their role in infrastructure and service delivery to regulation (Bayliss & Kessler, 2006, p.8). As such, privatization has moved on to become a prominent policy discourse in context of developing countries and the emphasis continues to be on institutional, financial and regulatory reforms to enable the private sector to play a major role in urban infrastructure development and provision. The ideology has acquired deep roots and the

¹ Privatization was advocated as an essential component of structural adjustment programmes in response to the public debt crisis in the developing countries and also made a condition for renewed lending (Kessler & Alexander, 2005, p. 253, Batley, 2001, p.359).

privatisation mantra has since been taken as a panacea for all the failings and under performance of the public sector, primarily in areas of infrastructure development and service delivery. The neo-classical economic theory and the theories of state failure have also advocated competitive market mechanisms, essentially on grounds of efficiency (Batley, 2001).

One of the services that received scant attention until recently in the context of the developing countries has been the management of municipal solid waste. While the provision of basic services, i.e. water and sanitation, has figured high on the priority list of municipalities, solid waste management has emerged as a grim environmental and public health issue requiring urgent attention only in the last decade or so. The unprecedented increase in solid waste generation and its poor management has emerged as a major environmental problem in developing world cities, forcing the public sector institutions to allocate higher priority to its effective management. According to UN-Habitat (2009, p.9), the current global estimate of municipal solid waste generation is 2 billion tonnes annually and, given the rise in per capita waste generation, by 2025, the figure is expected to reach 7 billion tonnes. The International Solid Waste Association (ISWA, 2012) estimates that the total municipal solid waste produced annually is between 1.6 to 2 billion tonnes, out of the total waste streams (municipal, industrial and hazardous) amounting to 4 billion tonnes, thus constituting a major share of 50 percent of the total.

While the public sector has been at the forefront of managing a city's waste till recent times, the shift towards private sector participation in municipal solid waste management is seen as an outcome of the globalisation policies and the inability of the public sector to tackle the issue effectively on its own (Zhu et al., 2008; UN-Habitat, 2009; MoUD, 2010; Cointreau-Levine, 1995; Cointreau-Levine, 2000). Thus, the role change of the state from service provider to service facilitator within the framework of globalisation processes has seen the emergence of private players on the scene. Institutional arrangements and mechanisms are thereby being put in place to facilitate the development of such arrangements to enable private stakeholders to participate in solid waste management processes.

1.1 Private sector participation in municipal solid waste management

Private sector participation in developing countries has been introduced as the preferred form of engagement to improve performance by employing innovative operations and maintenance methods, reducing and stabilizing costs of service provision, improving environmental protection by ensuring compliance with environmental requirements, increasing competition and reducing the state's budgetary deficits and limitations by opening conduits of private capital for investment in infrastructure sectors (Millar, 2000 and Savas, 2000 cited in Jamali, 2004, p.417).

Municipal Solid Waste (MSW) is no different from other service delivery sectors like water, electricity and sanitation, where private sector participation involvement has grown significantly over the last two decades in the developing world. Private sector participation in its various forms has been adopted in all spheres of MSW, i.e. collection, transportation, disposal and recovery (Post & Obirih-OPAREH, 2003; Simoes, Cruz & Marques, 2012). This has been despite the rationale of MSW being considered a *public good* (see Chapter II, section 2.4.1) and the concerns of providing public services through the private sector, which is assumed to operate more on the principles of profit than on social welfare. In most of the operational models (Post & Obirih-OPAREH, 2003; Simoes, Cruz & Marques, 2012; Massoud & El-Fadel, 2002; Dohrman & Aiello, 1999; MoUD, 2010), it is the public private partnership (PPP) model that is adopted wherein the state retains a control on the service offered, facilitates the functioning of the private sector and may also share the risks arising from such operations. The logic of private sector participation in MSW services hinges on the hypothesis of it performing more efficiently on all fronts and some empirical research to this effect also seems to support this understanding (Bartone et al., 1991; Ahmed & Ali, 2004; Post & Obirih-OPAREH, 2003; MoUD, 2010). However, there is also evidence to indicate the opposite, mixed or limited results (Simoes, Cruz and Marques, 2012; Dohrman & Aiello, 1999).

1.2 Contextual setting: India

One of the most critical areas of concern in rapidly urbanising India relates to the issue of MSW management in Indian cities. As per Government of India estimates (MoUD, 2010), urban India currently produces about 70 million tonnes of waste annually and this figure is

expected to touch an astounding 370 million tonnes by 2030 (figure 1, figure 2). This is attributed to the globalisation outfalls which have accelerated the per capita consumption and consequently higher rate of waste generation (Gupta, 2004).

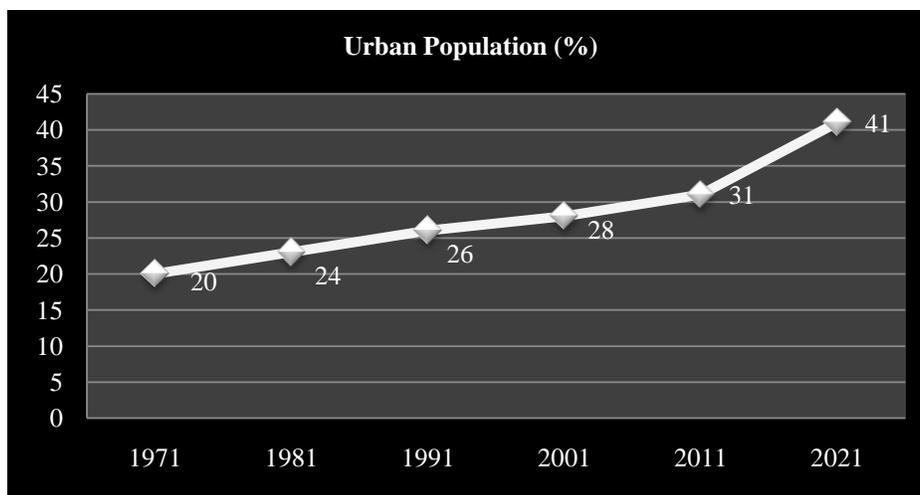


Figure 1 Urbanisation trends in India, 1971-2021

Source: Kundu (2011); GOI (2011)

The current per capita rate of 490 grams MSW generation is expected to reach 945 grams by 2047. The per capita generation is increasing by 1.3 percent per year, with class I cities² accounting for nearly three quarters of the waste generated in urban areas (Technology Review, 2010, p.40). The collection rate of waste ranges between 50-70 percent (Zhu et al., 2008.) Another study (Medina, 2002, p.1) mentions a collection rate of just 50 percent in urban India. Out of this collected waste, only a fraction (7%) is recycled through composting or waste to energy (WTE) measures and the remaining 93 percent, inclusive of the recyclable dry waste, find their way into the dumping sites.

Therein, the waste is rummaged by the informal waste collectors and random recycling activity takes place as an informal sector initiative. More than 90 percent of the solid waste is disposed of indiscriminately in unsanitary and poorly located landfills. If disposal continues at the same rate, it is estimated that by 2047, 1400 square kilometres of land surface would be covered by solid waste disposals (Technology Review, 2010, p.40).

² A Class I city refers to the Census of India classification of Indian settlements with a population of 100,000 or above. The current number of such settlements is 468, of which 53 cities are million plus cities (GOI, 2011, p.3).

Despite the fact that as much as 30-50 percent of the Municipal Corporation budgets in Indian cities are being spent on solid waste management, the state of affairs continues to be unmanageable (Zhu et al., 2008, p.51). Societal and management apathy and poor enforcement of *Municipal Solid Waste (Management and Handling) Rules, 2000*³ have compounded the problems of solid waste management in urban India. Thus the state of MSW in urban India is a challenge to city managers and policy makers alike.

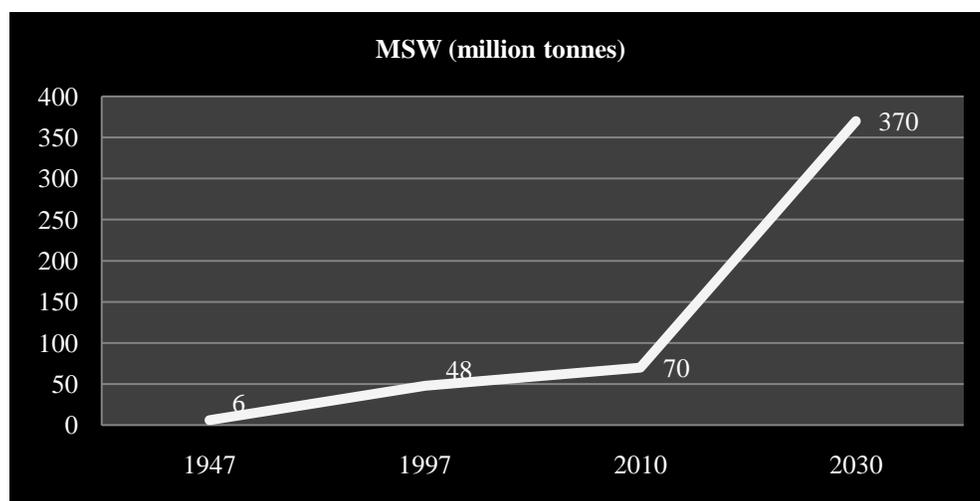


Figure 2 India's growth of municipal solid waste, 1947-2030

Source: computed from CBCB (2000), MoUD (2010)

Coming to the context of city governance and service delivery, India entered the process of economic liberalisation in the early nineties, following which the reform policies radically oriented towards an open market economy. In terms of governance, the first generation of urban reforms initiated by the *74th Constitutional Amendment Act, 1992 (74thCAA)* paved the way for a greater role by the urban local governments through decentralisation of power and functions and also promoted private sector participation and citizen participation in city building. The focus has been to empower the urban local bodies to initiate independent decision making and undertake fiscal generation towards city upgrade physically, socially and economically.

³The *Municipal Solid Waste (Management and Handling) Rules, 2000* (referred to as MSW Rules, 2000) were notified by the Ministry of Environment and Forests (MoEF, 2000) and provide directions to municipalities and other urban local bodies to establish compliance with its provisions listed under four schedules i.e. implementation schedule, management of municipal solid waste, specifications for landfill sites and standards for composting, treated leachates and incineration.

While the policy interventions in the MSW sector by the Government of India can be traced back to the 1960s, focused policy attention actually emerged from the plague epidemic in Surat city in Gujarat which led to the constitution of *The J.L. Bajaj Committee, 1995*. The committee made a wide range of MSW related recommendations, such as segregation of waste at the source, primary collection, levying user charges, use of appropriate equipment and involvement of the private sector in management of solid waste (MoUD, 2010 pp.10-11; Zhu et al., 2008 p.11-12; Dhamija, 2006, p.111-140).

The late 1990s witnessed increasing involvement of the private sector in MSW operations (figure 3). The Burman Committee set up by the Supreme Court of India in 1999 covered a wide range of recommendations on institutional, financial, health and legal aspects pertaining to MSW management with a key recommendation being inclusion of the private sector in MSW service delivery and management. Consequently, private sector involvement in MSW started in the mid-1990s in major metropolitan cities like Chennai and Hyderabad and witnessed further growth by the mid-2000s into waste processing, sanitary landfill development and management and closure of existing dumpsites.

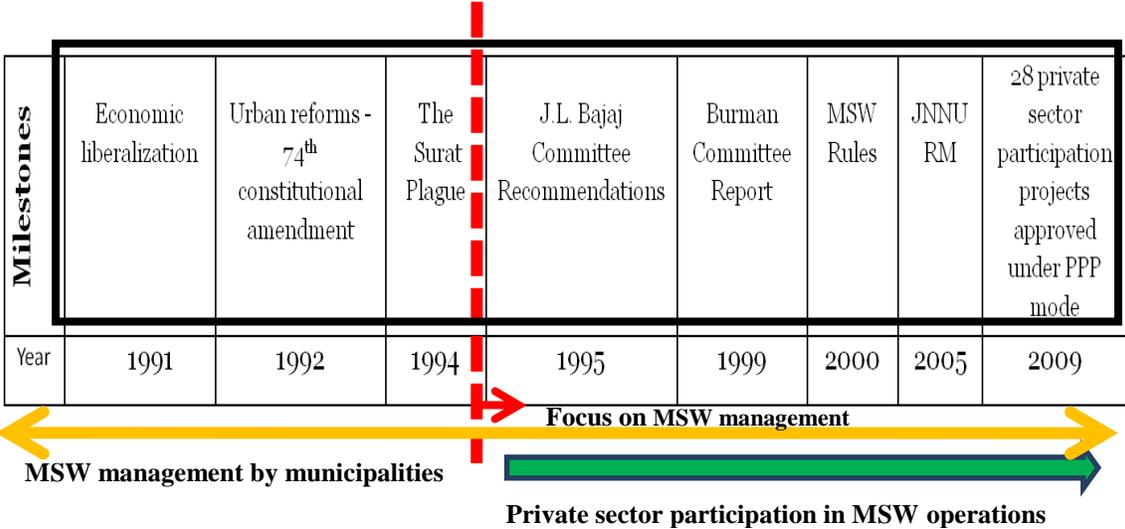


Figure 3 India's privatisation and municipal solid waste trajectory

The late 2000s have seen moves towards integrated MSW management for the entire operation to a single private operator, as in the case of the cities of Hyderabad and Guwahati. The Government of India, in its budget 2002-2003, initiated further reforms to promote private sector participation in urban/municipal infrastructure development (MoUD, 2010, pp.10-11; Zhu et al., 2008, pp.11-12; Dhamija, 2006, pp.111-140). In terms

of service delivery to the burgeoning urban populations and the reforms related to decentralisation of service delivery, the private sector is emerging as the front runner to play a more proactive role in public service delivery.

On the flip side, facilitation of private corporate in service delivery has left the informal unorganised sectors previously engaged in such ventures with a very real threat of displacement and loss of livelihoods. While the formal private sector has emerged on the MSW management scene only in the last decade, the informal private sector has been a major stakeholder, though largely unrecognised and therefore considered illegal. Collection of solid waste by the informal sector is estimated at 15-20 percent and an estimated one million urban poor work in the informal waste management sector (Rousse, 2006, p.1). Despite this, the MSW Rules, 2000 and solid waste management initiatives sideline the informal sector.

However, *The Solid Waste Management (SWM) Rules, 2016*⁴, notified at the time this research was nearing its completion, appear to be more pragmatic by recognising the right of the informal waste sector to access waste. The current study pertains to the MSW Rules, 2000, since the time period to which it subscribes falls within the governance of the same.

In context of the reforms, the second generation of urban reforms, the *Jawaharlal Nehru National Urban Renewal Mission (JNNURM)*⁵ was initiated in December 2005 with the objective of encouraging reforms and the development of identified cities. As such, private sector participation modalities were worked out and projects through Public Private Partnerships (PPP) mode were undertaken in the mission cities across the country, primarily targeting water and sanitation, solid waste management and urban transport projects. In terms of business potential, it is estimated to be Rupees (Rs) 32000 crores

⁴The Draft Municipal Solid Waste Rules, 2013 were released by Ministry of Environment and Forests on 29/8/2013 to the public domain to invite suggestions/objections. However, these were not notified and the change of the National Government in 2014 saw a process of revising the Rules once again to be released to the public for suggestions in August 2015 as The Draft Solid Waste Management Rules, 2015. In May 2016, The Solid Waste Management (SWM) Rules, 2016 were notified and replaced The MSW Rules, 2000 in April, 2016.

⁵The thrust of JNNURM was on building efficiency in infrastructure and service delivery mechanisms, community participation and accountability of urban local bodies and parastatal agencies towards the citizens. In a bid to augment and improve infrastructure, the mission was launched in 2005 by the then National Government in 64 cities with a provision of Rs 50,000 crores (9819.2 million AU\$) over a seven-year period.

(6284.3 million AU\$)⁶ (GOI, 2009, p.14) in MSW management services. As per GOI (2016), fifty-five projects on MSW Management have been approved to date under PPP mode, costing Rs 7590.95 crores (490.7 million AU\$).

The PPP modes in MSW under JNNURM are generally tipping fee based models⁷ with a private equity ranging between 15-30 percent. The Government of India made mandatory provisions for the municipalities to observe compliance with the MSW Rules, 2000, provisions regarding efficient management of MSW. The compliance was to be achieved by 2003 but, other than a few cities, this has not been achieved to date (GOI, 2009, p.29).

In terms of the experiences emerging from private sector operations, research reveals mixed results (MoUD, 2010; GOI, 2009; Post, Broekema & Obirih-OPAREH, 2003) indicating both successes and failures. Some studies (Anderson 2011; Hanrahan, Srivastva & Ramakrishna, 2006; Saxena, Srivastva & Sammadar, 2010) indicate that initial service provision by private sector operators has not been satisfactory, largely due to the inefficient framework of the municipalities, such as the capability to design, supervise and ensure successful private sector participation.

The MoUD (2010) highlights the lacunae in private sector operations to date citing under-developed and unstable privatised structures, inequitable risk allocations and capability, and unwillingness on the part of the local bodies as a major stumbling block that led to system failures. However, in the same breath, it also asserts that there is no rolling back on private operations in MSW management and hence emphasises the need to evaluate both successes and failures with the view of channelling the revelations to build better MSW management practices within the privatisation frameworks. The MoUD (2010), Post, Broekema & Obirih-OPAREH (2003), Athena Infonomics (2012) and Adam et al. (2015) acknowledge the lack of empirical evidence and research into assessing the impacts of private sector participation in MSW management.

⁶As on 23 October 2016, the exchange rate equivalent for Indian currency is; 1 Euro=Indian Rupees 72.84, 1 US Dollar=Indian Rupees 66.92, 1 Australian Dollar= Indian Rupees 50.92.

⁷ The tipping fee models in private sector participation in MSW management are based upon the fees that the municipality pays the private partner for the MSW managed, usually the fee is worked out on a per tonne basis of collection and transportation of the waste by the private partner. The amount is negotiated between the two players, the municipality and the private partner. Most of the privatised operations based upon service contracts are tipping fee based operations (Furniturewala, n.d; MoUD, n.d).

This is supported by Anderson (2011, p.iii) who says that it is quite surprising that this has not been subjected to adequate scrutiny and examination in India, given the significance and concerns associated with MSW privatisation. So while most of the municipalities across Indian cities are turning to the private sector for efficient MSW management, the fact remains that there is still limited literature on the actual experience and implications of private sector participation and their role in MSW management in Indian cities. Moreover, none of these studies have been conducted explicitly in conjunction with the principles of sustainability of MSW systems. The overviews therein pertain largely to the economic angle and service efficiency of the privatised operations in waste management.

Discussing the issues of private sector participation and sustainability research and investigation, Koppenjan & Enserink (2009, p.284) mention that research in sustainability in privatised operations is necessary since “proponents of PSP⁸ often focus on its financial advantage while disregarding the social and environmental aspects of sustainable urban infrastructures.”

1.3 Case study overview

The researcher is motivated to take the case of the city of Amritsar, which is her home town and also an important tourist destination. Located in Punjab State in India, twenty-seven kilometres from the international border with Pakistan, Amritsar is the second largest city in Punjab and plays a multifunctional role, including that of the political capital, being the centre stage of the Sikh religion. Amritsar has risen to be the second metropolis in Punjab with a population of 1,132,761 and areal extent of 14237.2 hectares, and is ranked forty-fourth in the list of fifty-five metropolitan cities of India, as per the Census of India, 2011 (GOI, 2011).

Being the seat of the Sikh religion and owing to the location of the Golden Temple, the city attracts tourists from all over the globe. It has also witnessed a spate of development activities in the last decade, owing largely to the liberalisation measures and a proactive political economic scenario, leading to planning and implementation of a large number of infrastructure, commercial and residential development projects in the city. In terms of MSW, the city currently generates between 650-700 tonnes per day. The overall

⁸In this sentence, PSP as used by the authors is the abbreviated form of private sector participation.

management of the solid waste management service is the responsibility of the Medical Officer of Health of the Amritsar Municipal Corporation (AMC).

1.3.1 Municipal solid waste management prior to private sector participation

The AMC is the relevant urban local body responsible for MSW management in the city but has been found wanting on all fronts when it came to discharging the responsibility efficiently, looking at the piles of accumulated garbage in the city. There was a shortage of storage bins and, therefore, in many places waste was dumped in vacant plots and roadsides. The collection levels were only about 50-60 percent and no provision or effort was made to segregate the waste or recycle it and dispose of the remainder in a scientific manner. Consequently, the city displayed a very poor sanitary condition and this was a negative factor for a holy city known for its tourist attractions.

The Government of Punjab took the initiative to go for private sector participation in MSW management services in the state after the National Government's directives favouring private sector involvement and the need to comply with the MSW Rules, 2000. The initiation of the JNNURM in Amritsar gave further impetus to private sector participation in MSW management in the city.

1.3.2 The shift to private sector participation

The resolution for effective MSW management and its scientific disposal was passed by the AMC on 27 March 2006, following which the AMC initiated the formation of a detailed project report on the MSW operations by hiring a consultant in June 2008. Work to be undertaken in Phase I involved collection, segregation, storage and transportation of waste to the disposal site (NIUA, 2009, pp.1-3). Phase II was related to processing and scientific disposal⁹ by establishing a MSW waste processing unit. Phase I of the programme started in February 2009 in PPP mode with the Antony Waste Handling Cell Private Limited being granted the contract for a period of seven years (effective from February 2009), whereas Phase II was stalled, largely due to disputes. Phase I was initiated under the JNNURM with a total capital cost of Rs 72.49 crores (14.2 million AU\$), with 50 percent coming from the

⁹Setting up a Refuse Derived Fuel (RDF) plant (100 tonnes/day), compost plant (350 tonnes/day), recycling unit (50 tonnes/day) and a sanitary landfill (for the remaining 100 tonnes/day).

Central Government, 20 percent from the Government of Punjab and 30 percent from AMC (Amritsar Tribune, 4 February 2009). The model emerging from this entailed that the private party would manage 41 wards¹⁰ of the total 65 wards of the city, and the remaining 24 wards would be handled by the AMC, including street sweeping activities for the entire city.

The company continued service delivery for three and a half years before it withdrew its operations at the end of July 2012, citing the non-payment of dues by the AMC to a tune of Rs 1.8 crores (0.35 million AU\$) as the primary reason for withdrawal. Prior to the final withdrawal, the company had already stopped work three times on account of non-payment of dues by the AMC. Consequently, after the withdrawal the blame game was rife with both parties accusing the other and leaving the city to suffer due to accumulating garbage. Finally, after nearly a fortnight of withdrawal with no garbage collection, following a high court¹¹ order, the AMC had no option but to deploy its own meagre resources to manage the city garbage and the results are far from satisfactory. Ever since the withdrawal of the private company, the AMC has made continuous attempts to negotiate with other private service providers to contract out MSW service provision again. There is no detailed research study so far that uncovers the context of MSW management in Amritsar city from the angle of private sector operations that could provide useful insights and factors responsible for its success or failure. With this background, the following research questions emerge:

- (i) What was the private sector performance when evaluated from the point of social, economic, environmental and institutional sustainability?
- (ii) What lessons can be drawn from the private sector participation that could serve as a base to incorporate better approaches to MSW management, within or outside the private sector participation mode in the city?

With these questions emanating from the preliminary picture in mind, the researcher sought to establish a research aim and a specific question that this research tries to answer.

¹⁰Wards are the administrative units of the city. Amritsar is divided into 65 administrative wards.

¹¹Refers to the Punjab and Haryana High Court of Justice

1.4 Research aim

Set against a background of serious concerns from inadequate MSW systems on one side and the impetus given to private sector participation in MSW management in Indian cities in recent times and in the case study setting as pointed out above, the study aims to critically examine and generate empirical evidence on the implications of private sector participation in municipal solid waste management through the lens of a comprehensive sustainability assessment framework that is specifically constructed for this purpose. The research seeks to challenge the notion that private sector participation in its current operational structures and environs in Indian cities can lead to sustainability in MSW operations. In the light of the evaluation and evidence emerging from the research, it is attempted to devise a generic framework (within or outside the private sector participation operational framework) that could contribute towards sustainability in MSW in Indian cities. The researcher seeks to address this research aim through the following modus operandi:

- (i) Construct a detailed sustainability assessment framework that is comprehensive and robust enough to be able to generate appropriate evidence towards sustainability of private sector participation in MSW management.
- (ii) Apply the sustainability assessment framework to a single empirical case study with the purpose of analysing key dimensions of sustainability with respect to private sector participation in MSW management in the case study.

1.5 Key research question

Does private sector participation contribute to sustainable municipal solid waste management?

Emanating from the research aim, the key research question seeks to find an answer to the sustainability issues in private sector involvement. As has been indicated earlier in the background, while private sector participation is being promoted almost as a *magic pill* to address the woes of MSW management in Indian cities, as pointed out, there is very meagre research that can provide suitable evidence or in-depth insight to evaluate the actual impacts on the ground. Moreover, sustainability assessment studies in this sphere are

acutely lacking and it is high time that this critical gap is filled by research. The key research question is further supported by a working hypothesis and five sub-questions.

1.5.1 Working hypothesis

Lincoln & Guba (1985, p.124, cited in Brand, n.d, p.8) state that “a working hypothesis is a tentative answer to a research question according to the pre-research state of personal experience, the relevant literature and theoretical reasoning.” The researcher feels that having a working hypothesis serves as a guiding instrument and, in the words of Erlandson et al., (1993, p.60 cited in Brand, n.d, p.8), allows for entry in the hermeneutic process and is continuously updated to reflect the understanding and insight gained during the research phase. In the case of the research question, the researcher assumes the following working hypothesis:

Sustainable municipal solid waste management cannot result from the current private sector participation initiatives that are inadequately structured or implemented from the underpinnings of social, economic, environmental and institutional sustainability in municipal waste management.

1.5.2 Sub-questions and their rationale

The key question gave rise to five sub-questions that needed to be answered in order to support the key research question. The first three sub-questions directed the literature review to strain the relevant information towards exploring the realm of contemporary knowledge in the sphere of MSW and private sector participation in MSW specifically. This information established the base for creating the sustainability assessment frameworks that hold the key to answering the research question. Sub-question four generates insights into the issues of sustainability and its dimensions and sets the base for drawing the sustainability assessment framework applying sustainability dimensions therein. It also investigates the use of criteria/indicators in privatised MSW operations specifically with the purpose of zeroing in on their choice in the constructed frameworks. The fifth sub-question then seeks the application of the sustainability assessment framework to the chosen case study with the purpose of finding the answer to the key question under investigation.

- i. *What are the prevailing understandings and components of the theoretical concepts and debates worldwide regarding sustainable municipal solid waste management?*

This question provided for building a body of relevant theoretical base, laying ground for conceptual clarity of the subject in question. Moreover, the same (the waste hierarchy principle and the ISWM in particular) was used as a base to construct a sustainability assessment framework for application in the case study.

- ii. *What are the prevailing private sector participation debates in their theoretical and empirical settings and what have been their impacts so far?*

The question creates a theoretical backdrop to the subject of private sector participation and gives insights into the assumptions and impacts of its operations cutting across various sectors of development. The same was useful to set a background for private sector participation in MSW operations and aid in developing the sustainability assessment framework to produce evidence in the context of the case study.

- iii. *What are the mechanisms of private sector participation in municipal solid waste management and what are their impacts?*

The question lends a theoretical/empirical backdrop to the subject of private sector participation in MSW and gives insight into the assumptions and impacts of its operations in MSW management. The same was useful in deriving appropriate knowledge and information to use in developing the sustainability assessment framework to produce evidence in the context of the case study.

- iv. *What are the dimensions of sustainability and how can these be holistically addressed through appropriate choice of sustainability assessment criteria and indicators in general and specifically in the case of private sector participation in MSW?*

The sustainability assessment framework demanded an understanding of sustainability and its dimensions. The construction of the sustainability assessment framework took the generic context and dimensions of sustainability into consideration and also derived

specific criteria and indicators from pre-existing frameworks and knowledge on the subject under scrutiny.

- v. *How does the private sector perform when evaluated through the sustainability assessment framework and what factors contribute to the positive or adverse implications of private sector participation in sustainable MSW management?*

This question directly addresses the key research question to apply the sustainability assessment framework to the case study to arrive at judgments about private sector operations in municipal solid waste management and their sustainability implications across environmental, social, economic and institutional dimensions. This question also seeks to unravel the reasons behind the sustainability conditions with the purpose of exposing challenges and opportunities that private sector participation in municipal solid waste management pose.

1.6 Justification of the research

By undertaking this research, a body of data and evidence has been generated that can enable in-depth evaluation of the outcomes of privatised waste management initiatives. The research is of particular relevance to the public sector urban local bodies who initiate private sector participation without sufficient information on the outcomes of such initiatives. The research seeks to provide a direction to the policy and decision makers at various levels to evaluate both the positive and negative impacts and be equipped with a better understanding to initiate or improve upon existing policies and programmes towards sustainable MSW management. As such, the study is relevant from both international and a local perspective.

The research provides a platform to judge the rhetoric and the reality of the private sector participation approach, thereby providing a means for the urban local bodies to introspect more deeply into their setups, as well as devise and apply better forms of pragmatic approaches based on the principles of sustainable solid waste management.

The research is of prime use in the case study city since data and analysis emerging from the context could be used directly by the urban local bodies (ULB), such as the AMC, to improve upon the existing mechanisms of MSW management. Finally, the conceptual

framework in terms of recommendations and suggestions pertaining to improved or other possible approaches can serve as a ground for establishing sound systems of MSW management by the ULBs in Amritsar, other Indian cities and similar contexts globally, towards pursuit of the larger objective of achieving sustainable solid waste management in urban India. In conclusion the research offers substantial knowledge and tripartite contributions namely empirical, methodological and theoretical.

In terms of the *empirical* contributions, the application of the sustainability assessment framework to the case study of private sector participation in MSW management in the case study is a first of its kind of attempt to undertake a comprehensive analysis. In that respect, it adds new knowledge and serves as a significant empirical milestone in the context of private sector participation in MSW management in India. Also, the researcher has not come across any similar comprehensive study in the Indian context and therefore believes that this study has the potential to set a precedent and direction for similar research to advance the knowledge gained herein.

The development of the sustainability assessment framework for private sector participation in MSW, built on a wide platform of literature review based analysis by the researcher, is a substantive *methodological* contribution that offers the key for undertaking critical analysis and sets the ground for its further development and application to studies of a similar nature. The comprehensive sustainability assessment framework pertaining to all four dimensions of sustainability (social, economic, environmental and institutional) can thereby also be seen as one of the major contributions that this research has to offer.

The research also seeks to contribute to *theoretical* knowledge through the development of the sustainability assessment framework that can be remodelled or adopted as it is to suit other research. In addition, the reflexive interface between the sustainability framework and the case study opens scope for the evidence to emerge which provides theoretical insights on private sector participation in MSW management processes and operations.

1.7 Methodological framework of research

The research is structured to follow the methodological framework divided into three sections, as indicated in figure 4, i.e. literature review, data collection and analysis and

results and recommendations. Each one of the sections is further elaborated in conjunction to address the key research question. The research is bound by this methodological framework.

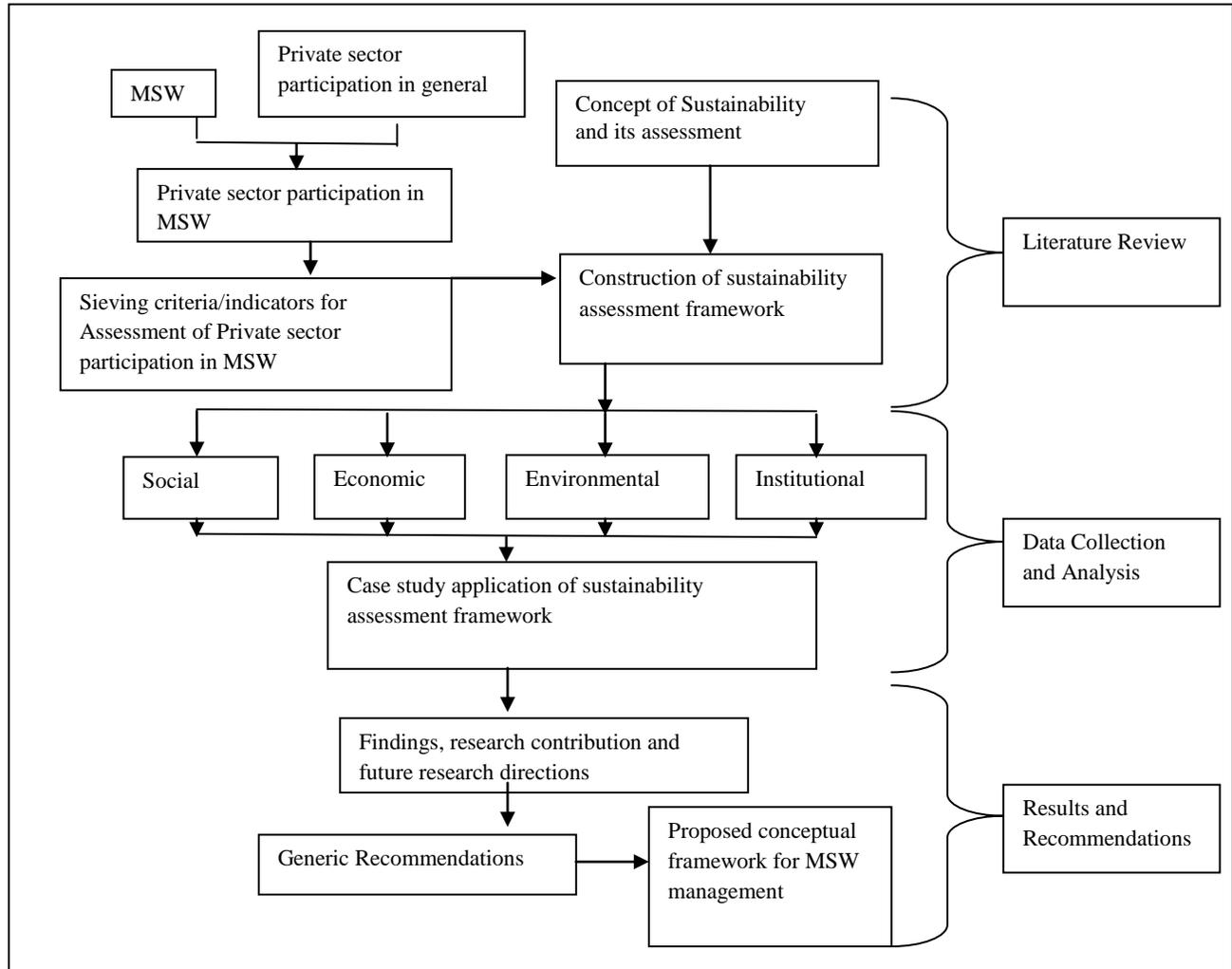


Figure 4 Methodological framework of research

1.8 Conclusion

The introductory chapter has built a background and established the need for the research and also stated the methodological framework underlying the sequencing of the thesis. Continuing the journey as defined by the methodological framework, the following chapter conducts a detailed literature review in sync with the research sub-questions mentioned in this chapter to enable identification of research gaps, clarity of related concepts and, most importantly, construct the sustainability assessment framework on a firm grounding.

Chapter II

Municipal Solid Waste Management: A Literature Review

“Literature always anticipates life. It does not copy it, but moulds it to its purpose.”

(Oscar Wilde, n.d)

2.0 Introduction

Analogous to Oscar Wilde’s statement above, the idea here is to undertake a journey to understand and dissect waste from its multifarious dimensions. This literature review is thus not an end but perhaps the beginning of a journey into the heart of the *waste land*. As such, the literature review for this research draws upon three prime components based on the sub-questions of research: theoretical understandings of MSW, the concept of privatisation and private sector participation in MSW management. After having evolved a concise understanding while sifting through theoretical and empirical literature, the researcher brings in the third and binding component, i.e. the concept of sustainability and its dimensions. The principal question of this research demands that the concept of sustainability be defined and underpinned for its application in constructing the sustainability assessment framework for evaluating the impact of private sector participation in MSW in the context of the case study. With this view, the review therein tries to evolve an understanding of sustainability and its dimensions and enable viable and strong inputs for construction of the sustainability assessment framework. However, prior to venturing into the literature review sojourn, it becomes pertinent to dwell upon the literature review methodology and the same is revealed in the following section.

2.1 Literature review methodology

According to Baumeister & Leary (1997, p.311), literature reviews serve as a scientific pitch by providing a bridge between the vast and scattered collection of material and the reader. In that sense, the literature review must enable a backdrop and a contribution to the research question by unravelling theoretical-empirical assertions and evidences. This serves as a base for construction of a framework to situate the research, while at the same time leading to valid conclusions about specific research directions, outcomes and gaps. In order to be able to meet its purpose, a literature review should be comprehensive, logically

structured and coherent in its presentation (Mongan-Rallis, 2014; Pautasso, 2013, p.1; Petticrew & Roberts, 2006, p.9; Danson & Arshad, 2014, p.37).

Specifically, in the context of this research, the sub-questions established the base for the literature review to take shape while being equally considerate of its desirable characteristics as mentioned. In the interest of “identifying, appraising and synthesizing all relevant studies” (Petticrew & Roberts, 2006, p.9), a systematic-narrative review approach was adopted wherein the *systematic* helped to identify themes and sub-themes, structure and underpin *all there is to know* about the specific research inquiry and thereby provide conceptual, as well as evidence based, information. The *narrative* enabled an exploratory and descriptive synthesis of information and evidence across heterogeneous studies related to the research query.

The literature draws largely from the interface between three areas of knowledge production, as figure 5 indicates, and was guided by framing five sub-questions (Chapter I) in order weave the factual backdrop and prepare a comprehensive analytical framework for the key research question to be answered.



Figure 5 Key literature review domains

Siddaway (n.d, p.2) stresses that search terms or key words “operationalize the research question” and help capture as many potentially relevant articles and other documents as possible. In resonance, use of key words (table 1) and their synonyms across electronic databases; Google Scholar and the Griffith University subscribed databases (ProQuest, Scopus, ISI Web of Knowledge, Web of Science, Geo Base, Science Direct, others) served the purpose of sensitivity (finding as many potential articles as possible). A specificity

analysis by sifting through the titles and abstracts led to narrowing down the search outputs methodically to the most relevant information while also allowing for the creation of themes and sub-themes to scope and structure the literature review.

Table 1 Prominent key words for literature search

Major themes	Key words
Waste Management	Waste, solid waste, municipal solid waste, sustainable solid waste management, integrated solid waste management, contemporary approaches to municipal solid waste management, waste management hierarchy, three/ four Rs, zero waste, polluter pays principle, waste streams, solid waste management technologies, criteria/indicators
Private sector participation	Privatisation, forms of privatisation, public-private partnerships, private sector participation in solid waste management, theory of public goods, private sector participation in infrastructure/ urban service delivery, private sector participation in developing countries, private sector participation in solid waste management in developing countries/India, pre-requisites, assumptions, rationality and failures of private sector participation, impacts of private sector participation in municipal solid waste management, criteria/indicators to evaluate private sector participation, private sector participation in municipal solid waste management, neo-institutionalism theories
Sustainability	Definition and concepts of sustainability, sustainable development, sustainability dimensions, sustainability assessment frameworks/measure, assessment measures for environmental/social/economic/institutional sustainability in municipal solid waste management, sustainability assessment of private sector participation/ in municipal solid waste management

The inclusion criteria were based on the understanding that studies directly or indirectly juxtaposing the three major themes would qualify to be included, as reviewing all such studies would allow an exploration uncovering some attribution of outcomes or indicative evidence. In terms of geographical settings, developing countries were more favourable; studies from other parts of the world were not excluded for the simple reason that they might be able to provide information, for instance, about criteria used to evaluate private sector participation in a generic sense or specifically with regard to municipal solid waste. The literature search was not bound to a particular study design and methodology or to a timeframe, going as far back as necessary if the study threw up relevant information. So as not to miss relevant evidence or information, the search was also extended to grey literature (government documents, newspapers, conference proceedings). The review largely covered English language material; however, local language (Hindi and Punjabi) documents or newspapers were also included.

A critical appraisal and mining of information was done by examining all of the selected literature and extracting relevant information under the pre-defined sub-themes and categories. For instance, all information pertaining to definitions of solid waste went into a

single file record, and so on. Petticrew & Roberts (2006, p.185) argue that best evidence synthesis happens when a reviewer works with whatever evidence is available. Having arranged all relevant information under sub-themes, cross-study analysis and triangulations guided the literature examination to its present embodiment of a structured thematic and interpretive description of information and evidences.

2.2 Municipal solid waste: exploring conjectural perspectives

The first juncture while undertaking the voyage through the wasteland is to sift through the waste pile and understand waste itself, unravelling its mystery. The same helps to put things in perspective and leads to evolving a better understanding of MSW. From the waste heap, the search is to explore the conjectural perspectives of MSW so as to arrive at a suitable and workable definition of MSW. The next sub-section analyses the conventional and unconventional contemporary approaches and sets the base for the case study evaluation, deriving relevant information from the mentioned approaches.

2.2.1 Sifting through the waste pile

“Behind every embassy, court, palace or grand hotel where history, as men record it, is made, in every city in the world, there is a row of battered dustbins.”(Wylie, 1959 cited in O’Brien, 2008, p.11). The visualisation or thought of battered overflowing dustbins can invoke images and transport the mind to the realm of *waste*. Little wonder that globally, nations and organisations are coining appropriate definitions and understandings of the term. For example, the amended Directive 75/442/EEC¹², adopted on 18 March 1991 by the European Union states that, “waste shall mean any substance or object in the categories in Annex I which the holder discards or intends or is required to discard”. Article two of *The Basel Convention, 1989* defines waste as “substances or objects which are disposed or are intended to be disposed or are required to be disposed of by the provisions of national laws”. According to the United Nations (1997, n.d), “wastes are materials that are not prime products (that is products produced for the market) for which the generator has no further use in terms of his/her own purposes of production, transformation or consumption, and of which he/she wants to dispose. The wastes may be generated during the extraction of raw

¹² Annex I, 75/442/ EEC article 1 a deals with the definitional aspects of waste. It seeks to frame a common definition and terminology in order to improve the waste management efficiency in member states.

materials, the processing of raw materials into intermediate and final products, the consumption of final products, and other human activities. Residuals recycled or reused at the place of generation are excluded.”

The above mentioned definitions reflect the international context and underpin the common understanding of waste as discards. However, various researchers are of the view that the term does not have a universal definition and is ambiguous (Pongràcz, 2002; Thompson, 1994; Wilkinson, 2002; UN-Habitat, 2010). In this context, Thompson (1994, p. 201) argues that waste is never unambiguously defined, in fact it always retains a certain social malleability. To this effect, Pongràcz, Phillips & Keiski (n.d. p.2) cite the case of the European Commission, where in a workshop in Leipzig in February 2004, it was highlighted that “using the definitions of waste is a tricky affair when determining when something becomes waste and when it stops being waste”.

Despite Thompson’s (1994) arguments on the subjective dimensions of waste, the fact remains that in order to devise appropriate management paradigms, waste needs to be defined unambiguously. This need and understanding prompts organisations and countries to try to come up with objective definitions of waste based on their notional and contextual requirements. Going a step further, Pongràcz & Pohjola (1997 cited in Pongràcz, Phillips & Keiski, n.d, p.2) assign the following categories to waste (table 2).

Table 2 Classes of waste

Class 1	<i>Non-wanted things created not intended, or not avoided, with no purpose.</i> Into this group belong outputs with negligible market value, non-useful by-products, emissions, processing and process wastes, cleaning wastes, etc.
Class 2	<i>Things that were given a finite purpose, thus destined to become useless after fulfilling it.</i> This is the group of single-use products, most packaging, single-use cameras, disposable diapers, etc.
Class 3	<i>Things with well-defined purpose, but their performance ceased being acceptable due to a flaw in their structure or state.</i> Obsolete outdated products, old furniture, discarded household appliances, non-rechargeable batteries, demolition wastes, etc.
Class 4	<i>Things with a well-defined purpose, and acceptable performance, but their users failed to use them for their intended purpose.</i> Spoiled/degraded products, products used in excess, products that go beyond their target, or simply products that the owners do not wish to own anymore. They could be perfectly useful, they are waste solely due to the owner’s wrongful action, and often are non-retrievable. This class embodies the essence of wastefulness.

Source: Pongràcz & Pohjola (1997 cited in Pongràcz, Phillips & Keiski, n.d, p.2).

Using the taxonomy therein, Pongràcz, Philips and Pojhola assert that it is possible to clarify and categorise waste and frame appropriate management paradigms geographically and temporally.

Examples from different countries can also be quoted to examine the geographical context of waste. For example, the German Waste Act (1972) defined waste, as “portable objects that have been abandoned by their owner(s)” or “requiring orderly disposal to protect the public welfare” (Bilitewski et al., 1997, cited in Seadon, 2006, p.1327). Seadon (2006, p.1328) cites the definition from New Zealand Waste Strategy, 2002, as more concise and encompassing. It defines waste as “any material, solid, liquid or gas that is unwanted ‘and / or’ unvalued, and discarded or discharged by its owner”.

The discussion above has focused on the context of waste and tried to dissect its various underpinnings while trying to reach an understanding of the concept. Based on the definitions, it may be concluded that organisations and countries define waste according to their needs or rather notions or bias emanating from the political or economic dimensions. For example, the bias on public welfare and therefore the need for stringent waste management is noted in the German Waste Act (1972). Waste is also highly temporal and personal, based upon the prevailing times as well as individualistic requirements and perceptions therein. The waste of one may easily be a want of another. Therefore, arriving at a universal concise taxonomy of waste really seems neither possible nor, perhaps, desirable. It has to be understood in the contextual and temporal setting. However, the understanding that emerges clearly from the discussion is that cutting across geographical, social or temporal lines, waste is understood as a discard, something that has lost its utility value and, by that understanding, it should be confined to its final resting place.

Waste as it emerges from the literature can be further split into different parts, depending upon the specific material characteristic of the waste streams. According to UN-Habitat (2010), the major waste streams are municipal wastes, industrial wastes, agricultural wastes, mining and quarrying wastes and energy generation wastes, which can be categorised further based on the generation sources and characteristics of waste generated. The United Nations Economic and Social Commission for Asia and the Pacific (UNESCAP, 2000) divides waste streams into four types, i.e. municipal solid waste,

agricultural waste, industrial waste and hazardous waste. Among its various components, the one that is now occupying the centre stage in global debates on sustainable environmental management is *municipal solid waste*.

MSW makes up the largest part of waste generated compared to other waste streams (Dorvil, 2007, p.32). As such, national and international organisations have attempted to coin appropriate definitions of MSW. MSW as defined in *Agenda 21* includes “all domestic refuse and non-hazardous wastes, such as commercial and institutional wastes, street sweeping and construction debris and waste from domestic and traditional industry. In some countries, it is noted that the MSW management systems also handle human wastes such as night-soil, ashes from incinerators, septic tank sludge, and sludge from sewerage treatment plants” (United Nations, 2012, p.97). According to the UN-Habitat (2010, p.8), MSW comprises household, commercial, institutional and street wastes. Small quantities of construction and demolition debris are often generated by refurbishment or small alterations in houses and these wastes are often mixed with household wastes.

In practice, specific definitions vary from place to place. According to Barata (2002, p.118), “MSW includes household waste (i.e. waste originated from domestic households) and other similar substances collected by or on behalf of a ‘waste collection authority’ (usually a municipality)”. Barata underpins the complexity of the definition which aspires to encompass three separate concepts, i.e. waste source, waste type and waste collection. It is this complexity that results in inconsistent and contextual applications of the term, making it difficult to universalise it, and therefore the concept and coverage of MSW must be understood in the localised context.

Another relevant definition is given by Medina, (2002, p.3) in the context of developing countries, wherein MSW refers to materials discarded in urban areas for which municipalities are usually responsible for collection, transportation and final disposal. This waste encompasses household refuse, institutional waste, street sweeping, commercial wastes and construction and demolition debris. In developing countries this also includes varying amounts of industrial wastes, as well as dead animals and faecal matter.

In a national context, it may be most pertinent to mention the definition used in India, since the empirical study shall be governed by this definition. According to The MSW Rules,

2000 (MoEF, 2000), MSW includes commercial and residential wastes generated in municipal or notified areas in either solid or semi-solid form, excluding industrial hazardous wastes but including treated bio-medical wastes.

There appears to be a diverse and mixed understanding of MSW from the international perspective and the contextual setting itself. The definition given by international organisations such as the UN-Habitat widen the coverage to include wastes emerging from commercial and industrial sectors but of non-hazardous nature and may also include some components of the bio-medical waste. However, what needs to be considered is that this definition is coined to subscribe to the case of developing countries and therefore includes mixed streams of waste since in developing countries most waste streams are difficult to segregate and may find their way into the municipal jurisdictions. The Indian context is more in tune with the international definition and widens to include commercial waste and treated bio-medical waste.

2.2.2 Contemporary approaches to municipal solid waste management

Making a comparative analysis of the MSW regimes¹³ in five countries (France, Germany, Greece, Italy and Netherlands) over the last century, Hafkamp (2002, p.11) observes that the conventional principles of MSW management were built on the key value of public health, primarily where waste was unravelled as a crucial actor in spreading contagious diseases. Therefore, waste has to be removed as a preventive measure. The conventional principle marking the old regime comprises the collection of waste by the municipality and its disposal, usually in a landfill or dumps. In addition, composting and incineration are also practiced.

The new regime set on the articulations of environmental activists is based on the key value of responsible management of natural resources while also giving, side by side, due consideration to the previous value of public health. Recognising grave environmental threats, such as resource depletion, land filling and incineration, as major risks from the

¹³ Regimes refer to the time period of the dominance of the given municipal solid waste management systems and procedures at that point of time. Old or conventional regime pertains to the second half of the 19th century till the 1970s and the new regime refers to the period beyond that, including the contemporary. A regime is a "collective agreement tacit or explicit which allows the agents to co-ordinate their activities" (Boyer & Orlean, 1994 cited in Hafkamp, 2002, p.8).

conventional regimes, the new regime emphasises solid waste management models such as *The Waste Management Hierarchy* (also known as the prevention ladder, waste pyramid, inverted waste pyramid) based on the *closed loop*¹⁴ principles where waste dumping is minimised and landfill diversion takes place, instead of indiscriminate dumping. The new regime also adopts the measure of holding the waste producers accountable for their waste through principles such as the *Polluter Pays Principle*, *Extended Producer Responsibility* and *Product Stewardship* (Hafkamp, 2002, p.14). The introduction of such principles is a radical departure from the producers' and consumers' absolute rights to throw away any amount of waste and instead brings in regulatory measures to fix responsibilities on those who pollute, generate a lot of waste or a type of waste.

While the conventional regime operates on a localised geographic scale, the scale in the new regime is not necessarily local and could extend beyond a city or a country (Hafkamp, 2002, p. 14-15). In terms of disposal methods, both landfill and incineration continue to be used, but since the emphasis has shifted onto waste prevention, at-source reduction strategies and technologies, such as eco-design, industrial ecology, supply chain management and other closed pipe technologies and measures that could create as much landfill diversion as possible, are being designed (Hafkamp, 2002, p.15).

Institutionally, the municipality continues to be the key actor, albeit in a diversified role of setting an appropriate framework for waste reduction, such as setting and enforcing standards for heterogeneous streams of waste into landfill, enforcing waste to energy recovery and setting up taxation, such as landfill tax, etc. and its management and the role of engaging and managing other actors such as the private sector in MSW management services.

In developed countries, the principles of the new regime are gradually but surely becoming a reality, whereas in developing countries, most of the waste management activities largely resemble the methodology of the conventional regime with some departures wherein the

¹⁴ The closed loop or the closed pipe principle implies that the discards are eliminated through adoption of measures of reduction, reuse, recycling and only material in the state of similar properties as the environment is returned back in that form. For example, inert material with soil-like properties, materials with nutrient value that is suitable for cultivation is returned to the earth, air-like gases to the air and water to water (Hafkamp, 2002, p.14).

waste management hierarchy approach has become popular in theory, but its application continues to remain elusive. The application remains hard to implement due to the conditions prevailing on the ground wherein the frameworks for applications do not exist or are not appropriately developed. In spite of this, the approach has gained wide acceptance wherein the Indian MSW Rules, 2000, are also founded on this concept.

Wilson (2007, p.205) states that all the developed countries have evolved their current waste management systems in a series of stages. In fact, the developing countries are largely looking towards their developed counterparts in the search for optimal responses to waste management. In this context it becomes necessary to run a discourse on understanding the MSW management approaches and concepts to determine potential interventions that can underpin the sustainability assessment framework for application in the case study.

2.2.2.1 The waste management hierarchy

The waste management hierarchy (table 3) was first introduced in 1977 in the European Union’s Second Environmental Action Programme, which stressed moving away from ruthless waste disposal practices towards the concept of resource management (Wilson, 2007, p.200). The resource value of waste is the driver of the waste management hierarchy embedded in the environmentalist agenda of the 1970s.

Table 3 The waste management hierarchy

Goal	Attribute	Methodology	
Reduce	Preventive	Using less material in design and manufacture. Designing and keeping products for longer use and reuse. Using less hazardous materials	
Reuse	Predominantly ameliorative and part preventive	Checking, cleaning, repairing, refurbishing, the products to facilitate their reuse either for the same or alternative purposes.	
Recycle and Recover	Predominantly ameliorative and partially preventive	Turning waste into a new substance or product such as composting, anaerobic digestion, incineration with energy recovery, gasification and pyrolysis which produce energy (fuels, heat and power)	
Disposal	Assimilative	Landfill and incineration without energy recovery	
			Most Preferred Least Preferred

Source: Constructed from Department of Environment, Food & Rural Affairs (2013, n.d) and Gertsakis & Lewis (2003, p.7)

The waste management hierarchy was fuelled largely by the environmental debates and formation of strong environmental lobbies that criticised, amongst other things, the dominance of the *end of the pipe* disposal approach in MSW management (Gertsaki and Lewis, 2003, cited in Davies, 2008, p. 11).

Four decades on, the approach has been demonstrated to be the most widely adopted, particularly in the developed nations, for serving as a model for developing the strategies for managing MSW (Barata, 2002, p.122). The *Three R's Principle* is at the heart of the waste management hierarchy approach with waste reduction at the source being at the apex of the hierarchy and the most favourable option (Wilkinson, 2002; Barata, 2002). The first R, *Reduce* focuses on waste avoidance and its minimisation. Following the reduce option is the second R; *Reuse*, essentially implying that when reduction is not practicable, the reuse of products and materials should be explored. Reuse involves diverting products from the waste stream by bringing them into alternative uses.

The third R stands for *Recycling* the waste through processes such as composting and recycling plastics, glass and tin to produce new usable products and recovering all energy from waste by incineration, gasification, anaerobic digestion or other processes (Barata, 2002; Davis, 2008; Wilkinson, 2002). The disposal forms the bottom rung of the waste management hierarchy and indicates the least favoured method. The hierarchy, usually arranged in a hierarchical or pyramidal depiction, moves from the most preferred option to the least desirable options i.e. disposal (figure 6).

The waste management hierarchy approach continues to be a populist intervention adopted with some modification by countries and institutions across the globe, as in the case of the European Union Waste framework directive (ISWA, 2013, p.6). However, this approach is not without its share of criticism. According to Schall (1993, cited in Davis, 2008, p. 12), waste management hierarchy assumes a linear progression outlook which might not be applicable in some situations simply because of the nature of the waste stream or the cost factor. For example, it might be economically more viable to dispose of a product than to recycle or recover energy from it.

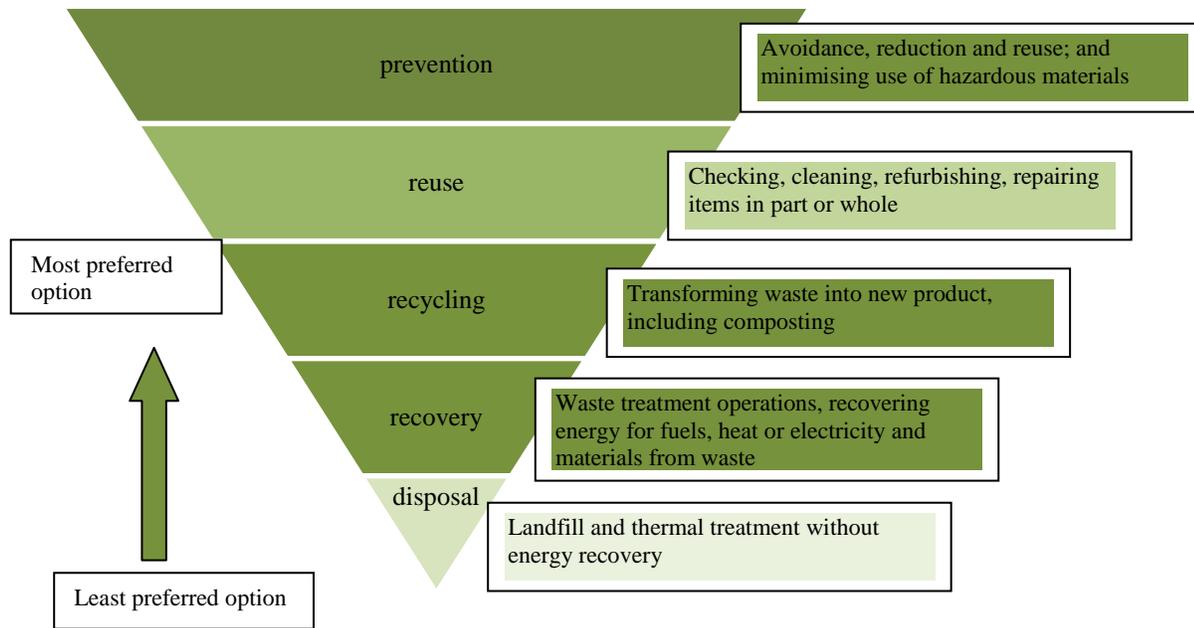


Figure 6 The waste hierarchy according to the European Union Directive (ISWA, 2013, p.6)

2.2.2.2 The zero waste concept

Moving a step ahead of the waste management hierarchy approach but grounded in the same principles of resource valuation, the zero waste (as defined by Zero Waste, International Alliance, 2004, p.1), is a “goal that is ethical, economically efficient and visionary to guide people to change their life styles and practices to emulate sustainable natural cycles, where all discarded materials are designed to become resources for others to use.” The zero waste approach is about mitigating the use of incinerations, landfills and essentially about closing the waste loop without creating any discard (Connett, n.d, p. 1, Davis, 2008, p. 5). The zero waste concept also calls for all waste to be refined as resource waiting to be managed and advocates of zero waste articulate sentiments such as replacing negative terminological connotations of waste management with *Resource Stewardship* (Davis, 2008, p.14). The zero waste concept gained wider ground from 1998 to 2002 and advocates advanced zero waste as a societal goal to propel the waste management agencies to eliminate the need for landfills altogether (Navia & Ross, 2009, p. 407). While the concept is novel and captures the imagination, its attainment continues to be a subject of debate (Connett, n.d; Navia & Ross, 2009; Davis, 2008).

Concepts such as the polluter pays principle, product stewardship and extended producer's responsibility have been constructed on the foundations of the waste management hierarchy and the zero waste concept. However, zero waste, as the critics (Navia & Ross, 2009, p.408) argue, is realistically not completely achievable based on the same arguments as mentioned for the waste management hierarchy.

2.2.2.3 Integrated sustainable waste management

The Integrated Sustainable Waste Management (ISWM), also referred to as Integrated Waste Management (IWM) and Integrated Sustainable Solid Waste Management (ISSWM), is attributed to the organisation *Waste* in the Netherlands, which developed this approach in 1995, primarily to arrive at more sustainable solutions to MSW management in the context of developing countries. The approach is based on the recognition of the inter-relationship of multiple factors in waste management wherein both the technical and non-technical aspects are considered together towards effective waste management (Davies, 2008). According to Barata (2002, p.122), the integrated approach should take into account the economic, social, environmental and institutional dimensions of waste management.

The economic aspects comprise the costs and benefits of implementation and the availability of municipal budgets. The environmental dimension consists of assessment of the risk associated with waste management (such as risk of epidemics, groundwater, air pollution, global warming and resource depletion). The social aspects include employment, health impacts and public participation or consent. The institutional dimension pertains to the various stakeholders including public sector, private sector and community (Van Beu Kering et al., 1999, p. 3 cited in Barata, 2002, p.122).

The ISWM approach (figure 7) marks the evolution of the recent approaches to waste management (waste management hierarchy and zero waste) to a level where it is recognised that there are no universal solutions to waste issues and there is nothing such as the *perfect fit* when it comes to the application of the waste management approaches. Therefore, within the broad framework of globally dominant paradigms, the waste management system has to be contextualised, with each city or region developing its own best suited solid waste management system.

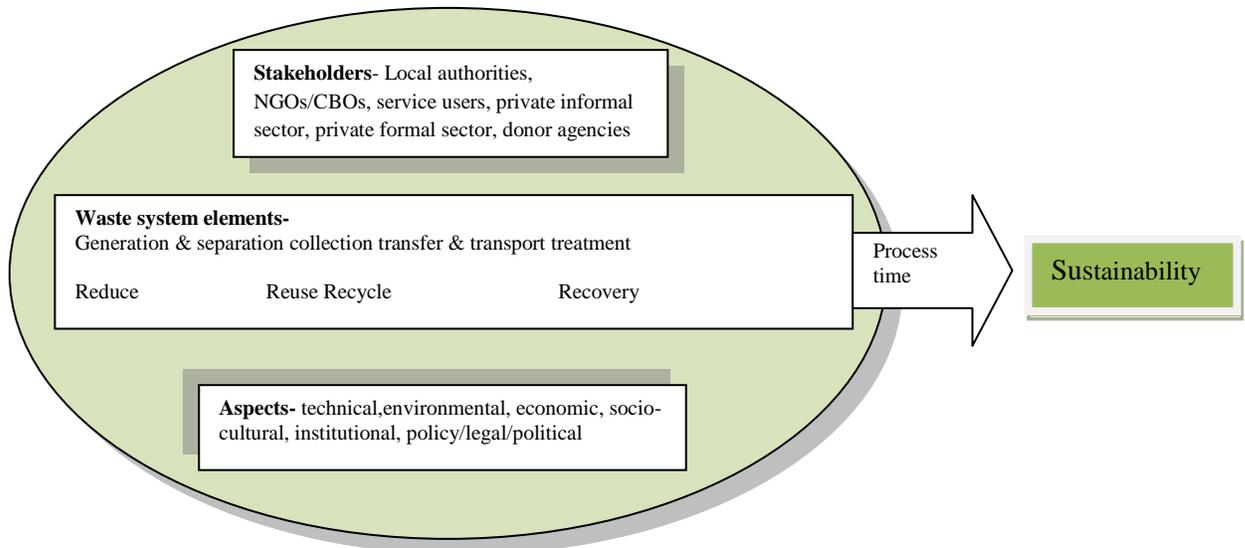


Figure 7 Integrated sustainable waste management (ISWM)

Source: Klundert & Anschutz, 2001, p.14

Klundert & Anschutz (2001, p.12), have elaborated the concept of ISWM on the four basic principles of *Equity*, *Effectiveness*, *Efficiency* and *Sustainability*, thus marking a point of departure where issues like equity and access also become embedded in the MSW management systems. Equity refers to all citizens being entitled to appropriate waste management systems for environmental health reasons. Effectiveness pertains to application of a waste management model that leads to the safe removal of all waste; efficiency refers to the management of all waste to maximise benefits, minimise costs and optimise resource utilisation and sustainability refers to a waste management system that is appropriate to local conditions from a technical, environmental, social, economic, financial institutional and political perspective (Klundert & Anschutz, 2001, p.12).

The concept of ISWM essentially comprises three dimensions, i.e. the stakeholders involved in waste management, such as the municipal workers, informal sector waste pickers, itinerant waste buyers, waste dealers, wholesalers, recycling enterprises and end user industries. The second dimension pertains to the practical and technical elements of the waste management system based on the underlying principles of industrial ecology and life cycle analysis, emphasising waste prevention, reuse and recycling. The third aspect consists of six sustainability aspects reflecting the framework that underlines the assessment of the existing waste management system and the planning and operation of the new system.

The six aspects comprise environmental aspects emphasising pollution control, public health concerns and resource recovery; political/legal aspects dealing with regulatory mechanisms and decision making frameworks; institutional aspects covering political and social structures that control and implement waste management; the socio-cultural aspects that include household practices, business and institutions in waste management; the financial and economic aspects that pertain to accounting and budgeting in the waste management systems and in relation to the local regional, national and international economy. The specific issues of privatisation, cost recovery, and cost minimisation are also covered herein. The last aspect covers the technical and performance part wherein the component of the design of the waste management system and its operational performance is examined (Klundert & Anshutz, 2001, p.13).

It is clear from the above summary that the ISWM approach strives to underpin the multi-dimensional character of MSW management. It seeks to achieve integration at various levels of various actors and various aspects. It conveys that the MSW management system of a city should be an outcome and reflection of such kind of integration. However, the ISWM is also not without its share of criticism, especially from the zero waste lobby who see, “integration discourse as an excuse to continue with the most environmentally damaging practices of land filling and incineration while shying away from seriously addressing waste prevention practices” (Zero Waste, New Zealand, 2003, cited in Davies, 2008, p.14).

Another *variant* of the ISWM is the framework proposed by UNEP (UNEP, 2015, p.30). The UNEP emphasises that “an integrated and sustainable waste management system must address all technical (infrastructure) and governance aspects to allow a well-functioning system that works sustainably over the long term.” As such, the UNEP variant emphasises two core areas: the physical elements of the waste system driven by public health, environmental protection and resource value, and governance strategies driven by inclusivity of stakeholders, financial sustainability and sound institutional structures (figure 8). Within the context of the new regime and prevailing paradigm of ISWM, waste management hierarchy and zero waste concepts, some new concepts have emerged to allocate greater responsibility to those contributing a major share to waste generation. The

major ones, polluter pays principle and extended producer responsibility and product stewardship, are discussed herein.

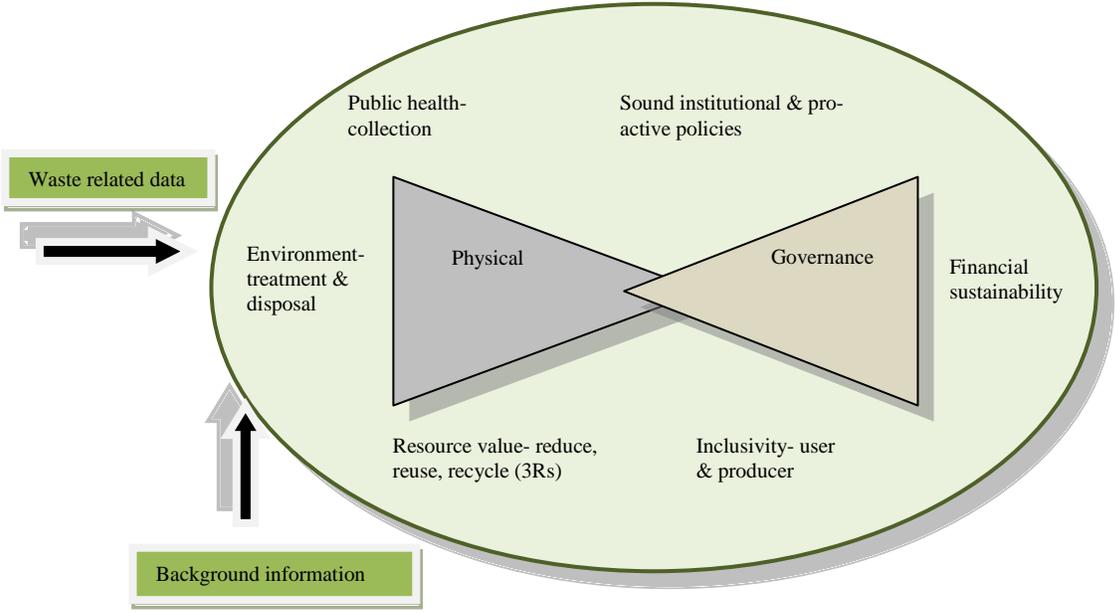


Figure 8 The ISWM framework by UNEP (2015, p.30)

2.2.2.4 Polluter pays principle and its variants

The polluter pays principle¹⁵ is the “ principle according to which the polluter should bear the cost of measures to reduce pollution, according to the extent of either the damage done to society or the exceeding of an acceptable level (standard) of pollution” (United Nations, 1997, p.58). The concept seeks to rectify environmental degradation by making polluters internalise the costs of use or deterioration of the environmental resources through the use of economic tools, such as levying pollution charges on polluters.

Concepts such as Product Stewardship and Extended Producer Responsibility are a variant of the Polluter Pays principle wherein all the stakeholders in the waste generation chain are held accountable for the waste streams that they generate and this is reflected in the policy instruments towards regulating waste management. These concepts are, by and large, similar policy approaches to address the environmental and public health impacts of

¹⁵ The application of the term is said to have been adopted first in Richmond in the US in 1916 (Silguy, 1996, cited in Dorvil, 2007, p.58) and gradually evolved to gain a wider acceptance globally.

products throughout the entire life cycle of the product, transferring the responsibility for the end-of-life management of a product from traditional waste management entities i.e. local governments and waste management companies, to the product manufacturers (Whitworth, 2007, p.1).

While Product Stewardship and Extended Producer Responsibility concepts have taken off and are in various stages of development in the developed economies, the developing countries are still in the nascent stage of developing these mechanisms. In India *E-waste Management and Handling Rules* (promulgated in 2010, effective in 2012) that enhance the producer responsibility in managing e-waste have been initiated. But such rules for other products do not yet exist, though some companies offer take-back schemes when a consumer wants to buy a similar new product from the company.

The above discussion brings out the differences and the methodologies adopted in the conventional and unconventional approaches to MSW. While the conventional systems are based on waste removal and its end of the pipe management, the unconventional approaches are marked by the principles of waste reduction at source and closed loop management paradigms wherein the disposal to landfill is minimised to the greatest extent possible. However, it also emerges that both approaches are operational in various geographical and economical contexts and vary between developed and developing economies.

The review on waste management hierarchy reveals it to be the preferred approach in contemporary times, setting the base for evolving concepts such as zero waste and development of principles such as the Polluter Pays and its variants. The ISWM approach based on the waste management hierarchy is bringing in multiple dimensions, encompassing principles of equity, effectiveness, efficiency and sustainability. It is grounded at localised levels and seeks to look beyond technical and piecemeal solutions, especially in the context of developing countries. The principles of ISWM grounded in the local scenario have been considered while framing the sustainability assessment framework for evaluation in the case study.

2.3 Private sector participation: a municipal solid waste perspective

The second component of the literature review, uncovers the theme of privatisation in the following sections by throwing light on its various dimensions in the generic as well as MSW context. By the means of review of the privatisation literature in this section, the researcher comprehends a bigger picture of privatisation with the purpose of setting the stage to analyse the context of private sector participation in MSW management. Derivations from the generic context relate to the use of terminology; privatisation rationale and impact evaluation in particular provide composite and comprehensive theoretical and empirical expressions that are then used by the researcher to ensure that the specific study does not neglect any related and important aspect and also to establish, through triangulation, the usage of common threads governing analysis in similar or related literatures.

The concept of private sector participation in public service delivery is not new and perhaps, as the literature reveals, it might be difficult to pinpoint a time in history when some form of private participation has not existed. The ancient civilisations of Rome and Greece provide ample examples of private sector participation (Sobel, 1999 p. 19, cited in Meggison & Netter, 2003, p.25). Ponderelli & Lacano (1996, cited in Meggison & Netter, 2003, p.25) mention that by the time of the industrial revolution and thereafter, the private sector had become a significant provider of public goods and services. A reversal of trend was witnessed, however, with the impact of the two world wars and the spread of the communist ideology that rendered nationalisation as a desirable mode of ownership and delivery of public services (Ghobadian et al. 2004, p.1; Meggison & Netter, 2003, p.27). The concepts and application of nationalisation ideas spread throughout the communist bloc and also spread their influence in many countries in Europe and the developing countries and by the end of the 1970s, a significant proportion of the world's governments had all infrastructure and production systems under their direct operations (Scalar, 2000, p.4).

Towards the end of the 1970s, the visible political and economic pitfalls in the socialist bloc of Eastern Europe and the extreme libertarian positions of economists such as Friedrich Von Hayek, Milton Friedman and Ronald Coarse contributed to new directions in

neo-liberal economic theory. The same was grounded in the belief that free market mechanisms driven by competition and seeking profit maximisation shall ensure that private actors shall respond by providing appropriate services, failing which they would be driven out of the markets (Weizsacker, Young & Finger, 2005, pp.6-9). As such, Burgess, Carmona & Kolstee (1997, p.141) state that “the state’s role in production, ownership, finance, marketing and regulation should be rolled back and its activities should be restricted to those of market enablement.”

A further critique of the failings of the state is highlighted by public choice theorists and also most explicitly highlighted in the theory of government failures (Walsh, 1995, p.23). It is founded on the argument that the inherent characteristics of demand and supply for public services leads to inefficiency since they occur within the monopolised setup of the state itself.

In a nutshell, these assumptions, rooted in the reality and theory of government failure to deliver, became a centre stage for the winds to turn in favour of the emerging neo-liberal ideologies and neo-conservative paradigms. These ideologies promoted the idea of a rolled back state that does not provide services directly, but facilitates the private sector to take over the provision of public services. Thus, the 1980s marked a paradigm shift towards de-nationalisation and privatisation. The last three decades have been witness to economic and governance reforms globally, and structural adjustments in developing countries in particular, creating fertile grounds for adoption of neo-liberal economic policies and pursuit of new public management models to facilitate the operation and growth of a free market economy and an era of privatisation and private sector participation.

2.3.1 Privatisation, private sector participation or public-private partnerships: clearing the terminological mist

While reviewing the literature on private sector participation in the context of public service delivery and with specific reference to MSW, the researcher encountered a range of terminologies shrouded in similar usage and understandings. Therefore, bringing clarity to the usage of the term private sector participation in this research, demands an academic and empirical clarity. In fact, many researchers (Martin, 2001; ADB, 2008; Hall, Motte & Davies, 2003; Weizsacker, Young & Finger, 2005; Yescombe, 2007) share the thought that

the term's meaning has continued to remain embroiled in overlapping definitions and imprecision. Martin (2001, p.2) goes on to say that there have been "countless definitions" of privatisation, some broader and encompassing and the others, considerably narrow. The term privatisation is used as an umbrella to convey various forms of engagement with the private sector. It may or may not refer to the complete transfer of responsibilities from the public to the private sector, as is normally presumed with the usage of the term. Table 4 presents the various broad interpretations of the same by various researchers.

Table 4 Definitional understandings of privatisation

Definition focus	Researchers
Attracting private sector investment (economic based)	Hall, Motte & Davies (2003,p.2), Martin (2001, p.2), Martin, (2001,p.3)
Government as facilitator, private sector as developer (role based)	Segbers (2005, p.5,6), Weizsacker, Young & Finger (2005, p.4), Yescombe (2007, p.4)
Co-operation between public and private sector by building partnerships for development	ADB (2008), Heilmann & Johnson (1992 cited in Leavitt & Morriss, 2007, p.327), Cordelli (2013, p.65), Cointreau-Levine (2000, p.17), Chen, Hubbard & Liao (2013, p.2), MoUD (2010, p.8), Nijkamp et al. (2002,cited in Jamali, 2004, p.416).
Transfer of assets from public sector and formulation of lease/contracts to private sector	Shirley (1992, p.24)

The Operations Evaluation Department of the World Bank defines privatisation as "the policy or process of making private as opposed to public" (Martin, 2001, p.2). In trying to evolve a wider understanding, Martin (2001, p.2) mentions that the term is also used in connection with contracting out and attracting private finance for public infrastructure. According to Shirley (1992, p.24), there are as many definitions of privatisation as there are analysts. Therefore, privatisation includes not only transfer of ownership of assets to the private sector but also transferring management without transferring ownership through contracts and leases. Providing a more holistic definition, Weizsacker, Young & Finger (2005, p.4) state that privatisation refers to "all initiatives designed to increase the role of private enterprises in using society's resources and producing goods and services by reducing or restricting the roles that governments or public authorities play in such matters".

Further, Hall, Motte & Davies (2003, p.2) state that due to political controversies surrounding the term privatisation, new terms such as private sector participation and public-private partnerships (PPP) were created to present the same forms of involvement of the private sector, but as a scaled down soft collaborative exercise instead of complete

transfer, as the term privatisation implied. The term private sector participation is widely used by the World Bank in its policy documents in the context of developing countries and also by other international organisations, such as the German Technical Cooperation Agency (GTZ) and the Swiss Centre for Development Cooperation in Technology and Management (Coad, 2005; Cointreau-Levine 2000; Cointreau-Levine, 1995; Hall, Motte and Davies, 2003).

The Asian Development Bank (ADB, 2008, p.1) defines PPP as a "range of possible relationships among public and private entities in the context of infrastructure and other services." The Asian Development Bank also acknowledges the usage of the terms privatisation and private sector participation to describe activities under PPP. The PPP is therefore a newly coined term for the same agendas: an old wine in a new bottle. Chen, Hubbard & Liao (2013, p.2) address PPPs as "co-operations between private parties and the public sector mainly through contract to deliver public services".

Koppenjan & Enserink address the terms PPP and private sector participation as synonymous (2009, p.285). According to Hall, Motte & Davies, (2003, p.7), "It is of little use to try to summarise what a PPP is or should be. There is no binding definition nor can one be found and it is hardly helpful to fiddle around with unclear words of often anglophone origin. What is sensible or not must, be determined on a case by case basis".

Coming to the context of India and MSW specifically, the Government of India, (MoUD, 2010, p.8) defines PPP as "a government service or private business venture which is funded and operated through a partnership of government and one or more private sector companies. PPP typically involves a contract between a public sector authority and a private party, in which the private party provides a public service or project and assumes substantial financial, technical and operational risk in the project." In fact, on the same page as this definition, the document uses the word PPP overlapping with private sector participation, stating that, "private sector participation or public private partnership may be considered by urban local bodies in the areas where municipal corporations or municipalities are not currently providing a service keeping."

The review above gives an insight into the definition and conceptual aspect of privatisation, private sector participation and PPPs. The terminological overlaps are noticeable wherein

the terms private sector participation and PPPs are used largely to convey the same underlying meaning of some form of engagement between the public and private sectors through contracting, cooperation or partnerships. In the Indian and MSW context, the terms privatisation, PPP, and private sector participation are used in an overlapping manner and convey the same meaning. The terms used throughout this thesis are private sector participation or privatised MSW operations or privatised service delivery of MSW.

2.3.2 Private sector participation: arguments of rationality and pitfalls

An insight into the theoretical arguments advanced by proponents of private sector participation reveals a set of similar assumptions linking up to the promise offered by the neo-liberalist ideology of efficiency of the free markets to deliver better in comparison to the state. Privatisation promotes greater efficiency and social welfare by creating incentives to allocate resources to their best possible uses and is also seen as a mechanism to scale down rigid bureaucracy and cronyism in the public sector by transferring property from the public domain to the private sector (Weizsacker, Young & Finger, 2005, p.11). Raiser & Volkman (2005, p.396) believe that private sector companies possess more capability to introduce high end managerial and technological innovations in service provision and that they also remain largely insulated from direct political influences. In this way, they are better equipped to provide better and cheaper interventions to provision of public service than the public sector organisations. Champlin (1999, p.1303) puts forth another assumption favouring private sector participation, arguing that shifting responsibility for providing goods and services to the private sector leads to increasing social capital¹⁶.

Researchers (Shirley, 1992, p. 27; Leavitt & Morris, 2007, p.325; Ngowi, n.d, p.4; Corry et al., 1996 cited in Cordelli, 2013, p.66) argue that private sector participation leads to faster innovation and cost efficient delivery of services, while others (Smita & Lipsky, 1993 & Minow, 2003 in Cordelli, 2013) assume that private sector participation would improve distributive equality, since private sector associations are often in a better position than the public sector to identify disadvantaged communities and therein develop sensitive

¹⁶ Social capital is defined as the extent to which individuals will voluntarily cooperate for the common good (Putnam, 1995, cited in Champlin, 1999, p. 1303).

distribution of services. Bayliss & Kessler (2006, p.7) mention the proponents of privatisation as presenting private sector participation as the “institutional solution to poor governance” and also build a compelling case for poverty reduction. Weizsacker et al. (2005, p.352) state that private sector participation can produce positive results under the right circumstances wherein large benefits can accrue in terms of attracting investment to the development of infrastructure for public service delivery, providing a better quality of services, increasing economic efficiency twofold by removing restrictions on staff redundancies, and leading to innovation, capacity building and exposure to modern technologies.

Research has also been equally vocal when it comes to addressing the ills of privatisation. Strong arguments against privatisation are put forth by researchers such as Dunleavy (1986 cited in Hodge, 1999, p.135), who justifies his criticism by arguing that privatisation is a façade on the continuation of the strategies that are favoured by senior policy level bureaucrats for advancing their own interests at the expense of producing qualitative and quantitative reduction of services, particularly to the poor groups. Champlin (1999, p.1311) challenges the idea that privatisation leads to building of social capital. Bayliss & Kessler (2006, p.19) state that the focus of market oriented reforms has been primarily on operational efficiency but not on its distributional impact wherein the profit centric approach of the private sector is inconsistent with providing access to poor users. Batley (2001, p.200) argues that private firms have no incentive to provide goods or services for which it is not feasible to charge in proportion to consumption and this is typically the case where the users cannot be excluded from consumption, as in the case of public goods.

Cherry picking, marginalisation of the poor and inequality can result when private companies serve affluent or upmarket locations who can afford to pay for the service rather than the low income areas (Weizsacker et al., 2005, p.354, Obser, 2005, p.260). Furthermore, it cannot be a foregone conclusion that privatisation will result in greater economic efficiency, especially when its profit maximisation endeavours are likely to result in cost saving measures and a significant price increase to the customers (Rodriguez-Boetsch, 2005, p.303). Finally, "commercially optional decisions are often sub-optimal for public goals demanding subsidies, raising charges, cutting necessary investment and maintenance or walking away" (Weizsacker, Young & Finger, 2005, p.12).

As can be observed from the above mentioned opinions, economic efficiency and operational effectiveness, high productivity and access to conduits of finance and technology are the forte of the private sector and these strengths have been used to advance the case of privatisation. At the same time, there are concerns as perceived by researchers who fear that privatisation policies are likely to have adverse impacts on operational efficiency and equity, and shall exclude people who cannot afford the cost of the service. While it may appear that costs to the public sector have reduced, in reality this may not occur due to the increase in transaction costs to the public sector, such as assuming greater risk allocation to ensure that the private operations are sustained. The next section, therefore, seeks to unravel through the literature, the impacts of privatisation to analyse whether the positive or negative assumptions have assumed realistic proportions at ground level experience involving the private sector.

2.3.3 Impacts of privatisation: evidence from practice

A review of the literature reveals mixed outcomes of privatisation. Batley (2001, p.211) states that while better private sector performance is observed in the case of public services like education and solid waste collection, these cannot be used to generalise or draw conclusions that privatisation means greater efficiency and effectiveness in all contexts. In fact, Batley notes that the better performance of the private sector can often be attributed partly to the fact that they were given easier sectors of the market. There were also cases where privatisation actually increased the cost to the public sector in terms of costs related to the need to manage the private contractors, retain a reserve capacity and also its selective inability to retrench staff in spite of privatisation. Therefore, one of the conclusions was that greater efficiency of the service delivery should not be the only criterion, but the gross effects on the total cost of providing the service (transaction costs) should also be considered.

In their examination of empirical evidence on the impact of privatisation in its various forms in the context of developing countries, Cook & Kirkpatrick (2003, p.210) reveal a contradictory picture with major theoretical disagreements about the estimated outcomes and also major variations in the empirical evidence emerging from across sectors as well as countries. Since the experience is diverse, they conclude that it is difficult to draw

"common patterns of experience or to draw general lessons for policy" (Cook & Kirkpatrick, 2003, p.217).

Bouin & Michalet (1991, p.182) mention that in terms of the comparative performance of public and private sectors, there is no decisive evidence regarding the impact of the ownership on the economic performance in terms of return on labour and capital and cost minimisation. They conclude that the results are weak and do not provide a full justification for privatisation. Obser (2005, p.257) mentions a study of the Operations Evaluation Department of the World Bank which found a very mixed record of performance across countries and sectors while conducting a review of the World Bank's assistance to privatisation. Performance was worse in low income countries where pre-conditions, such as stable macro-economic conditions, policies conducive to compete, an existing robust private sector and the administrative capacities to implement privatisation, did not fully exist (Kessler & Alexander, 2005, p.257). Where legal and regulatory institutions are weak, privatisation has not improved equity and has sometimes worsened it (Kessler & Alexander, 2005, p.258). In fact, Weizsacker et al. (2005, p.6) declare that the results having fallen far short of the promises while transferring public service to private provisions. In line with this thought, Deng, Song & Chen (2016, p.74) state that while PPP's have become increasingly popular in the last two decades, there is no widespread demonstration of their successes.

On the other hand, researchers like Domberger & Rimmer (1994, cited in Hodge, 1999, p.107), after conducting a review of two decades of experience in privatisation, submit that it usually leads to substantial reductions in service cost and that such gains appear to be consistent over time. Seidenstat (1999, p.20, cited in Martin, 2001, p.28), supporting the case of privatisation, mentions evidence that suggests that well designed privatisation almost always leads to lower costs and improved service quality. However, specifically in the context of developing countries, Martin (2001, p.30) mentions some evaluations of the tendering and contracting out of municipal services as producing efficiency and quality improvement as an outcome of the preparatory process of a careful analysis of costs and services in detail rather than actually being the outcome of competition. Martin also points to evidence that suggests that the failure to meet contract conditions or specifications ultimately leads to a decline in the quality of service. Kessler & Alexander (2005, p.230)

challenge the claims of privatisation proponents that privatisation provides improved services and access to the poor. They point to extensive evidence across sectors from which it is clear that privatisation leads to cherry picking, wherein service is offered to those who can pay the price.

Looking at the actual impact studies reviewed above, cutting across sectors of privatisation globally and in the developing world context in particular, it can well be seen that what appears is a mixed level of impacts, both positive and negative. While there are positives in terms of operational and economic efficiencies, the adverse impacts are primarily related to matters of equity, wage cutting and overcharging the consumers and instances wherein the private players do not negotiate but literally dictate terms of operation to the public sector, especially in matters of risk sharing. So whether privatisation is really as promising to policy and decision makers as it has appeared so far, especially in the sphere of MSW service delivery, is a question that needs empirical scrutiny to arrive at a rational judgment.

2.4 Private sector participation in municipal solid waste management: a review

With the backdrop of the generic context of privatisation, this section undertakes a review of literature into the specific context of private sector participation in MSW management with the purpose of establishing a deeper understanding of its application in MSW management and also of sifting through the literature related to the implications emerging from its application.

The municipal solid waste management that has long been the domain of the public sector has become a favoured area for involving the private sector since the neo-liberal movements emerged to enable the free market forces to exert a dominant role in the delivery of the public services. MSW, thus, is no longer the monopoly of the local government but a public service that has become open to various forms of privatisation and especially PPPs.

2.4.1 The public good status of municipal solid waste

The debates related to privatisation have often brought to centre stage the concept of *public good* since the move has been to privatise the public services that were traditionally

delivered by the public sector. Accordingly, researchers on privatisation have also tried to lend an appropriate definition to public good. Weizsacker et al. (2005, p.35) define public good as what the state has traditionally been expected to supply. According to Holcombe (1997, p.1), “a public good is defined by economic theory, is a good that once produced, can be consumed by an additional consumer at no additional cost.” Thus, such good has one or both of the characteristics of being non-excludable and jointness in consumption¹⁷.

In the context of MSW, researchers (Batley 2001, p.2004; Cointreau-Levine, 1995, p.5; Wilson, et al., 2012, p.251) give lucid justification of it being a public good and therefore its effective delivery as being of great significance to the overall public health and wellbeing of society. Cointreau-Levine (1995, pp.5-7) demonstrates the same by arguing to this effect about the various components of MSW. For instance, public space cleaning is clearly seen as a public good as it benefits the public at large and not some specific people. Similarly, safe MSW collection and disposal entails environmental and public health benefits for the public at large. For that matter, even the context of recycling, which has historically been treated as private good, is now being increasingly regarded as public good, recognising the large scale environmental benefits that stand to benefit the larger community (Cointreau-Levine, 1995, p. 6).

Since MSW falls within the domain of public goods and services, the debate that emerges and finds space in the literature centres around whether the private sector can deliver this service appropriately, looking at the principle of *private rationality* of profiteering on which the private sector operates. Strongly favouring private involvement in MSW management, Cointreau-Levine (1995, p.7) argues that the issue to be considered is not about cost recovery but rather to examine the involvement of the private sector from the perspective of efficiency, reliability, equitability and accountability. Putting forth the case for the private sector, Cointreau-Levine (2000, p.9) also argues that solid waste service is a public responsibility as a public good but being responsible for a service does not require

¹⁷ Non-excludability refers to the fact that it is difficult to keep people from consuming the good once it has been produced and joint consumption indicates that once produced for one person, additional consumers can consume the same good at no additional cost. Some of the examples of public goods quoted in the literature include national security, water, electricity provision, solid waste collection and disposal, transportation networks and parks.

the state to perform the service on its own and it can choose to meet its responsibilities by involving the private sector.

2.4.2 Main assumptions behind private sector participation in MSW

Primarily the same set of assumptions pertaining to the generic context of privatisation as discussed in the previous sections are displayed in the literature related to private sector participation in MSW, as can be inferred from the following review.

According to Cointreau-Levine (1995, p.7) and Massoud & El-Fadel (2002, p.621), MSW accounts for 20 to 50 percent of the total municipal expenditure of the local governments in developing countries and, despite this high expenditure, the MSW service is of low quality with only 50 to 70 percent being collected. The main argument in support of private sector involvement is that the private sector is more efficient than the public sector, has greater freedom of action, greater fiscal discipline and accountability. As such, it is expected to generate higher efficiency into the MSW service delivery. Quoting examples from developed countries such as U.S., Canada and U.K., Cointreau-Levine (1995, p.10) points to the labour productivity as smaller numbers of and younger workers, lower absenteeism, more flexible scheduling, efficient vehicle routing, better vehicles, managerial incentives, faster vehicle repairs and maintenance and competition as the principal reasons to engage the private sector in MSW management.

Cost effectiveness in terms of savings can be achieved through competition between private companies to win MSW contracts. Putting forward the World Bank's position, Cointreau-Levine (1995, p. 17) states that "Government should focus on privatising those activities that are most inefficiently done by government and consume a significant position of government budgets. For example, solid waste management should be a privatisation priority." According to USAID (1991, p.1, cited in Anderson, 2011, p.iii), privatisation opens doors to introduce new technologies in solid waste management. It can also reduce the costs of employing and managing permanent staff, as in the case of the public sector. Ahmed & Ali (2004, p.472) assume that not only does privatisation improve the efficiency of the entire waste sector, but it also creates new opportunities for employment.

Bel & Mur (2008, p.1) state that the common reason for private sector involvement in solid waste services is to lower the service production cost. Dohrman & Aiello (1999, p.7000) indicate that the prime motive for private sector participation in solid waste management is the weak financial health of the local government to make necessary and effective provisions on its own. Massoud & El-Fadel (2002, p. 621) mention the interest in the private sector due to increased performance by employing innovative operation and maintenance methods, reduced and stabilised costs of providing service by ensuring that the delivery is undertaken by the most productive and cost effective methods, improved environmental protection and compliance with environmental requirements, and access to private capital for infrastructure development.

It can thus be derived from the insights into the assumptions behind private sector participation in MSW that it has been promoted based on the underlying understanding of the private sector as being more efficient and performance oriented when compared to the public sector. The biggest perceived gains from privatised operations are cost efficiencies and the ability of the private sector to leverage technology, finance and labour to its advantage, thereby also producing positive economic, environmental and social impacts.

2.4.3 Private sector participation forms in MSW

The proponents of private sector involvement in MSW management suggest that most of the activities under MSW can be undertaken by involving the private sector. Cointreau-Levine (2000, p.17) proposes a framework to guide privatised operation to take shape within the context of MSW management. With the purpose of limiting government activity, four options (contracting, franchise, private subscription and concession) are usually exercised within the sphere of privatised service delivery, the most common in MSW being the contractual arrangements (Massoud & El-Fadel, 2002, p.621, Post, Broekema & Obirih-OPAREH, 2003, p.836, Cointreau-Levine, 2000, p.18). *Contracting* is an arrangement wherein the government awards a fixed term service delivery contract to a private firm to provide MSW services and the government incurs payment to the firm. This is also referred to as a service contract. Since the government is the client, it has the control to ensure that the performance expectations are met by the private contractor (Cointreau- Levine, 2000, p. 18).

In the *franchise* option, the government grants the private firm an exclusive monopoly to provide MSW services within a particular zone wherein the firm will collect its own revenues from the waste generators and/or generate revenues from the sale of recyclables from the zone. The third option for conducting MSW operations with private sector involvement is *private subscription*, also known as open competition. Here the government licenses the private firms to compete amongst each other in providing solid waste management services. No firm has a monopoly in a zone, nor is any price regulation required.

The firms engaged in competition collect their own revenues from the customers for the services rendered to them. In the fourth option, the *concession* is granted when the government may allow the private sector to utilise one of its resources for profit making purposes. In such a case, the resource would be solid waste. Such an arrangement involves construction of major facilities to sort, treat and dispose of MSW. Various forms of concession, such as the Build, Own, Operate (BOO); Build, Operate, Transfer (BOT); Design, Build, Operate Transfer (DBOT); or Design, Build, Own, Operate (DBOO); are found in the sphere of MSW management (Cointreau-Levine, 2000, p. 20).

A BOO agreement is one in which a private company builds, owns and operates a facility, whereas in the case of BOT and BOOT, a private company builds, operates and then transfers ownership to the government after the end of the concession time period, or at the end of the start-up operations. In a case where a firm designs, builds, owns, and operates or transfers, the concession agreement is known as DBOO or DBOT (Cointreau-Levine, 2000, p. 20). Where contracting and franchising are the most potential and favoured alternatives for MSW collection, concession arrangements are preferred for waste treatment and disposal facilities under the arrangements mentioned above (Massoud & El-Fadel, 2002, p 627). Accordingly, almost all components of MSW management processes can be subscribed to private involvement, as summarised in table 5.

Table 5 Private sector participation forms in MSW activities

MSW Activity	Form of involvement
Provision of vehicles/ heavy equipment	Contract
Collection of solid waste from residential areas	Contract/franchise/private subscription
Collection of demolition waste	Private subscription
Collection of commercial waste	Private subscription
Collection of general municipal waste from entire neighbourhood	Contract (service or management)/franchise
Sweeping or street cleaning	Service contract
Repair of MSW equipment	Service contract
Conversion of waste to compost	Service contract/concession
Operation of transfer station	Service contract/concession
Operation of disposal site	Service contrast/concession
Collection of usage charges or waste taxes	Franchise

Source: Derived from Cointreau-Levine (2000, pp.17-20)

As can be inferred from the above review, while full privatisation is not common in MSW management activities, contracting and franchise emerge as the common and recommended forms of private sector involvement by institutions such as the World Bank. Concessions such as BOO and BOT are used in fixed assets, such as disposal mechanisms as waste to energy plants, sanitary landfills, etc. It is perhaps not so much the form itself but rather the manner in which it has been structured and implemented that would have a deep impact on the quality of outputs generated.

2.4.4 Pre-requisites for private sector participation in municipal solid waste management

The move towards private sector participation by international and regional institutions such as the World Bank and the Asian Development Bank has been accompanied by the issuing of specific directives and guidelines regarding the pre-requisites for successfully involving the private sector in the delivery of public services (Cointreau-Levine, 1995; 2000; ADB, 2008). Presenting a generic (2008, p.49) perspective, the Asian Development Bank identifies five areas to create an enabling environment for privatised operations: appropriate legal regulatory and policy framework, technical preparation, capacity building, fiscal preparation, and labour consideration.

In the context of establishing an appropriate legal regulatory and policy framework as the first pre-requisite, a review of the existing regulatory regime should be undertaken to identify the gaps and requirements for involving the private sector that addresses all

arrangements, such as concession rights, dispute resolution procedures, labour laws and pricing mechanisms. The second prerequisite highlighted by the ADB (2008, p.50) is the need for technical preparation wherein specifications of the project involving the private sector must be clearly defined in the contract. Further, in this context, Meunier & Quinet (2010, p.128) state that the logical process to design such private sector participation initiatives is to first set the organization of the public procurement procedures itself. The ADB (n.d, p. 68) highlights a clear and systematic procurement process and an elaborate contract agreement as necessary to implement private sector participation initiatives.

The third pre-requisite is capacity building wherein the existing public sector institutions need to build their capacities in order to take on the role of initiating, regulating and monitoring the privatised operations. The ADB (2008, p.52) mentions setting up special institutional arrangements such as PPP units, project implementation offices or technical assistance units for this purpose. This is to ensure that involving the private sector follows consistent methodologies incorporating project identification, developing transparent operational procedures, ensuring appropriate treatment of employees and government assets and also monitoring the privatised project once it has been launched (ADB, 2008, p. 54). In this context, Bolaane & Isaac (2015, p.20) stress “building sufficient capacity within the public sector on the nature of information required for contracting out services and the criteria for performance evaluation within the contracting process through training of municipal officials.”

The fourth pre-requisite is fiscal preparation for private sector involvement. In this context ADB (2008, p. 56) suggests that there should be a process to balance service with tariff levels by creating a price and service package that is acceptable to customers and is also sustainable. The fifth prerequisite is labour considerations. In this case, ADB (2008, p.65) brings forth the concerns of the public sector workers fearing retrenchment. It states that the labour issue must be resolved as a pre-requisite by engaging the labour unions early in a dialogue to allay speculation so that the privatised operations do not face opposition, something that usually happens when faced with privatisation initiatives. The terms related to redundancies or opportunities for the redundant municipal staff to join the private company should be clearly formulated.

ADB (2008, p.66) also emphasises the need to include local stakeholders and their points of concern, expectations and risks. Consultations with stakeholders reduce the risk of opposition at a later stage, which may slow down or completely stall the processes involving the private sector. While the ADB's (2008, pp. 49-67) pre-requisites for private sector participation are generic in nature, to be adjusted to fit to any sector considering private sector involvement, the framework mentioned by Cointreau-Levine (2000, p.23) is specific to the context of MSW. In the context of developing countries, she suggests that the government should retain at least 30 percent of the overall collection area for MSW and provide a solid waste collection service in that part to maximise contestability and also minimise the potential for collusion. The contract periods should enable economic depreciation of assets and also repayment of loans. Cointreau-Levine (2000, p.24) suggests that the contracts involving investment in collection vehicles for MSW should have a minimum length of five years, and at least ten years for investment in fixed facilities, such as a transfer station or a landfill.

Cointreau-Levine (2000, p.24) also mentions flow control¹⁸ as part of the contractual agreements in order to minimise risk to the private sector and for successful implementation of MSW facilities. It is also important to delineate MSW zones as equitably as possible for contestability to be assured. Cointreau-Levine (2000, p. 26) states that equitable zones would be those which have a similar level of difficulty to service and also a similar level of opportunity to generate income. Focussing on building government capacity, Cointreau-Levine (2000, p.34) states that the municipal and central government capacities need to be enhanced so that they may be able to prepare competent tender documents for privatised operations in MSW, prepare estimates of waste quantities and service costs, handle complaints effectively and monitor the performance of the private sector operators. Cointreau-Levine (2000, p.29) further emphasises monitoring of performance as a basis for evaluating the efficiency, effectiveness and cost of service delivery by the private sector and also as a means to increase accountability. Further to this, Arbulu, Lozano & Rey-Maqueira (2016, p.252) state that a contract design in terms of appropriate risk allocation and payment mechanisms is also important for creating a conducive environment for privatised operations.

¹⁸Flow control refers to a guarantee to the service provider that a minimal set threshold of waste is available for collection.

As has been emphasised, operations involving the private sector can perform appropriately only if the pre-requisites are given due cognizance and put in place to ensure that an enabling environment exists. As such, the existence of policy and a regulatory framework that identifies and addresses all aspects of privatised operations needs to be in place, along with suitably trained officials in the public sector who are to implement and monitor the operations. The economic context regarding payments and tariff fixation must be explicitly detailed without leaving any room for vagueness which could at a later stage derail the project. Also, social aspects of labour considerations and stakeholder involvement mechanisms need to be addressed to ensure the social viability of such an operation. Most importantly, a well-developed evaluation and performance monitoring system addressing all dimensions of sustainability (as discussed in the follow up section) should be in place to ensure that the private player is delivering the service as per a well-defined contractual agreement. The pre-requisites suggested by ADB (2008) and Cointreau-Levine (2000) herein have been taken as a base for detailing out the pre-requisites to private sector participation as incorporated in the sustainability assessment framework.

2.4.5 Implications of private sector participation in municipal solid waste management: empirical observations

A review of the literature reveals that some research has been undertaken to evaluate the impacts of private sector participation on MSW management, largely from the economic and operational perspective, but less from the social, environmental or institutional perspectives. Also, research reveals mixed results of the positive or negative assessment of private sector involvement in MSW management.

A study from four cities of Latin America by Bartone et al. (1991, p.505) supports the hypothesis that the private sector can operate more efficiently than the public sector in delivering MSW services, provided that the requirements for contestable markets are met through competitive contracting and establishment of exclusive service zones. Post, Broekana & Obirih-OPAREH (2003, p.8465) evaluate the results from two cities of the developing world, i.e. Accra in Ghana and Hyderabad in India, and conclude that the results are positive. In both cities, the private sector has been able to provide sector efficient collection services at low costs and achieve higher consumer satisfaction. This has not only

helped to improve service standards at the city level in terms of waste volume and spatial coverage, but has also produced higher levels of employment.

On the adverse side, the same research points to poor labour conditions in the private sector marked by lower wages, job insecurity, fewer non-wage benefits and facilities. Both cases also point to the fact that environmental protection is still a low priority item in privatisation policies. If performance monitoring is there at all, it focuses on the effectiveness of MSW collection at the neighbourhood level, but ignores other negative environment externalities. The city authorities are not engaged in any policy to reduce the environmental burden of MSW through waste reduction, waste separation at source, support for recycling or reuse of waste. Therefore, a holistic sustainability angle is missing from the privatised operations in MSW (Post, Broekema & Obirih-OPAREH, 2003, p.849).

In assessing the performance of the public private collaboration in solid waste management in Accra, Ghana, Post & Obirih-OPAREH (2003, p. 45) conclude that privatised services have benefited consumers in terms of wider coverage, higher frequency of collection and more reliable services, but that there are a number of drawbacks, such as worse labour conditions, negative environmental impacts and a lack of sustainability. Additional empirical evidence is presented by Simoes, Cruz & Marques (2012, p.214) in their impact evaluation from the economic perspective in Portuguese cities. They conclude that while the waste collection services displayed overall efficiency in the treatment and disposal facility, the benefits were ephemeral and they diminish over time. In another empirical study from Gaborne in Botswana, Bolaane & Isaac (2015, p.14) state that the private sector performed well in terms of efficiency and effectiveness. However, in another study of privatised waste collection across five cities in Ghana, Oduro-Kwarteng & Dijk (2013, p.91) found that effective service was not achieved “owing to weaknesses in proper implementation of formal contracts, ineffective monitoring, delayed payment of subsidies, low cost recovery and weak municipal capacity to manage the contracts and contractors.”

Bel & Warner (2007, pp.1-2) conducted a meta-analysis of all published economic studies pertaining to waste since 1965 (18 studies) and conclude that the empirical studies indicate that privatised operations do not necessarily lead to cost savings. The theoretical expectations for cost savings are based on the belief in the benefits of competition, but

empirical studies indicate that the competition exists more often for the initial contract and may erode over time. Bel & Warner (2007, p. 8) conclude that only 6 out of 18 studies found cost savings with privatisation and most were using data from the 1970s. Also on the reverse side, Anderson (2011, p.13), criticising the stance of the World Bank to privatisation in MSW, states that the Bank, by pushing through its privatisation agenda and methodology in MSW management, has converted solid waste management from a matter primarily of material management into a *gauntlet* of extremely complicated and specialised administrative responsibilities that has proven daunting for the municipalities in developing nations.

A slight shift of stance is noticeable in the World Bank documents that guide private operations in MSW in the developing country context from 1994 and 2000. In the first case, the Bank's approach reflects a clear line of optimism around the magic formula of involving the private sector as the *ultimate* solution to the problems of MSW in developing countries, built on a critique of the inefficiencies of the public sector to deliver the service (Cointreau-Levine, 1995). However, by 2000 (Cointreau-Levine, 2000), based on experiences emerging from the privatised operations in developing countries, the Bank recognised operational difficulties at ground level and suggested solutions to address the same. However, it did not move away from the privatised operations but rather stressed having strong regulatory regimes and building government capacities to ensure success.

In the context of impacts on the informal waste pickers, Samson (2010) cites research from Cairo and Delhi and concludes that the impacts of privatised operations on waste pickers are adverse. She states that private sector involvement has not only reduced the role of waste pickers in recycling activities in particular, but has also decreased the overall levels of recycling. Highlighting environmental concerns, she further states that since the private contractors are paid based on weight delivered to the landfill sites, there remains a rather strong disincentive to segregate waste and remove recyclable materials from the waste stream (Samson, 2010, p.77). Another case of adverse impact of privatised service delivery with the view to enhance labour productivity and cut costs is highlighted by Samson (2003) after undertaking research in three municipalities of South Africa. Samson (2003, p. 31) observes a big difference in wages, benefits and conditions of employment between the private and public employer. In terms of equity, the wealthy areas in the three

municipalities received preferential service over working class areas comprising middle to low income residents (Samson, 2003, p. 99). In terms of distributive equity, findings of a study by Anestina, Adetola & Odafe (2014, p.2) reveal that high income areas received much higher access and quality of service in comparison to low and middle income areas.

The empirical analysis presented above reveals a mixed impact wherein the privatised operations seem to perform well in terms of economic and operational efficiency but have adverse social and environmental impacts. Even within the domain of social efficiency, there are observable disparities, as researchers, Bel & Warner (2007) and Simoes, Cruz & Marques (2012) indicate inconsistency and erosion of cost savings over time. However, these studies do not reveal detail and rigorous analytical frameworks for arriving at more authentic judgments. The contractual elements and environment settings also demand discussion while evaluating the impacts and the studies either ignore or just make a passing reference to the environment in which private service delivery is set. What can be derived from the analysis is the spheres in which impact has been measured by the researchers and the dominant areas that emerge are operational, economic and social impacts of private sector participation. The aspects considered herein have also been referred to while arriving at the specific framework for case study analysis.

2.5 Determining the lens of sustainability, assessment criteria and indicators

The previous section has attempted to lay a firm foundation for two literature review threads: theoretical understandings of MSW, and the concept of privatisation and private sector participation in MSW management. Having evolved a succinct understanding while sifting through the theoretical and empirical literature, the researcher now brings in the third and binding thread i.e. the concept of sustainability and its dimensions. The following review evolves an understanding of sustainability and its dimensions, tracing briefly the definitional aspects of the concept to its contemporary relevance and application in impact assessment studies and research.

2.5.1 The concept of sustainability and its dimensions

The concept of sustainability and sustainable development has emerged in the wake of a growing awareness and anticipation of environmental crisis that gained momentum

especially towards the end of the twentieth century. The unprecedented industrial and commercial boom and expansion after World War II was simultaneously accompanied by an emerging volume of literature, such as Rachel Carson's *The Silent Spring* (1962) and Edward Goldsmith's *A Blueprint for Survival* (1972). The same laid fertile ground for radical and acute environmental concerns that led to internationalisation of the concept of sustainability and sustainable development and culminated in a series of international conferences and commissions that highlighted the concern and need for sustainability (Du Pisani, 2006, pp.89-91).

At the United Nations Conference on the Human Environment, 1972, the term *sustainability* was incorporated in several of the principles adopted by the conference, also referred to as the Stockholm Declaration. However, the turning point at which the concept gained its current form of recognition and popularity was through the Brundtland Commission Report of 1987 (Du Pisani, 2006, p. 92; Gibson, 2006, p. 261; Munasinghe, n.d, p.33; Keiner, n.d. p.1). The report highlighted and stressed the need for sustainable development while balancing economic growth with environmental soundness. As such, sustainable development has been largely defined as development which meets the needs of the present time without compromising the ability of future generations to meet their requirements (WCED, 1987, Harris, 2003).

The three fundamental components of sustainability, i.e. environment, economy and society, were highlighted by the report and came to be known as *The Triple Bottom Line* (Du Pisani, 2006, p. 92). Elkington (1994, cited in Sartori, Silva & Campos, 2014, p.2), creator of the Triple Bottom Line, defined sustainability as the balance between the three pillars: environmental, economic and social. Roe (1998, cited in Omann, 2004, p.36) presents sustainability as a “multi-dimensional concept reflecting social, economic, cultural and environmental values.” According to Munasinghe (n.d, p.35), the concept of sustainability has evolved to signify three major points of view, i.e. economic, social and environmental, as can be represented by the sustainable development triangle (Appendix I, figure 43). The sustainable development triangle was presented at the 1992 Earth Summit in Rio De Janeiro and by the time of the 2002 World Summit on Sustainable Development, it had become widely accepted as a base for evolving other sustainability frameworks as the prism of sustainability.

2.5.2 The prism of sustainability

The prism of sustainability (Figure 9) was developed by the Wuppertal Institute, Germany with four dimensions of sustainability, i.e. social, economic, environmental and institutional (Singh et al. 2009, p.194, Centre for Environment Education, 2007, p.125, Keiner, n.d. p.4, Omann, 2004, p.67). Omann (2004, p.72), states that the *economic dimension* safeguards competitiveness, emphasises the production, exchange and usage of goods and services, and thus expresses market relations and its sustainability through competitiveness, creation of jobs and purchasing power.

The *environmental dimension* emphasises to “reduce material throughput” wherein the natural systems preservation is ensured by mitigating the impacts of usage of energy material and land (Omann, 2004, p.72). The *social dimension* emphasises increasing social cohesion in terms of equity in, for example, income, employment, access to resources and infrastructure (Hans-Bockles-Stifting, 2005, cited in Omann, 2004, p.73).

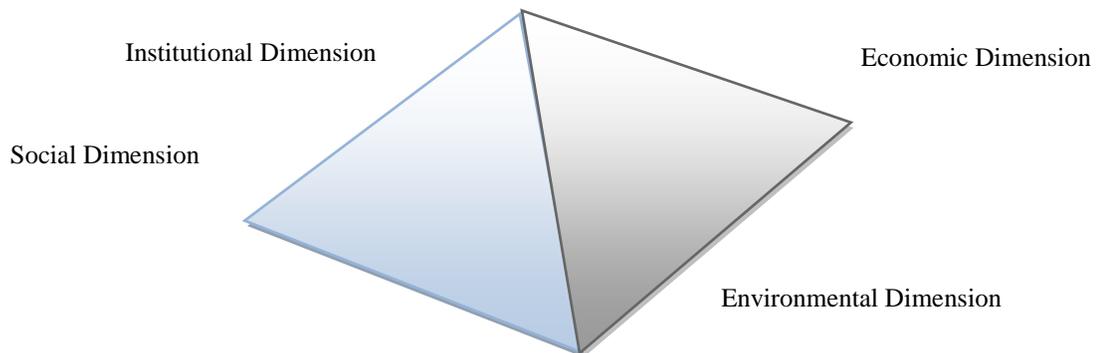


Figure 9 The sustainability prism (Keiner, n.d, p.4)

As Omann (2004, p. 73) states, the *institutional dimension* is often included in the social dimension and might not find explicit mention. However, there is a marked difference between the two, which is the reason why the institutional dimension has emerged as a separate component in the sustainability prism. While the social dimension presents intra-human (individual) aspects, the institutional dimension comprises interpersonal processes or group interactions. Omann agrees that if included within the social dimension, there is a danger that this aspect might be neglected.

According to Spangenberg (2001b, cited in Omann, 2004, p.73), “Institutions are understood as interpersonal mechanisms and rule systems for decision making and as means to implement decisions.” They contain organisation, institutional mechanisms, orientation and values and are central to governance. Institutional sustainability therefore means appropriate functioning, political and administrative institutions capable of promoting accountability, civil society empowerment, knowledge formation and ensuring structural change, communicative and social learning (Spangenberg, 2000b, Pignans Group, 2003, cited in Omann, 2004, p.74).

Many researchers (Gibson, 2006; Munasinghe, n.d.; Omann, 2004) highlight sustainability as an essentially integrative concept which means that there are inter-linkages between all the different dimensions of the sustainability prism and the complex issues connected with the notion of sustainability are a combination of all the dimensions as stated above. However, highlighting the difficulty in the integrative approach, Omann (2004, p.77) mentions that while documents highlight the necessity to address linkages, how this can be accomplished is rarely even mentioned. Integration of these dimensions and links is still not clear and so the practical applications are very vague (Omann, 2004, p. 77). In the context of real life case studies, Omann (2004, p. 74) argues that the separation of the four dimensions is more useful as they are easier to understand for researchers as well as for the stakeholders involved in any policy or decision making project. Carrying the defence further, Gibson (2006, p.264) states that the separate pillar based dimensional approach ensures clear and explicit attention to the dimensions and aids the decision making process in a subtle manner.

In summary, the four dimensions of the sustainability prism can be aptly applied to carry out analysis of private sector participation in MSW management in the case study. The four dimensions, i.e. social, economic, environmental and institutional, can enable clear formulation of the sustainability assessment framework for an ex-post evaluation and thereby reduce the level of complexity, enabling simplicity and generating in-depth understanding of the impacts.

2.5.3 Sustainability assessment measures

Ever since the concept of sustainability made itself markedly visible and was popularised at the international level by the United Nations and other organisations, conducting assessment of sustainability has been a subject of widespread research and thereby has been embedded into policy and decision making through ex-ante or ex-post evaluation of policies and programmes.

According to Costenza & Pattea (1995, cited in Omann, 2004, p. 37), sustainability can be determined only after the fact, i.e. with *ex-post evaluation*. In the ex-ante state, sustainability is always connected with uncertainty about the future events and impacts of present decisions; nevertheless the ex-ante evaluation to define a sustainable path is still necessary in order to develop policy measures. Kates et al. (2001, cited in Singh et al., 2009, p.191) state that the purpose of sustainability assessment is to provide decision makers with an impact evaluation in order to assist in determining what should or should not be considered towards achieving the goal of sustainability. The Rio+20 United Nations Conference on Sustainable Development (UNCSD, 2012, p.1) also gave due emphasis to sustainability assessments to advance the principles of sustainable development.

As has been highlighted, sustainability of a policy or programme can be viewed and analysed through the four dimensions. However, within these dimensions there is a need to devise clear criteria and indicators that can be used for measurement. In fact, indicators (Singh et al. 2009, p.191) are increasingly being recognised as useful tools towards analysis and for policy making and evaluation. Godfrey & Todd (2001, cited in Singh et al. 2009, p.191) state that “the main feature of indicators is their ability to summarise, focus and condense the enormous complexity of our dynamic environment to a manageable amount of meaningful information.” By visualising phenomena and highlighting trends, indicators simplify and help in analysis of complex and complicated information (Warhurst, 2002, cited in Singh et al., 2009, p.191). In summary, indicators summarise information to show the state of a phenomenon and support the evaluation of this state (BUND/Misersor, 1996, cited in Omann, 2004, p.75).

In terms of choice of indicators, Yigitcanlar & Dur (2010, p.324) suggest that they should be selected cautiously and be able to represent all necessary sustainability domains, i.e.

economic, environmental, social and institutional. Further, they state that in the context of availability of data and its quality, indicators should be limited in number but care should be taken to ensure that no essential indicator is omitted.

As can be inferred from the above discussion, the choice of criteria and indicators are *sine qua non* to making an assessment of sustainability in terms of the four dimensions. The following section looks at the criteria and indicators used in the relevant literature, both in generic and specific contexts to private sector participation in municipal solid waste to conduct ex-post evaluations across the four dimensions of the sustainability prism.

2.6 Criteria and indicators in the private sector participation literature

Whether privatisation in its varied forms has delivered on its promises has been a subject of considerable debate, especially over the last decade. It therefore becomes pertinent to see what criteria and indicators have been used in impact assessment studies to date regarding the private sector's performance in the generic sense, cutting across various sectors of development. Cook & Kirkpatrick (2003, p.209) assert that "*ex-post* impact assessment can be used to self-inform and refine future policy formulation." They further argue that conducting an assessment of the impact of privatisation encounters a number of methodological difficulties, the first being the choice of impact indicators themselves. Cook & Kirkpatrick (2003, p.210) also indicate that, more commonly, private sector performance and impacts can be assessed at a micro level in terms of economic efficiency and financial profitability. A further approach is to make an assessment of the outcomes by using a cost benefit approach, especially when the social impact of privatisation, such as employment, is included in the impact assessment. In terms of social impacts, Cook & Kirkpatrick (2003, p.216) state that the impact of privatisation on labour is an important consideration in assessing its impacts, especially in the case of labour retrenchment as a consequence towards efficiency and fiscal gains.

Kessler & Alexander (2005, p.256) suggest that implicit economic structures that are necessary for successful privatisation, such as efficient regulatory and fiscal regimes and an analysis of the impacts of privatisation, should take these into consideration. Pointing to methodological difficulties, Kessler & Alexander (2005, p.259) argue that often privatisation is a part of a larger economic reform programme and this makes it quite

difficult to identify and to measure the overall effects of privatisation. Thus, while the output and employment are difficult to quantify, efficiency gains are usually reported at the company level. Therefore, to draw generalised conclusions about the outcome is indeed difficult.

Bayliss & Kessler (2006, p.23) mention that the focus of policy research is often on choice of indicators that are priorities to the private providers or the finance ministries, such as profitability and economic efficiency, rather than social aspects, such as access and affordability to low income groups. In fact, an overall assessment of service provision outcomes depends upon the priorities attached to the impact on the numerous stakeholders. As such, narrowly defined criteria may distort the impact assessments outcomes, as Bayliss & Kessler (2006, p. 24) point out.

In the context of the evaluation of privatisation impacts, Martin (2001, p. 20) suggests that definition and clarity of terms such as productivity, efficiency and effectiveness and the distinctions between them are of major importance in evaluating the impacts of privatisation on the quality of the public service delivered. Berman (cited in Martin, 2001, p.20) defines *productivity* as “the effectiveness and efficient use of resources to achieve outcomes” while *efficiency* is defined as “highest outputs in proportion to inputs or unit costs” and *effectiveness* is defined as the “achievement of objectives and increasing the public good”. In the context of efficiency, Martin (2001, p.21) points out that it is typically a more important goal for the private sector where the success tends to be singularly defined by the profits accrued. Martin also mentions some business texts as defining productivity as efficiency.

The prime indicators to measure productivity emerging from Martin’s analysis of the impacts of privatisation are labour productivity (Martin, 2001, p. 23-24) and the gains emanating from it. Martin also uses the aspects of labour relations, pay and working conditions as a measure of impacts of privatisation. Within this, due consideration should be given to the prevailing labour relations climate, attitude of governments, content of agreements made with the union in the context of privatisation policies and human resource development initiatives by the private service provider and the prevailing regulatory environment.

Birdsall & Nellis (2002, p. 3-4 cited in the World Resources Institute, 2003, p.4) report that while the economic context of the efficiency gains are given due regard in impact evaluations of privatisation, they are lacking in terms of the measure to see whether the gains are actually distributed equitably. There is thus usually a significant gap between the reported economic benefit of privatisation and its apparent social costs. Therefore, the impacts must also give due regard to the social context of privatisation. The World Resources Institute also points to the environmental implications as an important aspect to be considered. Indicators such as those relating to environmental provisions in contracts, such as mandatory compliance with existing environmental standards and audits, should be considered in measuring the environmental impacts of privatisation.

In the context of sustainability and privatisation, Koppenjan & Enserink (2009, p.284) suggest three areas of sustainability assessment, i.e. social, environmental and financial. *Social sustainability* refers to impacts of privatised services on the affordability of and access to public service delivery by the poor (Roseland, 1998, cited in Koppenjan and Enserink, 2009, p.284). *Environmental sustainability* refers to impact of public service delivery in terms of the health and well-being of the population, as well as urban environments, i.e. air quality, water quality and ecological impacts. *Financial sustainability* refers to possibilities of local authorities to live up to the financial obligations that result from private investments in the long and short term (Nair et al., 2005, cited in Koppenjan & Enserink, 2009, p.284).

The above section provides an insight into the structure of frameworks used to evaluate the impacts of privatisation in general and also draw from other sectors, such as telecommunications and health. The researcher delves into the generic context to be able to customise and include the assessment criteria and indicators while constructing the specific sustainability assessment framework for application in the case study context. Based on a review of the related literature on generic impact evaluation criteria and impact evaluation indicators (Koppenjan & Enserink, 2009; Cook & Kirkpatrick, 2003; Martin, 2001; Hodge, 1999; Jamali, 2004; Kanter, 1994 cited in Jamali; 2004; Barrows et al., 2011), it is concluded that, while there are frameworks for the assessment of privatisation in general, none have been specifically constituted to touch upon all four major dimensions of sustainability.

In summary, it can be concluded that most of the privatisation impact criteria and indicators focus on the operational efficiencies and economic aspect of assessment, while the other dimensions of social, environmental and institutional impacts particularly are considered only weakly at best. Instead, privatisation should be evaluated against set goals/objectives and by making an appropriate and elaborate choice of measurable criteria and indicators addressing the dimensions of sustainability. In the light of these derivations, the researcher attempts to use the information from the review to generate a specific framework for the sustainability assessment of private sector participation in MSW operations for application in the case study context.

2.7 Private sector participation in municipal solid waste management; assessment of criteria and indicator choices

Moving on specifically to the case of private sector participation in MSW, after sifting through the relevant literature, the researcher has conducted a literature review of previous research to explore and analyse the assessment criteria and indicator choices.

Studies that give due weight to all dimensions appear to be few and far between (Post & Obirih-OPAREH, 2003; Post, Broekama & Obirih-OPAREH, 2003). Arbulu, Lozano & Rey-Maqueira (2016, p.253) argue that there are no unique parameters to make such assessments, therefore different measures should be considered to assess performance and sustainability of MSW operations and contracts. Some studies (Bartone et al., 1991; Massoud & El-Fadal, 2002; Bel & Warner, 2007; Simoes, Cruz & Marques, 2012) focus primarily on the performance dimension in arriving at a judgment about success and failure of private sector involvement. Furthermore, their aim is not analysis of all dimensions of sustainability but to focus primarily on the economics involving the private sector. The performance or operational side is termed as successful based on the researcher's discretion to comment on just one aspect without a much deeper analysis, for example, focusing on collection of waste rather than its storage or disposal attributes.

Post, Broekama & Obirih-OPAREH (2003, p. 837) consider service efficiency and service effectiveness as criteria for primary assessment, the former being largely economic and measured in terms of cost savings while service efficiency is judged by using indicators to measure quality and accessibility of the service. The indicators that are used to evaluate the

select criteria are reliability, frequency, type of collection and spatial coverage. Post, Brokema & Obirih-OPAREH (2003) also mention that research in privatised service delivery tends to ignore the *transaction costs*, i.e. the additional costs incurred by the authorities for contract management and performance monitoring. Scant attention has also been paid to impacts on labour conditions as well as the environmental impacts, which are *virtually absent* from the assessments (Post, Brokema & Obirih-OPAREH, 2003, p. 837).

Another framework that can be used to derive criteria and indicators for evaluating the impact of private sector participation in MSW operations is the performance monitoring measures outlined by Cointreau-Levine & Gopalan (2000, pp. 6-11). The authors emphasise choice of criteria and indicators pertaining to operational efficiency in particular, followed by economic and social criteria wherein the institutional context is not taken as a criterion. The framework is not prepared or arranged for a sustainability analysis, however, from the point of view of performance evaluation, the framework is reasonably inclusive.

Amongst the frameworks specific to impact evaluation pertaining to privatised operations in MSW management, Dorvil's (2007) research is one of the main references as having attempted to develop a framework to measure sustainability outcomes in privatised operations. Dorvil (2007, p.174) has used the hierarchy principle, polluters pay principle, continuity principle, effectiveness, equity and efficiency as the criteria for measuring integrated sustainable solid waste management. In terms of institutional aspects, Dorvil uses asymmetric information, principal-agent dilemma and organisational theory to evaluate the satisfaction levels of the public and private sector and conflict management. However, the shortcoming of Dorvil's framework is that it lacks comprehensiveness to evaluate privatisation impacts, for instance, the social aspect is not given consideration. It ignores stakeholders such as the informal waste pickers in MSW management processes. Details of the criteria are also lacking. For example, within the context of economic efficiency, cost under municipal administration versus cost of privatised operations is a sole indicator, wherein other important indicators, such as labour and vehicle productivity, are excluded. The indicators pertaining to the criteria, for instance, the hierarchy principle, are also inadequately developed to judge the impacts related to operational and environmental effectiveness.

Within the context of the theoretical frameworks pertaining to MSW management, the ISWM, i.e. the concept of Integrated Sustainable Waste Management, is suitable for consideration and adjustment to the framework devised specifically for the case study. The main reason that can be cited in support of this is that it has been developed specifically for consideration and adoption in the context of developing countries. The ISWM framework gives due regard to stakeholders, waste system elements and technical, environmental, economic, socio-cultural, institutional and policy/legal/political aspects influencing MSW management. ISWM is flexible to being developed further as per requirements of case specific areas and also emphasises the waste management hierarchy as the base for sustainable MSW management. It also suggests performance measure indicators to evaluate MSW management and the same has been given due consideration to arrive at a specific sustainability assessment framework in the case study context.

Specific to the Indian context, the Ministry of Urban Development (MoUD, 2010, pp.40-41, MoUD, 2011, p.1) has listed a set of eight performance indicators as service level benchmarks to primarily evaluate municipal or privatised performance in MSW management. The service level benchmarks have been made in line with the compliance criteria as per the *MSW Rules, 2000* (MoEF, 2000), specified by the government of India as the policy for managing MSW in the country. The benchmarks are listed in Table 6.

Table 6 MSW performance benchmarks

Service benchmarks	coverage
Household level coverage	100%
Extent of segregation of waste	100%
Efficiency of collection of solid waste	100%
Extent of MSW recovery	80%
Extent of cost recovery	100%
Efficiency in user complaint redressal	100%
Efficiency in collection of user charges	90%
Extent of scientific disposal of waste	100%

Source: MoUD (2010, pp.40-41), MoUD (2011, p.1)

However, the benchmarks do not go beyond evaluating the operational and broad economic efficiency and completely ignore the social side of MSW operational, as well as the institutional and inter-organisational, aspects. As a result, they do not provide a comprehensive framework for conducting an assessment of privatised operations in MSW, but are a good reference point to derive and elaborate upon the given framework. Also the

norms given in the service level benchmarks are useful to assess the indicators against a standard measure and are given consideration while preparing the framework for this piece of research.

The discussion above gives valid insights into the research on private sector participation in MSW so far and serves as an important source to base the choice of specific criteria and indicators. The criteria and indicators used by other researches provide a reference point to cross check the validity of criteria and indicators that could be chosen and in that matter establish their relevance in the context of the research question. However, the frameworks used in prior research are not specifically designed to assess all four dimensions of sustainability and this mandates the need and preparation of a sustainability assessment framework, drawing inputs from the discussion so far.

2.8 Sustainability assessment framework for case study evaluation

The previous sections of the literature review laid the grounds for the construction of a sustainability assessment framework specific to private sector participation in MSW. The insights derived from this review set the ground for building the specific framework, as detailed in this section.

Based on the understandings generated by theoretical deliberations and also a systematic evaluation of the performance domain frameworks applying to privatised models cutting across theory and actual service delivery sectors (such as telecommunications, water, public health and MSW), a sustainability assessment framework for case study evaluation is derived. The researcher uses the findings from the literature review to establish strong and valid criteria and indicators in relation to the subject under investigation. While all references mentioned have made direct or indirect contributions to aligning the researcher towards making relevant derivations pertinent to the subject under question, of larger importance have been the works of Cointreau-Levine & Gopalan (2000), MoUD (2010), Hodge (1999), Dorvil (2007), Kessler & Alexander (2005), Martin (2001), Cook & Kirkpatrick (2003), and Barrows et al. (2011).

While researchers such as Hodge (1999) and Barrows et al. (2011) illustrate frameworks for the assessment of privatisation in general and governance of contractual relations and

evaluation of PPPs in the health sector respectively, Dorvil (2007), Cointreau-Levine & Gopalan (2000) and MoUD (2010) focus more specifically on privatised operations in MSW service delivery. The framework is prepared by establishing the four dimensions of the sustainability prism as the domains within which the criteria and indicators are set. The framework is comprehensive and adequate care is taken to ensure that pertinent criteria and indicators are not missed out. In order to do this, a multiple verification (triangulation) using the works of other researchers as mentioned, both generic and specific to the context of MSW, is analysed. The criteria to evaluate the sustainability dimensions of environment, social and economic impacts are derived from both generic and specific research on private sector participation in MSW; the context of inter-organisational relationships is embedded in the theory of neo-institutionalism. The cue towards the same is taken from the works of Dorvil (2007), Sahoo (2006), Barrows et al. (2011), Walsh (1995) and Nee (2003) and has been deliberated upon in the following section to gain further clarity on its theory and application.

2.9 Neo-institutionalism and evaluation of inter-organisational relationships

In order to evaluate the impacts of privatised operations in MSW management within the institutional dimension of the sustainability prism, it is envisaged to evaluate inter-organisational relationships as one of the criteria. The assumption is that inter-organisational relationships have a significant impact on the working and sustainability of the venture that brings two sectors, the public and private, together into a working partnership. The judgment of inter-organisational relationships is grounded in the theory of neo-institutionalism¹⁹ which emphasises the fundamental importance of institutions for decision making and policy implementation and a complex network of relationship between these institutions that leads to particular outcomes (Nee, 2003, Pereira, n.d.). Royer (1999, cited in Barrows et al., 2011, p.36) highlights that the advantage of using neo-institutionalism theories is that they “focus on sociology of institutions and take into consideration the context of outcomes rather than the profit-maximizing behaviour of neo-

¹⁹The rise of neo-institutionalism is attributed to the dissatisfaction with neo-classical economics in the works of Veblen, Commons, Gurchy, Veblen and Myrdal, but largely established through the seminal works of Coase (Problems of Social Cost, 1960). It also came to be known as NIE or Neo-Institutionalism Economics and is considered an extension of neo-classical economics, while trying to explain the role of institutions that the former had neglected (Sahoo, 2006, p.2).

classical economics. They focus on the environment in which decisions are made and the social and political constraints and requirements that are super imposed on pure market forces.” Barrows et al. (2011, p.36) further elaborate that the sociology of institutions encompasses matters of organisational design, commitments, governance, values, norms and also perceptions. As such, institutions and inter-organisational matters can be evaluated using neo-institutionalism grounded theoretical perspectives, such as the agency theory and transaction costs. He regards them as highly applicable, especially in evaluating PPPs, and as useful to “examine why theoretical outcomes with regard to PPPs are not always realized in practice.” Scott (1987, cited in Barrows et al., 2011, p.37) argues that new forms of institutional arrangements such as PPPs can be considered a distinct societal sphere as they represent a unique institutional arrangement and can be evaluated within the context of transaction costs and agency theory.

2.9.1 Agency theory

The operational mechanisms of organisations and institutional arrangements can be viewed and analysed from several perspectives, such as a bureaucracy with its rules, authority and hierarchy, or a community with its values, relationships and networks, or as a market with its incentives and prices from independent buyers and sellers (Hodge, 1999, p.38). Built on the dynamics of the standard market model, one could then view the delivery of services through an organisation of contracts wherein the owners of the company are not the managers and therefore the issue of ownership is separated from control. In such cases, the principal (as the public sector institution) enters into a contract with the agent (private sector) for delivery of services wherein the agent agrees to deliver the services in an appropriate manner for an agreed amount (Hodge, 1999, p.38).

Agency theory focuses on the complexities arising when the agent carries out work on behalf of the principal and their interests do not necessarily coincide (Ross, 1973, cited in Walsh, 1995, p.36). Where there is perfect free information then there is little difficulty because the principal will be able to monitor the agent’s performance and design an effective set of sanctions and incentives. Failures in performance and the reasons for failure will be instantly and accurately observable. Without perfect information there will be monitoring impediments. The principal may also not be able to tell whether or not there has

been a failure or whether the failure is a result of the actions of the agent. Failure to adequately perform may be due to unforeseen or unforeseeable problems, but it may equally result from the opportunistic actions of the agent, for example shirking at the cost of the principal's interests. According to Gould (2007, p.18), in the ambit of agency theory, both the principal and agent, are seen as *rational utility maximisers*, seeking to advance their own goals.

Walsh (1995, p.37) mentions that in order to be effective, the contract between the principal and agent needs to distribute the risk between them in a mutually acceptable manner. In case there is failure of the principal to monitor the behaviour of the agent, it will result in problems of risk distribution whereby either the principal or the agent will be totally able to dominate the relationship and have the capacity to *hold up* the other. Hill & Jones (2007 cited in Barrows et al. 2011, p.42) thereby opine that it is important that the arrangements between agents and principal reflect adequate and appropriate risk sharing mechanisms and also efficiently organise information in order to minimise problems resulting from asymmetrical information.

2.9.2 Information asymmetry

Rational choice institutionalism argues that actors use institutions to maximise their utility. It explains the creation of institutional relationships to reduce the transaction costs of collective activity, which would be much higher without such institutions. It assumes that actors within the institutional settings have a fixed set of preferences and in order to maximise them, the actors behave the way they do, based on foresight and cost-benefit analysis. The institutional environment provides information and enforcement mechanisms that reduce uncertainty for each actor about the corresponding behaviour of others (Nee, 2003, p.7; Periera, n.d, p.53; Sahoo, 2006, p.4). However, problems can occur due to the information asymmetry phenomenon wherein one key actor involved in the transaction has information not known to the other. Information asymmetry and uncertainty make commitments to agreements difficult to secure, wherein the actors may act in an opportunistic manner and lead to negative outcomes of the agreement. Usually information asymmetry is embedded in relations such as that between the principal (public sector) and the agent (private sector), as underpinned by the agency theory discussed above.

2.9.3 Transaction costs theory

The core concept of institutionalism is transaction cost which refers to the cost of negotiating, securing, and completing transactions in a market economy (Nee, 2003; Sahoo, 2006). Transaction costs include the cost of negotiating a contract, policing contract enforcement and administering a contract that is related to the exchange of goods and services traded, such as the expenses of a lawyer, chartered accountant, police and other administration costs. *Transaction cost theory*, developed by Williamson (1975, cited in Schepper, Haezendonck & Doooms, 2015, p.933), implies that imperfect information allows parties to a contract to operate in an opportunistic manner by exploiting information asymmetry and is thereby blamed as the main reason for transaction costs to accrue.

In a scenario where information is perfect and the exchange is instant and occurs frequently, transaction cost would not be high, but when information regarding the future behaviour of the parties involved in the exchange is not clearly known, institutions may incur a transaction cost (Saboo, 2006). Usually institutions try to reduce transaction costs, but there could be situations where transaction costs rise to the point of causing an operational crisis. This could lead to the failure of the privatised operations. However, when contracts are subject to a transactional analysis and if appropriately constructed, they can lead to lowering of transaction costs (Royer, 1999, cited in Barrows et al. 2011). In reality, ideal contracts are difficult to create due to the limitations of bounded rationality wherein both the parties cannot foresee all potential negative events or agree on all possible recourses.

The above discussion shows that agency theory, information asymmetry, and transaction costs are highly co-related, as well as appearing in principle to lead to a suitable understanding of the theory behind inter-organisational relationships that can lead to measuring particular impacts in sustainability outcomes of privatised operations in MSW. As such, the same are adopted to evaluate the inter-organisational angle as part of the institutional dimension of the sustainability assessment framework.

2.10 Sustainability assessment framework

In line with the key characteristic of a sustainability assessment framework to enable in-depth analysis, an assessment framework has been designed for evaluating privatised operations in MSW management. The strength of the framework lies in its clear demarcation of four sustainability dimensions, assigning a goal²⁰ for each and adding detailed and relevant criteria and indicators to measure impacts on each of the dimensions. The framework can serve as a one stop comprehensive tool for analysis of privatised services in MSW and is replicable, especially in the context of developing countries, and can also be amended or improvised to suit other situations.

In terms of the *social dimension*, most of the assessment frameworks of privatised service delivery have completely ignored the same, whereas it can be considered significant in measuring the quality of life impacts on all stakeholders in the operations. This framework gives due consideration to issues of spatial equity (pertaining to privatised operations in the affluent and poorer areas of the city), the impacts on the informal waste sector, public sector sanitation employees and the working conditions of the private company employees. The informal sector is an important stakeholder, as recycling in most developing countries is undertaken by this sector, but it does not find its due place in any of the frameworks examined. Privatised waste management services can have significant impacts on municipal sanitation employees in the transition to privatisation of MSW services. Also, the working environment of the employees of the private sector company can often lead to a situation of exploitation and conflict that could mar the overall sustainability of the operations. In addition, the community is an important stakeholder and its participation in sustainable MSW, as well as satisfaction with privatised service, both constitute elements of the sustainability assessment framework.

In context of the *economic dimension*, the efficiency achieved in contracting out MSW services is perhaps the single most important driver behind MSW privatisation. The rationale of privatisation is based mainly on the economic benefits it is perceived to bring to the key stakeholders (public and private sector) as well as creating an environment of

²⁰Drawn from the ISWM framework (Klundert & Anschutz, 2001, p.12)

competition to reduce costs to the beneficiaries. In addition, labour and vehicle productivity also contribute to economic efficiency and as such have been included in the framework.

The *environmental dimension* looks at the entire gamut of MSW sustainability, measuring the effectiveness of the privatised operations from waste storage, its segregation, collection and transportation, treatment and disposal. The hierarchy principle encompassing *reduce, reuse, recycle and recover* serves as the underlying base for detailing out indicators in this dimension. At the same time, due attention is given to the spatial coverage of secondary storage facilities, regularity of the service, as well as the nature of the infrastructure deployed in the operations.

The making or breaking of a privatisation structure and operations depends upon the pre-requisites framework and the contract design as a prelude to the entire process, all of which form a part of the *institutional dimension*. The proposed framework elaborates on the pre-requisites for private sector participation in MSW management and serves as a format for evaluating the contract. In addition, the issue of contract changes post-privatisation and the inter-organisational relationships underlying the success and sustainability of privatised operations are also included in the framework.

Table 7 Sustainability dimensions, criteria and sources

Sustainability Dimension	Criteria	Sources of criteria derivation
Social	<ol style="list-style-type: none"> 1. Equity 2. Impact on stakeholders <ol style="list-style-type: none"> i. Informal sector ii. Public sector MSW employees iii. Private sector MSW employees iv. Community 	Hodge,1999, Barrows et al. 2011, Bayliss & Kessler, 2006, Koppenjan & Enserink, 2009, Samson, 2010, Samson, 2003, Cointreau-Levine & Gopalan, 2000, Cook & Kirkpatrick, 2005
Economic	<ol style="list-style-type: none"> 1. Economic efficiency 2. Labour productivity 3. Vehicle productivity 	Hodge, 1999, Dorvil, 2007, Cointreau-Levine & Coad,2000, Cointreau-Levine & Gopalan,2000, Barrows et al. 2011, Bartone et al. 1991 Post, Broekama & Obirih-OPAREH, 2003, Martin, 2001, Cook & Kirkpatrick, 2005
Environmental	<ol style="list-style-type: none"> 1. Storage effectiveness and waste segregation 2. Collection effectiveness 3. Treatment and disposal effectiveness 	Cointreau-Levine & Gopalan, 2000; Dorvil, 2007; Weizsacker et al. 2005; Batley, 2001; Martin, 2001; MoUD, 2010
Institutional	<ol style="list-style-type: none"> 1. Initial contract setting (pre-requisites framework) 2. Impact on contractual setting 3. Inter-organisational relationships 	Hodge, 1999, Martin, 2001, Barrows et al. 2011, Dorvil, 2007, Post, Broekema & Obirih-OPAREH, 2003

The table 7 presents the four sustainability dimensions based upon the sustainability prism and the major criteria as derived through triangulation from theoretical and empirical literature sources.

2.11 Conclusions

The journey through the wasteland elicits some lucid revelations into various facets of MSW and its management through the lens of theory and contemporary debates. The discussion has been useful to understand the context of MSW from all theoretical perspectives and provides an ample backdrop to situate the research within the understandings of what comprises MSW and contemporary approaches to its management.

The section on the generic context of private sector participation, in retrospect, has thrown light on various aspects of private sector involvement wherein its recent favour is attributed to the rise of the global macro-economic neo-liberal paradigms, leading to its adoption worldwide and arriving at a point where rolling back to the public sector service delivery mechanisms seems highly unlikely, if not impossible.

The review of the literature cleared the mist on the usage of terminologies such as privatisation, private sector participation and PPP. It is also deduced from the review that the three terms are used interchangeably in the literature. The term privatisation by itself is not used to convey its actual meaning of full privatisation, but finds usage as an umbrella term to convey forms of privatisation as PPP which involve part privatisation and also full privatisation as divestiture. The term PPP is most widely used in the context of delivery of public services in developing countries, whereas the aid institutions such as the World Bank use private sector participation to indicate contracting of the private sector. In sync with these understandings, the terms privatised operations, privatised service delivery or private sector participation are used interchangeably, whereas the term PPP is referred only in context of the actual contract specifications.

The term privatisation is used as an umbrella term to convey a reference to private sector involvement without specifying the actual form in the generic sense. Further, the arguments of high efficiency and productivity have ensured that private sector participation is seen almost as a panacea for all the ills that ever existed within public sector operations.

However, the fact that the same has not lived up to its promise is evident from a body of literature that is emerging to challenge the claims of the privatisation proponents by highlighting its pitfalls, especially towards issues surrounding distributional impacts, social outfalls and sub-optimal delivery of public services.

The section specific to MSW has elucidated the context of private sector participation in MSW through theoretical and empirical perusal of literature. While privatised operations are preferred in MSW, a set of pre-requisites is necessary to ensure their smooth operation, or else a poorly structured private sector involvement might lead to adverse impacts and outfalls. Therefore, it can be emphasised herein that for an impact evaluation study to be conducted, the analytical framework should also consider the pre-requisite settings governing the operation of the contract between the private and the public sector. Also, the review of literature on the implications of privatised operations in MSW management throws up a myriad picture of empirical observations, presenting a mixed image of the performance of the private sector, while it also reveals the lack of a comprehensive and robust framework to deduce rational impact evaluations, and this can be highlighted as a gap in the review accounts presented herein. The reviews present directives into areas to be examined and create fertile ground for the researcher to assume safe directions while constructing frameworks for the case study analysis.

In summary, it may be concluded that the impact evaluation literature on private sector involvement in MSW is not adequately developed or widely researched as a subject of critical importance towards documenting detailed experiences covering all major impacts of private sector participation in MSW management and especially in the developing country scenarios. By attempting to undertake this research, the researcher hopes to fill some of the research gap that the literature review reveals, particularly in the Indian context.

The section on sustainability underscored the need for conducting sustainability assessments in general and specific to MSW through the use of four sustainability dimensions, as seen in the sustainability prism, i.e. social, economic, environmental and institutional. Sustainability as a base is taken to ensure that the criteria emerging from the analysis of privatisation in general and specifically towards private sector involvement in MSW are well aligned with the goals of sustainability across the four dimensions. An

insight into the assessment measures applied in empirical cases, pertaining to both generic and private sector participation in MSW in particular, set the base for validating and zeroing in on the choice of criteria and indicators to be used in the case study analysis, and also for drawing up the comprehensive sustainability assessment framework for private sector participation in MSW management presented in the next chapter. The framework also helps to establish a boundary for data identification and collection by the researcher and serves as the guiding beacon for the core query of this research to be answered.

Chapter III

Research Design and Methods

“Waste is a terrible thing to mind”

(Weingart, 2007)

3.0 Introduction

The previous chapters have built a foundation grounded in theory and empirical dimensions of the subject matter of private participation in municipal solid waste management. Sifting through the body of literature led the researcher to construct a sustainability framework through which the evaluation of private participation in municipal solid waste management takes place. While the framework has been developed for evaluation of private sector participation in municipal solid waste management, of critical importance is the methodology that is employed therein to gather data and garner information; its fine grained analysis determines the outcome of this research. This brings to the fore the need to ensure that the research is underpinned by conceptual rigour and clarity and the issue under research attains its most desirable outcomes through appropriate choice of research methodology.

Before advancing further in devising a specific research methodology pertinent to the research, it is important to revisit the research question once again with the purpose of aligning the methodology with its core query.

3.1 Revisiting the key research question

Outlined in Chapter I, the key research question that is answered through this research project is:

‘Does private sector participation contribute to sustainable municipal solid waste management?’

The research question has been set in the context of the backdrop outlined in Chapter I and it is supported by a working hypothesis and sub-questions:

- What are the prevailing understandings and components of the theoretical concepts and debates worldwide regarding sustainable municipal solid waste management?
- What are the prevailing private sector participation debates in their theoretical and empirical settings and what have been their impacts so far?
- What are the mechanisms of private sector participation in municipal solid waste management and what are their impacts?
- What are the dimensions of sustainability and how can these be holistically addressed through appropriate choice of sustainability assessment criteria and indicators in general and specifically in the case of private sector participation in MSW?
- How does the private sector perform when evaluated through the sustainability assessment framework and what factors contribute to the positive or adverse implications of private sector participation in sustainable MSW management?

The first three sub-questions directed the literature review to strain the relevant information towards exploring the realm of contemporary knowledge in the sphere of MSW and private sector participation in MSW specifically.

This information established the base for creating the sustainability assessment framework that holds the key to answering the research question. Sub-question four generated insights into the issues of sustainability and its dimensions and set the base for drawing the sustainability assessment framework applying sustainability dimensions therein. It also investigated the use of criteria/indicators in privatised MSW operations specifically with the purpose of zeroing in on their choice in the constructed framework. The fifth sub-question then seeks the application of the sustainability assessment framework to the chosen case study with the purpose of finding the answer to the key question under investigation.

The research methodology thereby follows the specific procedure as outlined in Figure 10.

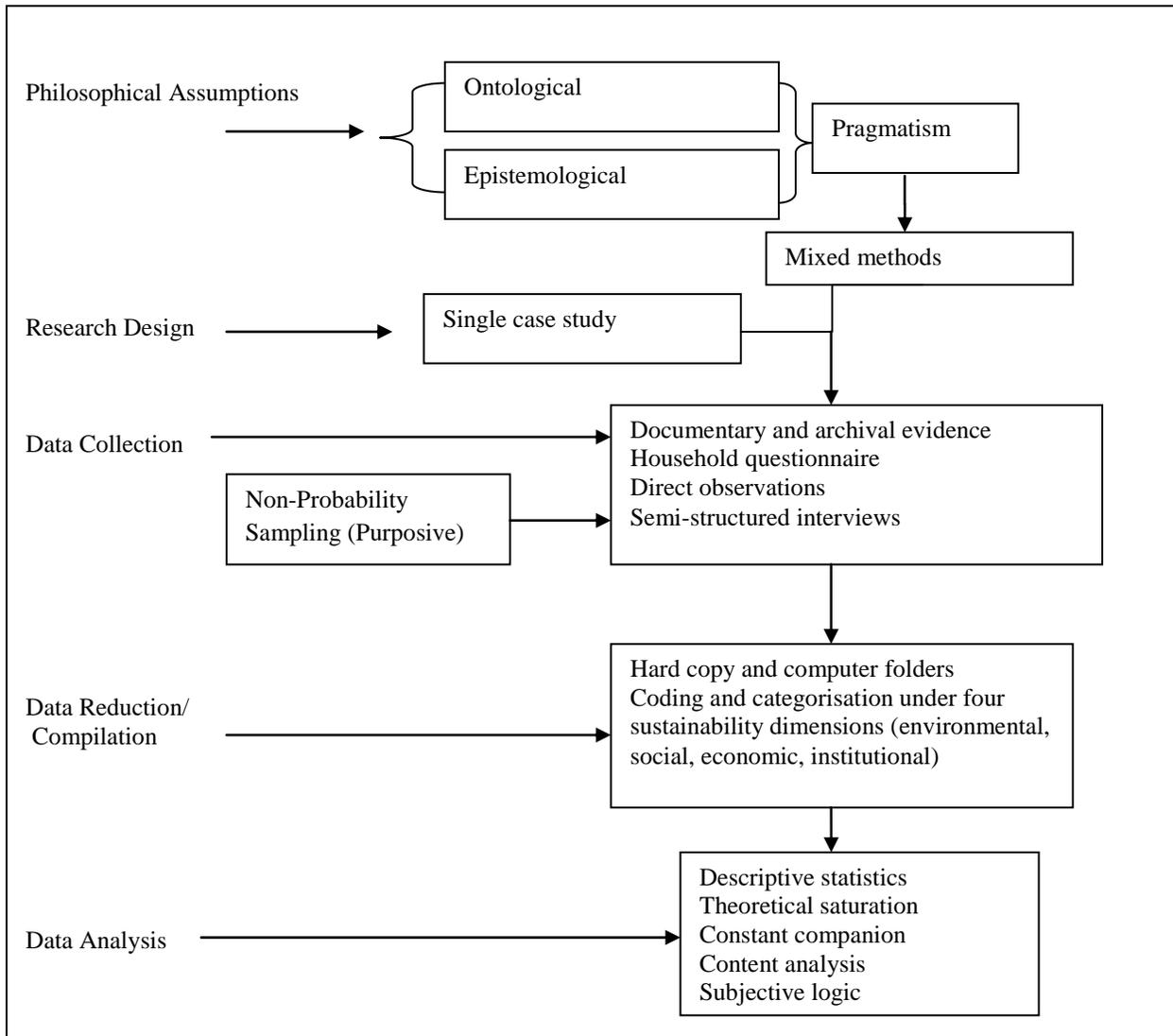


Figure 10 Specific research procedure

3.2 The sustainability assessment framework for research

The research synthesis of the sustainability assessment framework in the previous chapter underscored the need for conducting a sustainability assessment in general and specific to MSW through the four sustainability dimensions as seen in the sustainability prism i.e. social, economic, environmental, and institutional. Carrying forward from the framework outlines devised in the previous chapter, a comprehensive sustainability assessment framework was designed to guide the research both systematically and inclusive of the components required to answer the key research question. The four dimensions pertain to the sustainability prism, while the goals are derived from the ISWM frameworks (Chapter

II). The assessment measures applied in empirical cases in particular set the base for validating and zeroing in on the choice of criteria and indicators for developing the sustainability assessment framework. Since none of these studies used a comprehensive assessment framework pertaining to all four dimensions of sustainability, a pre-constructed prototype framework could not be used herein and thus the need to derive and tailor a specific framework, as elaborated in Table 8.

Since the impact evaluation pertains to the privatised operations in MSW management, in that sense it constitutes the boundary of the comprehensive sustainability assessment framework designed herein. The application of the sustainability framework enables a wider and deeper reflexive interface to surface through its application in a case study pertaining to private sector participation in municipal solid waste management.

Table 8 Sustainability assessment framework for assessing private sector participation in MSW management

Sustainability Dimension: SOCIAL	
Goal: The system must provide equally accessible services to all citizens and spaces wherein stakeholders must not be adversely impacted from MSW management operations in private sector participation.	
Assessment criteria	Indicators
Impact on stakeholders: informal sector	Local government policy towards informal waste sector integration in privatised MSW operations. Impact on access to waste Impact on income Impact on relation with other stakeholders
Impact on stakeholders: public sector MSW employees	Employee layoff and retrenchment Impact on employee income Absorption of contract workers by the private operator Transfer/adjustment in alternate municipal departments Freeze on municipal recruitments Impact on working conditions Impacts on sanitary union post-privatisation
Impact on stakeholders: private sector MSW employees	Employee wages and service benefits Labour turnover and downsizing Provision of safety gear Working conditions Termination procedures in the event of suspending operations
Impact on stakeholders: community	Level of community satisfaction with storage and collection system Number and nature of awareness programmes conducted with community participation Community complaints and their redressal mechanism Community involvement in source segregation
Equity	Service coverage in privatised zones in terms of households receiving door to door service Secondary waste collection accessibility to households

Sustainability Dimension: ECONOMIC

Goal: The system must be affordable for the users and also financially viable for the municipality and the private service provider.

Assessment criteria	Indicators
Economic efficiency	Productive efficiency- extent of cost saving for municipality under privatised services in comparison to previous incurred costs on MSW operations. Cost recovery and profit to the private sector vis-a-vis investment into MSW operations. Allocative efficiency- application of user pay charges and revenues collected from. Implicit factors (knowledge of waste quantum, timely and complete payment of tipping fees, tipping environment at landfill, collusionary practices, competition and contestability)
Labour productivity	Amount of waste collected and clearance per worker Number of workers in service Strike downs Implicit factors (turnovers and strike downs, labour downsizing, worker skills and experience)
Vehicle productivity	Number of vehicles in service Waste quantity per vehicle per day Types of vehicles deployed Vehicle trip rate optimisation. Implicit factors (vehicle routing, downtime, vehicle quality and maintenance, excess load, off load time, fill loss)

Sustainability Dimension: ENVIRONMENTAL

Goal: Efficiency of the MSW systems elements in conjunction with the waste hierarchy principle

Assessment Criteria	Indicators
Waste generation	Efforts at source reduction
Storage and waste segregation	Primary waste storage and segregation at source. Secondary waste storage and segregation Provision and placement for segregated secondary waste storage, biodegradable, recyclable, other disposables Storage provisions of hazardous waste and inert debris covered/open containers Placement and provision of secondary containers as per norms Maintenance condition of containers Capacity of secondary containers vis-a-vis waste generation
Collection and transport effectiveness	Door to door collection of MSW Regularity/frequency of collection service door to door Number, type and condition (age/quality) of vehicles used in collection service Covered/uncovered vehicle operations Safety practices in waste loading (manual/mechanical)
Treatment and disposal effectiveness	Extent of MSW recycled/ recovered Technological option used in MSW treatment Environmental impact of the technological option Location of landfill; technical design and compliance of the landfill to requirement Landfill facilities and environment controls at landfill site; Site entrance and fencing, presence of green buffer around landfill, weighing facility, administration and site control offices, access roads, waste inspection and sampling facility, equipment types, workshop and garages, waste acceptance norms, closure and post closure plans, pollution prevention during operations, provision of birds/rodent control, landfill fire management, equipment emission reporting, leachate and gas monitoring, daily compaction and soil cover.
Environmental/ & occupational risk	Environmental health risk from MSW Occupational risk to workers in MSW management (handling and use of safety gear)

Sustainability Dimension: INSTITUTIONAL	
Goal: Institutional coherence and smooth inter-organisational relations between public and private sectors backed by appropriate policy frameworks to ensure sustainable municipal operations.	
Assessment Criteria	Indicators
Initial contract setting (pre-requisites framework)	Appropriate regulatory and policy framework: Adequate public sector institutional capacity Adequate private sector capacity Political commitment and support Stakeholder support mechanism Technical and fiscal clarity
Key contract specifications	Risk allocation-maintenance and repair risk, volume risk, payment risk, financial risk, environmental health and safety risk, terminal risk Dispute resolving procedures Adherence to sustainable waste management Optimal timeframe for operations Provision for contract amendment Performance requirements for waste system elements Mechanism for review and monitoring Provision for including key stakeholders Provision for appropriate labour welfare Service disruption and termination modalities Fiscal and tariff provisions
Inter-organisational relationships	Principal-agent impasse (agency theory) Information asymmetries Transaction costs theory Mutual institutional capacity building and knowledge transfer

Source: constructed by the researcher with inputs from literature review

While the sustainability assessment framework sets the ground for the research canvas, the next logical step is to establish the scientific paradigm to guide data collection and analysis pertaining to the criteria and indicators in the sustainability assessment framework.

3.3 Of ontological and epistemological premises: detangling the paradigm web

Research, whether qualitative or quantitative, is based upon a set of principles that provide a foundation to the methods and drive their application (Gelo, 2012, p.212). These principles are considered to be organised in scientific paradigms reflected through the beliefs, values and assumptions around ontological and epistemological premises. “While research methods define the what and the how of empirical research, scientific paradigms provide the way of scientific inquiry” (Gelo, 2012, p.212), providing it with basic philosophical foundations of *ontology*, i.e. what is there to know, and *epistemology*, i.e. how can it be known. In other words, ontologies are constructed around the nature of reality and epistemology around the nature of knowledge. Both lead to a choice of a paradigm that

grounds the formulation of methodology in terms of how to find out what one is looking for and what data may lead to that.

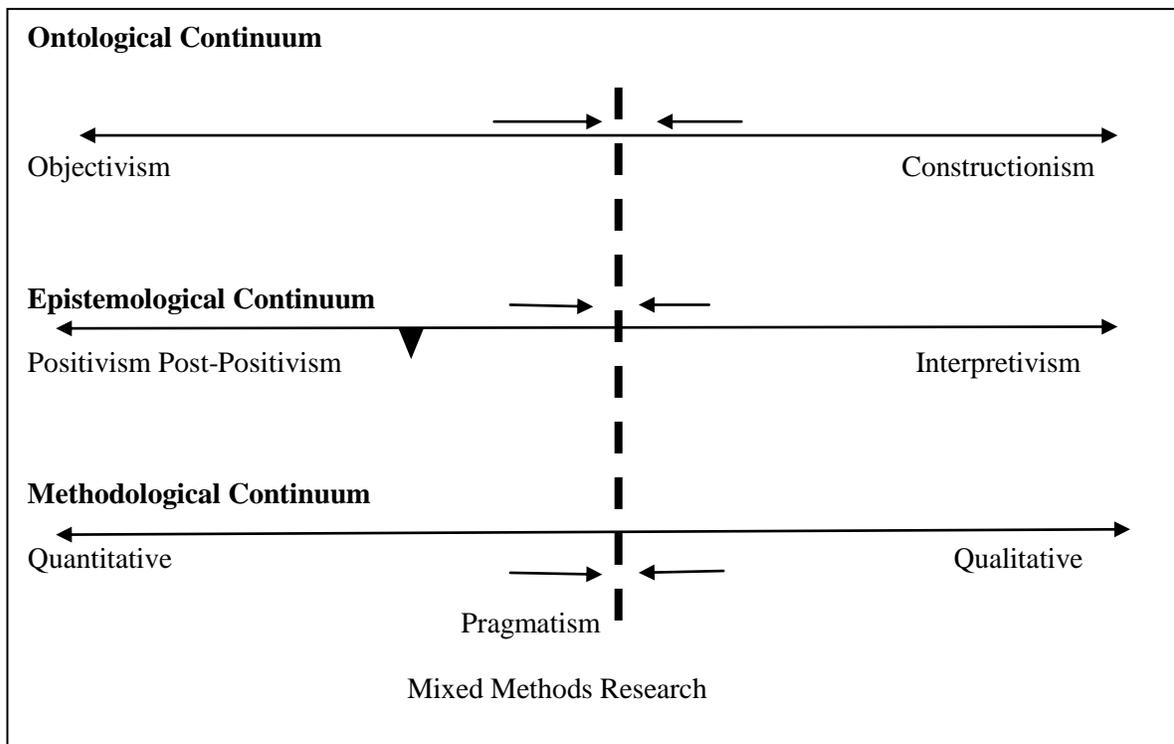
The *realist* or *objectivism ontologist* positions subscribe to the view that the real world exists independently and is made of objects and structures that have identifiable cause and effect relationships. The social world, just like the natural world, is marked by causal relationships between variables that can be identified, proven, predicted or even controlled (Biber & Leavy, 2006, p.13). The quantitative research methods fall within this domain of ontology and epistemology. On the opposite scale stands the *relativist ontology* that rejects objectivity, maintaining that the world is unstructured and very diverse, in contrast to what is assumed by the realists (Kings & Harrocks, 2010, p.9). As such, subjectivity in research is recognised by the relativists and is manifested in the form of qualitative approaches to social science research, grounded in interpretivist epistemological assumptions.

3.3.1 Putting research in perspective: assuming a position

Within the theoretical canvas summarised above and, specifically, in the context of this research on private sector participation in MSW management, my own ontological premise is that an objective reality does exist in its independent domain and is reflected in scientific evidence, such as the total amount of municipal solid waste being generated or the land space being occupied by landfills. At the same time, I also accept that subjectivity in terms of the researcher's own interpretation and that of the social subjects under study are intrinsic to MSW management research which involves dealing with the opinions and views of stakeholders, and their perception of the truth leads to the creation of constructs, patterned and structured by the researcher to produce knowledge.

Going back, the researcher developed the sustainability framework without aligning herself with purist ontology or epistemology to enable a pragmatic or a common sense approach to determine what could be a viable framework to research the issue in question. After developing the sustainability framework for case study evaluation, the researcher has positioned herself with a scientific paradigm that falls midway between the extremes of objectivity and subjectivity, moving a step forward from post-positivism to the *pragmatic ontological-epistemological premise*, as Figure 11 indicates. The philosophical grounding of pragmatism is rooted in the view put forth by Popper (1979, p.153 cited in Guthrie,

2010, p.44) considering a common sense scientific start point of realism, accepting that the real world exists, even if this cannot be demonstrated or even be refuted.



Source: inspired by Jean, n.d

As such, the implication of this understanding is that “there is no reason to assume that the use of a particular research technique necessarily locks the researcher into its conventional assumptions because there is no need to be locked into such assumptions at all” (Guthrie, 2010, p.44). The philosophy of pragmatism views knowledge as useful in terms of its practical effect and, from this perspective, the real value of research methodologies lies in their usefulness in engaging with the real world. Therefore, the pragmatic start point is the research issue. The research issue in fact defines and implies the data that needs to be collected, which then leads to the data collection techniques and use of appropriate in sync methodology (Guthrie, 2010, p.45).

A combination of research methods and their relative strengths can enable a researcher to address important questions and hereby enhance and enrich knowledge that, in all probability, the singular applied studies are unable to do (Currell & Towler, 2003, p.524, cited in Pansiri, 2005, p.193). As such, pragmatism combines the logic of inquiry in terms

of *induction* (discovery of patterns), *deduction* (testing of hypothesis or theory) and *abduction* (uncovering and relying on the best of a set of explanations for understanding one's results (Johnson & Onwuegbuzie, 2004, p.17).

The researcher herein chooses to agree with Armitage (2007, p.6) when he argues that the human mind can see “beyond the metaphysical divide” between the qualitative and quantitative approaches. My own belief is that mixed methods enable intellectual flexibility and allow for processing research without compartmentalising the human mind and thereby the flexibility to choose the most viable method from either of the two approaches.

In the context of this specific research, the researcher takes a rather eclectic line of thought by adopting a mixed methods approach and seeking to draw from both traditions, as demanded by the sustainability framework constructed for application in the case study.

3.4 Research design

Having chosen a scientific paradigm within which the research is positioned, an appropriate research design is of immense significance to situate the research in the empirical world and, more significantly, to connect the key research question to the data to be collected (Punch, 1998, p.141). Research design provides a framework for the collection and analysis of data and a choice of the same reflects decisions about the priorities assigned to a range of dimensions of the research process, such as expressing causal connections between variables and generalisation of outcomes (Bryman, 2004, p. 27). In the words of Yin (1994, p.19), research design is “an action plan for getting from here to there, where here may be defined as the initial set of questions to be answered and there is some set of conclusions (answers) about these questions”.

3.4.1 A case study as research design

“Clearly one good case can illuminate the working of a social system in a way that services of morphological statement cannot achieve” (Gluckman, 1961, p.9, cited in Mitchell, 2000, p.81). Bryman (2004, p. 34) categories research design into five types,²¹ one of them being the case study design, as entailing the detailed exploration of a specific case. Yin (1994,

²¹ Others being experimental, cross-sectional, longitudinal and comparative design (Bryman, 2004, p.34)

p.13) defines the case study as a comprehensive research strategy comprising an all-encompassing method wherein the logic of design incorporates specific approaches to both data collection and analysis. The basic sign of undertaking a case study, as Punch (1998, p. 144) outlines, is to understand the case in depth in its natural setting and recognise its complexity and context in a holistic dimension. The pertinent question that could be posed at this juncture could be what could be this case, in other words, the unit of observation and analysis.

Going back to the principal research aim of this study, it is to critically examine and generate empirical evidence on the implication of private sector participation in MSW management through the lens of a sustainability assessment framework. In essence, the study seeks to uncover the *if* and *how* of private sector participation in MSW management and its engagement with principles of sustainability. As such, Yin (1994, p.7) highlights that the *how* research questions are more explanatory and lead to the use of research design as the case studies. Essentially, as Punch (1998, p.145) opines, a case study must display four characteristics. First, it must have *boundaries* even if not clearly evident (Punch, 1998, p. 145). Creswell (1998, p. 3) refers to the bounded system as bounded by time and place and it is the *case* under scrutiny. Also the context of the case involves situating it within its physical, social, historical or economic setting.

In this study, the case is bounded both in terms of time and space pertaining to the city of Amritsar as a geographical boundary and a longitudinal time window primarily focusing on the time between 2008 to 2012, coinciding with the private sector operations in municipal solid waste management in the city. The sustainability framework also provides a boundary wherein four domains of analysis i.e. social, economic, environmental and institutional related to private sector operations in MSW management in the city are the subject of scrutiny herein.

The second characteristic is that “the case is a case of something” (Punch, 1998, p. 120). The idea herein is to make the direction and logic of inquiry clear. In this particular research, the focus is on generating empirical evidence towards whether and how the private sector operations in MSW management contribute to sustainability. The

sustainability framework so constructed (table 7) retains the focus on the central theme to be addressed through this case study in the follow up chapters.

Thirdly, as Punch (1998, p.145) states, there must be a deliberate attempt to conserve the case in terms of its holistic dimensions of unity and integrity. In the study in question, the researcher seeks to embrace the uniqueness and specificity of the case by adoption of the logic of inquiry that supersedes bias to the greatest extent possible so that contamination possibilities are minimised at all stages.

Punch (1998, p. 145) says that case study research allows for multiple sources of data and multiple data collection methods in a naturalistic setting. Indeed, the researcher in context has applied mixed methods utilising multiple sources from the quantitative-qualitative continuum to enrich and generate wholesome data to address the research question. Finally, in the words of Stake (2000, p.19), case studies are useful in the study of human affairs because they are “down to earth and attention holding and may be epistemologically in harmony with the research as well as research experienced and may become a natural basis for generalization”.

3.4.2 A single case study

This research entails a single case study as both intrinsic and instrumental in seeking an answer to the key research question. The single case study as the logic of inquiry lays fertile grounds for intensive investigation and analysis, so that all dimensions that hold vital clues and threads may be sighted by the researcher and become a subject of intense scrutiny. Yin (1994, p. 38) underlines three major rationales for selecting a single case study, the first being when the case represents the critical case for testing a theory or a hypothesis or proposition believed to be true. In conjunction with this rationale, the specific research study frames a hypothesis challenging the sustainability assertions surrounding private sector operations in municipal solid waste management. The case study thus aids to either falsify or confirm the hypothesis and whether its assertions are correct.

The second rationale for a single case study is one in which the case represents a *unique* case (Yin, 1994, p.40). From this perspective, the city of Amritsar indeed presents a unique case as one of the important tourist destinations in the country, attracting national and

international tourists. As such, the city administration has been keen to present and showcase the city on a global platform. However, the inadequacies of MSW management have remained a mega problem that was expected to be completely solved by private sector interventions. The city municipality became one of the first in Punjab to enable private sector participation in MSW management. However, no exhaustive research has been conducted specific to the context and all these points made this case study unique for the researcher to engage with.

The third rationale for a single case study is the *revelatory* case (Yin, 1994, p. 40) wherein the researcher has the possibility to observe and investigate a phenomenon that might have previously been inaccessible to scientific investigation. While the context of inaccessibility cannot be held true for the specific research study, what is in sync with the rationale herein is that such kind of previous research to the context of private sector participation in MSW management in general, and specifically in the case of Amritsar city, has not been a focus of investigation. Therefore, this study serves to be a revelatory case allowing for deeper analysis and insights to emanate therein.

3.5 Of reliability and validity

A research design is representative of the logic of inquiry and must be robust and able to meet the context of research quality and rigour. As such, methodologists (Yin, 1994; Bryman, 2004; Biber & Leavey, 2006; Stake, 2000) have been univocal in sensitising researchers to the context of reliability and validity. Researchers on the ontological-epistemological continuum are concerned with validating their research and also ensuring that it meets the criteria of reliability.

Reliability refers to the consistency of a measure of a concept and is judged from the angle of stability, internal reliability and inter-observer consistency (Biber & Leavy, 2006, p. 67; Yin 1994, p. 36; Bryman, 2004, p. 71). This specific research strives to achieve internal consistency by selecting criteria and indicators based on intensive triangulation in the literature review phase to arrive at the most suitable operational framework for conducting this study. It is opined that the developed framework is replicable in the specific-temporal scale but the resulting outcomes would be contextual and, in fact, that is desirable towards robustness of research.

Validity is more concerned with the accuracy and the extent to which a method could provide a trustworthy answer (Gorman & Clayton, 1997, p. 57). Yin (1994, p. 33-36) points to four tests of validity that a research design must be able to meet. To achieve *construct validity*, Yin (1994, p.32) emphasises establishing correct operational measures for the concepts under study by deploying multiple sources of evidence, establishing a chain of evidence and also have the key informants review the draft case study results as part of the data collection and composition phases. Guthrie (2010, p.110) points out that validity can be improved by mixed methods as well as triangulation, both of which are employed in this particular case study to validate and generate suitable evidence. Furthermore, the researcher seeks to enhance the validity by a wide perusal of literature in terms of theoretical and empirical reference and evidence building, data identification, collection and analysis methodologies of other research in the sphere of privatisation and MSW studies.

The test of *internal validity* refers to establishing a causal relationship resulting from the evidence collected as part of the case study. The important issue herein is to reduce inconsistency by ensuring that all rival explanations and possibilities are considered towards convergent evidence. Yin (1994, p.33) suggests the tactical approaches of pattern matching, explanation building and time series analysis in the data collection phase to enhance the internal validity of the research. In the context of the specific research in question, the internal validity is enhanced by considering all possible inferences and explanations emerging from a triangulated data collection and analytical approach wherein the information emerging from interviews is sought to correspond with observational findings and secondary information from documents.

The test of *external validity* seeks to determine whether a study's findings are generalisable beyond the immediate case study (Yin, 1994, p.35). Bryman (2004, p. 77) argues that while external validity on the issue of generalisations beyond the confines of the particular context in which the research was conducted is particularly strong in pure quantitative research, in qualitative settings the generalisation is problematic usually due to small sample sizes. However, Stake (2000, p.22) states that "knowledge is a form of generalization, not scientific induction but naturalistic generalization, arrived at by recognizing the similarities of object and issues in and out of context and by sensing the

natural covariations, of happenings. To generalize this way is to be both intuitive and empirical.”

To this effect, the researcher believes that generalisation is an outcome of tacit knowledge of how things are or why they are, emanating from particularisation (from the case study) and forming a base for natural generalisation, which allows a person not to make assumptions but rather leads to expectations. The study of private sector participation in MSW management, as the researcher perceives, meets the criteria of external validity by offering a rich descriptive and explanatory analysis of the case, using the sustainability framework that has been constructed with replication logic.

3.5.1 Triangulation as a validity tool

Yin (1994, p.91) states that individual sources of evidence are not suitable for conducting case study research. Rather a major strength of case study data collection is the opportunity to use many different sources of evidence and developing converging lines of inquiry. Biber and Leavy (2006, p. 67) add that the process of triangulation can also capture alternative and multiple perspectives on the social reality, which shall provide further richness to the research. Guthrie (2010, p.47) sees triangulation as the key application of mixed methods, and this is used in this research. Triangulation is the internal methodological bearing of this research, beginning at the literature review (to validate view points and derive theoretical-empirical patterns), followed by data, theory and methodological triangulation using both convergent and non-convergent multiple sources of evidence.

3.6 Case study protocol

From Yin’s (1994, p.65) perspective, having a protocol for the case study draws intense focus on the subject under research. Secondly, the preparation of a protocol also forces an investigator to anticipate several problems that might be encountered and such forethought helps to avoid contamination and spuriousness and achieve appropriate outcomes in the long run. Properly designed field procedures are thus essential to maintaining the value and integrity that research demands.

The researcher has already established the case for a mixed methods research methodology as the most suited to address the research question. The literature review has also revealed the usage of largely mixed methods by researchers working in the field of MSW management and privatisation, such as Adam, et al. (2015), Dorvil (2007) and Post, Broekema & Obirih-OPAREH (2003). Using this evidence as substantial support towards the use of mixed methods in this specific research and her own position of pragmatism, the researcher has combined the usage of both methods. Guthrie (2010, p. 46) has also emphasised triangulation as the essence of mixed methods research and this tool is applied in this research to strain all possible data to a point of relative saturation towards addressing the research question. At this juncture the researcher also justifies the use of multiple data sources as revealed in the forthcoming sections for the logic of *closed doors* meaning that there is a possibility when one methodology is applied, it reveals very limited or no information to address the criteria and its select indicators. In such cases, using alternate sources can enable the researcher to access requisite data.

3.7 Methods employed for data collection

Embracing the mixed methods research methodology, the researcher applied the methods based upon careful scrutiny of the same in terms of *what* needs to be answered and *how* it shall be answered. Constant focus on these two questions, underlined by extensive reading on the specific research methods (Yin, 1994; Bryman 2004; Guthrie, 2010; Creswell, 1998; Punch, 1998; Biber & Leavy, 2006; Neuman, 2006; Babbie, 2013), provided the basis for grounding the specific method.

To evaluate private sector participation in MSW management in the case study context, the sustainability framework served as the structure for initiating data collection to target the selected indicators. These indicators provide vital links to evaluate the chosen criteria under the sustainability dimensions (social, economic, environmental and institutional) and link them directly to the research question.

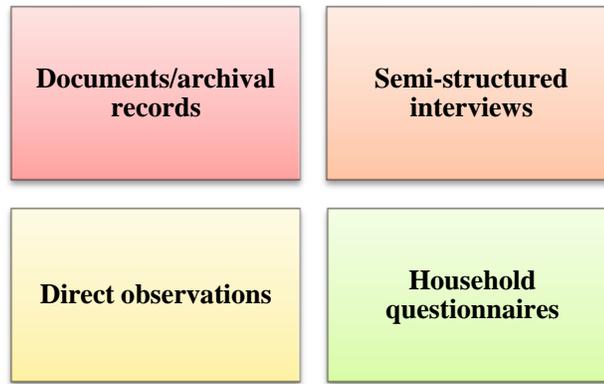


Figure 12 Methods employed for data collection

It may also be mentioned that while the sustainability framework is constructed with clear boundaries of each of the dimensions as mentioned in Chapter II, the data collection protocol combines the data to be sought from one source (figure 12). For instance, the household questionnaires administered to the community include questions pertaining to environment and the social dimensions of storage efficiency, collection of MSW, equity and community perspectives in the context of private sector participation in MSW management. The following section throws light on the methods engaged for the data collection process, followed by their specific application to the sustainability framework.

3.7.1 Documentary and archival evidence

A wide array of relevant data can be retrieved from documents and archival records, as is opined by researchers (Bryman, 2004; Mogalakwe, 2006; Mullen, 2005). However, this method of collecting viable data is often underrated. As Mogalakwe (2006, p.222) points out, “documentary research in social science is a useful and under-utilized approach that can be adopted by researchers in the full confidence that it is also a scientific method that requires rigorous adherence to research protocol.” According to Bryman (2004, p. 381), documents can serve as important sources of data and also include mass media outputs, such as newspapers, television, internet sources and visual objects like photographs and videos.

However, the researcher must be aware of the mechanisms of handling documentary evidence. Scott (1990, cited in Mogalawke, 2006, p. 225-227) identifies the four criteria for handling documentary data as authenticity, credibility, representativeness and meaning.

Hakim (2000, p.52, cited in Mullen, 2005, p.48) cautions about three problems, access, cost and utility, that may be encountered while using documentary and archival evidence. In terms of *access*, there could be restrictions on making use of information or publishing the data contents. In terms of *cost*, obtaining and analysing documents could be a costly affair, both financially and also in terms of time. In terms of *utility*, documents may not have been compiled in a clear and consistent manner, or may have been kept for internal rather than public use, with severe implications for both clarity and quality.

The study in question has employed a large body of data sourced from documentary and archival evidence. Documentation pertaining to various aspects of MSW management was retrieved from sources classified as:

- i. *Municipal documents and records*: Detailed project reports, MSW operation records, fiscal records, minutes of meetings between AMC and private company, AMC annual reports, contract document between AMC and Antony Waste Handling Cell Private Limited, city demographic records, AMC sanitation employee records.
- ii. *Private company document and records*: Brochure of Antony Waste Handling Cell Private Limited, contract document, infrastructure records, operational records, sanitation employee records.
- iii. *Correspondence*: Letters exchanged between AMC, Antony Waste Handling Cell Private Limited, Pollution Control Committee, PSHRC, NHRC, PPCB, Department of Local Self Government of Punjab, Bhagatanwala Resident Association.
- iv. *Court proceedings*: Details of judicial records and judgements related to MSW issues.
- v. *Other government documents*: Punjab State of Environment Reports, Census records, state level policy and guidelines for involving private sector, working papers.
- vi. *Newspapers*: The Tribune, The Hindustan Times, Dainik Bhaskar, Dainik Jagran, Punjabi Tribune and Ajit.

It may also be mentioned that the researcher had to seek data under the Right to Information Act (RTI, 2005)²² to get access to information including the contract document and the detailed project reports on MSW management prepared in 2008 by a consultant hired by AMC for this purpose. This was done only after relevant data was denied by the AMC and the PPCB on the grounds of it not being in the public domain. The researcher filed three RTI applications, two with the AMC and one with the PPCB. The information was made available, albeit in a piecemeal manner that too had significant gaps, which the said organisations pleaded were not available. Ward wise categorisation of households based on income was one such data set that was not available. Also, the financial data for making an assessment of economic sustainability was insufficient and fragmented, and thus imposed limitations on absolute accuracy of information.

A vast quantity of documentary and archival record was sifted to search for evidences. A number of these records were in the Punjabi language and were read through with relevant parts translated into English as potential quotes in the thesis.

3.7.2 Semi-structured interviews

The second and defining pillar of this research was mining evidences and data through conducting interviews with related diverse stakeholders to enable pertinent insights to emerge.

Bryman (2004, p.543) describes semi-structured interviews as those where the interviewer has a series of questions that are in the general form of an interview guide but is able to vary the sequencing of the questions and also retain some latitude to ask further questions in relation to the interviewees responses, allowing space for plausibility probes to take place. Further, Kvale (1996, p.88, cited in Babbie, 2013, p.348) details seven stages in an interview process, namely, thematising, designing, interviewing, transcribing, analysing, verifying and reporting. Following these stages, the researcher classified the potential interviewees into nine groups based upon occupation, activity or affiliation. After this categorisation, nine interview protocols were designed and sufficiently elaborated with a

²² The Right to Information Act, 2005 was enacted by the Government of India on 5th June 2005 with the objective of providing citizens with access to information under the control of public authorities.

total of 346 questions (38 questions at an average) based upon the sustainability assessment framework boundaries as well as an informal interaction with some of the potential interviewees.

While initially, fifty potential interviewees had been identified, in order to seek their consent, they were contacted through phone or personal visits to explain to them in advance, the research modalities and purpose. Some of the potential interviewees refused to be interviewed on the grounds of official restrictions, despite the researcher's attempt to convince them of the purely academic outcomes of this research. Respecting their decision and in resonance with the ethics of research, the researcher did not pursue them further.

Finally the researcher undertook *thirty-two* semi-structured interviews in total to garner information in all four sustainability dimensions. The time and place of interview was at the convenience of the interviewee and the interview lasted a minimum of one-and-a-half hour on an average. Elements of constant companion, triangulation and saturation across interviewee based information and opinions enabled the researcher to develop confidence that the data gathered through the semi-structured interviews was tangible. The interviews were conducted using a digital voice recorder with the interviewees' consent. In case of interviewees who did not wish to be recorded, the researcher made handwritten notes of the information provided by them.

3.7.3 Direct observation and field notes

According to Yin (1994, p.86), by making a field visit to the sites under investigation, important evidence is generated. He opines that direct observation can substantiate data verification and validity as collected by other methods, such as interview, and is therefore of immense use in case study research. Photographs and video recording may also provide critical evidence and facilitate interactive visual research. While the protocol of structured direct observation emanates from the quantitative domain (Bryman, 2004, p.165) and entails structural and systematic observation following a fixed redefined protocol, unstructured observations from a qualitative continuum can also be deployed effectively to capture data.

In a field study where the researcher was trying to answer the question of sustainability in MSW management, overt direct observation as a data collection tool was immensely important and useful to substantiate the data collected by other means, such as questionnaires and interviews (Appendix II), and also to triangulate the data collection. The researcher applied this method specifically in the social and environmental sustainability domain while making direct unstructured observations of the MSW context to supplement the data in terms of the criteria of storage collection and disposal effectiveness of municipal solid waste management by private operations in the city.

3.7.4 Household questionnaires

This method, emanating from the quantitative domain, is used to collect data when the researcher is faced with a population that is geographically dispersed and there is a limitation on time and resources to conduct interviews, which are actually much more time consuming and demanding (Bryman, 2004, p.133).

One of the components of this research was to gauge community behaviour and perceptions about private sector operations in managing MSW in the city. The household survey was required to make an assessment and feed into social and environmental sustainability and comprised the following information;

- Household waste practices and perceptions of MSW management in the city
- Household access to privatised waste service and participation in MSW management post-privatisation
- Household waste practices in the privatisation milieu
- Privatised operations coverage and collection efficiency
- Health impacts from the disposal practices post-privatisation

For this, the study used the household questionnaire (Appendix II). A structured questionnaire was distributed to the respondents to evaluate criteria largely from environmental and social sustainability domain. The researcher framed the final questionnaire after pre-testing the same (discussed in section 3.8). The questionnaire consisted of four sections: socio-economic information of respondents, questions about MSW management in the city, questions about privatised service delivery and a special

section to be filled out by respondents living in proximity to the landfill site. The total number of questions was ninety-eight; however section C was to be filled out only by households in proximity to the landfill and comprised twelve questions.

The questionnaire was designed to be both comprehensive and simple, while at the same time allowing maximum information to be captured using both open and closed ended questions. The nominal scale was used for the questions that required yes/no responses. For questions requiring responses such as good, bad and other judgemental responses, the Likert scaling method was used. According to Babbie (2013, p.217), the Likert scale is “easy to understand, based on the relative intensity of items.” Further, multiple expected responses based upon the contextual situation were framed, for example, the frequency of waste collection can be answered by giving multiple choices as once a day, once in two days, etc.

The questionnaire was administered by the researcher through two research assistants who received pre-field visit training including detailed explanations of the research objectives, the method of conducting and seeking responses for the questions, and particularly respecting ethical concerns that can arise, such as a household refusing to participate in the household survey.

3.8 Sampling methods

As mentioned in the previous section, the researcher makes use of four methodologies to collect data. As such, the sampling techniques apply to the chosen methodologies, i.e. documentary evidence, semi-structured interviews and household questionnaires.

According to Bryman (2004, p.84), the principles of survey research that involve sampling apply equally to documentary records. Accordingly, documentary evidence and archival records relevant to the research question were selected through a purposive sampling methodology, furthered by both heterogeneity and snowball sampling methods. The study generated evidence from newspapers, contract documents, municipality-private company correspondence letters and minutes of meetings, municipality records and documents, private company records and documents, secondary data sources like research in this area

by other researchers and official statistical records. This was done till a natural saturation limit was reached.

Sampling of the semi-structured interviews was based upon purposive method, using expert, snowball and opportunist sampling methods wherein the researcher also applied her knowledge and contacts with the interviews to elicit opinions and extract targeted information from the most reliable sources. Accordingly, the list of interviewees is presented in table 9.

Table 9 Schedule of interviews

Interviewees	Number	In text usage
Amritsar Municipal Corporation		
Managerial staff	1	AMC managerial staff 1
Sanitary supervisors	3	AMC sanitary supervisor 1,2,3
Sanitation union leaders	2	AMC union leader 1,2
Sanitary workers	3	AMC sanitary worker 1,2,3
Private Company (Antony Waste Handling Cell Private Limited)		
Managerial staff	2	PC managerial staff 1,2
Sanitary workers	5	PC sanitary worker 1,2,3,4,5
Non-Government Organisations/Community Organizations		
Pollution Control Committee	2	NGO member 1,2
Bhaktanwala Resident Association	3	Bhaktanwala Resident Association member 1,2,3
Informal waste sector		
Waste pickers	6	Waste picker 1,2,3,4,5,6
Itinerant waste buyer	2	Itinerant waste buyer 1,2
Waste contractor	2	Waste contractor 1,2
Other related stakeholders		
	1	Newspaper correspondent 1
Total	32	

AMC- Amritsar Municipal Corporation, PC- Private Company

The household questionnaires were administered to gauge community based information pertaining to private sector operations in MSW management following the sampling methodology, as below.

As mentioned earlier, the city has been divided into 65 administrative units called wards, with varying populations and spatial sizes. Using secondary analysis and official documented information, the researcher identified the spatial wards. Out of these 65 wards, 41 had been brought under privatised operations. Out of these 41, 20 wards were selected for survey based upon the following criteria:

- i. Geographical spread – where locational attributes were considered, such as inner city, periphery and spatial location in proximity to the landfill.
- ii. Socio-economic heterogeneity –wherein it was important to get a representative sample of households from varying socio-economic compositions (high income, middle income, low income and economically weaker groups) to be able to collect information about the distributive equity of the service.

Having decided on the wards, the next task was to finalise the sampling frame in terms of the households to be administered the questionnaires. However, in this context there was a major data gap as the distribution of households ward wise based on their socio-economic categories was not known. Therefore, a sampling frame could not be clearly determined. According to Oeschar (n.d.) and Gingery (2009, n.d.), non-probability sampling methods are required when the sampling frame is not known. The following reasons favoured non-probability purposive sampling in the study.

- i. Wide geographical spread of the area.
- ii. Unknown sampling frame.
- iii. Lack of information on locational attributes of the households.
- iv. Lack of information about the socio-economic characteristics of households.

According to Bryman (2004, p.100), quota sampling as a type of purposive sampling technique can deliver as good results as a probability sample, especially when the population is dispersed over a much wider geographical area. Another factor leading to the choice of this method was the fact that one of the sub-aspects to be examined, *equal access to the service*, required choosing from among the income and spatially diverse locations. Since the distribution of households by income categories in the city was not known, the researcher exercised her knowledge of the city conditions to select locations with different socio-economic structure. Further, choosing locations around the landfill site was critical to determining the environmental impacts of dumping waste in their vicinity.

The researcher was aware of the fact that such a selection of representative households would bring in the researcher's bias. In order to correct and reduce the sample bias, Panzeri, Magri & Carrago (2008, n.p) state that the “target population must be properly defined and that the sample frame matches it as much as possible.” In order to achieve this, three

methods, increasing sample representativeness, diversification and enlarging database (Skorwonek & Duerr, 2009, p.413), were applied. To achieve sample representativeness, the sample matching method (Cooper & Greenaway, 2015, p.7, Baker et al., 2013, p.33) was applied by conducting a reconnaissance survey in the potential localities and matching the characteristics of households with the socio-economic criteria. Diversification was induced by taking a wider geographical spread (33 localities in 20 wards). Further, the questionnaire was sufficiently elaborated to include wider data coverage. All these methodologies were supplemented by verification of selection from the respective ward councillor, the local NGO members who had knowledge of the population characteristics, and direct observations by the researcher. Also the survey data was supplemented through triangulation from data pertaining to semi-structured interviews, direct observations and documentary records.

Having taken steps to minimise the bias inherent to purposive surveys, it was important to also decide the number of households to be surveyed. Since the total sample population was not conclusively known, the researcher decided to carry out a pre-test survey to be able to finalise the count, check the validity of survey questions, and also determine the time and resources that the survey would need. Twenty pre-test household surveys were conducted, comprising eight localities and four pre-determined income group categories (high income, middle income, low income and economically weaker sections). The pre-test revealed that self-administered questionnaires would not be feasible, as eighteen out of the twenty households asked for assistance to understand the questions and insisted that the researcher be present. On average, a single questionnaire took at least one hour to fill in, with the researcher facilitating the process. Secondly, the results of the surveys categorised across the four income groups revealed a similar pattern of responses. Based on the time involved and the attitudes of household towards self-administered questionnaires, it was decided to enlist two research assistants to physically administer and get the questionnaires filled. Thirdly, looking at the pattern of responses, the number of questionnaires was limited to two hundred. The researcher acknowledges the fact that this would impose some limits on generalisation. However, looking at the time, cost and resources, in consultation with the supervisors, this decision was arrived at with a conviction that the process followed would lead to reliable representation and information.

3.9 Data analysis

A study of this nature generated a vast amount of data and therefore data management as a process of organising and storing the data began almost simultaneously, occurring side by side with data collection. Building on the “*three I’s*” as suggested by Creswell (1998, p.142), i.e. “*insight, intention and impression*”, the researcher engaged in the process of moving in analytical circles rather than a fixed linear approach, as is indicated in Figure 13 (Creswell,1998, p.143).

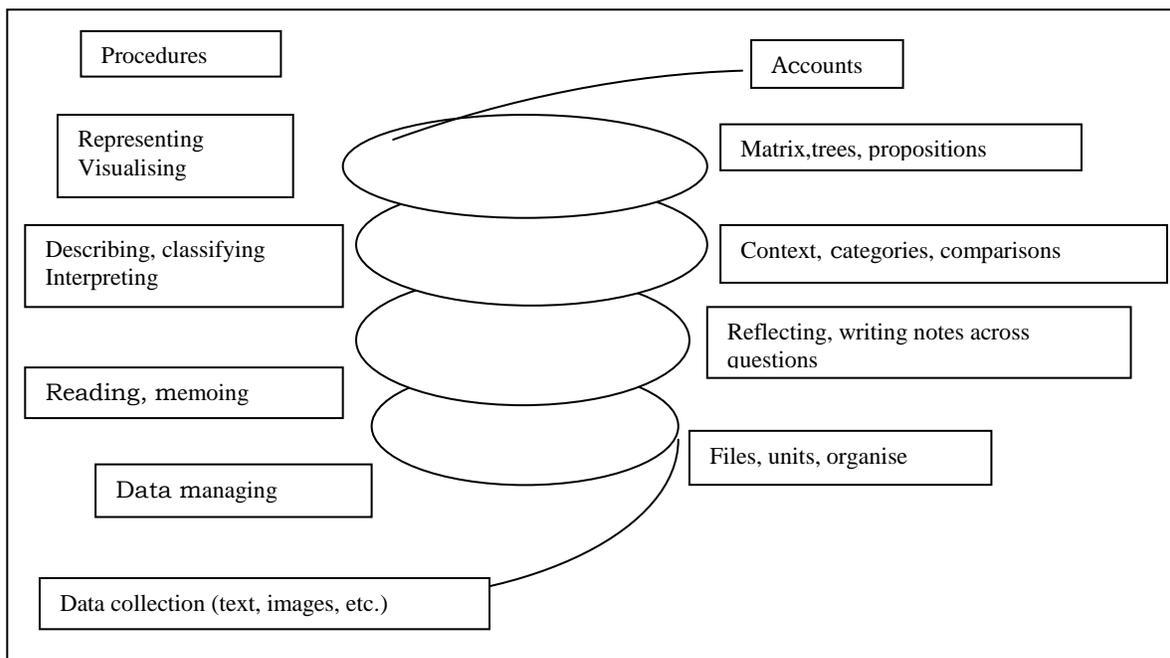


Figure 13 Data analysis spiral

Adapted from Creswell (1998, p.143)

As part of systematic data storage and management, the data collected through the aforementioned methodologies were gathered in the form of documentary and archival evidence, household questionnaires, field notes and photographs from direct observation and individual interview recordings. For the purpose of draft handling, the researcher organised the data in separate hard copy folders, as well as in the form of computer based files, with the attempt to organise the data under the four sustainability dimensions as a preliminary approach. At a later stage, data sifting and arranging, subscribing to each of the specific criterion under the specific sustainability dimension was addressed. Another

important approach to organise and undertake data reduction, “*winnowing*” as Creswell (1998, p.140) calls it, involved sorting the data into codes and categories using the principles of open and axial coding.

As in the case of mixed methods research, the outcomes were expected both in numeric and rich descriptive text and therefore the researcher employed data analysis techniques drawing from both research traditions. As derived from the sustainability framework, numeric data was seen as supportive to evaluate the domains of sustainability as defined. In the case of the household questionnaire, the questions and responses were coded in numbers and tabulated in Microsoft Excel worksheets. As such, the researcher applied descriptive statistics (Bryman, 2004, p.227; Guthrie, 2010, p.168) using the Microsoft Excel and SPSS software to present data outputs and describe what the data indicated and represented the same through univariate analysis as frequency tables, diagrams as pie chart, graphs and bar charts.

In addition to generating numeric evidence towards evaluation of the sustainability domains, this was also supplemented by a fine textured explanation of the findings of the data, generated from all four methodologies applied in its collection. Critical and reflexive analysis entailed the researcher adopting iterative theoretical saturation²³ and constant companion²⁴ (Bryman, 2004, p.403) to fit the descriptive and explanatory constructions within the four sustainability dimensions.

Content analysis is one of the unobtrusive methods that can aid learning about a case by analysing the material items produced within a culture (Biber & Leavy, 2006, p.204). It involves examination of documents, photographs, books, archival records, mass media like television, or websites for obtaining and analysing data as required and is also a good method for triangulation (Bryman, 2004, p. 183). Content analysis seeks to either quantify or qualify (or both) the data in pre-determined categories in a systematic and replicable manner (Byrman, 2004, p.183). According to Hall (1981 cited in Biber & Leavy, 2006, p. 292), “texts do not simply mirror social reality but are also an integral component in shaping that reality.” As such, text analysis has been the most commonly used form of

²³ Refers to reaching a point where new data is no longer illuminating.

²⁴ Where a close case connection is maintained between data and conceptualisation so that the correspondence between concepts and categories with their indicators is not lost.

content analysis (Biber & Leavy, 2006, p. 291) and this method was deployed in engaging with data emanating from field notes, interview transcripts and related documentary evidence. The transcripts from the semi-structured interviews were probed manually, allowing the researcher to be intimately engaged with the script in order to sift and organise the themes and relevant quotes effectively.

Further, in order to present the outcomes on the four sustainability dimensions, indicating low, medium and high levels of sustainability (derived from the analysis of the sustainability criteria and indicators), the researcher relied on the concept of subjective logic to construct the interpretations that are represented graphically using the radar diagram. According to Ceolin, Nottamkandath & Fokkink (n.d, .p.1), *subjective logic* “focuses on the representation and the reasoning on assertions of which the truth value is not fully determined, but estimated on the basis of the observed evidence.” Jøsang (2012, p.1) states that while in standard logic propositions are considered to be either true or false, the fundamental aspect of human environs is that it can never actually be fully determined if a proposition about the world is true or false. Also, whenever the truth of a proposition is evaluated, it is always done by an individual, and it thereby cannot be rooted in an objective belief. Moglia, Sharma & Maheepala (2012, p.182) reason that many situations that one deals with, are not fully knowable. As such, humans make judgments, influenced by their ideals and acquired knowledge about the truth.

In the context of the case study, the researcher acquired intellectual competence from the literature and praxis to arrive at rational judgements on the four sustainability dimensions and benchmark them as low, medium and high to be able to conclude effectively from the results emerging from the analysis. The scales of sustainability, drawn in the realm of rational subjective logic, present an engaging template to visualise the status of sustainability that privatised waste management operations contributed to in the case study.

3.10 Research ethics

According to Guthrie (2010, p.15), ethics are standards of professional behaviour that guide us to act with integrity, especially towards the participants in the research. Therefore, awareness and due consideration to ethics is indispensable and this aspect is dealt with sensitively in Griffith University’s ethics protocols and gives due consideration to the issue

of informed consent, confidentiality, feedback and responsibilities of the researchers. The same were adhered to strictly by the researcher in preparation of the questionnaires and interview protocols and related data collection, handling and analysis matters throughout the duration of the research project.

3.11 Conclusions

Neuman (2006, p.151) argues that social researchers pursue research following one of the two logics, i.e. reconstructed logic or logic in practice, the former indicative of a highly organised system restated in an idealised and formal form, as the model presented in the literature. The latter is more indicative of actual enquiry interplaying with a mess, an often ambiguous clutter oriented towards the practical completion of a task. This is often based on judgments and common wisdom. The researcher herein followed a path wherein the research methodology framework is both symbolic of reconstructed logic and logic in practice, where the researcher moves in hermeneutic spirals to think, re-think, refine, organise, re-organise, analyse and re-analyse information through the selected methodological lens.

Through the medium of the above discussion, the researcher fixed a boundary within which the research took shape and evolved towards its final form. However, at this juncture, the researcher, assuming her position of a *reflexive pragmatic*, also considered going off on a tangent to enable space for unexpected data sources, or better suited data analysis techniques to be discovered, sought and applied towards answering the research question and also for the theoretical-academic objective of producing viable and quality research.

In essence, operating within the confines of pragmatism, the researcher deployed mixed methods towards data collection and analysis. While maintaining her role as a reflexive pragmatic, the researcher endeavoured not to loosen the grip on the sustainability framework in its four dimensions that underpin the very directions and outcomes of this research.

PART B

EMPIRICAL ANALYSIS AND OUTCOMES

When the going gets tough, the tough gets empirical.

(John Carroll)

Chapter IV

Amritsar: A Waste Trajectory and Chronicle of Privatisation

“Amritsar, sifiti da kar (Amritsar, the abode worthy of praise)”

(Anonymous)

4.0 Introduction

The overarching aspiration of this piece of research is to make conceptual and empirical contributions to the subject of private sector participation in MSW management by unearthing its impacts from a four-cornered sustainability framework evolved in chapter III. This chapter erects a waste trajectory on the grounds that pragmatic inquiry into the research questions without an appreciation of factors that shape, if not contain, the waste realities in the case study, would be analogous to narrating sequences without a theatrical setting. Waste practices do not operate in a vacuum, so research endeavours should transcend the waste sector and include wider socio-political, cultural and economic factors that might influence practices (Davies, 2008, p.59). Resonating with this view, this chapter lays the ground for empirical investigation in the subsequent chapters.

The nature of the chapter demands data sourced from a variegated body of archival and documentary records spanning official government documents, legislation, newspaper articles, and correspondence records between institutions, such as Amritsar Municipal Corporation (AMC), National Human Rights Commission (NHRC), Punjab State Human Rights Commission (PSHRC), Punjab Pollution Control Board (PPCB), Punjab Mandi Board,²⁵ Department of Local Government, Punjab, and Non-Governmental Organisations (NGO) like the Pollution Control Committee Amritsar (PCC). In addition, direct observation and the household survey questionnaire conducted to gauge and triangulate information from the community, and interviews with stakeholders, also serve as a base for the content and analysis herein.

²⁵Punjab Mandi Board (also known as Punjab State Agriculture Marketing Board) controls and supervises the marketing network of sale and purchase of food grains in Punjab.

4.1 Amritsar: a spatial-demographic brief

The name Amritsar, meaning *the pool of nectar*, traces its origin to the year 1577 A.D. during the reign of the Mugal Emperor Akbar (Bawa, 1977, p.9; Dutta, 1967, p.3). The rise of the Sikh religion served as a stimulus for development of religious towns, with Amritsar emerging as the most sacred settlement and the seat of the Sikh religion in North-west India. Amritsar was the last Sikh bastion to be annexed by the British in 1849 (figure 14). Demographically, the population in the early 1850s is estimated to have been around 100,000 (Davies & Blyth, n.d. cited in Gauba, 1988, p.25). The first census operation conducted in 1855 indicated a population of 112186 persons, emerging as the largest city of Punjab till 1881 when it was taken over by Lahore (Gauba, 1988, p.221). The city became the face of the independence movement in the country (Llyod, 2012, p.196) and was the epicentre of one of the largest migrations in the century that displaced 13 million people. The spectre of partition in August, 1947 crippled the city both demographically and physically, taking a period of nearly two decades before a decadal growth rate of 30 percent was reached and the city slowly but steadily gathered the threads to limp back to its status of regional importance, though it can well be said that the shadow of a hostile international border with Pakistan, always loomed large on its horizons. The post-independence city grew mostly in a haphazard manner to assume a distorted oblong form with a dominance of mixed landuses with no clear spatial divide (Sandhu & Gill, 2010, p.4).

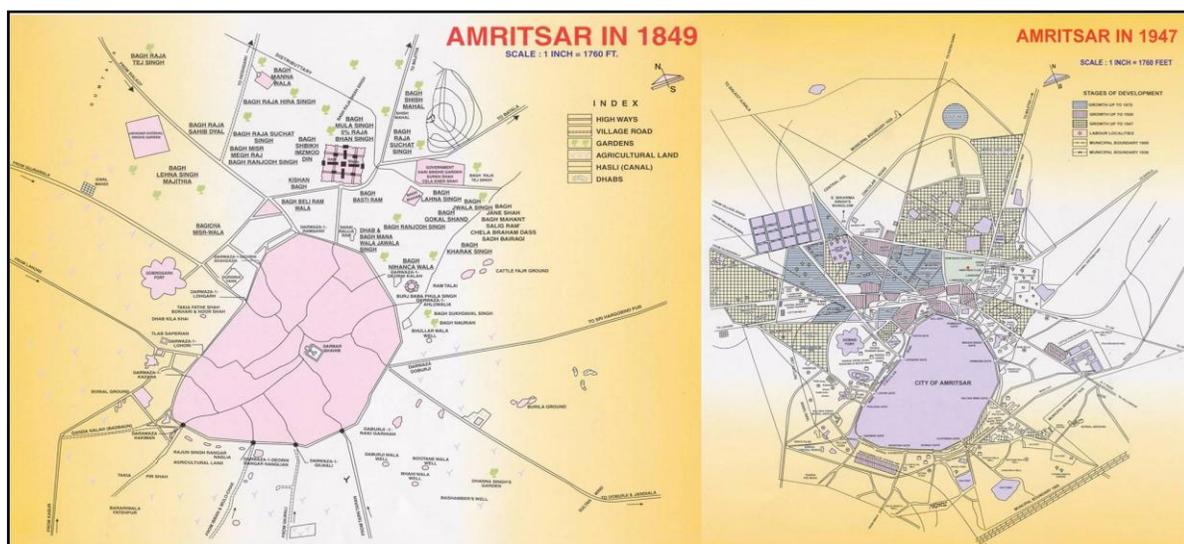


Figure 14 Amritsar, a spatial visage (1849, 1947)

Source: AMC (2005, p.10,12)

The period of (1991-2011) coincides with the move towards neo-liberalist macro-economic policies that spurred growth in the region under the tutelage of political stability, leading it to its current spatial and demographic embodiment of a young metropolis, its socio-economic and cultural vibrancy and, yet, an urban order reflected in a largely chaotic contemporary cityscape (figure 15). It is in this distinctive setting that the specific research scene is situated. The historical trajectory of waste as unveiled in the section below is thereby a logical extension in the setting established in this discourse to explore the waste practices and trace their contemporary bearings in the city.

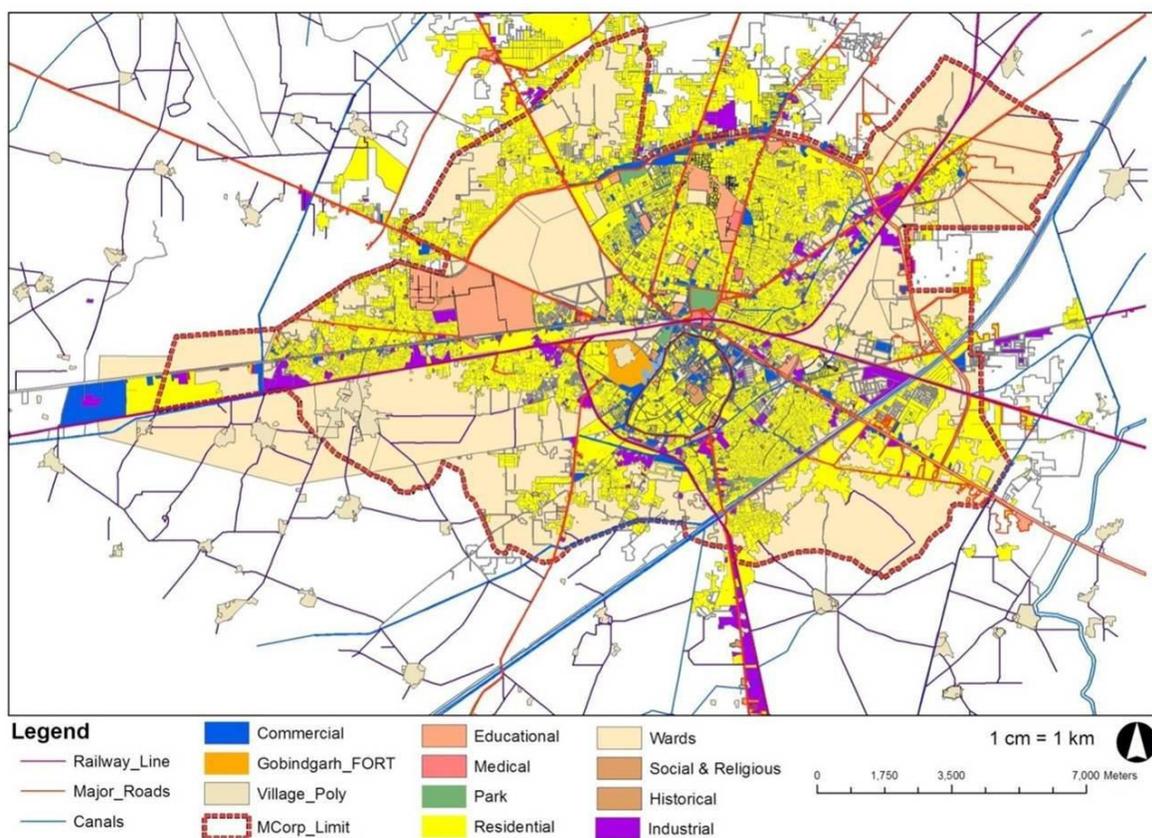


Figure 15 Amritsar landuse, 2012

Source: Sandhu & Teotia, (2013, p.43)

4.2 The waste trail

The sanitation and waste management system of Amritsar and, for that matter, the entire Indian sub-continent bears a colonial legacy that can be traced back in time to the British public health and sanitation endeavours in the late nineteenth century (Mushtaq, 2009, p.1; Beall, 2006, p.1). *The Report of the Royal Army Sanitary Commission* (1863) laid the

foundation of the sanitary movement to evolve and take shape throughout colonial India. The annexation of Amritsar by the British witnessed the city administration under the governance of the Deputy Commissioner and a Local Area Committee for about two decades after the end of the Sikh reign. The arrangement for refuse removal was said to be properly organised since 1864 (Report on Local Improvements 1864 cited in Gauba, 1988, p.185). However, refuse disposal continued in the city *dhabs* (depressions) and moats. The Amritsar Municipal Committee was established in 1868 following the recommendations of the Royal Army Sanitation Commission and founded primarily to provide better sanitation and water supply as the chief amongst other duties (AMC, 2005, p.4; Gauba, 1988, p.184). Not surprisingly, the Sanitation Committee was one of the first sub-committees of the Municipal Committee set up to administer proper sanitation services in the city.

The year 1911 saw the passing of a historic piece of legislation, *The Punjab Municipal Act, 1911*, to make better provisions for administration of municipalities in the state of Punjab and also making elaborate provisions related to the sanitation duties of municipalities, including moving of the landfill beyond municipal limits (Doabia, 1987, p.408). The Act also provided for a health officer for towns with above 20,000 population. Due to better management, deaths and occurrence of epidemics declined significantly. Despite these efforts, the conditions as reported in 1944 were far from satisfactory (Annual Report, Public Health Department, 1944, 1947, cited in Gauba, 1988, p.187).

The waste for disposal was an amalgamation of different waste streams, a major component being human excreta. Taking the per capita MSW generation as 0.295 kilograms (CPCB, 2000, p.10), in 1947 the city would have generated approximately 118 tonnes²⁶ of municipal solid waste characterised by manual scavenging, street sweeping, waste transportation and final unsanitary disposal at the city designated landfill. Post-independence, the waste scene did not change strikingly, in fact it continued to bear and carry on the legacy of the colonised structures amalgamated with the Indian traditions of caste based waste collection mechanisms, using infrastructure such as hand carts and later the tractor trolleys. Dumping continued as the practice of disposal in the pre-independent designated dumpsite at Chabhal Road. Meanwhile, Amritsar continued to witness demographic and spatial growth, along with the other prominent cities of Punjab state,

²⁶One tonne is 1000 kilograms.

Ludhiana and Jalandhar. This led the Punjab Government to formulate *The Punjab Municipal Corporation Act, 1976*. Its purpose was to upgrade the city municipal committees to corporation status to enable provision of administration and civic amenities in the cities where population exceeded 300,000 and the annual income was more than two crore rupees (0.39 Million AU\$). The Amritsar Municipal Committee was upgraded to corporation status in 1977. Fast paced spatial development led to the expansion of the area under the Amritsar Municipal Corporation (AMC) in 1988 and 1994 and also the increase in number of administrative wards to 14, 16, 19, 50, 60 and 65 in 1961, 1971, 1982, 1991, 2001 and 2005 respectively (PUDA, 2010, p. 16; Sandhu & Teotia, 2013, p. 32).

While the solid waste management system did not change much, two noticeable activities in this sphere are worthy of mention. The first is the division of the city into 26 sanitary divisions and the second is the constitution of *Mohalla Sudhar Committee* (MSC), i.e. the local area improvement committees with an aim of managing the sanitation workers and infrastructure more efficiently. The settings up of MSC's in 1996 (JBIC²⁷, 2010, p.50) was a more participatory manner of ensuring the sanitation management of localities by the residents themselves. The MSCs were setup and run by the area residents and operated under guidelines issued by the AMC. The MSCs were responsible for door to door collection of MSW by engaging and also supervising *Safai Karamcharis* (sanitary workers). The payment for the sanitary workers was divided equally between the AMC and the MSC, who in turn collected it from the area beneficiaries (JBIC, 2010, p.2-26). The MSCs (235 in number) were disbanded after the services were taken over by the private company²⁸ in the city.

The scavenging activities related to picking and dumping of excreta reduced drastically, except for some parts of the old walled city, with the laying down of the sewer lines in the city from mid-1960 onwards. The scavenging community comprising the caste stratified division of the *Chuhras* and *Balmikis*,²⁹ dominated the occupational hierarchy of the sanitation workers in the AMC since the beginning of formalised municipal waste and

²⁷ Japan Bank for International Cooperation

²⁸ A private company is a voluntary association of at least two and not more than fifty members whose liability is limited and the transfer of whose shares is limited to its members. The Indian Companies Act 1956, updated to The Companies Act 2013, contains legal provisions for establishing a private limited company (Ministry of Corporate Affairs, n.d).

²⁹ Considered as low caste communities with traditional occupational practices such as sanitary waste cleaners and scavengers.

sanitation operations in colonial times. Scavenging as an activity has continued, albeit in the MSW domain with the informal waste pickers, largely migrants from other states, stepping in to occupy the space vacated by the former scavenging community. The informal sector is therefore an undeniably integral part of the MSW landscape and this research solicits to give them their due space in this scenario.

A mention of the MSW landscape brings to the fore the need to understand the waste characteristics and management operations in the city in order to build the contextual background which is the aim of this chapter and provides the canvas for this research.

4.3 MSW characteristics and composition

According to Sharholly et al. (2008, p.460), “the composition and quantity of MSW generated forms the basis on which the management system needs to be planned, designed and operated.” The estimated MSW generation in the city was considered to be between 575-586 tonnes, rounded to 600 tonnes/day, based on a survey by the Department of Local Government, Punjab (AMC, 2009, p.49). These estimates are based upon a sample survey and theoretical assumptions placing the per capita waste generation at 484 grams for the city population and 300 grams for 70,000 for the floating population (table 10). However, as JBIC opines, these are broad assumptions rather than any comprehensive actually measured data (JBIC, 2010, p. 2-27). A consistent increase in waste generation is visible with the current (2015-16) estimates placed between 650-700 tonnes per day.

Table 10 MSW generation trends (2001-2015)

Year	Population	Including @ 7% floating population^a	Grams/capita/day	Generation of MSW tonnes/day
2001(census figures)	1016079	1087205	452	491.5
2008 (estimates)	1097755	1174598	480	564
2009 (estimates)	1109423	1187083	484	575
2010 (estimates)	1121091	1199567	488	585
2011(census figures)	1132761	1212054	492	596
2012 (estimates)	1145765	1225969	496	608
2015 (estimates)	1184777	1267711	528	669

^aFigures including 7% floating population is added to the city population as per MoUD (2000) to make projections related to MSW generation. Per capita waste generation figures from AMC (2009, p.41)

Riding on the crest of fast economic growth following the liberalised economy and availability of wide choice of consumer goods as a general trend in Indian cities like Amritsar has contributed in a big way to the waste generation increase in the city, especially in the last two decades. Residential areas are the largest contributing generators of MSW, followed by commercial areas, as table 11 indicates. The ward wise variation in per capita generation for the surveyed year of 2008 varied from 448-482 grams respectively. Further, the household questionnaire survey indicated a range between the low and high income groups as varying between 330 grams to 630 grams/capita/day (May, 2014).

Table 11 MSW generation based on land use

Source	Biodegradables (tonnes/day)	Biodegradables and non-biodegradables (tonnes/day)	Total (tonnes/day)	Percentage
Residential	260	138	398.00	67.93
Commercial establishment	20	65	85	14.50
Hotels/restaurant	23	35	58	9.9
Gardens	15	6.2	21.20	3.62
Temples	12	4.7	16.70	2.85
Marriage places	5	2	7	1.20
Total	335.00	250.90	585.90 (rounded to 600)	100.00

Source: AMC (2009, p. 4)

Coming to the physical and chemical analysis, the same is indicated in table 12. An analysis of physical composition reveals that the waste is predominantly composed of organic matter and therefore has a low calorific value of 890 Kcal/Kg³⁰.

Within the organic waste category, 57.10 percent comprises easily biodegradable and compostable material, such as kitchen and wood wastes, whereas long term biodegradable and compostable comprises 14.5 percent of the total waste. This is followed by inert debris at 19.10 percent and recyclable waste at 9.3 percent.

³⁰Calorific value refers to a measure of heating power and refers to the amount of energy released when combustion takes place. Its unit of representation is kcal/kilogram.

Table 12 Physio-chemical analysis of MSW

Physical Analysis		
Waste components	% content	Tonnes/day
Short term biodegradable		
i. Food waste, leafy matter, fruit and vegetable peels, flowers, leaf plants, cups	46.00	276.00
ii. Grassy material, home garden waste.	6.00	36.00
iii. Chicken, meat bones	2.10	12.60
iv. Cattle dung	3.00	18.00
Sub- total	57.10	342.60
Long term biodegradable/combustibles		
i. Palm leaves, banana leaves, stumps, coconut shells, fruit stones, tree twigs	3.00	18.00
ii. Paper products, corrugated boxes	6.50	39.00
iii. Wooden materials, bamboo products, jute, rags, cotton textiles	5.0	30.00
Sub-total	14.50	87.00
Recyclables: Plastic Products		
i. LDPE, HDPE, PET ^a	6.50	39.00
Polypropylene (soft and hard)		
ii. Metal: iron, aluminium, tin	2.0	12.00
iii. Glass	0.8	4.80
Sub total	9.3	55.80
Inert and others		
i. Stone, sand, bricks, debris	14.50	87.00
ii. Miscellaneous items (diapers, sanitary napkins)	4.60	27.60
Sub total	19.10	114.60
Chemical Analysis		
Parameter	Observed value	
i. PH value	5.80	
ii. Organic carbon%	36.00	
iii. Nitrogen%	0.85	
iv. Potassium %	0.52	
v. Phosphorus%	0.60	
vi. Calcium%	1.00	
vii. Magnesium%	0.25	
viii. Sulphates%	0.40	
ix. C:N ratio (carbon-nitrogen)	42.3:1	
Heavy metal analysis		
Parameter	Observed values (PRM)³¹	
i. Lead	60.00	
ii. Cadmium	Below detectable limits	
iii. Nickel	8.50	
iv. Chromium	4.00	
v. Mercury	Below detectable limits	
vi. Copper	30.00	
vii. Zinc	70.00	

A LDPE- Low Density Polyethylene, HDPE- High Density Polyethylene, PET- Polyethylene Terephthalate

Source: AMC (2009, p.48, 49)

The category of miscellaneous waste includes some amount of bio-medical and industrial waste streams, such as animal carcasses, diapers and sanitary napkins, stained cotton and bandages and industrial effluent from cottage industries like ash, that is discarded along with MSW in the absence of stringent enforcement of The Biomedical Waste (Management

³¹PRM refers to pre-monsoon samples which will be different from the POM (post-monsoon) samples.

and Handling) Rules, 1998 and The Hazardous Waste (Management, Handling and Transboundary Movement) Rules, 2008.

4.4 MSW management operations

The following description pertains to the MSW management, both prior to and post-termination of the privatisation operations in the city in August 2012. As mentioned, the AMC has been the concerned institution since colonial times for waste management and sanitation issues in the city. References in documents pin point the MSW system in the city as being primitive, obsolete and far from acceptable standard (PUDA, 2010, p. 123; AMC, 2008, p.54), both in terms of available infrastructure as well as operational procedures followed in MSW management. The collection and transportation infrastructure (table 13) in the city is quite inadequate as per the waste infrastructure norms (see Chapter VI, section 6.4.1) mentioned in the MSW Manual (MoUD, 2000).

Table 13 MSW collection and transportation infrastructure

Item	Owned by M.C.	On hire basis
Dumper	5 (capacity 10tonnes)	-
Tipplers	4(6tonnes)	-
Large Trucks (Tata-1613)	2(10 tonnes)	-
Truck (Tata-709)	5(5tonnes)	10
Tractor trolley	48 (3.53 tonnes)	18
Tempo	1(2 tonnes)	10
JCB ³² front end loader	3	-
Bull dozer	2	-
Water sprinklers	3	-
Secondary containers ³³ (4.5 cu.m)	125	-
Secondary containers (10 cu.m)	10	-
Pushcarts	50	-

Source: JBIC (2010, pp.2-29), AMC (2009, p.60), Interview with AMC sanitary supervisor 1, 2

In addition, about 50 percent of vehicles are more than ten years old and require phasing out. Also, the storage infrastructure is highly inadequate based upon the quantum of waste generation (AMC, 2009, p.60-61, AMC sanitary supervisors 1, 2, 3).

³²The JCB loader takes its name from J.C. Bamford, the Chairman and owner of the JCB Company.

³³ Refer to the containers placed at public places or roadsides to accumulate collective solid waste.

4.4.1 Bricolage practices and waste segregation at source

The age old tradition of bricolage and salvaging resalable material, such as newspaper, glass bottles, empty cans, plastic bags and old clothes, has not become entirely redundant with the neo-liberal advent of the age of disposable consumer goods. Table 14 reveals that 79.3 percent of the surveyed households resort to bricolage practices like segregating resalable goods such as newspaper (95.4%), plastic goods (78.6%), metal scraps (70.9%) and glass waste (79.8%).

Table 14 Household bricolage and waste segregation practices

Question	Number	%
Do you practice waste separation at house hold level ($n^a=198$)		
Never	41	20.7
Sometimes	126	63.6
Often	17	8.6
Very often	3	1.5
Always	11	5.6
Do you segregate wet and dry waste into separate storage bins at household level ($n= 194$)		
Yes	35	18.0
No	159	82.0
Do you segregate newspapers at house hold level ($n= 195$)		
Never	9	4.6
Sometimes	4	2.1
Often	13	6.7
Very often	41	21.0
Always	128	65.6
Do you segregate plastic bags/ plastic bottles at house hold level ($n=193$)		
Never	41	21.3
Sometimes	17	8.8
Often	12	6.2
Very often	30	15.5
Always	93	48.1
Do you segregate iron scraps at house hold level ($n= 199$)		
Never	58	29.1
Sometimes	29	14.6
Often	9	4.5
Very often	24	12.1
Always	79	39.7
Do you segregate glass waste at house hold level ($n= 198$)		
Never	40	20.2
Sometimes	40	20.2
Often	19	9.6
Very often	25	12.6
Always	74	37.4
What motivates you to segregate waste at household level ($n 200$)		
Can't say	13	6.5
I can make money from the itinerant waste buyer	157	78.5
I can reuse at home	6	3.0
I can give it to the waste picker for selling	15	7.5
It is environment friendly	9	4.5
Any other reason	0	0

^a n refers to number of respondents. Source: Household survey (May, 2014)

The motivation for segregation is that the household can make money by selling resalable discards (78.5%). The practice of selling resalable wastes to the *Kabadiwallahs* (itinerant waste buyers) in the city is thereby a common practice. Despite this, a lot of additional recyclable and non-recyclable dry waste is mixed with the organic waste stream. Households (82 %) do not practice a strict segregation between dry and wet waste. This mixed waste finds its way to the community receptacle, road side or is collected door to door by a waste picker who segregates the resalable for his livelihoods and disposes the remainder in community receptacles, on the roadside, at unauthorised dumpsites or in city landfill.

4.4.2 MSW storage, collection and transportation

At household or the primary storage level, the waste is usually stored in a single dustbin or polythene bag to be either given to the door to door waste collector (usually the waste pickers or the sanitary workers) or to be discarded in the community receptacle in the vicinity. In areas where door to door operation or secondary bins are not available, waste is disposed of on the road side or on a vacant plot of land or in city drains. As per AMC sources (AMC managerial staff 1), 100 percent of the MSW is collected daily, however documentary information mention a collection rate between 60-70 percent (PUDA, 2010, p.123; Batish, 2014, p.352). The waste is collected in tractor trolleys and trucks mostly lacking a top cover, leading to spillage on the city roads.

The quality of storage infrastructure (figure 16) is also poor and lack of adequate number, capacity and top cover leads to spillage by rodents and waste pickers rummaging through their contents to salvage recyclables. As per AMC claims, generated waste is collected the same day but actual conditions reveal a collection rate of once every three or four days in some city wards (Sandhu & Teotia, 2013, p.12, direct observation by researcher). Street sweeping takes place entirely in the municipal domain, with the sweeper assigned a road space usually known as a beat.³⁴ The usual practice of the sweeping is to create a pile, the most common form of informal storage on the roadside to be picked up by the vehicle plying that route for transporting to the landfill site.

³⁴A beat of length one kilometre without drain with width sixteen feet, or half kilometre with drain (Sanitary Inspector 1).



Figure 16 MSW storage infrastructure in the city

Source: Sandhu (12 October 2014)

“In the absence of transfer stations, the waste is transported by all form of deployed vehicles to the landfill, increasing trips lengths affecting adversely the vehicle and labour productivity and also being a cause for vehicle obsolesce and breakdown that causes at least 40 percent of the vehicles to be off road for repair and maintenance purpose” (AMC sanitary supervisor 1). As a concluding point, it may also be mentioned that collection is done manually, without gloves and masks, by sanitary workers using a basket and shovel, thus exposing them to a host of health concerns due to improper waste handling (direct observation by researcher, AMC sanitary workers 1, 2).

4.4.3 Waste disposal practices

When it comes to MSW treatment and disposal mechanisms, it may well be said that it is not only very basic and unscientific, but also that the most insensitive allocation of space to the landfill has been made by the AMC. No pre-treatment or sorting is done, except by the waste pickers. The post-partition trajectory of the unsanitary landfill is mapped in table 15. The current landfill at Bhaktanwala lies adjacent to the regional grain market and has been the city landfill since 1999. The inappropriateness of the location is the non-conformity of the surrounding landuses and especially the grain market, through which the vehicles transporting waste often trespass. In 2002, the *Amritsar Tribune* (16 April 2002) reported that, *“so pathetic is the situation here that even all sides of the grain market, consisting of at least 60 shops, have been covered with garbage stock piles. The place, which otherwise*

displays paddy and wheat grains during procurement season, has now been accumulated with solid garbage, emanating a filthy smell.”

Table 15 Post-partition (1947) landfills

Time period	Name	Land space in hectares	Distance from CBD in Kilometres	Current status
Post-partition–1999	Chabal Road Naraingarh	2 hectares 1 hectare	2 6	Exhausted but informal dumping practiced
1999 – December 2014, February 2015 to present	Bhaktanwala	8.1 hectares	2	Exhausted but proposed for MSW plant. Dumping continues.
December 2014 – February 2015	Fatehpura	5.8 hectares	6	Started dumping in November 2014 but stopped after NIMBY protests and court intervention.
Proposed	Bharariwal Mahal	2.65 hectares 3 Hectares	5 5	Proposed

Source: JBIC (2010, pp.2-31)

The landfill (figure 17) has been a constant and continued source of conflict between the Punjab Mandi Board, the labour unions of the grain market and the residents’ association of the surroundings localities who claim that the localities were existing before the designation of the landfill. This has also been a subject of litigation but, to date, no lasting solution has been conceived and indiscriminate disposal has continued despite the emergence of factual data pertaining to environmental and health concerns around the landfill (Sandhu & Teotia, 2013, p.124; household survey; Amritsar Tribune, 15 November, 2014).

The landfill infrastructure is non-existent, with the exception of JCB loaders vehicles and eight sanitary workers deployed from time to time to assist in tipping and settling the waste uniformly. The practice of putting soil layers on waste does not exist. The landfill, as high as ten feet, extends into the area of the grain market as well as along the rail line and overflows into the adjacent residential localities. Foul odour, large numbers of rodents and frequent self-ignition, gas formation and contamination of ground water due to leachate have been reported from the landfill (Dainik Bhaskar, 7 July 2007; Amritsar Tribune, 12 November 2014).



Figure 17 Bhaktanwala landfill and adjoining area

Source: Google Earth (2015)

Based on a massive protest by affected residents, and under political pressure emanating from the same, the AMC had to temporarily stop dumping waste at the Bhaktanwala landfill site (Amritsar Tribune, 5 November 2014; 12 November 2014) and for a number of days the city garbage was not picked up, due to lack of another disposal site. Finally, the site at Fatehpur Village, six kilometres from the city, was made functional (Amritsar Tribune, 2 December 2014; 3 December 2014), but not without another protest from the Fatehpur village in a typical NIMBY³⁵ syndrome erupting there. So great has been the resistance ever since, that waste disposal at Fatehpur landfill took place under police protection. However, after judicial intervention, dumping was suspended and resumed at the Bhaktanwala landfill site, where it continues to date.

4.4.4 Recovery of recyclables

The city completely lacks a mechanism of formal recycling and recovery and whatever little takes place, does so in the informal waste management sector. In addition to the traditional bricolage practices of selling resalable waste like newspapers, glass bottles, plastic bottles and cans to the itinerant waste buyers, all other recyclable waste is scavenged by waste pickers operating at household, secondary bins at roadside, the informal dumping

³⁵ Abbreviated form of *not in my backyard*, the term is used to describe community resistance to projects such as a landfill in their vicinity.

sites and the landfill in the city. The estimated waste recycling undertaken by the informal sector is presented in table 16.

Table 16 Waste recycling by informal sector

Total recyclable waste (minus organic waste)	Waste recycled by informal sector	Recycled as % of recyclable waste	% recycled from total waste generated
94.8 tonnes	21.2 tonnes	22.36%	3.5%

Source: AMC, (2008, p. 48,49) and researcher’s estimates based upon interviews with itinerant waste buyers and waste pickers

The recovered material is sold to small or large scrap dealers and thereby brought back into the recycling chain purely by the informal actors. Despite this, a considerable amount of recyclable waste remains unsorted and loss of quality occurs due to mixing with organics and wet waste, which discourages scavenging by waste pickers. This contributes to the waste burden at the landfill. No component of the organic waste generated in the city is channelled into composting operations and this remains the bulk waste component at the landfill.

4.5 Community perceptions of MSW management

The household survey findings presented in table 17 disclose that MSW is seen as one of the biggest public service concerns in the city, with 77 percent of the respondents affirming this opinion. Also, the MSW management is attributed as bad (40.5%) and very bad (52.5%) and similarly the secondary waste storage (50.5%) and collection system is also rated as very bad by the households.

Disposal was rated as poor by 94.5 percent of the households, with waste often being littered in streets and open spaces. At least 31 percent and 58 percent of households rated poor secondary storage infrastructure and poor collection rate as the major issue in MSW in their areas respectively. The opinion emanating from the community validates that garbage management was and is a serious problem, the gravity of which can also be judged from the succeeding discussion on waste litigations in the city.

Table 17 Household perspectives of MSW in the city

Question	Number	%
What do you see from the following public services as one of the biggest concerns in your area (n= 200)		
Water supply	11	5.5
Sanitation	6	3.0
Inadequate public transport	14	7.0
Electricity supply	15	7.5
Municipal solid waste management	154	77
In your opinion how is the current municipal solid waste management situation in the city (n= 200)		
Very bad	105	52.5
Bad	81	40.5
Good	13	6.5
Very good	0	0.0
Excellent	1	0.5
How would you rate the current municipal solid waste storage (waste collection bins) system in the city (n= 200)		
Very bad	101	50.5
Bad	89	44.5
Good	9	4.5
Very good	0	0.0
Excellent	1	0.5
How would you rate the current solid waste collection system in the city (n= 200)		
Very bad	124	62
Bad	66	33
Good	9	4.5
Very good	0	0.0
Excellent	1	0.5
How would you rate the current solid waste disposal system in the city (n= 200)		
Very bad	115	57.5
Bad	74	37.0
Good	10	5.0
Very good	0	0.0
Excellent	1	0.5
What according to you are the major issues in municipal solid waste management in your area (n= 200)		
Poor secondary storage infrastructure	62	31.0
Poor collection rate	116	58.0
Disposal on roadside/surroundings	19	9.5
Any other	3	1.5

Source: Household Survey (May, 2014)

4.6 An account of waste litigations

The narrative of MSW management in the city would be incomplete without an insight into the waste related litigations. In fact, it is not an exaggeration to say that the litigations contributed to the stimulation of the privatisation process in the bid by the local government to find a solution to the city's long pending garbage woes. The genesis of the waste litigations can be traced to a series of representations and written communications amongst government and non-government organisations such as the PCC, AMC, PPCB,

PSHRC, Department of Local Government, Punjab, NHRC and The Punjab and Haryana High Court³⁶ as the institution to which the complaints were made.

Between 1994 and 1999, a number of representations were made from the associations of affected areas, as well as the local NGOs, such as Amritsar Vikas Manch and PCC. However, the non-responsive and lackadaisical attitude of the AMC led to one of the local NGOs, PCC, making a formal legal complaint, referred to as complaint number 42 of 1999 to the PSHRC, titled “*Solid waste disposal of Amritsar City at Chabhal Road, causing pollution and inconvenience to the people living around.*” The complaint elaborated twelve issues highlighting the negative implications for the 50,000 surrounding residents and made reference to Article 21³⁷ of the constitution of India as being violated by the AMC and the State of Punjab. The PCC appealed to PSHRC to direct the AMC to stop dumping at the Chabhal Road landfill and shift dumping of MSW to another, properly designated site (PCC, Complaint 42-99, p.12).

Meanwhile the PPCB (Zonal Office) Amritsar had recommended the closure of the Chabhal Road landfill site in March 1999 (letter no. 688, dated 5 March 1999) and the same was formally closed to dumping operations by the AMC in December 1999 and shifted to the alternate location at the site adjoining the Bhaktanwala Grain Market. Returning to complaint 42-1999, with the closure of the dumpsite at Chabhal Road, the dumping at the Bhaktanwala grain market site led to the opening of another frontier of conflict between the AMC, the grain market associations, the District Market Committee and the surrounding resident associations and the PCC. In one of their communications from July 2000, the NGO, PCC apprised the PSHRC about the dumping of MSW at Bhaktanwala site and also pleaded with the PSHRC to direct the AMC to adhere to the MSW Rules 2000 in all matters and identify landfill site locations as per the specification mentioned therein.

In its final decision regarding complaint 42-1999 on 22 January 2004, PSHRC pointed to the intent and requisite action to that effect taken by the AMC and felt that there was no

³⁶The National Human Rights Commission is constituted under the Protection of Human Rights Act, 1993 to look into matters related to violation of human rights in the country (NHRC, 1993, p.3). In addition, state level bodies to safeguard human rights are also constituted as the Punjab State Human Rights Commission (PSHRC) in the state of Punjab, The Department of Local Government, Punjab administers municipalities in the state. The High Court of Punjab and Haryana is an institution of justice for the states of Punjab, Haryana and the Union Territory of Chandigarh.

³⁷ Article 21 of the Constitution of India guarantees the right to life and personal liberty.

ground to proceed further with the complaint. Accordingly, the proceedings were dropped on 22 January 2004 with the direction to the AMC to “ensure that the action already initiated is completed expeditiously and promptly within four months” (PSHRC, complaint No.42 of 1999, p. 25-26).

Despite the directive from the PSHRC, the shifting and closure of the Bhaktanwala dumpsite and setting up of the MSW plant did not take place. Left with no other resort, the PCC filed a civil writ petition (CWP)³⁸ number 2032 in February 2006 in the Punjab and Haryana High Court. The complaint highlighted the failings of the AMC to follow PSHRC orders, as well as to comply with the provisions of the MSW Rules 2000 for closure of operations and shifting of the dump to a compliant location. The Court, while reprimanding the AMC, PPCB and Department of Local Government, Punjab for the lapses in complying to the MSW Rules 2000, also noted that consistent efforts were being made to organise MSW management by initiating private sector participation and undertaking operations in the meantime to keep the city clean. Accordingly, the decision was announced that the AMC shall award a contract to set up MSW management plant within six months from the date of the judgment and AMC shall apply for authorisation in respect of its site at Bhagtanwala (CWP No. 2032 of 2006, p. 23-24).

Despite the decision of the Punjab and Haryana High Court, to date the AMC has not been able to resolve its garbage predicament and the attempts to involve the private sector, even after the failed partnership with Antony Waste Handling Cell Private Limited, continues, pushed forward by the Government of Punjab. Meanwhile, on the landfill issue, as mentioned previously, the city continues to witness massive NIMBY protests with no practicable solution in sight. This therefore entails a discourse on the initiation and process of involving the private sector in MSW management operations in the city and the same unfolds in the following section.

4.7 Romancing privatisation; on shaky grounds?

The privatisation models of urban service delivery can be attributed to the neo-liberal macro- economic policies that were adopted by India in 1991, as has been highlighted

³⁸In the Indian legal system, a civil writ petition is filed in the High Courts and the Supreme Court under Article 226 and Article 32 of the Constitution of India.

previously (chapter II). *The Indian Infrastructure Report* (1996), *The Task Force on Urban Governance and Financing* (2001), *The Report of the Committee on India Vision* (2020), and also the Central *Eleventh and Twelfth Finance Commission Reports* highlighted the severe deficiencies in urban infrastructure and municipal services in the country (Gupta & Teotia, 2006, p.18). In pursuance of this, legislative reforms as the Seventy Fourth Constitutional Amendment Act (74th CAA, MoUD, 1992) were formulated to devolve and decentralise power at the local government level (municipal) and empower them to undertake decision making in urban infrastructure and service delivery, mentioned in the twelfth schedule.

The state of Punjab also adopted the pro-privatisation approach in 1995 with the setting up of the *First Finance Commission* (1996) to provide recommendations, one of them being that the local government should consider the involvement of the private sector in the provision of urban services, as most municipal services are feasible for privatisation. In a bid to fast track the privatisation agenda, *The Punjab Infrastructure Development Bill, 1998* was formulated with the aim of establishing the Punjab Infrastructure Development Board (PIDB) to accelerate the development of infrastructure and initiate private sector participation in the state. The agenda became more pronounced and visible in the objective of the Punjab Infrastructure (Development and Regulation) Act, 2002 that states, “to provide for the partnership of private and public sector, particularly of private sector in the development operations and management of infrastructure facilities and development and maintenance of infrastructure facilities through financial sources other than those provided by the state budget by following modern project management systems and for matters connected there with or incidental there to” (PIDB, 2002, p.1).

With the agenda on the roll, *The Second and Third Finance Commission Reports* (Government of Punjab, 2006) also lent further emphasis on involving the private sector in urban service delivery. The Third Finance Commission Report categorically states, “PPP arrangements should be resorted to where possible, particularly in the area of solid waste management” (Government of Punjab, 2006, p.87). Further, *The Punjab Development Report* (Planning Commission, 2002, p.314) states that there is a tremendous scope for private sector participation in infrastructure development and delivery of services. The

private sector can help in commercially viable projects and ensure efficient provision and delivery of services, customer satisfaction, pricing and cost recovery.

The onus of urban service lies with the local government at the city level under the urban reform structure. The local government under the Constitution of India comes under the domain of the state government³⁹ and in the pre-privatisation setup they were operating under the control of the state government with very little fiscal or functional autonomy (Planning Commission, 2002, p.291). Despite the 74thCAA (1992) that aimed to remove structural deficiencies and upgrade the municipalities to improve decision making and discharge of their responsibilities, this has not happened, largely due to traditional bureaucratic power structures that favour control instead of devolution of power to local government.

The Planning Commission (2002) and Sandhu & Teotia (2013, p.229) mention that the functional domain of the municipalities in Punjab continues to suffer from lack of clarity, stability and its functional responsibilities are usually controlled or even taken over by the state and fragmented amongst several agencies such as parastatal⁴⁰ organisations like Punjab Water Supply and Sanitation Board (PWSSB) and State Urban Development Authority (SUDA) (Figure 18). These organisations encroach upon the functional domain of the municipalities. As such, MSW, while being under the functional domain of the municipality, is subject to state control through the Department of Local Government, Punjab Infrastructure Development Board (PIDB), Punjab Municipal Infrastructure Development Company (PMIDC) and PWSSB. With this administrative backdrop, the organisational structure of AMC regarding MSW is denoted by figure 19. Figure 20 summarises the national, state and local level milestones that led to privatisation of MSW in Amritsar.

³⁹In list II of the 7th schedule of Article 246 of the Constitution of India.

⁴⁰Organisations owned or controlled partially or wholly by the government.

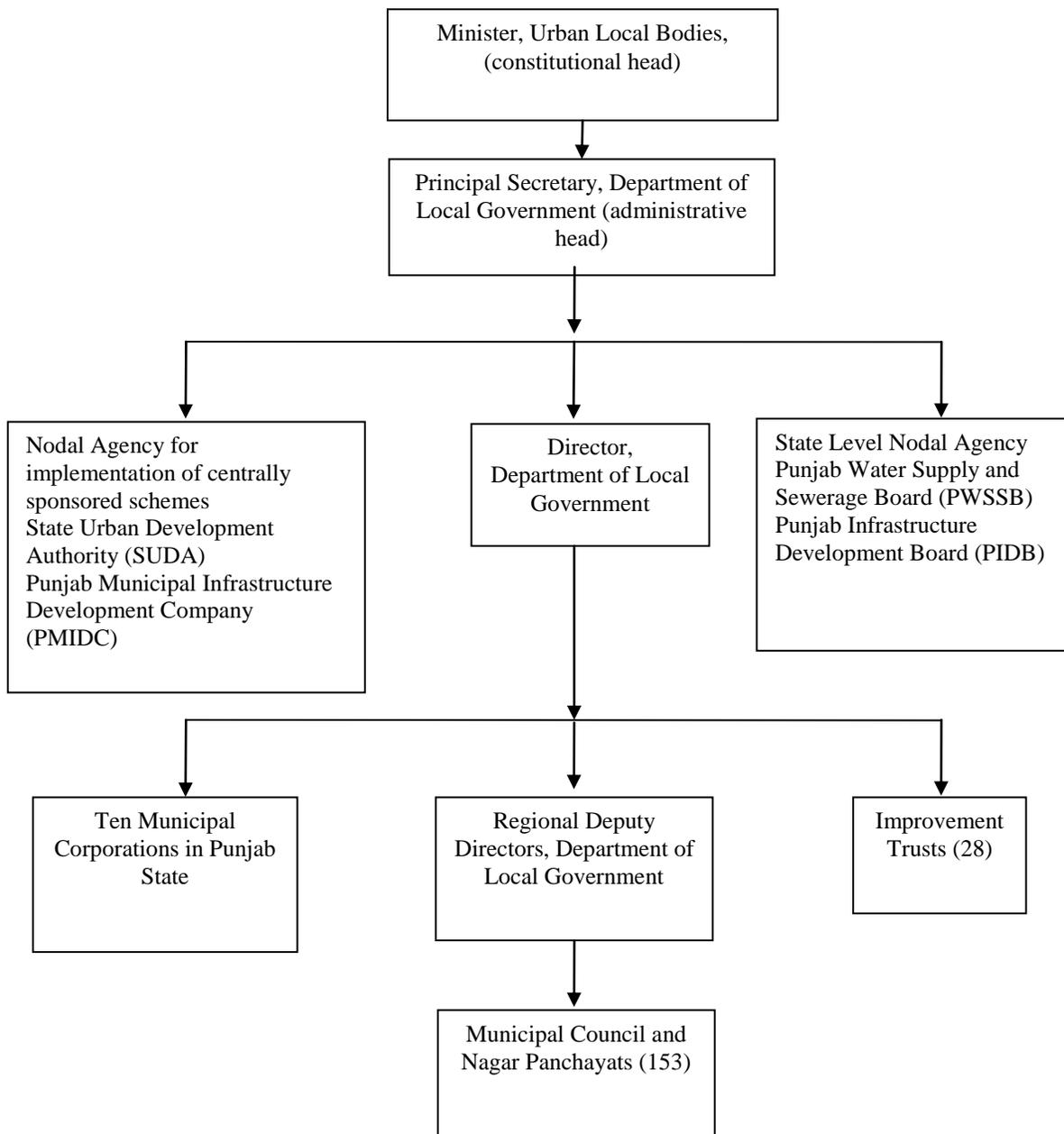


Figure 18 Institutional governance structure, Punjab

Source: Derived from administrative structure of Punjab urban local bodies department, Government of Punjab

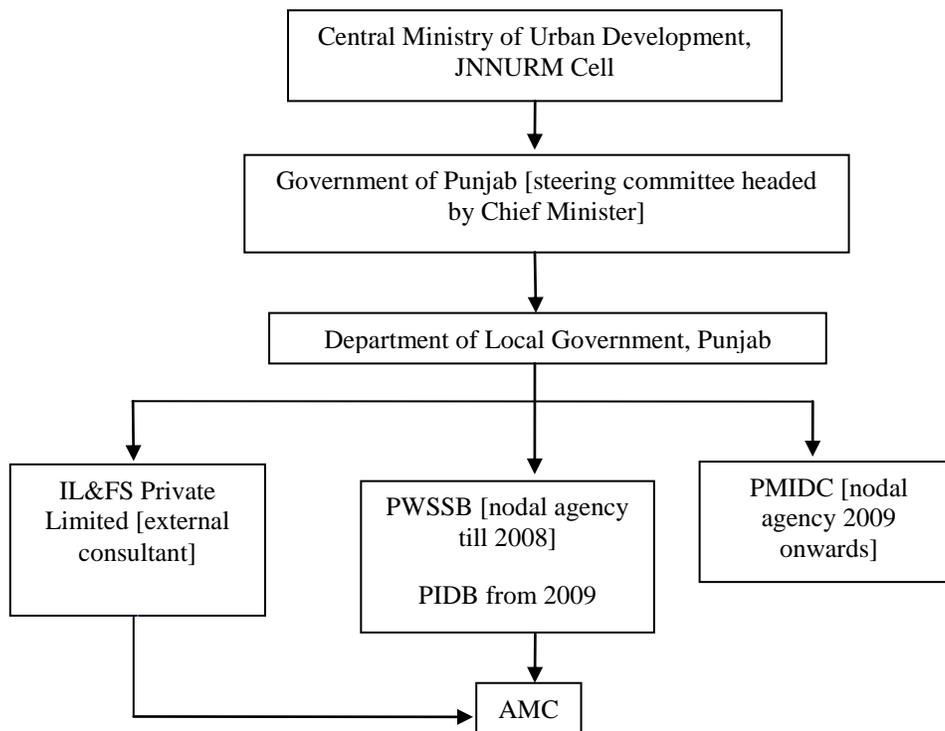


Figure 19 Institutional structure for private sector participation in MSW management

Source: derived from the institutional structure for private sector participation, Government of Punjab

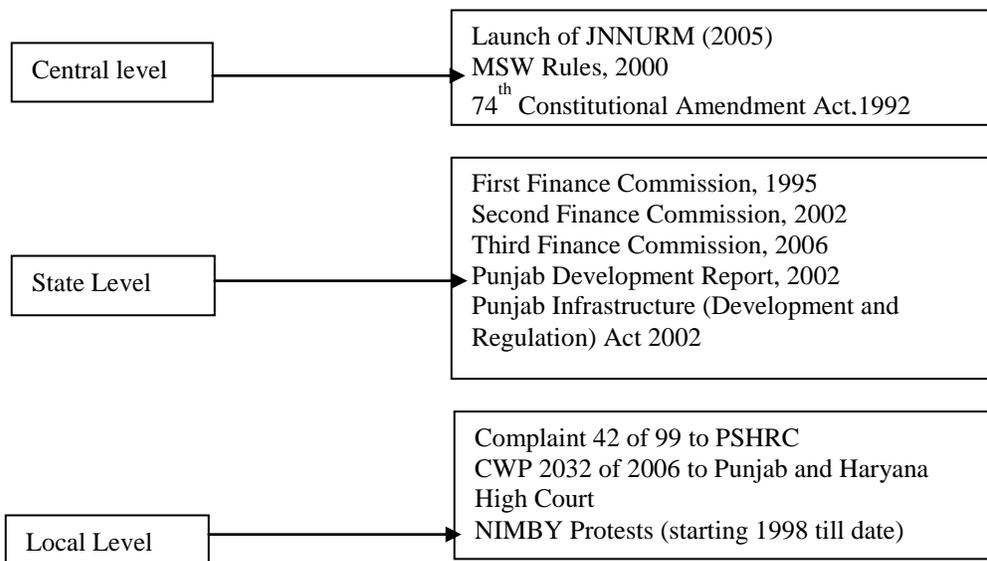


Figure 20 MSW privatisation stimulants

Source: Derived from the chronological order of events

4.7.1 Amritsar's neo-liberal cityscape and tryst with waste privatisation

As a consequence of the liberalised policy paradigm, transformation of the city has been visible through spatial developments and conversion of landuse, besides the demographic and social changes altering the city fabric. The inclusion of Amritsar for urban renewal and development under JNNURM set the momentum for infrastructure upgradation and service delivery through the privatised mode. An insight into the projects involving the private sector reveals that most of them have been in development projects, such as roads, terminals, commercial malls and mega residential projects, and less in urban service delivery projects, such as MSW.

The intention of the Government of Punjab to privatise MSW operations and establish a waste management plant in Amritsar was mentioned in the correspondence between AMC and PSHRC in February 1999 (in the context of complaint 42-99). It mentioned that a scheme was being prepared by the Department of Local Government to enter into a formal agreement with a private company, M/S Excel Industries Private Limited. Meanwhile, the Government of Punjab planned a scheme for the management of MSW in three cities, i.e. Jalandhar, Ludhiana and Amritsar, in early 2000 and declared the PWSSB as the nodal agency under the Department of Local Government to manage the process. Tenders were called by PWSSB for all the corporations in the states, including Amritsar, for installing a MSW plant on a BOOT/BOO basis and three private companies⁴¹ submitted tenders. However, the proposals did not materialise and fresh tenders were advertised again in May 2002, again without success.

After Amritsar came under JNNURM in 2005, the MSW project earned central government patronage (under the JNNURM Cell in the Central Ministry of Urban Development) and the same mandated the preparation and submission of a Detailed Project Report (DPR) for the MSW management project as a condition for release of funds from the Central Government. In keeping with this requirement, in June 2008, a consultant was approved to prepare DPR for MSW collection and transportation (Phase I) and MSW management plant (Phase II).

⁴¹ M/S India Waste Energy Development Private Limited, Parl Holding Private Limited and EDL India Private Limited.

In early 2008, the Department of Local Government appointed IL& FS Private Limited⁴² as the Transaction Advisor and allocated it the task of planning the development of MSW management for five corporation towns in Punjab (Amritsar, Ludhiana, Bathinda, Patiala and Jalandhar) and 129 Municipalities. It would enter into a Memorandum of Understanding (MoU) with the client municipality and carry out all project development activities on its behalf on an end to end basis, culminating with the signing of a contract agreement between the concerned municipality and the private company.

In July 2008, the request for qualification (RFQ) was advertised in different newspapers for Phase I of the MSW project, i.e. collection, segregation, storage and transportation. Based on the same and the bids received therein, the AMC, through a resolution in September 2008, accorded approval to allot the work under Phase I to M/S Antony Waste Handling Cell Private Limited, Noida. The agreement to this effect was signed in October 2008 and ground operations began in February 2009, after approval of the process by the Department of Local Government and the State Government. 41 out of 65 city wards were to be handled by M/S Antony Waste Handling Cell Private Limited and the remaining 24 wards by AMC (figure 21). The company would handle about 310 tonnes of waste per day and would be paid an amount of Rs 500 (9.8 AU\$) per tonne of waste.

Simultaneously the DPR prepared for Phase II (MSW management plant) was also approved by state government and the JNNURM Cell of MoUD in February 2009. Based on tenders invited for the same, M/S AKC Developers Private Limited, Noida were allotted the work and the contract agreement was executed in May 2009. Vide a resolution, the AMC resolved to lease land at Bhaktanwala landfill site at Rs one (0.019AU\$)/square metre/year for thirty years on a BOOT basis, and the lease deed to this effect was signed between AMC and M/S AKC Developers Private Limited in July 2009. However, even before the operations could begin, the Department of Local Government cancelled the contract for Phase II on the grounds that AMC had finalised the same in an arbitrary manner at exaggerated cost. A quote from a newspaper (Amritsar Tribune, 7 September 2012) reads, *“Amritsar waste plant contract terminated, connivance investigation finds serious irregularities, norms were relaxed, rates exaggerated to favour firms”*.

⁴²Infrastructure Leasing and Financial Services Limited. Their home page reads, *“One of India’s leading infrastructure development and finance companies. IL&FS has developed the capacities to take infrastructure projects from concept to commissioning”* (www.ilfsindia.com).

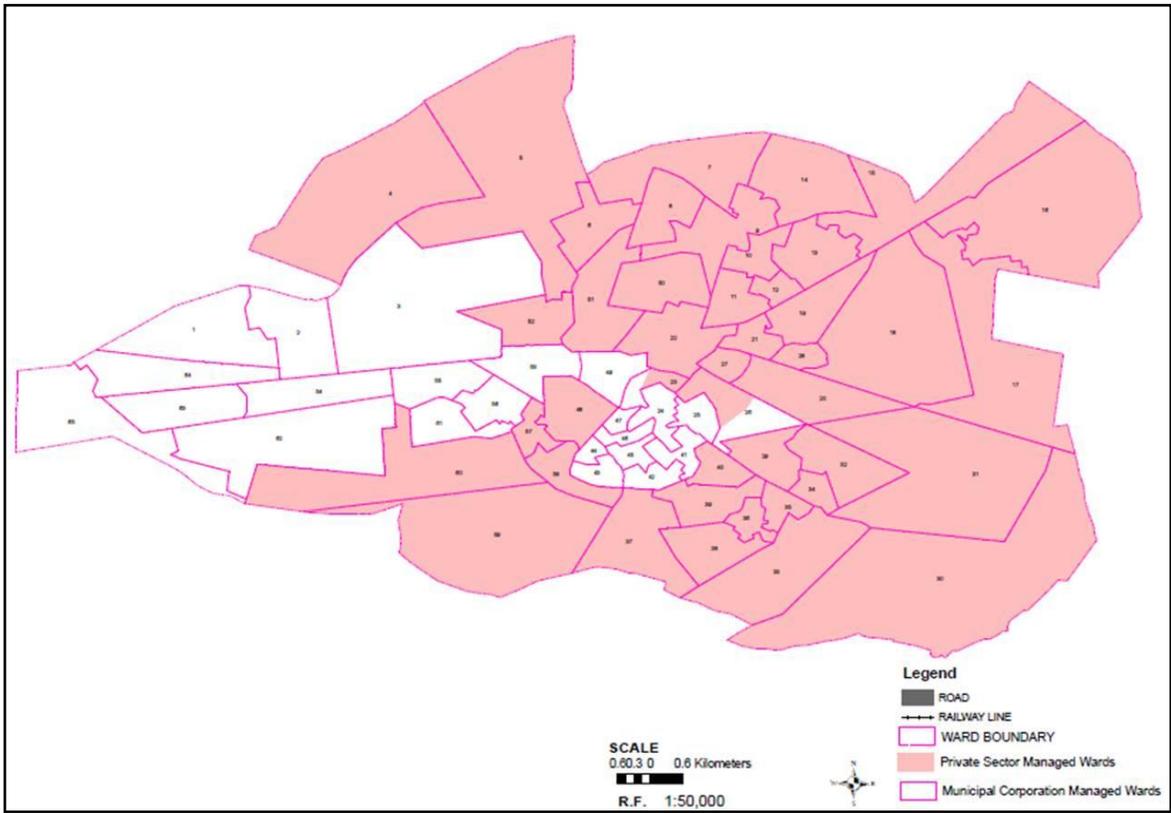


Figure 21 Distribution of city wards between AMC and Antony Waste Handling Cell Private Limited

Source: Derived from AMC (2008, p.45)

Phase II of the MSW project never took off, but Phase I continued to be operational till it met its untimely demise at the end of July 2012 when M/S Antony Waste Handling Cell Private Limited stopped all operations citing non-payment of dues to a tune of Rs 1.8 crores (0.35 Million AU\$) by AMC as the major reason of its withdrawal. After the withdrawal, the task of MSW management for the entire city naturally came back to the AMC, with the informal sector involved by way of its livelihood compulsions on the waste management horizon of the city.

Till the time of this writing, the process to find a private service provider, never mind a previously failed attempt, continues. Meanwhile, the city continues to struggle with its garbage problems and the NIMBY protests erupting sporadically.

4.8 Inferences and conclusions

The contents of the former sections have provided a comprehensive overview of the city of Amritsar, its demographic and spatial profile, its waste trajectory, the administrative structures in relation to MSW and the privatisation of MSW operations and its collapse along with observation of the recent initiatives. The purpose of this chapter was to paint a poignant portrait of the city, encompassing all the relevant information required to position the succeeding analysis in line with the objective of this research.

The city of Amritsar holds a place of significance in the state of Punjab and its journey from a religious hamlet to a contemporary, fast-growing metropolitan city reveals an interplay of demographic as well as geo-political factors, reflected through phases of growth, trials and tribulations. The city continues to expand demographically and spatially, and the same growth contributes in compounding its already complex waste concerns.

The waste trail reveals the imprint of the colonial system and structures extended into the current day waste management systems. The establishment of the municipal structures of administration and The Punjab Municipal Act, 1911 established an exclusive public responsibility towards waste management. The colonial practices of collection, storage, transportation and disposal have not changed much, and the unsanitary practices of dumping waste without treatment continues to this very day. While manual scavenging practices have also continued, the only change has been the shift from excreta lifting to scavenging recyclables from MSW by the informal waste pickers. The Punjab Municipal Corporation Act, 1976, formulated to upgrade the municipal body, did not deflect much from the Punjab Municipal Act, 1911 and did not propose any structural reforms for undertaking MSW management. Consequently, the AMC continued operations as the service provider with no innovative or new practices adopted in managing the city waste, except for the MSCs that tried to decentralise garbage management to the city wards.

A fundamental turn from the continuing tradition of AMC managing city waste came through the adoption of the privatised approach by the state government, led by central government directives. In typical bureaucratic top-down decision making, as against the specifications of the 74th CAA 1992, the decision to privatise MSW in Amritsar city was made at the level of the Government of Punjab and Department of Local Government. It

can be inferred from the failure of privatisation attempts between 1999 and 2008 that the concerned stakeholders, and especially the AMC, lacked the skills and resources to do the same. In order to fill this gap, albeit open another private front, the IL&FS Limited was brought in in 2008 as the intermediary to set all operational procedures on behalf of the AMC. Thereby, a private company was hired to prepare bids and tender documents and initiate private sector participation in MSW. The need to privatise stimulated more activities for privatisation, such as the hiring of IL&FS and also private consultant for DPR preparation.

Further, the IL&FS Limited involvement was only till the signing of the contract agreement, after which the dealings were left to the AMC. An insight into the waste litigations brings to the fore the idiosyncratic logic, motivations and actions of multiple stakeholders staking claim to the city, invoking the right to life and pleading for appropriate waste management in the city. It can be said without a doubt that waste litigation and community pressure also served as a motivation for the AMC and the state government to embrace privatisation as a panacea for dealing with waste woes. The jolt of a failed privatisation has not derailed privatisation endeavours, as recent initiatives reveal. Privatisation of MSW continues to be seen as the way forward, resting in its neo-liberal realm, reinforced through waste governance agendas treading the urban space. There seems remote chance of a roll back. Whether private sector participation in MSW management is indeed the formula for sustainable MSW management is the subject under scrutiny in this research and the succeeding chapters seek to uncover the rhetoric and reality behind this conjecture.

Chapter V

Sustainability Assessment of the Social Dimension

“The proponents of PSP often focus on its financial advantages while disregarding the social and environmental aspects of sustainable urban infrastructures.... sometimes the remedy may be worse than the disease”.

Koppenjan & Enserink (2009, p.285)

5.0 Introduction

The previous chapter has built a historical and empirical discursive space culminating at a point where privatisation of MSW from the Amritsar experience emerges as a paradigm response resting uneasily on the edge of the sustainability culvert, not knowing which side the balance shall tilt. It is this research gap that the researcher aims to fill and this chapter is the first of the four to sieve out evidence and conduct a critical analysis of the social sustainability dimension of the sustainability prism. The sustainability assessment framework for private sector participation in MSW management serves as the lens for examination of the sustainability dimensions using the criteria and indicators derived therein. In sync with the sustainability assessment framework, this chapter focuses on the impact of privatised operations in MSW management on stakeholders, i.e. informal waste sector, public sector employees, private sector employees and the community, while also investigating equal access to the service as one of the criteria for an enquiry of this nature. The level of analysis aims to offer a deeper understanding of the social outcomes of privatisation of MSW services in the case study, while also generating evidence for existing normative beliefs to be validated or otherwise.

The data for analysis in this chapter is largely sourced from archival and documentary evidences, and semi-structured interviews of the target stakeholders, as well as supplemented by household survey and direct observations by the researcher.

5.1 A brief review of social sustainability benchmarks

Can privatisation of MSW be seen as a vanguard of social sustainability, steeped in the faith that it stems positive spillovers on all fronts? In a bid to answer this question, this

chapter relies on the sustainability assessment framework, as mentioned. By a logical understanding, this demands a yardstick or certain benchmarks for arriving at a cogent analysis with respect to the chosen criteria. In order to conduct this review, the research draws from three sources that specifically define or provide directions on the social sustainability criteria to be examined herein. These tripartite sources are the related legislation and policy, The MSW Rules 2000, and the contract agreement between AMC and Antony Waste Handling Cell Private Limited, the private company. Reference to the international approaches is also made to strengthen the contextual directives or if contextual information was weak or missing.

Voicing concern over lack of and the need for equitable access to MSW services, the UN-Habitat (2010, p.22) states that waste management services should be “provided to all strata of the society regardless of income, ethnic group or social status.” In conjunction with these arguments, the MSW Manual specifically provides directions for equitable provision of MSW services in low income areas (MoUD, 2000, p.194, 519) by providing community bins for secondary storage and daily door to door collection services in slum areas to ensure sanitary conditions there, irrespective of their legal or illegal status. Privatised arrangements must therefore be made more responsive to the requirements of low income communities through specific provisions in contracts (ADB, 2008, p.82). Examining the contract agreement in relation to equity issues, no specific mention of this aspect was observable between AMC and Antony Waste Handling Cell Private Limited.

Moving on to the implications for the stakeholders, Klundert & Anschutz (2001, p.13), Samson (2010, p.79), Sandhu & Dhillon (2008, p.240), and Schubeler, (1996, p.37) regard the informal waste sector as important to developing a system of integrated and sustainable solid waste management in developing countries like India. The MSW Manual (MoUD, 2000, p.430) directs the urban local bodies to encourage waste pickers in organising doorstep waste collection and providing them with an opportunity to improve their working conditions and income. The contract agreement between AMC and Antony Waste Handling Cell Private Limited does make a reference to the issue herein. Clause 5.5 of the contract agreement states, “*the contractor can engage as also encourage rag pickers or make use of the service of rag picker associations for the purpose of segregation of MSW and/or disposal of recyclable material*” (AMC, 2008, p.15). Whether this clause was simply a

formality in the name of inclusive privatisation practices, is a subject of scrutiny in this chapter.

Coming next to the case of the workforce, both in the public and private waste management sector, a statement that is reiterated often is that cost cutting takes place at the level of the labour workforce (Samson, 2010, p.24,91). In the national context, the MSW Manual emphasises the welfare of staff engaged in handling MSW by way of adequate protection and free health care facilities (MoUD, 2000, p.520). Recognising human resources as essential to proper MSW management, the MSW Manual recommends adequate training for updating skills and knowledge to maintain to the standards of service (MoUD, 2000, p.519).

Comprehending worker rights necessitates a deliberation on labour legislation. The labour laws in India (Appendix I, table 57) can be categorised as economic and welfare legislation, social security legislation and conflict settlement legislation (Pillai, 1996, p.1, 247,415). *The Industrial Disputes Act 1947* is the principal conflict settlement legislation with the objective of “harmonizing the relations between the employer and the employees and thereby to restore and maintain industrial peace.” It aims to provide a mechanism for settlement of industrial disputes related to strikes, lockout, closures, retrenchment and layoffs (Goswami, 1999, p.459). The economic and welfare legislation related to the context are the *Minimum Wages Act 1948*, *Payment of Wages Act 1936*, *Contract Labour (Regulation and Abolition) Act 1970*, *Industrial Employment (Standing Orders) Act 1946*, *The Punjab Municipal Safai Karamchari Service Rules 1984* (constituted under *The Punjab Municipal Act 1911*) and *The Punjab Industrial Establishment Act 1965*.

According to Goswami (1999, p.248), social security measures are significant to achieve the goal of a welfare state and to enable workers to perform more efficiently. Accordingly, there is legislation devoted to this aspect comprising *The Employees Provident Fund and Miscellaneous Provisions Act 1952*, *The Employees State Insurance Act 1948*, *The Worker Compensation Act 1923* and *Payment of Bonus Act 1965*. Coming to the specific context, clause 5.7 of the contract agreement between AMC and Antony Waste Handling Cell Private Limited mentions the facilities and benefits for the workforce employed as a set of uniforms (two sets per annum), a set of hand gloves (once in six months), mask (once in

three months) and safety shoes (once in twelve months) and a set of gumboots. Further, clause 13.1 directs the private company to comply with labour laws with specific reference to The Contract Labour (*Regulation and Abolition*) Act 1970 and *The Minimum Wages Act 1948*. The private company is also directed to carry out periodical health check-ups of all employees twice each year. Clause 13.3 directs the private company to protect the workers against accidents and also comply with provisions of *The Worker Compensation Act 1923* (AMC, 2008, p.15, 35, 36).

The prevalent norms and directions have been sifted out herein to be able to construct a lucid evaluation of the labour practices accompanying privatised operations in MSW in Amritsar. Last, but not least, the community (households) as one of the key stakeholders cannot be ignored. The waste generated by a population is primarily a function of their consumption patterns and socio-economic characteristics. Simultaneously, the community's attitude, awareness and interest in waste segregation and minimisation and waste segregation behaviour contributes to the status of MSW management (Schubeler, 1996, p.35). Harping on the same note, the MSW Manual states that all efforts must be made to build awareness in the community, besides developing a mechanism to register public grievances and the redressal benchmark of at least 90 percent should be achieved (MoUD, 2000, p.416, MoUD, 2010, p.40). The contract agreement does not mention community participation as such, but makes reference to conducting awareness and education programs by the private company through clause 5.4 (AMC, 2008, p. 15).

A discursive ground with an overview of directives has been prepared herein. In conjunction, the following sections unravel the ethos of the social sustainability dimension of privatisation of waste management operations, beginning with the implications for the informal waste sector.

5.2 Informal waste management operations in the city

All recycling operations in Amritsar city are undertaken by the informal sector. This sector is arranged in a pyramid with waste pickers at the bottom rung and forming the backbone of waste collection (figure 22). There is no formal count available, but it is estimated (based upon interviews with stakeholders) that there were 2500-3000 waste pickers engaged in informal waste collection and recycling operations in the city. There is also an informal

operation where the itinerant waste buyer buys directly from a household by paying a small amount for the recyclable waste and their number is estimated to be around 2500. Next are the small scrap dealers who buy the waste from these waste pickers/itinerant waste buyers and sell it to larger scrap dealers who deal with specific items and materials who then supply waste to the recycling units or the re-processors. On average, a waste picker spends about 10-12 hours daily looking for and filtering waste.

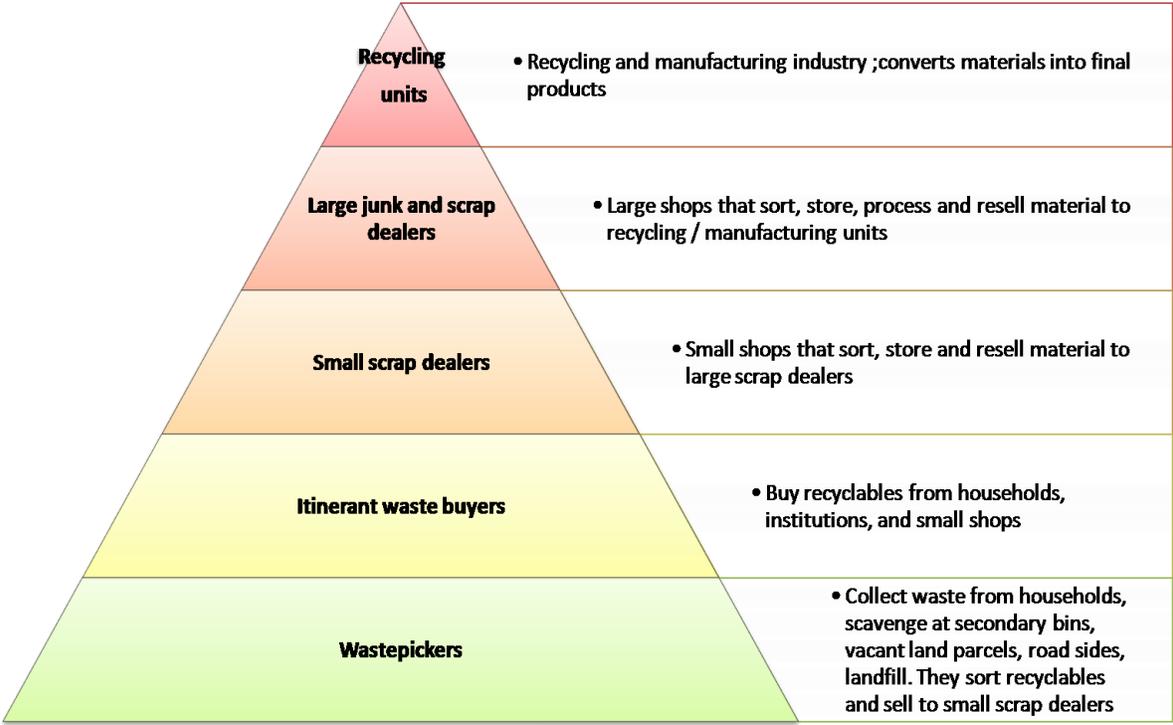


Figure 22 Informal waste management pyramid

Source; The generic arrangement of the recycling flow mechanism in the informal sector (modified from Masood & Barlow (2013, p.95).

There is a territorial route demarcation by the waste picking community in some parts of the city while in other parts there is none. The waste is collected from various sources: landfill, illegal dumping sites in the city, secondary storage bins and also, in some localities, directly from the households. It is then sorted manually in the areas where the waste pickers reside. The waste pickers collect items based upon recycling demand and at least twenty items, including plastics, paper, iron, cloth, animal bones, leather and bottles are collected by them (based upon interviews with waste pickers and itinerant waste buyers).

The waste pickers can be broadly divided into three groups, including those who collect waste door to door, from the roadside and municipal bins, and at the city landfill. Their mode of operations is described in table 18.

Table 18 Waste picker modus operandi

Model	Waste Generator	Waste Controller	Controlled stakeholder	Remuneration and conditions of access to waste
1	Household	Municipal Sweeper	Waste Pickers	The waste pickers pay the municipal sweeper a set amount, between 200-500 Rs/month ^a , for access to waste.
2	Household	Private Sweeper	Waste Pickers	The private sweeper employs 2-3 waste pickers to transport and dispose of the waste without giving them financial remuneration but enabling access to waste.
3	Household	Private Sweeper	Waste Pickers	The private sweeper employs 2-3 waste pickers to transport and dispose of the waste, also giving them financial remuneration between Rs 500-1000, besides enabling access to waste.
4	Household	Waste Picker	--	Waste picker collects waste directly from the household for a fixed payment varying between Rs 70-100
5	Household	Waste Picker	--	Waste picker collects waste directly from the household for no payment but simply for access to recyclables.

^aThe exchange rate equivalent for Indian currency (23 October 2016) is; 1 Euro= Rs 72.84, 1 US Dollar=Rs 66.92, 1 Australian Dollar=Rs 50.92

Source: Developed by researcher based upon interviews with waste pickers and NGO representatives.

The waste pickers typically come from the poorer states of Bihar, Maharashtra and West Bengal⁴³ and have been in the city from 1 year to a maximum of 30 years. The waste picker household usually comprises of an average of 6-7 persons. The majority of the economically active members of the households in the age group 9- 67 years are engaged in waste picking and sorting work while those remaining work as rickshaw pullers, labourers and domestic help in the case of women.

Escape from chronic rural poverty is the major reason for moving to the city and adopting this occupation. In addition, other reasons cited include being unskilled and illiterate for any other work and also due to their personal circumstances, such as having run away from home or being orphaned (based on interviews with waste pickers). Going by the Suresh Tendulkar Committee⁴⁴ estimates of below poverty line (BPL) level as Rs 33.30 (0.65

⁴³India is divided into 29 states and 7 union territories

⁴⁴The Report of the expert group to review the methodology for estimation of poverty (GOI, 2009) was prepared by a committee headed by Professor Suresh Tendulkar.

AU\$)⁴⁵ in urban areas or a spending of less than Rs 5000 (98.19 AU\$) per household per month (The Hindustan Times, 7 August 2013) the majority of the waste picker households, with an average earning between Rs 5000-7000 (98.19-137.47 AU\$), hover close to the poverty line.

Regarding the issue of benefits, scavenging by the informal sector creates economic and environmental benefits, supplies inexpensive raw materials to industry and reduces the need for municipal investment in collection, transport and disposal equipment, facilities, as well as labour costs, as fewer employees are needed to perform these tasks (Medina, 1997 cited in Medina 2007, p.69). Table 19 provides a visualisation for understanding the contribution of the informal waste sector specific to Amritsar, using the prism of sustainability with its four dimensions, environment, economic, social and institutional⁴⁶.

It can be seen that the informal sector contributes positively to all dimensions, their intervention resulting in a landfill diversion of 21.2 tonnes, cost saving to the AMC and production of social capital with job creation and poverty alleviation.

Table 19 Benefits from informal waste management sector

Environmental Benefits	
Recycling activity per waste picker weekly ^a	Between 20-40 kgs ^c (taking 30 kgs as the average weekly collection)
Itinerant buyer collection/week	Between 50-70 kgs (taking 60 kgs as average weekly collection)
Monthlywaste picker collection	30x 4= 120 kgs
Monthly collection by all waste pickers in the city	120x 3000= 36,000 kgs
Monthly itinerant buyer collection	60x 4= 240 kgs
Monthly collection by all itinerant buyersin the city	240x 2500= 600,000 kgs
Total recyclables collected/month	36000+ 600000= 636,000 kgs/ month or 636 tonnes
Total recyclables collected/day	21.2 tonnes
Landfill diversion/day	21.2 tonnes
Capacity of one tractor trolley	10 cu.metres (3.53 tonnes)
Additional trolley requirement savedfor 21.2 tonnes	6 trolleys (single trip basis)
Additional space saved from disposal at the landfill/day	60 cu.metres or 15.3 sq.metres/ day and for 636 tonnes, 459 sq.metres or 0.113 acres/month.

⁴⁵ For a family of six, the total amount to Rs 6000 (117.83 AU\$) approximately based upon the Rs 33.30 (0.65 AU\$) BPL norm.

⁴⁶Due to inadequacy of data, only the aspects for which a sound estimation could be made are included. Details such as energy savings and savings from air and water pollution are not considered in the benefit visualisation.

Economic Benefits	
Cost of hiring/deploying a trolley or truck/day	Rs 1000
Cost per transported tonne	Rs 283.28+ Rs 100(estimate of all other overhead charges)= 383.28/day
Cost per tonne paid to private company for collection/transportation	Rs 500/tonne/day
Cost saving to AMC @333.28/tonne/day	383.28x 21.2 tonnes =8126 or 243,766/month
Cost saving toAMC @500/tonne/day	500x21.2 tonnes=10,600 or 318,000/month
Employment generated at the bottom rung of the informal sector (other levels are not estimated due to lack of any related data that could help estimation)	3000 waste pickers + 2500 itinerant buyers =5500
Economic value of recyclables recovered by waste pickers and itinerant buyers, assuming an average cost of Rs 10/ kg	10x 636,000 kgs = 636,0000/ month or Rs 212,000/day
Social Benefits	
Livelihood generation	5500 waste pickers and itinerant buyers
Poverty reduction (assuming households with average family size 6 depending on income generated from waste)	5500x6= 33000 people
Institutional Benefits	
Cost savings to AMC due to waste diversion of 21.2 tonnes @ cost incurred by deploying private company ^b	10,600/day or 318,000 (6245.05 AU\$ ^d /month

^a A weekly estimate is made based on the fact that 2-3 days in a week and seasonally, such as on rainy days there would be variations in collection of waste (Hayami, Dikshit and Mishra, 2006, p.63).

^b Other savings, such as those from deployment of manpower, and cost savings at the landfill, have not been taken into consideration due to lack of data to make a relevant estimation.

^cKgs is kilograms, 1 tonne is equal to 1000 kgs

^dThe exchange rate equivalent for Indian currency (23 October 2016) is; 1 Euro= Rs 72.84, 1 US Dollar=Rs 66.92, 1 Australian Dollar= Rs 50.92

Source: Estimates based upon information derived from interviews with AMC and informal sector stakeholders.

5.3 Local government policy towards informal waste sector integration

Coming specifically to the context of privatisation, the research considers the three and a half years when the private company was engaged in managing waste operations in the city from February 2009 to August 2012. Analysing public policy in developing countries towards the informal waste sector, Medina (2007, p.73-74) categorises them as one of repression, neglect, collusion or stimulation. Taking a cue from this categorisation, a scale is developed to place the informal sector in the context of the existing government attitude and policy structures (figure 23). The scale has three levels, the first indicating the mild and the last towards the right indicating the extreme. The highlighted boxes in figure 23 indicate the current policy and attitudes towards the informal waste management sector. The design of privatisation followed by the city has been one of alienation. The Phase I (collection and transportation by private company) design started with waste collection at the doorstep of households in the 41 wards of the city contracted to the private company. This design left no room for the waste pickers to access the waste they wanted.

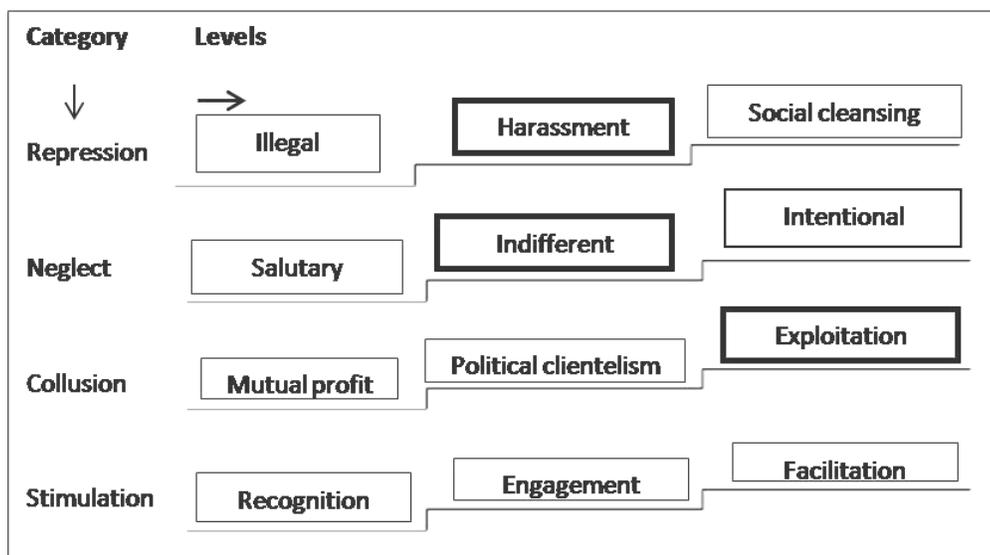


Figure 23 Policy towards informal waste management sector

Source: Constructed by researcher drawing on inputs from Medina (2007, p73-74)

The contract, as stated in the review section, did mention that the private company should engage with waste pickers, but this was done without any bindings and left to the private company to decide and thus appears as just a formality. Interviews with AMC staff revealed that they did not think that the services rendered by the waste pickers were “superior” enough, as can be gauged from this comment (AMC sanitary supervisor 1), “the state government wants to develop the city into an international tourist destination and world class city. Only a reputed private company with technological expertise and experience can deliver.”

Secondly, the argument was that (AMC sanitary supervisor 3) “these waste pickers could work as employees of the company if they wanted to and there would be no displacements, rather better employment avenues would result as an outcome of the city’s waste privatization.” The prejudices of the AMC were also made visible in the remark of one of the interviewees (AMC sanitary supervisor 3), “their work is illegal and has a nuisance value. These waifs are responsible for increasing crimes in the city.” It is quite apparent that the local government did not regard the work done by the informal sector as significant or as a value adding enterprise that plays a formalised role in the city’s waste management operations.

In the case of the private company, they also did not attach any weight to the work of the informal sector and rather spoke of it as being “*primitive and non-scientific*” (PC managerial staff 1). Further, “*they are only interested to access recyclable materials. They cannot be engaged as they don’t have skills and knowledge*” (PC managerial staff 2). It was also apparent that the private company, in a bid to maintain a technological-savvy impression, did not want to have any engagement with the informal sector, fearing a negative impact on its image.

Regarding the waste pickers themselves, analysis revealed that they have never been approached by the local government, directly or indirectly, to discuss either work operations or any other matter related to waste management in the city. Rather than support, some municipal sanitation employees (street sweepers, drivers, waste bin clearers) are believed to harass and exploit the waste pickers. “*I have to pay money to the corporation workers, sometimes Rs 200 (3.92 AU\$), sometimes 300 (5.89 AU\$) or more, only then I am allowed to dispose of waste in municipal bins or access recyclables there*” (waste picker 3).

Repressive policies were pursued in the form of harassment of waste pickers especially by both the AMC sanitary staff and the private company workers. An extreme form of collusion was visible when the waste pickers were allowed to continue their operations once they paid an amount to the municipal sanitary workers. To date, there is nothing in the name of stimulation that has existed in the city towards the operations of the informal waste sector.

5.4 Impacts of privatisation on the informal sector

The following section analyses the impacts of privatisation guided by the criteria and indicators from the sustainability assessment framework devised in Chapter III. Table 20 summarises the situation and impacts, before and after privatisation, of waste management operations.

Table 20 Pre- and post-privatisation scenario

Impact categories	Before Privatisation	After Privatisation
Impact on access to waste	Door to door access to waste recyclables. Customary right to waste. Access to secondary waste containers and landfill.	Waste pickers no longer had access to household waste directly, the primary source of recyclables resulting in loss of livelihoods. Right claimed by the private company till the disposal took place after weighing waste quantities at the landfill. Informal policing by private company staff to enhance waste quantity on which their profits depended (as the payment was tonnage based) limited access to waste.
Impact on income	Segregation and recovery of recyclables in better quality conditions. More possibilities of climbing up the economic ladder.	Mixing and compaction of waste especially through compaction units of the private company rendered acute reduction of the quality of recyclables like plastic and paper, leading to difficulties in segregation and further decline of incomes. No further possibility due to reduced access to waste coupled with larger competition amongst the waste pickers.
Impact on relationship between stakeholders	Cordial territorial route demarcations amongst waste pickers. Collusion and harassment by AMC sanitary workers.	Breach in territorial route demarcations resulting in competition, conflict and rupture in their social fabric enhancing inner tensions. Collusion and harassment by municipal sanitary workers and also by private company workers.

Source: Constructed by researcher based upon interviews with waste pickers

5.4.1 Impact on access to waste

Those most severely impacted from privatised operations were the waste pickers collecting at households who were asked by the households not to come for waste collection after the private company began operations in their areas. *“I lost access to many houses. I begged them but they asked me to leave. I could salvage very little recyclables, my income dwindled and I was forced to look for recyclables in municipal bins and landfill”* (waste picker 5). Furthermore, the private company was paid by weight and randomly policed its road side secondary bins (though this was limited and not fully possible looking at the scale of operations) to prevent waste pickers recovering recyclables and reducing the volume that could result in loss of tonnage. Since in Phase I the company’s contract was only for collection and transportation, waste pickers did not completely lose their right as customary owners to waste but rather were limited in the potential locations from where waste could be accessed by them, i.e. only the landfill. However, the fact remains that when it came to door to door employment, the waste pickers were badly hit and had to look for alternative means of livelihood within or outside the informal waste sector.

In the case of the itinerant waste buyers, analysis reveals that the private company operations did not have a significant impact on their work operations. The reason is that

traditionally bricolage practices have been established in India and still remain strongly embedded in the household waste management behaviours wherein recyclables such as waste paper, iron and steel scrap, bottles, waste plastics, etc. are sold to the itinerant waste buyer in return for some amount of money (see Chapter IV, section 4.4.1). While the fiscal benefit of this nature may not play a big role for some households, for others it is still a valuable remunerative activity. However, the itinerant waste buyers interviewed did mention that “to add to the tonnage, the private company staff asked households for all disposable wastes including iron scraps, old television sets/ refrigerators and other waste and also succeeded in getting these recyclables in case of those households who did not seem to care much for bricolage practices” (itinerant waste buyer 1).

5.4.2 Impact on income

The loss of door to door employment led to a substantial loss of income for the door to door waste pickers who became suddenly unemployed and cut off from access to domestic recyclables (table 21).

Table 21 Income loss incurred post-privatisation

Waste picker categories	Income before private operations began (average earnings/month in Rupees ^a)	Income after private operations began (average earnings/month in Rupees)	Average decline (Rupees)	percentage
Waste pickers (landfill)	5500	4000	1500	27
Waste pickers (roadside and secondary bins)	5000	3500	1500	30
Waste pickers (households)	6000	2000	4000	60
Itinerant waste buyers	10,000	9000	1000	10

^aThe exchange rate equivalent for Indian currency (23 October 2016) is; 1 Euro= Rs 72.84, 1 US Dollar=Rs 66.92, 1 Australian Dollar= Rs 50.92.

Source: Constructed by researcher based on interviews with informal waste stakeholders.

However, the other category of waste pickers, primarily those operating at the municipal bins and landfill or other informal dumpsites, were not cut off immediately from recyclables, as these were still available to them albeit at the; the landfill where the private company disposed of waste after getting it duly weighed and accounted for as valid tonnage for payment by the AMC. The quality of the waste recyclables declined considerably due to

the use of compactor vehicles for increasing the density of the waste and reduction of volumes to be transported to the landfill. A decline in incomes was reported by the interviewees due to the low quality of recyclables.

The waste pickers operating at the secondary bins and landfill also reported a drop in income primarily due to the competition for recyclables becoming more intense at the landfill, with more waste pickers moving there to access recyclables, since the previously decentralised collection mode was now concentrated and confined spatially to the city landfill. While the itinerant buyers were not significantly impacted, they did mention a decline in income due to the endeavour of the private company staff to ask the households for recyclables that were traditionally given to the itinerant buyers.

5.4.3 Impact on relationship with other stakeholders

Competition amongst the waste pickers who had lost the door to door employment avenue and shifted to the municipal bin and landfill locations brought about internal conflicts within the waste picking community as territorial route and area demarcations were fractured in the struggle for sustenance. *“Households told me not to come anymore as company would come to collect their waste. I lost my earning. After that I went to Bhaktanwala dump but there were so many there like me. I was often threatened and chased away by older waste picker”* (waste picker 3). In the context of their relationship with AMC and private company employees, a waste picker revealed forced collusion and exploitation, lamenting that *“earlier it was only the municipal corporation sanitation workers but now we had to also deal with private company workers who threatened us if we tried to approach households or municipal bins”* (waste picker 3). It is quite evident that privatisation alienated and damaged the livelihoods of the waste pickers, leaving them little choice in the face of exclusion to their customary right of accessing household waste and their survival in the city. The discussion in the section below presents an account of the stakeholders from the AMC post-privatisation of waste management services in the city.

5.5 Impact on AMC sanitary workers

The pursuit of sanitation and health were the major drivers historically leading to the establishment of the municipalities in the country by the colonial rulers. Since their inception, waste management has been the key function of municipalities and a large part of its human resource personnel are deployed in managing the city's waste. Traditionally, the work comprising street sweeping, waste collection and disposal has been done by permanent sanitation workers of the municipalities across the country, almost always organised in unions under political patronage as well as other labour unions (Vyas, 2009, p.326) for safeguarding their interests and lobbying or campaigning for their labour rights. However, other than the permanent employees, a trend that can be traced to the early 1990's is the hiring of contract sanitation workers by municipalities (Vyas, 2009, p.326), largely to cut the costs of a full time employee as these contract workers are paid much less⁴⁷ than a permanent sanitation employee.

Waste work in India has almost always been associated with occupational caste hierarchies with the scheduled castes exerting dominance and control in sanitation employment matters supported by their strong presence in the sanitary worker unions. Hereditary accession to jobs in the sanitation sector in municipalities has therefore been more of a rule than an exception. The case of Amritsar is no different than the above mentioned. The management cadre from the health officer to the sanitary supervisors comprises permanent staff. While in the lower hierarchy constituting sanitary workers (drivers, sweepers, waste handlers), the staff has been recruited both on a permanent and temporary basis (figure 24).

Prior to the AMC operations, there were 1360 permanent sanitation workers and 1050 contract workers hired under the MSC scheme of the AMC. While the permanent staff earned a salary of Rs 14000 (274.93 AU\$), the temporary workers were employed for a meagre Rs 1200 (23.56 AU\$) since the year 2000, with a marginal increase up to Rs 2850 (55.96 AU\$) till 2009, an amount which was lower than the Government of Punjab minimum notified wages for 2009 (Government of Punjab, 2015), as indicated in table 22. Benefits such as a uniform allowance (Rs 3200 (62.84 AU\$) /person/annually), annual increments, retirement benefits and casual leave were not available to the contract workers.

⁴⁷Usually a third of the salary of permanent municipal sanitation employees.

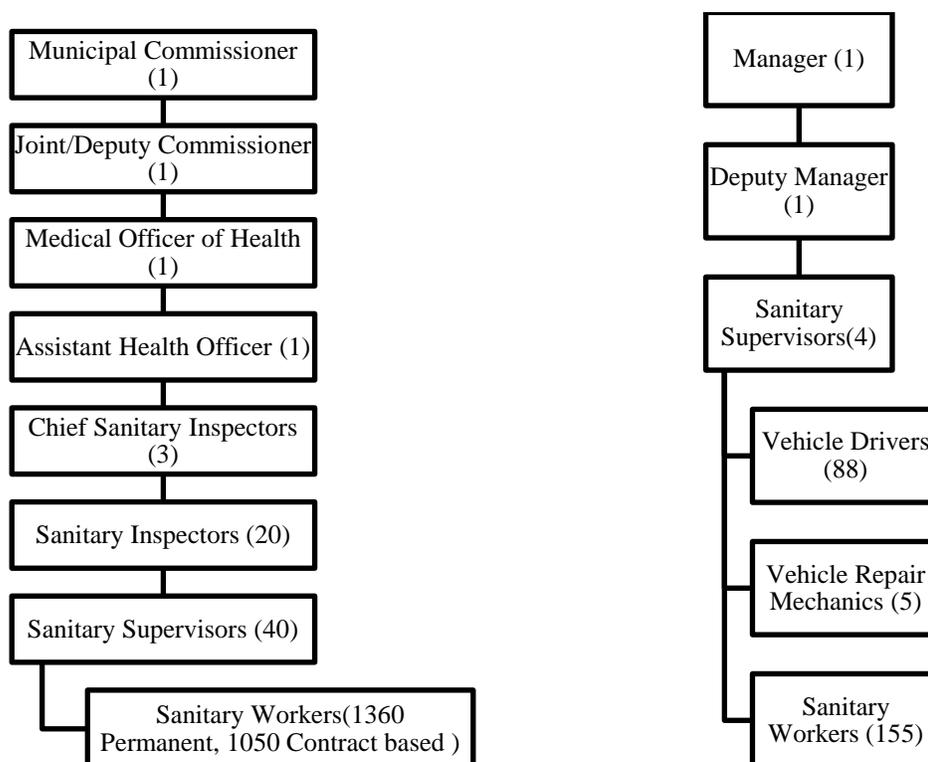


Figure 24 Human resources, AMC and Antony Waste Handling Cell Private Limited

Source: AMC (2009, p.59), PC managerial staff 1

Table 22 Minimum wages (in Rupees)^a for Punjab State (2009-2012)

Category	Description	1/3/09	1/3/10	1/3/11	1/3/12
Unskilled	Sweeper, helper, labour	3302	3554	3842	4268
Semi-skilled	Above with two years' experience	3647	3899	4187	4613
Skilled	Semi-skilled with five years' experience	4031	4283	4511	4454
High skilled	Graduate or professional trade as heavy vehicle drivers, tempo, tractor, bulldozer, JCB	4477	4729	5017	5443

^aThe exchange rate equivalent for Indian currency (23 October 2016) is; 1 Euro=Indian Rupees 72.84, 1 US Dollar=Indian Rupees 66.92, 1 Australian Dollar= Indian Rupees 50.92
Source: Government of Punjab (2015)

Besides, they were often made to perform overtime and unrelated tasks, like working as domestic help at the home of the municipal officials. When asked why they continued to work in such adverse conditions, the response of one of the interviewees (AMC sanitary worker 1) was that, *“hope, only hope kept me going. I had hope that one day my perseverance shall pay off and I shall become permanent with the AMC and thereafter my*

children can also get access to a job there. Now I am permanent after working on contract for nine years. My son is also a sanitation employee and I am trying that my younger son also gets in”.

At least three parallel unions of sanitary employees exist besides eight unions pertaining to other departments of the AMC. There is no elected single union. However, depending upon inter-union networks and agenda, coordinated lobbying representing all or some of them takes place. In case of the sanitation unions, allegiance to different political parties has not made it possible to have a single union. These unions give political endorsements and serve as a support bank to political candidates and are quite vocal about their demands and expectations from the political leadership. Seventy-five percent of the municipal staff is from the scheduled caste communities (Balmikis and Churas) and therefore these unions seek to represent their common interest. Contract employees also owe affiliation to these unions, which are caste and occupation based, with the hope of getting permanent jobs with the AMC.

The context of privatisation of MSW must be examined within this structural setup of the sanitation administration and operations in the city. According to Baker (n.d. cited in Khan et al., 2012, p.123) the greatest source of opposition to privatisation comes from the employee unions. This assertion is valid to the core in Amritsar wherein the first opposition to privatisation of MSW came from the sanitation unions, all three unifying under a single banner in pursuit of non-privatisation, stemming from a fear of job loss and lack of job creation in future. Between 2007 and 2009, a number of massive organised protests by the sanitation unions supported by other AMC unions and the city based CITU⁴⁸ against privatisation of MSW were held by workers striking down work, lasting between 4-10 days. They pushed for the regularisation of the contract workers and dropping the privatisation agenda for MSW. A compromise was reached between the political leadership (Minister, Urban Local Bodies, Government of Punjab), the managerial staff of AMC and the protesting unions by agreeing to regularise contract workers and retaining part of the area of the city under AMC. This compromise and pacification of the unions by the political and bureaucratic leadership paved way for the privatisation operations to begin in

⁴⁸ CITU is the abbreviated form of *Constitution of the Centre of Indian Trade Unions*, a left wing organisation, engaged in working for the economic and social rights of the workers.

the city. It also appears, understanding that there was nothing stopping the privatisation agenda, that at best, the unions tried to serve as a legitimate institutional vehicle to bargain for their interests, while at the sametime trying to maintain credibility in a changing municipal structure post-privatisation. The post-privatisation impacts of MSW on the sanitation workers are described below.

5.5.1 Employee layoff and retrenchment

According to Khan (et al., 2012, p.123, 124) politically, the most difficult and feared impact of privatisation is employee layoff and retrenchment. Labour force restructuring before and after privatisation is expected, as public enterprises are usually overstaffed and often used as instruments of job creation. In this context, the case of privatisation of MSW operations in the city presents a slightly divergent view. Going back to the compromise with the unions, 175 contract employees were made permanent in 2009 to symbolise that privatisation would not harm the interests of the sanitation workers. However, with the protests erupting again⁴⁹ and also in the wake of state elections in 2011, another round of permanency took place. As one of the interviewed union leaders boasted “*our union is very strong. They (private company) cannot touch our jobs. We can create difficult conditions for them if this happens. We are also political workers and have direct links with top leadership*” (AMC sanitation worker 1). The condition laid was that only those who had worked continuously without any break of service since the day of appointment would be considered. Meanwhile, the MSCs were dissolved and at least 500 contract workers were made redundant under this criterion. While it can be affirmed that employee layoff and retrenchment per say did not take place for the permanent staff, a gradual layoff using a compromise formula to retain some (to appease the unions) and lay off the remaining contract employees did take place post-privatisation.

5.5.2 Effect on employees income

Martin (2001, p.26) states that changes in pay structure can take place in preparation for privatisation. In the context of the case study, the permanent employees were not impacted by the privatisation operations in terms of a salary cut. However, the contract workers

⁴⁹ In the wake of state government elections in 2011, not wanting to lose sanitation union support, the AMC made permanent the services of an additional 375 sanitation employees

whose services were terminated in 2011 were adversely impacted. *“I had worked for the AMC for five years continuously. Then, due to illness, I left for about one year. I was not made permanent and was removed without any benefit. I am in a pitiable economic state. I am in touch with the union to get my case through”* (AMC sanitation worker 3). The commutative effect of privatisation would have been felt by all the 500 contract employees who were removed and therefore it can be said that they bore the brunt of the privatisation process.

5.5.3 Absorption of contract sanitation workers by private company

Chandler & Feriella (1994, p.16) state that the onset of privatisation leads to restructuring options in public sector enterprises, such as transfer of employees to other government departments or being absorbed by the private company or to being completely outplaced. Interviewees (AMC sanitation workers 3) revealed that contract employees of the AMC were not absorbed by the private company. *“We were told by the management officials that they would pressurize the private company to assign jobs to us but this did not happen”*. This can be attributed to three reasons: firstly, it was only in mid-2011 that contract workers were terminated, the second year of privatised operations. Secondly, the private company staff was hired through an advertisement and later through personal networks of the private company managerial staff and its employees who sought to get their relatives into the privatised operations. Thirdly, the private company did not want to bring the AMC union work culture into its operations, so it thought it best not to hire previous AMC workers.

5.5.4 Transfer or adjustment to alternate municipal departments

None of the sanitation staff was transferred to any other municipal department. As per the adjustment policy of the AMC, the surplus staff was adjusted in the 24 wards under AMC, while street sanitation in the entire city continued to be under AMC. However, in the absence of any retrenchment, the regularisation of 550 employees did create a surplus. Interviews with an NGO representative (NGO member 1) revealed that, *“there was an excess of sweeping staff as the road lengths assigned were reduced to absorb more workers. They had only half or one street which they could finish in an hour and then be free for the rest of the day. Also this surplus led to higher collusionary practices with*

municipal workers resorting to higher abstention in collusion with their colleagues as well as the supervisory staff".

5.5.5 Freeze on AMC recruitments

Political compulsions (state elections 2011) and union pressure led to the regularisation of 550 employees simultaneously with privatisation operations underway, in contravention to the expected downsizing in the event of privatisation. Since then (2011), no additional employment has taken place, despite 150 retirements till 2014. However, this cannot be taken as a freeze in the actual sense of the word, since the privatised operations were withdrawn in August 2012 and, as an interviewee revealed, *"past experience indicates that AMC does not have a fixed policy of making regular recruitments and appointments are generally made when elections are around the corner or under heavy union pressure"* (AMC sanitary supervisor 2).

5.5.6 Impact on working conditions

Aghair (2010 cited in Khan, et al, 2012, p.128) reasons that once an organisation begins to privatise, the insecurity and fear of job loss can lower the employees trust in their organisation and this can be negatively reflected in their attitude towards their work. However, there are contradicting views on the working conditions post-privatisation for the municipal sanitation workers. *"Our work is our pride and livelihood. For the private company it is only about money. We had to work harder as they did only the easy work of emptying roadside dustbins into their compactor vehicle. They never picked up animal carcasses or waste heaps from street sweeping. It was left to us to deal with it"* (AMC sanitary worker 1). It was also felt that the private company got the easier sectors of the city, whereas the difficult ones, such as the walled city, were handled by the AMC. However, as already pointed out, surplus staff created less work for the AMC employees and led to more furlough and abstention.

5.5.7 Unionisation post-privatisation

Chandler & Feriella (1994, p.20) and Bach (2000, p.27) imply that contracting out reduces the credibility of the employee unions of the public sector and may spell the elimination of

the union altogether. The union leaders from AMC strongly refuted that the union's credibility and bargaining power was eroded post-privatisation of MSW. As one of them remarked cynically, "*privatization will always fail but we are here to stay*" (AMC sanitary worker 2). In hindsight, it can be said that while the union could not stall privatisation altogether, it did serve as a strong pressure group and succeeded in retaining jobs and regularisation of at least half of the contractual workers. Neither were the unions eliminated, nor did they lose credibility. Rather, it motivated the private company workers to form a union to press for their demands, contributing to private unionised operations, as discussed later in the followup section.

5.6 Impacts on sanitation workers of Antony Waste Handling Cell Private Limited

The private company began operations in the city on 2nd February 2009 and hired workers by placing advertisements in the local daily newspapers in January 2009. Accordingly, the organisational structure of the private company is presented in figure 24. Bach (2000, p. 20) states that privatisation operations are marked by lower pay, work intensification, lower job security, decline in holidays and other entitlements, and less tolerance of sickness and absence. The literature review on privatisation in Chapter II points at the exploitation and harder working conditions for employees, largely seen as a natural alignment with the principle of private rationality of cutting capital costs and maximising returns. Amritsar is also, as can be observed, a case to the point in conjunction with the arguments emanating from the review of the literature. Based upon information gauged from the interviews cutting across managerial staff and workers, it is evident that previous skill or work experience in the waste sector was not a mandatory condition imposed by the private company. Also surprising, the managerial staff had no previous experience, except that the drivers were licensed – other staff were unskilled. Paradoxically, in a larger perspective, waste work has not been regarded as specialised and requiring special skills or experience. Also, no in-house training or workshops were conducted to make the workers aware of the principles of sustainable waste management and its safe handling.

5.6.1 Employee wages and service benefits

The managerial staff (Manager and Deputy Manager) were paid a lumpsum salary of Rs 40,000 (785.54 AU\$) and Rs 30,000 (589.15 AU\$) respectively, with provision of leave on

Sundays and an annual paid leave of two weeks. The supervisory staff was paid Rs 7000 (137.47 AU\$) with one day leave weekly but no annual leave. The technical repair staff (mechanics) were paid between Rs 6000-8000 (117.83-157.10 AU\$), depending upon their skill, again with a weekly leave but no annual leave. The worker class (drivers and helpers) were employed on a salary of Rs 3900 (76.59 AU\$) with no provisions of any leave per week or annual leave. While the wages complied with the norms in the unskilled and semi-skilled categories (table 22, section 5.5), they were lower for skilled and high skilled worker categories than the minimum wage regulations. Annual increments were given to the managers and supervisors, but no increment was there for the workers and drivers.

Besides no leave, pay deductions were made when leave was taken on any account, including sickness. *“Many times we were deployed after work operations, such as when a VIP (very important person) was visiting the city, but we were never given any overtime benefit”* (PC sanitary worker 1). In lieu of annual increment, the workers were informed of a bonus of one extra salary after completion of one year, but this was also not given. However, the Employee Provident Fund (EPF) was maintained by the private company with a matching deduction from the staff salary. Health insurance cover was not given, instead the workers were given ESI⁵⁰ hospital cards to access healthcare in the government hospital on a low cost basis. However, as a worker claimed, *“it was just a farce to show that some form of health service was provided, but in truth it was the same for anyone who wants to use the government hospital”* (PC sanitary worker 2).

Feeling exploited and in response to the poor salary and lack of benefits, the workers went on strike in July 2010 to demand a salary hike, as per the specified minimum wages, and one day of leave per week. While the former was not acceded to, the private company relented and agreed to a single day of leave per week, but resorted to deducting the salary for four days of the month, much to the chagrin of the employees, instilling a fresh disenchantment amongst them.

In June 2011, the employees, with support from the AMC sanitation worker union and CITU, went on strike again for a better salary and increment. Simultaneously, they also

⁵⁰Refers to employees state insurance scheme of the Employees State Insurance Corporation of India to protect employees as per the contents of The State Insurance Act, 1948, against the impact of incidences of sickness, disablement or death during employment.

lodged a legal case with the local labour court, leading to directions to the company to increase pay and offer increments. Accordingly, the salary was enhanced to Rs 4500 (88.37 AU\$) (still not as per the minimum rates given by the Labour Department, Punjab) and a fiscal allowance (compensating for an increment) of Rs 180–250 (3.53–4.90 AU\$) every six months. Subsequent to this, the employees went on strike in January 2012 against salary deductions for leave and again appealed to the labour court to intervene, which led to directions to the company to not deduct leave salary. However, in contravention, the private company continued to cut salary against any leave taken by the employee and this resulted in a continuous resentment amongst the workers. The management stand is clear from their thoughts, *“in the garbage section there are no holidays. There employees wanted the same salary and benefits as the AMC employees, can that even be possible in the private sector?”* (PC managerial staff 1). It can be gauged that the private company indulged in exploitation and cost saving tactics, in the process triggering dissatisfaction amongst lower hierarchy employees that led to strikes and labour court litigations.

5.6.2 Labour turnover and downsizing

Interviews with employees revealed that labour turnover was high and labour downsizing was practiced by the private company to reduce costs. In February 2009, at the beginning of operations, the worker strength stood at 248, but from 2011 onwards the strength hovered between 170 to 200. The workers were not given any terms of reference and nor was a contract agreement signed. Hence, exploitative and arbitrary practices marred managerial and labour relations. The workers hired in the first batch had a misconception that they would be municipal employees and had a hope to be permanent in the future. On realising that this was not the case, some of them left. Besides, long work hours and inadequate salary and benefits also led to a high turnover. However, as a managerial employee opined, *“labour is not a problem, we get job enquiries and enthusiasts every day”* (PC managerial staff 2). It does not seem that labour turnover impacted the private company adversely on account of readily available unskilled labour, as well as the practice of reducing workers as a way to enhance labour productivity and cost cutting.

5.6.3 Provision of safety gear

Adopting a defensive stance on the issue of provision of safety equipment to its field staff, the managerial employees' response was that uniforms (green for drivers and brown for workers), masks and gloves were provided. *"They do not wear them as they don't want to be recognised as waste workers"* (PC managerial staff 2). Apparently the interviewee was referring to the stigma attached to waste work as the domain of the lower caste, a label that people find socially degrading. Whereas the interviewees from the worker staff lamented that other than one pair of uniforms provided during the start of private company operations in the city, no other safety gear, such as masks, boots and gloves, were provided. Vaccination, health and safety cover was also disregarded by the private company, exposing their staff to occupational risk. *"While handling garbage manually, some of us got injured due to the unsorted garbage, but the private company gave us no compensation for any injury during work and left us to fend for ourselves"* (PC sanitary worker 2).

5.6.4 Working conditions

From the above discussion, it can be gauged that the working conditions were not conducive to the lower hierarchy workers of the private company. While the front line managerial staff enjoyed benefits, the workers were the ones where the private company tried to cut costs to the maximum. An interviewee mentioned that *"officially the duty time is 8 hours, but in reality we worked 10-12 hours, but without any overtime benefit"* (PC sanitary worker 1). Leave could not be claimed as a matter of right and leave pay deductions were a norm. There were no facilities for the drivers and workers, such as restrooms or some provision for refreshments. The management delayed salaries and also imposed unjust salary cuts by bungling with workers' attendance. *"Even when we had worked for 25 days, we got salary only for 20. Our request to them to be transparent about salary preparation fell on deaf ears. So we had to counter this by setting up our own employee register so that such cheating could be stopped"* (PC sanitary worker 2).

The interviewees also revealed that when the AMC imposed a penalty, the same was deducted from the salary of the concerned employee. In the case of a vehicle fault or a vehicle related accident, the employee had to contribute to the same. Describing an incident, an interviewee revealed that *"our vehicle by accident hit a bypassing lady who*

died. The private company did not help in any way. The worker union collected about Rupees one lakh (1963.8 AU\$) to deal with police and gave compensation to the bereaved family” (PC sanitary worker 1). Quite to the contrary, the managerial staff stated, “our vehicles are insured and the private company gave compensation in all matters related to its vehicles in accidents” (PC managerial staff 2). However, it can be inferred that unclear service rules, lack of transparency and unfair methods of cost reduction led to hostile service conditions for the workers.

5.6.5 Termination modalities in the event of private company suspending operations

The worker interviews state that the private company’s dealings were never transparent and therefore it did not inform or prepare its employees for the suspension of MSW operations thereof. “Around June 2012, the private company started to secretly send its vehicles, mainly the compactors and dumper placers, to Noida⁵¹. We suspected that it was planning to withdraw but, on confronting the manager, he said that the company was going to get a new vehicle in their place for city operations” (PC sanitary worker 3). In a business as usual mood, on 25th July 2012 when the workers arrived for duty, the gates of the company office cum workshop were closed and a notice pasted informing them that their services had been terminated. Accordingly, no advance notice was given to the workers and nor were they given any compensation for sudden termination.

The managerial staff, however, stated that a month’s notice was given but later admitted that “one month’s notice was only on paper to be legally correct in case of a dispute. In reality, we terminated them immediately without any notice. However, we cleared their pending salary and dues, but no additional compensation could be given, we had no money even to run the operations anymore” (PC managerial staff 1). The immediate response of the workers was to approach the AMC commissioner who expressed his helplessness in the matter, saying that it was an internal matter of the company. Left with no other resort, the terminated employees united under the Greenfield Worker Union, filed another case in the labour court in protest against the sudden termination and lack of compensation. The decision on the same was still pending at the time of these interviews. The union leaders stated that collectively the private company owned them Rs 50 lakhs (98192.59 AU\$) in

⁵¹The other city where the company had a running contract and to Mangalore city where it had won a bid.

compensation. They also mentioned the impacts of immediate termination as very severe. In the words of one of the union leaders, “*There is a Punjabi proverb which says, when the stove is not ignited the women will leave home. You can imagine how pitiable the condition of 200 terminated workers become overnight. I could not find a job for nine months thereafter and most of my colleagues are still unemployed*” (PC sanitary worker 1). It can be deduced that the sanitary worker did not get an appropriate work environment with the private company, which paid little regard to the service conditions of the workers in a bid to cut costs and simultaneously maximise labour productivity.

5.7 Equitable access to service

An analysis of equal access to the service was made by dividing households into four categories based on their disclosed incomes and visual observation of the residential locality and housing structures. The result of the survey in the context of distributive equity is presented in table 23. The income based categories are classified as economically weaker sections (EWS), low income groups (LIG), middle income groups (MIG), and higher income groups (HIG)⁵².

Table 23 Household access to privatised waste service

Questions	Household categories (income based)			
	EWS (50)	LIG (50)	MIG (50)	HIG (50)
	N (%)	N (%)	N (%)	N (%)
Did the private company collect the waste from your doorstep? (n=198)				
Number of respondents	48	50	50	50
Yes	18(37.5)	27(54)	30(60)	47(94)
No	30(62.5)	23(46)	20(40)	3(6)
How do you rate the private company service delivery from your door? (n=198)				
Number of respondents	49	49	50	50
Very Bad	7(14.2)	5(10.2)	4(8)	-
Bad	11(22.4)	13(26.5)	7(14)	2(4)
Good	20(40.8)	24(48.9)	29(58)	9(18)
Very Good	8(16.3)	4(8.1)	5(10)	18(36)
Excellent	3(6.1)	3(6.1)	5(10)	21(42)
Do you think the placement of the secondary container from your house was accessible? (200)				
Number of respondents	50	50	50	50
Yes	5(10)	8(16)	10(20)	11(22)
No	39(78)	33(66)	16(32)	18(36)
Not Sure	6(12)	9(18)	24(48)	21(42)

Source: Household Survey (May, 2014)

⁵² This categorisation is based upon the Monthly Per Capita Expenditure (MPCE) given by the Indian National Sample Survey Report (2004). The Ministry of Housing and Urban Poverty Alleviation categorises the households as EWS, LIG, MIG and HIG based on annual income. Accordingly, the income specification for EWS and LIG is Rupees 1 lakh (1963.85 AU\$) and 1-2 lakh (1963.85-3927.70 AU\$) respectively (The Hindu, 2012).

In terms of collection of waste from doorstep, 62.5 percent of the sampled EWS and 46 percent of the LIG category received no door to door collection, whereas this dropped to 40 percent in MIG and just 6 percent in the HIG category. A majority of the HIG households rated the door to door service by the private company as excellent and very good, whereas this figure dropped down the line to 6 percent in EWS households.

This reveals a bias wherein the HIG households appeared to be much better serviced than low income households. This point is also substantiated by an interviewee from the private company, “*as directed by the AMC, we gave special attention to elite parts of the city as many powerful people reside there. We collected waste daily in Ranjit Avenue, Green Avenue and many other rich areas, sometimes also twice from the secondary bins. In slum areas we sometimes skipped a day or two as the waste quantum was smaller and led to high cost of diesel*” (PC managerial staff 2). Besides the door to door collection, there appeared to be a variation even in distribution and access to the secondary waste bin, wherein 78 percent of EWS and 66 percent in LIG households found the containers inaccessible from their homes. Whereas this dropped to 32 percent and 36 percent in MIG and HIG households respectively. This is an indication that fewer secondary containers were placed in low income areas, leading them to be at a greater distance and hence inaccessible to most households in low income locations.

5.8 Community participation in MSW post-privatisation

As mentioned earlier, the community is an important stakeholder in MSW management services. Therefore, it becomes imperative to evaluate the impact privatisation of MSW services had on the behavioural and generational attitudes of the community, whether it invoked their participation and addressed their grievances appropriately. This section relies on household surveys for constructing a picture of community responses and impacts therein. The community, as the response reveals, was not involved in the MSW management processes (table 24).

Consequently, it was reflected in the *business as usual* attitude with a majority of respondents reporting insignificant change in their households’ waste disposal pattern, while a small percentage (1.5%) mentioned participating in waste awareness programmes. 13.3 percent of households admitted to disposing of more waste after the privatisation of

MSW services. The reason attributed to this came partially in the form of a response from an itinerant waste buyer (itinerant waste buyer 1), who said that, “*the staff of the private company asked the households to give them all forms of waste, including reusable or recyclable like broken or old furniture and plastic products which were earlier given to us, simply to increase their quantum of waste to enhance weight and thus their profit*”.

Table 24 Household participation in MSW management post-privatisation

Questions	Number	%
Are you aware of the private company that was undertaking waste management services in your area from February 2009 to August 2012 (n =199)		
Yes	119	59.8
No	80	40.2
Were you/ your household ever involved in any waste awareness programme at area/city level (n= 194)		
Yes	3	1.5
No	191	98.5
Did the private company ask/request you to segregate waste into wet and dry separately (n= 179)		
Yes	42	23.5
No	137	76.5
Was there any initiative by the private company to give you information about the importance of waste recycling (n= 149)		
Yes	40	22.6
No	137	77.4
Not sure	23	11.5
Did you notice any change in your waste disposal behaviour after the private company began operations in your area (n =181)		
Yes	24	13.3
No	42	23.2
Can't say for sure	115	63.5
Did you ever lodge a complaint while the private sector services were operational (n= 187)		
Yes	22	11.7
No	165	88.2
If yes, what was the response in addressing the complaint (n= 21)		
Very Bad	3	14.3
Bad	10	47.6
Good	4	19.0
Very Good	4	19.0
Excellent	0	0.0

Source: Household survey (May, 2014)

In terms of addressing grievances, the response of the private company can be considered as only marginally better than the AMC, with 61.9 percent of the respondents rating the response as bad and very bad, thereby not meeting the benchmark requirements (90%). The reason for laxity was revealed by an interviewee from a local NGO who stated, “*The private company took care of operations and complaints from elite areas, but disregarded the same in low income localities. Since they were in collusion with the AMC sanitary*

inspectors, they did not expect any trouble and adopted a complacent approach” (NGO member 1).

5.9 Inferences and conclusions

This chapter aimed to comprehend privatisation from a social sustainability perspective, applying the criteria set in the sustainability assessment framework to guide and situate the analysis. Based upon the discussion therein, it is possible to sieve out major inferences.

Based upon the analysis, table 25 represents a précis of impacts, dividing the same on scales of low, medium and high to represent the cumulative outcome and status of social sustainability post-privatisation of waste management operations in Amritsar. Figure 25 presents a graphic view of the social sustainability impacts and indicates low levels of social sustainability performance of privatisation in the context of the stakeholders; informal waste sector, private company sanitation workers, low community involvement and inequitable access to waste services. In case of the AMC workers, considering the fact that no retrenchment of permanent employees took place but some contract workers did loose jobs, a moderate impact is visualised.

Table 25 Scale of social sustainability

Scale	Equity	Informal waste sector	Private company sanitary workers	AMC sanitary workers	Households
Low (1)	Poor equity and coverage of low income areas	Exclusion and largely adverse impacts	Poor labour law enforcement and high labour turnover	Retrenchment, layoffs and salary deductions	Lack of community involvement, limited awareness, lack of waste segregation/efforts towards waste minimisation
Medium (2)	At least 60% coverage of low income areas	Some effort of inclusion, some adverse impacts	Some adherence to labour laws	Some retrenchment/layoffs	Moderate involvement and some effort towards waste segregation/ minimisation
High (3)	100% coverage of low income areas	Inclusion and integration with no adverse impacts	Adherence to all mentioned labour laws	No retrenchment/ layoffs but follow the course of natural attrition	High degree of awareness and involvement along with achieving source segregation/ minimisation

Source: Based upon the review and analysis of criteria and indicators to assess social sustainability

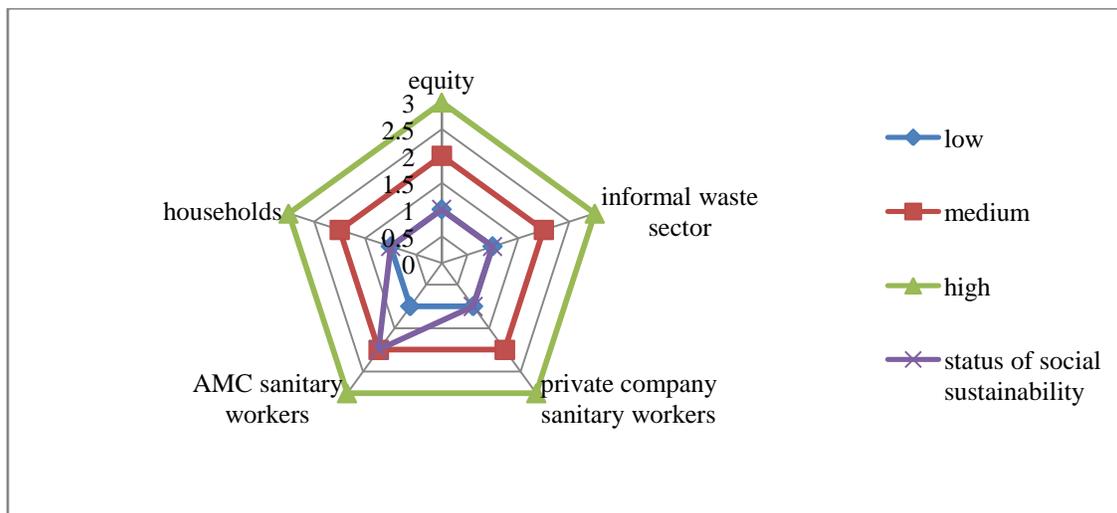


Figure 25 Status of social sustainability post-privatisation of MSW

Research by Samson (2010) and Mishra (n.d) points to negative impacts of privatisation on the informal waste sector. Based upon the deductions from the analysis, this research validates their contestation. It is quite ironic that the informal waste sector as the traditional stakeholder was not recognised while considering privatisation as an approach, as well as during its design, even though they have been performing this task for at least three decades. Lack of knowledge and apathy seems to create a biased mindset amongst the local government officials and therefore hindered the devising of a holistic inclusive policy towards integration of the informal sector into the design of privatised operations.

Furthermore, the mention of engaging with the waste pickers was merely a formality in the contract, since the private company followed an approach that can be best described as regressive. The company did not want to tolerate a parallel informal waste collection sector that could threaten its monopoly on waste operations and therefore dealt with them rather ruthlessly by cutting off access wherever it became possible at the collection stage. The perception amongst the itinerant waste buyers was that if the private company had stayed longer in the city it would have been able to make inroads into the traditional practices of bricolage and recycling and, in that case, the itinerant buyers would have been even harder hit.

The impact on the waste picker community fabric was no less damaging as, prior to privatisation, the waste pickers operated on informally demarcated territorial routes to

enable a cordial and conflict free access to mutual livelihoods. Privatisation did away with these mutual unwritten arrangements, replacing it instead with competition and conflict and a daily struggle to access waste. In conclusion, it can be inferred that privatisation of waste management services impacted the informal sector stakeholders, specifically the waste pickers, adversely, reducing their meagre incomes further and forcing them to adopt alternate survival measures.

The chapter also analysed the impact of the privatised operations on municipal sanitation workers and presented findings related to it. The case of Amritsar demonstrates that the impacts do not completely match the wider beliefs about privatisation emanating from theory and other case studies (Bach, 2000; Martin 2001; Khan et al., 2012; Chandler & Feriella, 1994). In the current municipal structure as described, it is extremely difficult to layoff or retrench permanent municipal workers. Despite the advent of privatised service delivery, two recruitment drives were initiated, albeit under political support and union pressures. A worker surplus reduced work pressure (as half the area was given to privatised operations) rather than adding to it, as is usually expected from the downsizing that occurs during or post-privatisation. Parochial resistance from the sanitation unions led to adoption of a midway policy of a trade-off which was applied to ensure that privatisation was not dislodged from its tracks by union pressures and actions. However, the services of almost half of the contract municipal workers were not regularised and they faced the brunt of privatisation.

Collusion and abstention became more rampant under the readjusted work arrangements. It is hard to ignore the existence of the political dimension from the reorganised work balance of the municipal employees. While privatisation was politically motivated, it is the same element of political clientelism that prevented layoffs and retrenchment, adding to the municipal expenditures. Politically defined outcomes rather than social or economically defined results governed the impacts on the municipal human resource in waste privatisation operations in the city.

The case of the sanitation workers of the private company substantiates claims by researchers (Martin, 2001; Bach, 2000) that down the hierarchy, worker conditions in the private sector decline and most cost saving takes place in that category. Disregard of labour

laws, exploitation tactics and ambiguity around working norms is noticeable from the discussion. Also, catering to staff standards was not a part of the contract and was not monitored by the AMC.

In case of equity, Dorvil (2007, p.242) mulls that residents of high income areas are better served than those in poorer areas by private companies. The context of equity in the case of Amritsar also substantiates this claim and brings out two reasons for the disparity: the first being the need for compulsive cost cutting by resorting to lower door to door collection as well as reduced levels of service in low income locations, while the higher income areas received better and more regular service on account of higher political or administrative connectivity and income based societal dominance.

Davies (2008, p.52) points out that civil society remains at the margins of waste implementation policies. In sync with this proposition, inferences from the community perspectives on waste privatisation indicate a weak community involvement in waste segregation or waste reduction, demonstrating apathy on the part of the private company towards the issue. In terms of addressing grievances, the private company also did not perform to an expected higher level, leading to doubts appearing about its capability or, rather, intentions to provide quality services as proponents supporting the privatisation claim. In summation, the findings from the chapter substantiate the context of sub-optimal sustainability of the privatized operations in context of the social dimension.

Chapter VI

Sustainability Assessment of the Economic Dimension

“Early one morning I watched from my vantage point as a packer truck compacted my peanut butter jars and chicken bones with those of my many, many, many neighbours. What has been mine now, unceremoniously the city’s. It was time to come downstairs to find out what happened next.”

Royte (2005, p. 24)

6.0 Introduction

Central to the ambition of the governments turning to privatisation has been the belief in its inherent and natural productive capabilities compared to the chronic poor performance and unsustainable ways of the municipal bodies. In pursuit of the principal objective of this research, in the previous chapter, the researcher scrutinised and laid bare the social sustainability dimension of privatisation of waste delivery service in Amritsar. Continuing with the quest for answers on the four-dimensional sustainability assessment framework developed to gain critical insights into the subject under investigation, the pursuit herein shifts to the next dimension for its analysis and sieving out derivations to validate either way, the arguments surrounding economic sustainability privatisation endeavours in MSW services. The enhanced and consistent interest in privatisation of waste management service is attributed to lower cost of service provision through adoption of productive and cost efficient means (Massoud & El-Fadel, 2002, p.621). Further, *“is it truly less expensive for governments to hire a for profit company corporation to manage waste than for government itself to manage waste?”* (Anderson, 2011, p.iii). Resonating with this query, this chapter aims to offer an analysis and deeper comprehension of the economic dimension of sustainability, examining the contexts of economic efficiency, labour productivity and vehicle productivity in relation to privatization of MSW management.

The analytical construct is based upon data collected through semi-structured interviews with stakeholders from both AMC and Antony Waste Handling Cell Private Limited and from archival sources encompassing the municipal documents and newspapers. As in the previous chapter, the review section presents the framework guiding the examination of the

criteria underlining the economic dimension of sustainability. The framework derived herein is the product of the scrutiny of a body of literature related to the subject (at both international and national levels) as well as the MSW Rules 2000 and the contract agreement between AMC and Antony Waste Handling Cell Private Limited.

6.1 A brief review of economic sustainability benchmarks

Essentially, a system is economically sustainable if it is able to optimise costs, cover expenses and have a return on the investment or resources deployed (Koppenjan & Enserink, 2009, p.287; Munasinghe, n.d. p.42). Thereby, in the contextual setting of privatised MSW services, optimisation would mean a lower cost of service delivery vis-a-vis the public sector. Cointreau-Levine (1995, p.19) states that after the cost to the local government body to operationalise private sector services is added, the overall costs should still be lower than delivery by the public sector. Bel & Costas (2004, p.2) remark that the analysis should take into account the first year of operations in order to know the variations in service cost from the pre- to post-privatised environment. It is evident therefore that an operational system has to be justified on the grounds of being cost effective to be economically efficient. Economic efficiency is measured in terms of productive efficiency and allocative efficiency grounded in competition and contestability for achieving further cost reduction. *Productive efficiency* refers to the operational performance of the service provider, measured as cost per tonne of MSW, while *allocative efficiency* is usually a measure of the extent of cost recovery for service provision (Batley, 1996, p. 743 cited in Post & Obirh-OPAREH, 2003, p. 48). It is also pertinent to mention here that while there are apparent and visible cost and benefits, there is also a set of implicit or hidden costs and benefits (Yedla & Kansal, 2003, p.520).

While both the explicit and implicit costs and benefits should be considered, UN-Habitat (2010, p.37) and Wilson et al. (2012, p.260) opine that determining real costs or benefits in developing countries is a challenge due to traditional systems of accounting and also the unavailability and unreliability of data. Nevertheless, an insight into both explicit and implicit aspects of MSW can aid analysis, despite data constraints. Table 26 provides a comprehensive coverage of implicit and explicit factors impacting MSW management costs.

Table 26 Factors impacting MSW management costs^a

Productive efficiency	
Explicit factors	Implicit factors
Capital expenditures (considered in depreciation)	Competition and contestability
Labour costs	Recycling and treatment costs
Vehicle operation costs (fuel)	Knowledge of actual waste quantum
Vehicle depreciation	Intermittent or delayed payments
Containers and other equipment depreciation	Corruption and collusion costs
Vehicle repair and maintenance costs	Environment and public health costs
Equipment and container repair and maintainance	Land value of landfill
Administrative overheads (including insurance and sundries, utility costs, miscellaneous)	Costs in planning and contracting
Payment to private sector for outsourced services	
Allocative efficiency	
All taxes/charges and user fees	Public health and environmental Benefits
All revenues from recycling	Value of recyclable processing by informal sector
	Public image enhancement and benefits (example, increase in tourism activity)

^a Derived from Hunt Jr, Howes & Hunt (1997,p.109), Tin et al. (1995, p.109), Bel & Costas, (2004, p.6), Ezibilo & Animasaun (2011, p.38), UN-Habitat (2010, p.170), MoUD (2000, p.439), Yedla & Kasal (2003, p. 520).

Cost per tonne or cost per capita of MSW collected is a common metric used to measure economic efficiency (Hunt Jr, Howes & Hunt, 1997, p.4) and compare different systems or improvements (UN-Habitat, 2010, p.140). It must be clarified that there are no norms on desirable or optimal per tonne or per capita expenditure on MSW (CPHEEO, 2005, p.37) and thereby the element of subjectivity remains embedded. However, applying norms or assumptions available for independent variables as labour, vehicle and equipment can reduce the margin of subjectivity.

Further the CPHEEO (2005, p.133) states that MSW service in India either generates no or insignificant revenues. If at all, revenues may come in the form of a certain amount of property tax. As a result, per capita annual revenue is only around 12.80 Rs (0.25 AU\$), while the per capita expenditure is 189.39 Rs (3.71 AU\$), with a deficit of Rs 176.59 (3.46 AU\$) and a cost recovery of only 6.7 percent.

Based upon assignment of monetary values to the variables of productive and allocative efficiency, the resultant equations are,

(i)

$$\text{Productive efficiency} = \frac{\text{explicit} + \text{implicit costs}}{\text{total collected MSW tonnes}}$$

or

$$\text{Productive efficiency} = \frac{\text{explicit costs}}{\text{total collected MSW tonnes}}$$

(ii)

$$\text{Allocative efficiency} = \frac{\text{total MSW generated revenues}}{\text{explicit} + \text{implicit costs}} \times 100$$

or

$$\text{Allocative efficiency} = \frac{\text{total MSW generated revenues}}{\text{explicit costs}} \times 100$$

As mentioned earlier, the implicit costs and revenues are difficult to assign monetary values due to data constraints. However, the researcher endeavours to reflect a semblance of sensitivity to implicit costs and benefits by resorting to qualitative analysis of the same.

Finally, “optimum efficiency does not occur when there is no opposing competitive force” (UN–Habitat, 2010, p.7). However, as Cointreau-Levine (2000, p.15) opines, since competition forces may be constrained in developing countries, contestability is necessary where the local government also provides service in parts of the city. Thereby no more than 70 percent of the area should be allocated to the private sector to retain an element of contestability.

Further, examining the contract document between the AMC and Antony Waste Handling Cell Private Limited from productive efficiency angle, article-VII, clause 7.1 (ii) mentions a tipping fee of Rs 500 (8.81 AU\$)/ tonne of MSW in the first year, followed by an increase of three percent for the next three years and five percent for the remaining duration of the contract. The tipping fee would be paid on a monthly basis and remitted within 30 days of

the receipt of bills from the private company (AMC, 2009, p.20). Penalties may be levied as per the mentioned schedule in conditions of non-compliance. In addition, modalities of termination payments are mentioned in clause 8.2.6. In case of default by the private company, it shall not be entitled to receive any payments outstanding and the security deposit shall be forfeited, whereas in the case of AMC default, the company shall withdraw security deposits and claim all outstanding payments.

In the case of allocative efficiency, as per the contract, the private company would collect and deposit user charges from each household as per charges decided and notified by the AMC. In the context of labour and vehicle numbers, the agreement makes it mandatory for the private company to provide an appropriate number of skilled and trained manpower and appropriate vehicles and machinery in terms of type, capacity and number (AMC, 2008, pp.13-14).

Coates (1980, p.90) states that “productivity analysis is aimed at determining the effectiveness with which resources are being employed.” Productivity therefore can be understood as the ratio of singular or multiple resources used to produce an output. In the context of MSW, labour and vehicle productivity are determined in order to evaluate the operational and economic sustainability of the system (UN-Habitat, 2010, p.113; Cointreau -Levine, 1995, p.16).

In terms of *labour productivity*, the quantitative assessments usually take into consideration the labour cost, labour count or labour man hours incurred to generate an output, in this case the MSW tonnage (Attar, Gupta & Desai, 2012, p.11; Teixeira, et al., 2014, p.1212). Further, labour productivity based on gross output measures considers the labour requirement per unit of output (Attar, Gupta & Desai, 2012, p.12). While its main advantage lies in its ease of measurement, it does not reflect the influence of other factors that can influence labour productivity. These factors include labour strikes, unclear instruction to labour, financial difficulties of the owner, high absenteeism and turnover of labour, lack of skill, poor management, unproductive time (internal delay, extra break time), lack of tools and equipment, health and safety factors and labour accidents (Attar, Gupta & Desai, 2012, p.13). These are the implicit costs and have a bearing on labour productivity but, as pointed out earlier, these may be difficult to induct into the total actual

costs owing to lack of data and understanding of implicit costs and especially that which displays an element of intangibility. Simultaneously, benefits that accrue due to the induction of labour and labour costs, such as reduced expenditure on public health (Yedla & Kansal, 2003, p.520), would also impact actual costs. Thereby the dependent variable, labour productivity can be expressed as a function of:

Labour productivity = f (wage and benefit costs, labour count, implicit costs and benefits).
Therefore;

$$\text{Labour productivity} = \frac{\text{labour costs (explicit+implicit)}}{\text{collected MSW tonnes}}$$

While consideration of implicit costs and benefits is mentioned by researchers such as Yedla & Kansal (2003), Cointreau–Levine (2000), Cointreau–Levine (1995), MoUD (2000), none of the studies mention a rule of thumb or guideline that could be assumed to lend a monetary value to the same. Therefore, in the case study a quantitative consideration cannot be given to implicit costs and benefits and as such are excluded from the equation therein. Based upon the discussion herein, the following equations apply in the case study:

- (i) *Labour productivity = $\frac{\text{labour costs}}{\text{total collected MSW tonnes}}$*
- (ii) *Labour productivity = $\frac{\text{labour number}}{\text{total collected MSW tonnes}}$*
- (iii) *Labour productivity = $\frac{\text{MSW clearance (tonnes)}}{\text{total number of workers}}$*

While a higher tonnage per worker may reflect more labour productivity, the cost of inadequate number of workers impacts collection efficiency and quality of services. Therefore labour productivity should be evaluated against the recommended norm. CPHEEO (2005, p.133) mentions the norm as 2.8 sanitary workers/1000 population and one sanitary worker for 175 households in the case of door to door collection (AMC, 2008, p.60).

Oliver (n.d, p.1) defines *vehicle productivity* as “the ability of a suitable vehicle to continuously transport goods or people within established time schedules and at realistic,

acceptable life time costs, providing a high level of availability and reliability over the expected life time of a vehicle.” In the context of MSW, the amount of waste collected and transported depends on the number of vehicles of each type, their capacities and trips undertaken (CPHEEO, 2005, p.30).

In simplistic terms, vehicle productivity can be measured by the collected MSW tonnage per vehicle daily. This measure was given by Bartone et al. (1991, p.504) and Huang, Pan & Kao (2011, p.1278) and is largely used for comparative efficiency measures. However, in actual terms, a large set of factors impact vehicle productivity and a brief deliberation on the same becomes imperative. Based upon review of the literature pertaining to the subject (UN-Habitat, 2010; Teixeira, et al., 2014; Tin, et al., 1995; Coad, 2005; Yedla & Kansal, 2003; Simons, Mason & Gardner, 2006; Emery et al., 2007; MoUD, 2000), the factors impacting vehicle productivity are presented in table 27.

Table 27 Factors impacting vehicle productivity in MSW

Explicit Factors	Implicit Factors
Vehicle number and trip rate	Routing of vehicles,
Vehicle depreciation	Vehicle type,
Fuel costs	Vehicle downtime,
Maintenance and repair of vehicles	Additional standby vehicles,
Driver and crew costs	Fill loss,
Administrative overheads (e.g. stationary, electricity, water supply)	Driver breaks,
	Excess load time,
	Environment and public health costs and benefits.

Explicit factors are visible and therefore most commonly used to arrive at cost based vehicle productivity. Vehicle capital costs are usually associated with owning the vehicle but not with operating them. However, depreciation as a way of converting capital expenditures into annual costs should be considered (UN-Habitat, 2010, p. 113-114).

$$\text{Depreciation costs} = \frac{\text{vehicle capital cost}}{\text{vehicle economic life}}$$

Fuel consumption per hour of vehicle operation or fuel consumption per vehicle operated mile is used as a measure of fuel incurred expenditure (Emery, et al., 2007, p.259, UN-Habitat, 2010, p.113). Tin et al. (1995, p.109) declare that preventive maintenance and

repair can contribute to increasing long term vehicle productivity. In the context of developing countries, UN-Habitat (2010, p.113) states that in the case of lack of experience in maintaining expenditures, a figure of 8 percent of the capital cost of the vehicle may be assumed. However, if the vehicle age is more the costs actually escalate. Administrative overheads include driver wages, administrative charges such as insurance, etc. (Emery et al., 2007, p.206). Appropriate number of vehicles as per norms and requirement also contribute to vehicle productivity if an optimal trip rate is achieved (Tin et al., 1995, p.120; MoUD, 2000, p.428). For instance, vehicles with lower capacity making several trips to the landfill make the system very uneconomical. Trip norms are suggested for vehicles with higher capacity, as per table 28.

Table 28 Optimal trip rates

Number of Trips	Distance to Landfill
7-8	Upto 7.5 Kms
5	5-10 Kms
3-4	Above 10 Kms

Source; MoUD (2000, p.428)

Implicit factors (table 27) are used relatively less often in making evaluations but, if included, could give a more realistic picture. For instance, Yedla & Kansal (2003, p.515) point out in the context of Mumbai city that vehicle routing is rarely considered and routes are randomly allocated leading to waste collection inefficiency and thus lowered vehicle productivity. Route allocation should therefore be rationalised to reduce waste collection time and cut vehicle operating costs (MoUD, 2000, p.23; Tin et al., 1995, p.108; Lavee & Khatib, 2010, p.2205; Cointreau-Levine, 2000, p.24).

“The rate of waste generation and density has a significant bearing on collection system and choice” (Tin et al.,1995, p.107) and therefore effects vehicle productivity. Since the waste in developing countries has high density (300-500 Kgs/cu.m), compaction trucks are not required, however, in cities above five lakh population, hydraulic vehicles as dumper placers, refuse collector trucks are required for large and small containers (10 cu.m, 4.5 cu.m, 0.5-1.0 cu.m capacity) respectively. While tractor trolleys in cities with poor repair and maintenance are acceptable, simple hydraulic tipping trailers are recommended to avoid manual unloading (MoUD, 2000, p. 236). For narrow streets and congested areas, small vehicles and rickshaws are preferred.

Further, vehicle downtimes occurring due to accidents or breakdowns or for other reasons, should also be accounted for and minimised (UN-Habitat, 2010, p.150). As a norm, 80 percent of the vehicles should be in service each day and additional vehicles (33%) are required to ensure reliable service and compensate for downtime (MoUD, 2000, p.239). Simons, Mason & Gardner (2006, p.125) emphasise consideration to driver breaks, excess load time, fill loss and speed loss in vehicle productivity evaluation. Manual loading takes time and reduces the productivity of both the vehicle and deployed manpower. Besides, fill loss in under-loaded vehicles leads to under utilisation of the vehicle fleet, lowering overall productivity (MoUD, 2000, p.233). Again, as in labour productivity, a contextual direction to assume monetary values for implicit costs and benefits is unavailable and therefore based on the discussion above; the following two equations are used in the case study to calculate vehicle productivity measures.

(i) *Vehicle productivity = explicit vehicle costs/MSW tonne*

(ii) *Vehicle productivity = MSW tonnes/vehicle/day*

The review establishes a yardstick for making an assessment of what can be termed as economic sustainability in MSW services and its privatisation. The following section examines the elements of economic sustainability in Amritsar.

6.2 Economic efficiency

Privatisation in MSW service delivery implies that the input costs must be lower while mutual economic gains are generated by both the public and the private sector stakeholders. In other words, both productive and allocative efficiency are necessary to pronounce a system economically sustainable.

6.2.1 Production efficiency

An assessment of productive efficiency entailed the examination of variables such as vehicle costs, labour costs, equipment depreciation and maintenance costs, administrative and overhead costs, on a temporal span for both AMC and Anthony Waste Handling Cell

Private Limited⁵³. As can be inferred from table 29, the cost per tonne of MSW per day to AMC prior to privatisation was Rs. 1953.17 (38.35 AU\$) but increased substantially, doubling in 2009 and more than tripling between 2010-2012.

Table 29 Cost of MSW tonne/day to AMC and PC (2008-2012)

Costs/day (in rupees) ^a		2008	2009	2010	2011	2012
Vehicle costs/ day	AMC	83593.97	62460.62	68473.76	69475.95	69475.95
	PC	-	62753.68	66659.68	67310.68	67310.68
Labour cost/ day	AMC	905900	900066.7	1637983	1637983	1637983
	PC	-	48073.67	43400	45395.83	45395.83
Equipment depreciation/ day	AMC	3144.44	3144.44	3144.44	3144.44	3144.44
	PC	-	14284.25	14284.25	14284.25	14284.25
Maintenance cost of equipments/ day	AMC	1240.54	1240.54	1240.54	1240.54	1240.54
	PC	-	3872.21	3872.21	3872.21	3872.21
Administration over head cost @ 5% of labour cost	AMC	45295	45003.34	81899.15	81899.15	81899.15
	PC	-	2403.68	2170	2269.79	2269.79
Vehicle rental costs @ Rs 1000/day	AMC	38000	0	0	0	0
	PC	-	0	0	0	0
Total costs/day	AMC	1039174	1011916	1792741	1793743	1793743
	PC	-	131387.5	130386.1	133132.8	133132.8
MSW collection in tonnes/day	AMC	551.5	290	290	290	290
	PC	-	280	250	200	200
Costs/tonne/day	AMC	1953.17	3489.36	6181.86	6185.32	6185.32
	PC	-	469.24	521.54	665.66	665.66
Total cost of MSW/tonne to AMC (inclusive of amount paid to PC)	AMC	1953.17	3989.82	6606.63	6525.94	6333.69
Average payment/day by AMC to PC for MSW collection	AMC	-	145134.9	123183	98780.98	43027.04
Total cost AMC/day post privatization	AMC	-	1157051	1915924	1892524	1836770
Variation between AMC and PC costs		-	3520.58	6085.09	5860.281	5668.026
Ratio of costs between PC and AMC		-	8.50	12.66	9.80	9.51

^aThe exchange rate equivalent for Indian currency (23 October 2016) is; 1 Euro=Indian Rupees 72.84, 1US Dollar=Indian Rupees 66.92, 1 Australian Dollar= Indian Rupees 50.92.

⁵³ While the detailed aspect wise tables are attached in Appendix I (table 64-70), summary results are compiled in table 29.

This can be attributed to three reasons, the first being that labour retrenchment did not take place to a scale that would reduce costs significantly, rather two recruitment drives led to accelerating costs of wages of permanent employees. Secondly, the reduction in vehicle costs was only marginal in proportion to the reduction of trips required to collect the MSW tonnage from the wards of its jurisdiction. Thirdly and most importantly, the tipping fees paid to the private company imposed an additional burden for the AMC. As an AMC staff (AMC union leader 1) also opined, “between 30-50 lakh rupees (58915-98192.5 AU\$) per month was given to the company and this was additional burden on the AMC. There was no gain, only losses accrued.”

Figure 26 indicates a dramatic temporal increase in cost per MSW tonne post-privatisation for AMC, averaging 38.96% without and 42.89% after considering payments to the private company. Whereas the private company cut wages and reduced worker numbers (see labour productivity, section 6.3) significantly, thereby reducing costs on labour. It was also able to lower vehicle costs by limiting only larger vehicles to undertake landfill trips in contrast to the AMC where all collection vehicles undertook landfill trips. However, one additional factor that needs to be mentioned here and that is the MSW tonnage collection by the private company.

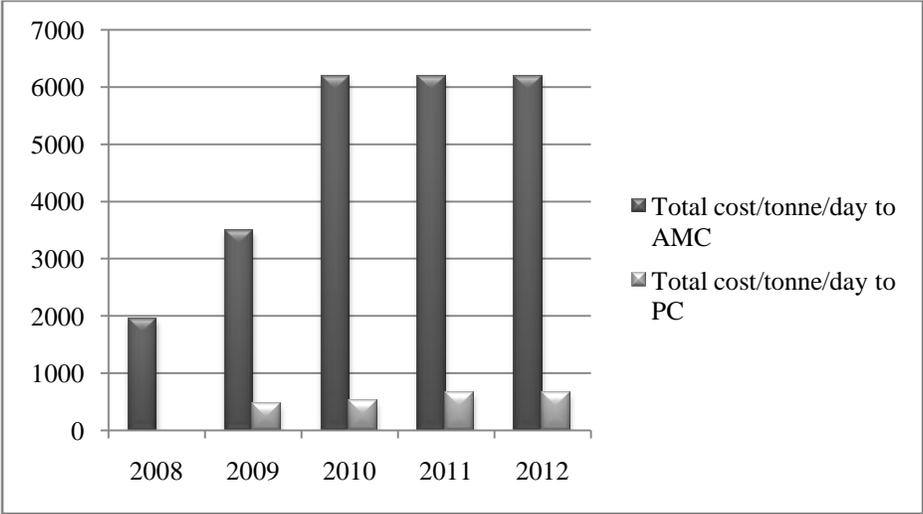


Figure 26 Total cost per tonne per day (in Rupees), AMC and PC (2008-2012)

As table 29 illustrates, the average collection declined from the first year to the last year of operation. This is attributed largely to the poor conditions at the dumping site hampering vehicle productivity and, in turn, having an adverse impact on MSW collection tonnage. In

addition, depletion of the vehicle fleet and exaggerated vehicle downtimes, coupled with highly irregular, incomplete or total lack of payment by AMC, especially from 2011 onwards, accelerated the costs for the private company.

In one of the communications from the private company to the AMC (a letter dated 26 July 2012), a paragraph reads, *“this is to inform you that the company’s financial condition is very bad and not in a position to even repair vehicles which are off the road for the past couple of months. AMC has not paid monthly instalment to us for the last couple of months and more than Rs. 1.80 cores (0.35million AU\$) is outstanding. We have submitted several request letters showing our inability to continue the contract due to non-payments and dumping ground failure by AMC.”* Scrutiny of the available records by the researcher did indicate irregularities in payment as well as incomplete and missed payments to the private company by AMC (Appendix I, table 69). The reason for the delays was put forth by an AMC staff member, *“the burden of the financials was on AMC as the JNNURM grant from central government did not come through. AMC had to give from its own and its capacity was limited”* (AMC sanitary supervisor 2). Consequently, the cost per tonne per day rose for the private company, with reduced tonnage and payment issues with the AMC.

Thus, it can be gauged that the privatisation of the MSW endeavour was economically not viable for the AMC. In the initial year of operation, it could make payments from the Punjab State sponsored grant of Rs. 20 crores (3.92 million AU\$) (RTI letter dated 9 April 2014) but defaulted on payments thereafter, causing the venture to become unviable for the private company as well. Contrary to expectations of reduced cost per tonne post-privatisation, exorbitantly high costs were incurred by the AMC. While the relative costs were much lower for the private company, factors such as hampered vehicle productivity and untimely payments to them by AMC increased the operational cost per tonne in the succeeding years of the operations, rendering the same unviable and unprofitable, as can also be visualised from the ensuing discussion on allocative efficiency.

6.2.2 Allocative efficiency

Drawing from the review, the comparative temporal allocative efficiency has been indicated in table 30, offering an insight into cost recovery and the profit rationale post-privatisation.

Table 30 Allocative efficiency (%), AMC and PC (2008-2012)

Year	2008	2009	2010	2011	2012⁵⁴
AMC (with depreciation costs added)	3.82	3.59	2.19	2.24	4.06
AMC (without depreciation costs added)	3.94	3.70	2.23	2.24	4.20
PC (with depreciation costs added)	-	90.79	90.88	70.93	30.04
PC (without depreciation costs added)	-	130.26	130.83	101.19	62.55

The allocative efficiency for AMC was only 3.82 percent pre-privatisation in 2008. Post-privatisation, it dipped further to an average of 2.59 percent, largely due to escalated costs (as discussed in productive efficiency) but also almost negligible revenue from waste since the AMC neither recycles any waste on its own nor, more importantly, collects a user charge. *“The households do not pay user charges to date. Neither commercial nor industrial establishments pay user charges. However, there are small conservancy fees from hotels and slaughter houses. No tariff structure exists in the city and there is no income as such”* (AMC sanitary supervisor 1).

As mentioned in the review, the contract document made provision for collection of a user charge, but this was not implemented due to lack of directions from AMC. In one of the minutes of the meetings (AMC, 4 July 2011), the comment to this effect read, *“the bidder should get a tipping fee from the government and user charges from citizens to make the project more sustainable, with some assured income from government. User fee collection is a procedure that has never been successful in any city due to poor enforcement support. User fees should be collected by AMC directly from waste generation through water, electricity, property tax bill, which will be an easier process”*.

This indicates that the private company, while eager to get the user charge implemented, also tried to reason, albeit unsuccessfully, and argue for its share of the same in addition to the tipping fees that it was receiving. Analysing allocative efficiency with depreciation costs, it becomes clear that the private company was not able to break even throughout the life of the privatised operations.

On the face of it, the values (table 30) mask a hidden loss from depreciation, thereby taken and interpreted as profit, as this interviewee suggests, *“they made heavy profits. They are*

⁵⁴The Private Company withdrew operations in last week of July. Therefore the figures for year 2012 is calculated for seven months only including July.

lying if they say they suffered financial loss. They made good money” (AMC union leader 2). Another interviewer from the AMC contradicted this statement (AMC managerial staff 1): *“the private company could not achieve a break-even point and suffered losses consistently. In addition, payments were delayed by AMC due to delays by central and state government”*. From the company’s side, one of the managerial interviewees (PC managerial staff 1) pointed out that, *“company operated on no profit, no loss. First one and a half years it was O.K. For next one and a half years we ran into losses.”* The costs by the researcher support the second statement and set aside speculations about the private company making hefty profits.

In addition to the problems at the dumping site and delays by AMC, lower actual available MSW tonnage than estimated and consequent lower collection are also put forth as reasons for lower allocative efficiency by Antony Waste Handling Cell Private Limited. *“The Amritsar city does not generate 600 tonnes per day. It is only a theoretical assumption made by Dr. Sharma⁵⁵, which is completely wrong. In our case, the details given to us at the time of the last tender were wrong due to which we are facing major losses in the ongoing project. Waste generation assumed in our tender for 50 percent of the city area handled by us was 310 tonnes/day, but we have been able to achieve only 220-250 tonnes/day for the last two years. We invested in the infrastructure for 310 tonnes/day and the entire calculation was based on 310 tonnes/day, due to which the project is facing major financial losses. We are incurring a loss of 10 lakh (19638.52 AU\$) every month due to this”* (AMC-Antony Waste Handling Cell Private Limited minutes of meeting, 4 July 2011).

However, deriving information on tonnage from the payments made to the private company, the researcher found the highest tonnage as 372.87 tonnes/day during the month of May 2009, averaging to 300 tonnes/day between April to September 2009. Thus the above statement does not hold much weight. Therefore, the reasons zero down to higher input costs and incapability to collect MSW remunerative thresholds, compounded by the AMC’s intermittent and delayed payments contributing to the surmounting losses to the company and its untimely withdrawal from the city’s waste management scene.

⁵⁵ Name changed. Here the reference is to the consultant who prepared the detailed project report on behalf of the AMC.

6.2.3 Implicit factors

Three of the implicit factors actually directly caused the outcomes demonstrated through explicit factors, i.e. knowledge of accurate waste quantum, timely and complete payment of tipping fees and the tipping environment at the landfill site. Recycling and treatment options were not included or implemented as a part of the privatised operations and accrued no cost and thereby merit no space herein. One of the implicit factors worth a mention, and the one that emerges from the select interviews, is the issue of corruption and collusionary practices. *“The private company cheated in weighing in connivance with AMC officials. Bogus bills were generated and ratified by monitoring sanitary staff. So much so, even construction waste was picked up by them”* (AMC union leader 2). Another interviewee states, *“with some collaboration, they bought waste even from the villages. The trucks were weighed again and again and our own employees were involved. They took money to allow such practices”* (AMC union leader 1).

The staff from the private company refuted such practices, claiming that on most days, the waste collected was much lower than even the expected 310 tonnes per day. However, although instances of corrupt practices and collusion cannot be verified, they must be prevalent and have an impact on operational costs, as can also be gleaned from the observation of an NGO representative: *“I came to know that people in the AMC, including ruling party councillors, political leaders, they expected something from the company in cash or kind. They hoped for kickbacks, as AMC was paying a huge amount to the company. When the company resisted paying kickbacks, they created bottlenecks in their payments”* (NGO member 2).

Further, the context of competition and contestability, Antony Waste Handling Cell Private Limited was the sole private operator, with no other competing firm. Therefore, the presumed advantages arising out of competition, such as lowered costs and better quality service to the consumer, cannot be deliberated. Contestability did occur with the city wards divided in the ratio of 64 percent (41 wards) to the PC and 36 percent (24 wards) to the AMC. However, this did not have a significant impact on economic efficiency or reduction of costs to the AMC, as has been discussed earlier. But it did improve collection in the

AMC serviced wards, as more infrastructure could be diverted to achieve a 100 percent collection efficiency.

6.3 Labour productivity

Taking on from the review directives, the analysis herein seeks to establish an insight into explicit and implicit aspects of labour productivity. In order to establish the human resource costs, the average wages of the MSW staff of AMC and Antony Waste Handling Cell Private Limited were considered. While the average wages could be arrived at based upon documentary evidence and interviews, it was not possible to arrive at exact information on benefits and allowances for both AMC and Antony Waste Handling Cell Private Limited staff, due to undisclosed and unreliable data. Therefore, the researcher decided to use the thumb rule developed by Tin et al. (1995, p.122) in the context of developing countries as 15 percent of the wages to be added as average benefit costs while working out labour costs.

6.3.1 Explicit factors

In purely economic terms, i.e. higher waste collection at a lower labour cost, the private company delivered waste collection service at a much lower labour cost than the AMC (table 31). On average, the cost per tonne was just 4.2 percent of the cost incurred by the AMC, with an average ratio of 1:25.09 Rs.⁵⁶ More so, the worker costs to AMC increased at an average of 27.32 percent between 2009 to 2012, whereas for Antony Waste Handling Cell Private Limited the average increased was only 10.61 percent.

Transiting from municipal to privatised operations, the AMC incurred much higher worker costs post-privatisation, with 88.94% (Rs. 182.63, 3.58 AU\$) increase from 2008 (non-privatised year) to 2009. This finding challenges the normative notion that the privatisation of waste services renders a reduced labour cost per tonne to the public sector authority (by cutting labour wages).

⁵⁶ For every 1 Rs (0.019 AU\$) spent by the private company, 25.09 Rs (0.49 AU\$) are spent by the AMC.

Table 31 Comparative labour costs^a, adequacy and waste clearance per worker (2008-2012)

Year	2008		2009		2010		2011		2012	
Aspect	AMC	PC	AMC	PC	AMC	PC	AMC	PC	AMC	PC
Area of operation (wards)	65	-	24	41	24	41	24	41	24	41
Percentage area of operation (wards)	100	-	36.92	63.08	36.92	63.08	36.92	63.08	36.92	63.08
Pop ^b share (including 7% floating pop.)	1174598	-	427350	759733	431844	767723	436339	775715	441349	784620
MSW sanitation staff strength	2410	-	1535	248	1910	230.	1910	200	1910	200
Total salary and benefits per month in rupees	27177000	-	27002000	1442210	49139500	1302000	49139500	1361875	49139500	1361875
Avg ^c waste generation/day	575	-	290	310	290	310	290	310	290	310
Avg waste collection/day	551.5	-	290.00	280.00	290.00	250.00	290.00	200.00	290.00	200.00
Total labour cost/day in rupees	905900	-	900066.67	48073.67	1637983.33	43400.00	1637983.33	45395.83	1637983.33	45395.83
Labour cost/tonne/day in rupees	205.32	-	387.96	21.46	706.03	21.70	706.03	28.37	706.03	28.37
Workers/tonne	4.36	-	5.29	0.89	6.59	0.92	6.59	1.00	6.59	1.00
Worker no. as per norms @2.8/1000 pop. or 1 sanitary worker/175 HHs ^d	3288	-	1197	724	1209	731.	1222	738.00	1236	747
Deficit/surplus workers	-878	-	338	-476	7001	-501	688	-538	674	-547
Percentage deficit/surplus workers	28	-	28	66	58	69	56	73	55	73
Per head waste clearance in tonnes	0.22	-	0.19	1.13	0.15	1.09	0.15	1.00	0.15	1.00
Variation between labour costs AMC and PC		-	366.50		684.33		677.65		677.65	
Cost ratio (PC:AMC)		-	1:18.08		1:32.54		1:24.88		1:24.88	

^aAll costs are in rupees. The exchange rate equivalent for Indian currency (23 October 2016) is; 1 Euro=Indian Rupees 72.84, 1 US Dollar=Indian Rupees 66.92, 1 Australian Dollar= Indian Rupees 50.92. ^b Population, ^c Average, ^dHouseholds.

During the life span of the privatised service, worker costs increased substantially for the AMC and very marginally for the private company (figure 27). As discussed in Chapter V, the reason for this was that AMC carried out two recruitment drives during the period that added to the costs of hiring workers on a permanent basis. Even though the temporary contract workers were removed in 2009, this did not make a significant difference in cutting costs since the wages of permanent employees was much higher. In addition to this, the tonnage to be collected by AMC was reduced to 290 tonnes, i.e. 48.3 percent of the estimated generation of 600 tonnes. The private company was able to lower labour costs as it paid much lower wages and benefits to its labour, in particular as compared with AMC.

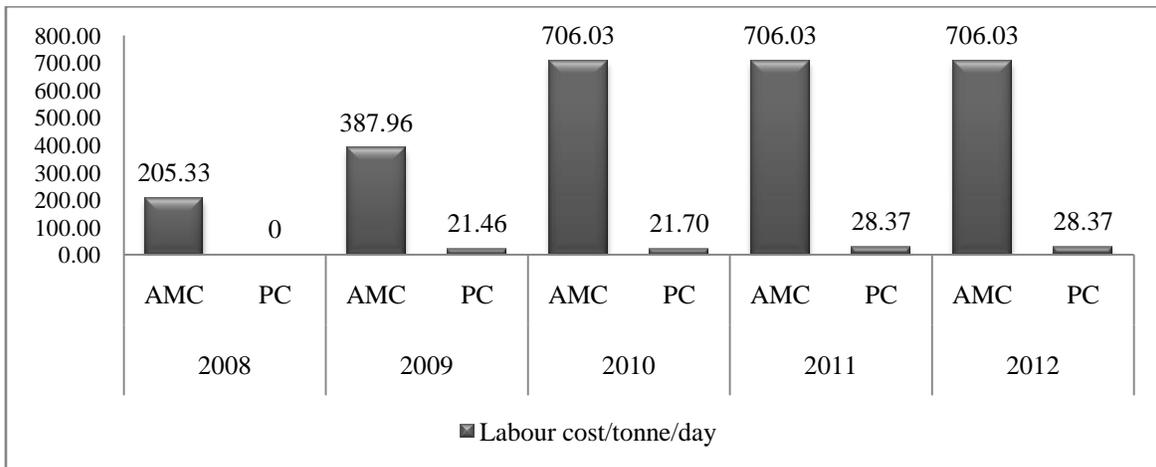


Figure 27 Comparative labour costs (in Rupees), AMC and PC (2008-2012)

In spite of the assumptions of a shrinking municipal work force post-privatisation and thereby reduced labour costs, ground realities indicate otherwise, reasoned in the contextual socio-political conditions and compulsions, as in the case study. Thereby two recruitment drives added an additional 550 sanitary workers against a significantly reduced waste tonnage. Accordingly, an average surplus of 49.25 percent of the work force was observed for AMC, compared with the standard worker norms, was observed for AMC. However, evaluating the private company against the norms indicates an average deficiency of 513 sanitary workers or 70.28 percent. Little wonder that the average waste clearance per worker was only 0.16 tonnes/ worker as compared to 1.05 tonnes/ worker while the worker number per tonne stood at 6.26/tonne and 0.95/tonne for AMC and the private company respectively (figures 28 and 29).

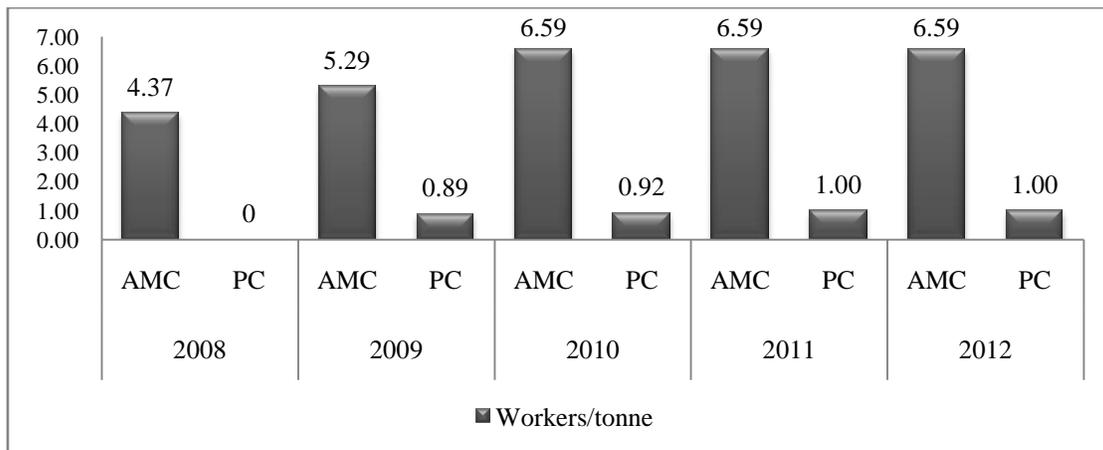


Figure 28 Worker/tonne, AMC and PC (2008-2012)

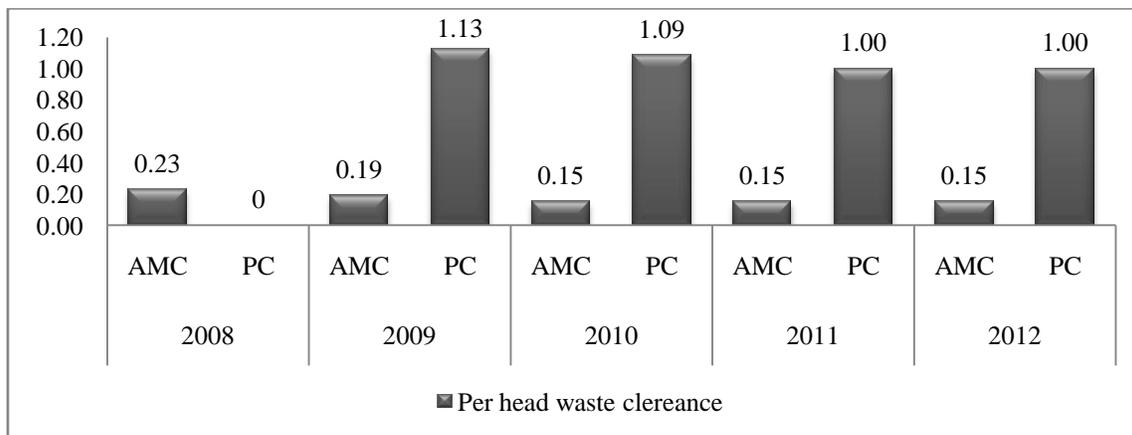


Figure 29 Waste clearance per worker (in tonnes), AMC and PC (2008-2012)

The analysis indicates that privatisation did not enhance labour productivity in the AMC. Information obtained from the semi-structured interviews also substantiates this stance. *“The system in the city is such that if there are 100 workers, only 75 are working, at least 25 are abstaining. The sanitary inspectors take money from them and let them abstain”* (AMC union leader 1). Another viewpoint, arguing that privatisation may actually enhance competition and thereby the productivity of AMC workers, was made by an interviewee, *“the private company was actually brought in as the absenteeism among AMC employees was high and efficiency was low”* (NGO member 1).

However, this contention does not hold ground, as is revealed from the interviewees herein and also section 5.5.4, chapter V. A question that emerges then is does privatisation contribute to further lowering of the labour productivity of the public sector employees as in the case study? The answer lies in two arguments constructed through the analysis. Firstly, the prevailing socio-political environment shaped the responses to the labour environment post-privatisation. If retrenchments had taken place, the scenario would have been quite different. Secondly, in comparative analysis, as in the case study, the worker costs/tonne would invariably be lower for the private company since it compromised both on optimal worker numbers and wages. While following an explicit economic rationale, the private company demonstrated higher labour productivity; the implicit rationale seeks to underpin the subjective dimensions of labour productivity herein.

6.3.2 Implicit factors

Affirming the exploitative and compromised environment under which the sanitary workers of the private company were operating, a local NGO representative (NGO member 2) remarked, *“It (Antony Waste Handling Cell Private Limited) did not attach any significance to human values. The private company completely ignored labour laws and justice. They did not give workers due wages, security of service, or facilities and even uniforms. Because of the threat of unemployment and poverty, those people worked under compromised conditions”*.

This attitude led to a high turnover, as well as labour strikes, an interviewee (PC sanitary worker 1) reveals, *“Employee turnover was high. Only 50 percent of the originally recruited employees continued till the contract termination. Rest was high turnover with duration between 2 to 6 months, mainly due to salary and work problems.”* While this indicates a mechanism of natural attrition at work, it is equally true that labour downsizing took place as well, as is hinted at by another interviewee, *“the private company wanted to save all costs. So it cut down its workers”* (PC sanitation worker 2). Also, even the private company was not free of labour strikes on various accounts and especially on payment and benefit issues. *“AMC did not make payments on time so our staff salary got delayed. So they went on strike. They wanted increments but the company was working at a loss, how could increments be given”* (PC managerial staff 1). This comment points to labour disenchantment, also bringing out economic compromises, such as lack of increments, while maintaining that the private company was undertaking a losing venture.

Further, the fact that private company workers did not have any training or experience in solid waste management practices is seen from a letter between AMC to the private company (dated 12 October 2011), *“The drivers and labour engaged by the company are also unskilled and spread garbage at all the entrance points of the dumping ground and block all entrance routes.”* A narrative of implicit factors offers, in part, an explanation for the economic dimension of labour productivity, while also bringing to the fore that actual productivity would be affected by factors such as turnover or lack of skills or labour disenchantment. It can be opined, based upon the analysis herein, that the private company

failed to achieve appropriate labour productivity in the actual sense of the word by grossly ignoring appropriate labour norms and values.

6.4 Vehicle productivity

Collection and transport vehicles constitute the backbone of waste management systems and by that virtue, high vehicle productivity is imperative to MSW management system efficiency. It is pertinent to mention that data gaps and unreliability regarding the actual capital costs of vehicles, depreciation values, actual and exact fuel costs, exact repair and maintenance expenditure, led to the researcher working out the closest possible estimations, based on the norms (MoUD, 2000) and assumptions from related studies (Tin et al., 1995; UN-Habitat, 2010). Table 32 presents two explicit factors considered, i.e. vehicle costs per day per tonne and MSW tonnes per vehicle per day.

Table 32 Total comparative vehicle costs^a and MSW tonnes per vehicle (2008-2012)

Vehicle aspects		2008	2009	2010	2011	2012
Vehicle depreciation cost/day	AMC	16235.48	16235.48	16235.48	16235.48	16235.48
	PC	0	25722.11	25722.11	25722.11	25722.11
O & M^d cost / day	AMC	11148.49	11148.49	11148.49	11148.49	11148.49
	PC	0	14246.57	14246.57	14246.57	14246.57
Fuel cost/ day	AMC	56210	35076.65	41089.79	42091.98	42091.98
	PC	0	22785	26691	27342	27342
Total Vehicle cost/ day	AMC	83593.97	62460.62	68473.76	69475.95	69475.95
	PC	0	62753.68	66659.68	67310.68	67310.68
MSW collection/ day^b	AMC	462.5 ^c	290	290	290	290
	PC	0	280	250	200	200
Vehicle cost/ day/ tonne	AMC	180.74	215.38	236.11	239.57	239.57
	PC	0	224.12	266.63	336.55	336.55
MSW tonnes / vehicle/ day	AMC	7.11	4.46	4.46	4.46	4.46
	PC	0	10.76	9.61	7.69	7.69

^a All costs are in rupees. The exchange rate equivalent for Indian currency (23 October 2016) is; 1 Euro=Indian Rupees 72.84, 1 US Dollar=Indian Rupees 66.92, 1 Australian Dollar= Indian Rupees 50.92.

^b Includes only AMC vehicles and not rental vehicles.

^c 462.5 tonnes MSW was collected by AMC vehicles only. Additional collection of 89 tonnes by rented vehicles is not included here.

^d Refers to operations and maintenance.

6.4.1 Explicit factors

The vehicle costs per tonne per day reflect the summation of depreciation costs, repair and maintenance costs and fuel consumption costs.⁵⁷ Figure 30 indicates an increase from the pre-privatisation period (2008) to the period under privatised services (2009-12) for the AMC. This is attributed to a decrease in collection tonnage to 290 tonnes post-privatisation but the trip rate reducing by only 37 percent in order to achieve a 100 percent collection rate, as claimed by the AMC.

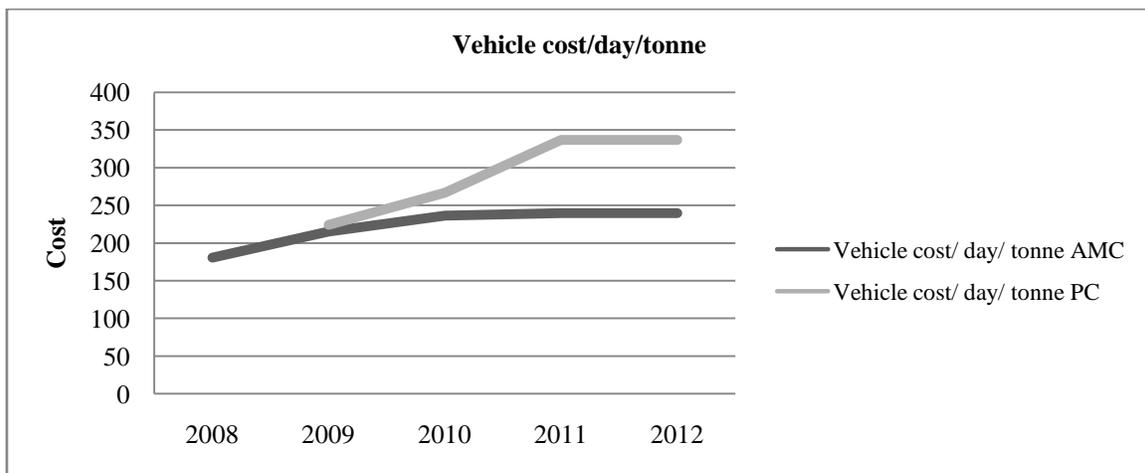


Figure 30 Vehicle costs per day per tonne

Prior to privatisation, AMC's collection rate (462.5 tonnes by AMC and 89 tonnes by hired contract vehicle) was short by at least 23.5 tonnes of the actual generated waste (575 tonnes) per day. In absolute terms, the decline of trip rate post-privatisation reduced daily fuel costs by an average of 14.27 percent (between 2009-12) and thereby overall vehicle costs by 9.07 percent to the AMC, however the reduced MSW tonnage accounted for a higher vehicle cost per tonne. Antony Waste Handling Cell Private Limited, only in the first year of its operation, had a marginally higher vehicular cost than AMC, but in the next two year of operations, the vehicle costs increased and averaged 2.39 percent but remained lower then the vehicle costs to AMC. A decrease in MSW tonnage, inducing a higher cost per tonne of MSW collected to the private company. The reasons for relatively higher cost and reduced tonnage can be gleaned from the interviews and written correspondence between AMC and Antony Waste Handling Cell Private Limited. *“Due to the pathetic*

⁵⁷ Human resource expenditure (drivers) has been considered in labour productivity and excluded herein to avoid duplication.

conditions of the dumping ground, our vehicles have broken down miserably and we have incurred exorbitant costs in repairing and renovating the same. Trucks have overturned inside the dumping ground in the past, resulting in major losses. Losses on repair and maintenance are above 50 lakhs (98192.5 AU\$) in two years” (Letter dated 1 August 2012 from Antony Waste Handling Cell Private Limited to AMC).

Lamenting the reduced vehicle productivity and lower collection, one of the interviewees from the private company stated, *“the dumper placers and compactor found it extremely difficult to climb the dump and would get stuck in the waste and unable to off load, thus reducing vehicle efficiency. The vehicle would be stuck for several hours or days, losing on waste collection and tipping fees”* (PC managerial staff 1).

While Antony Waste Handling Cell Private Limited continued to maintain that the conditions at the landfill site were not conducive to allowing appropriate offload to take place, the AMC refuted the claim by stating, *“we are maintaining the dumping ground by deploying dozer and two ditch machines regularly. The company has been verbally directed many times by the chief sanitary inspector of the dumping ground for providing light vehicles at the dumping ground but to no avail... the machinery used by the company has become obsolete and the dumping ground of the MC Amritsar has immense capacity to handle garbage”* (letter dated 12 October 2011 from AMC to Antony Waste Handling Cell Private Limited).

It is apparent from these comments that the conditions at the landfill were indeed challenging and direct observation by the researcher also confirms this fact (figure 31). Indirectly, by stating that lighter vehicles must be used for disposal, the AMC made a veiled admission of the off loading difficulties at the landfill. In comparison to the first year of operation (2009), the private company incurred higher vehicle costs per tonne in the follow up years (2010-12). For the AMC, instead of decreasing, the temporal costs actually increased post-privatisation, indicating lower vehicle productivity.



Figure 31 Dumping conditions at the landfill site

Source: Sandhu (15 December 2014)

In terms of MSW tonnage collected per vehicle per day, figure 32 indicates that the AMC tonnage per vehicle at 7.1 tonnes was more than the post-privatised collection tonnage, averaging 4.46 tonnes per vehicle per day.

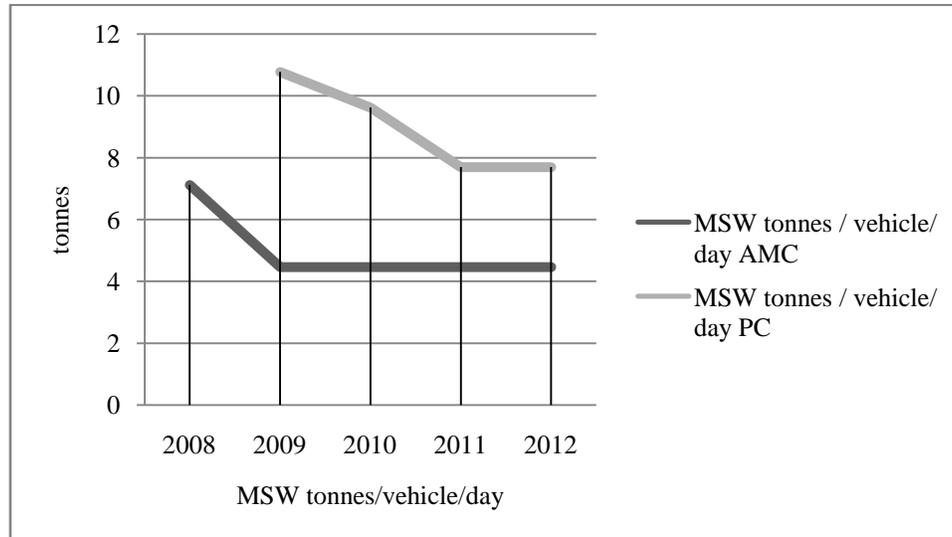


Figure 32 MSW tonnes per vehicle per day

Arguably, the reduced operational wards and share of tonnage with the deployment of more or less the same vehicle fleet with a lower trip rate reduced the tonnage per vehicle, hinting at a lower productivity, whereas the private company was able to achieve 10.76 tonnes per vehicle per day in the first year of operations, but declined to 9.61 and 7.69 tonnes in 2010

and 2011 respectively. Again this is attributed to the repair and maintenance problems, largely due to the conditions at the landfill, but also to a reduction in the vehicle fleet. “*In the first year, the private company deployed the required infrastructure and operations were efficient but in the second year it withdrew some of its machinery, like compactors and JCB loaders, as a result of which operations in the city suffered*” (AMC sanitary supervisor 3). Resultantly, the tonnage declined per vehicle, but was still double that of AMC, indicating that the company was working towards optimisation of its existing vehicle infrastructure. Vehicle infrastructure optimisation merits a discussion on number and type of vehicle deployed in service, and table 33 throws light on vehicle adequacy.

Table 33 Vehicle adequacy as per norms

Vehicle type	Requirement as per norms ^a	Number of vehicles		Total shortage	Surplus	Remarks
		AMC	PC			
Dumper Placer	12	5	10	0	3	
Tipper (TATA 1210)	45	4	6	35	0	
Mini Tipper (TATA Ace)	79	0	50	29	0	
Large Truck (TATA 1613)	0	2	0	0	0	Replace with hydraulic non-compaction trucks
Small Truck (TATA 709)	0	5	0	0	0	
Tractor Trolley	0	48	0	0	0	To phase out completely
Tempo	0	1	0	0	0	
JCB (front end loader)	4	3	2	0	1	
Bulldozer	2	2	0	0	0	
Water Sprinkler	5	3	0	2	0	
Containerised Hand Carts	300	0	0	300	0	
Containerised Tri-cycles	200	0	60	140	0	
Compactors	60	0	10	50	0	

^aRequirements are based upon findings in the detailed project report of the AMC (2009, p. 74) and MoUD (2000, p.433).

The shortage of specified type of vehicles is clear from table 33 after adding the operational vehicles of both AMC and Antony Waste Handling Cell Private Limited. However, specifically in the context of the private company, the correspondence letter dated 12 October 2011 from AMC to the private company pointed out that the “*machinery provided by the company is also inadequate. Rather the M.C. Amritsar has written to the company many times to deploy machine as per time of approval of tender.*”

In context of the type of deployed vehicles, table 33 also mentions the requisite type and the vehicles to be phased out. While the compaction truck is given on the list of suitable vehicles (AMC, 2009, p.74), it is pertinent to point out that MoUD (2000, p. 234) recommends non-compaction based hydraulic vehicles of capacity 6 to 15m³ with the top or back loading facility matching the waste density conditions in India. It can therefore be argued that although compactor trucks were deployed by the private company, owing to their non-suitability to the local waste characteristics or conditions, their operational and maintenance costs were higher, as this comment indicates, *“dozers are deployed to push the refuse collector truck from behind, thus damaging the tail gate mechanism of the compactor which costs around 4 lakhs (7855.41 AU\$) per unit. We have incurred a loss of 47 lakhs (92301AU\$) till date repairing their tail gate system and cylinders.”* (Antony Waste Handling Cell Private Limited to AMC, letter dated 19 September 2011). In the context of the compactor trucks, one of the managerial staff of the private company lamented *“every other day these machines would develop a technical snag, costing us between 3-4 lakhs (5981.56-7855.41 AU\$) repair charges only”* (PC managerial staff 2).

The private company is found lacking both in terms of adequacy and appropriateness of vehicle infrastructure. Optimising waste collection with a smaller fleet to cut capital and operational costs is the reason given by an interviewer, *“the private company did not ply all its vehicles to cut costs. They bought the Tata 709 truck but did not ply them. Minimum vehicles were used”* (AMC sanitary supervisor 2).

Optimal utilisation of vehicles brings in the rationale of a trip rate analysis (table 34), giving cognizance to both pre and post-privatised conditions. In line with the guidelines of MoUD (2000, p. 428), as also mentioned in the review, only trips pertaining to vehicles going to the landfill is considered. It may be mentioned that, except for non-motorised rickshaws/ handcarts, all load carrying vehicles, irrespective of their capacities, made trips to the landfill, rendering the system uneconomical and lowering productivity. The private company deployed 26 vehicles achieving 0.27 trips per tonne of MSW compared with 0.55 trips per tonne of AMC. However, both AMC, with an average trip rate of 2.49, and the private company with 3, did not reach the norm of 5 for vehicles with higher capacity when the distance to landfill is between 5 to 10 kilometres.

Table 34 Vehicle trip rate

Vehicle trips^a	AMC	PC
Vehicles going to landfill	65	26
Total vehicle trips/day 2008	258	0
Trips/ vehicle 2008	3.96	0
Total vehicle trips/ day 2009	162	78
Trips/ vehicle 2009 onwards	2.49	3
Trips/tonne 2008	0.55	0
Trips/ tonne 2009 onwards	0.55	0.27

^aOptimal trip number is 5 with landfill distance between 5-10 kms in case of Amritsar.

6.4.2 Implicit factors

As emphasised in the review section, vehicle routing is critical to optimal waste collection and cost reduction. In the context of AMC, one of the interviewees mentioned, *“There is no routing plan. Vehicles are allocated based upon tentative waste load in an area”* (AMC sanitary supervisor 1). Surprisingly, in the context of the private company, the situation was not much different, as can be gauged from the information revealed by an employee, *“there was no routing as such. We had 41 wards. The company was under pressure also. Some ward councillors from the ruling party would ask for vehicles in their ward. So we had to make trips there due to such pressures”* (PC managerial staff 2). The statement points to both adhoc allocation mechanisms, as well as political bureaucratic interference in the operations of the private company.

Further, vehicle down times can negatively impact vehicle productivity and this is observed in the case study as well. In case of the AMC, since a majority of the fleet was older than 8 years (AMC sanitary staff 2), it is assumed that the down time would be higher and thereby the operational capability of the fleet would be lower than the 80 percent norm (MoUD, 2000, p. 239). However, this statement cannot be substantiated in the absence of reliable downtime data. Regarding the private company, in the first year of operations, with new vehicles, vehicle down times were minimal (PC managerial staff 1). However, later, as an NGO representative opines, *“within two and a half years their vehicles became in a bad shape and reduced. Then people started complaining that the vehicle did not come to their lane”* (NGO member 1). This statement finds a validation from the following information

(table 35), mentioned in the letter dated 11 September 2012 from AMC to Antony Waste Handling Cell Private Limited.

Table 35 Out of order vehicles of private company as on 24 July 2012

Vehicle	Grounded	Working	Total	Vehicle Downtime ^a	Operational ^b
Mini tipper	28	22	50	56%	44%
Compactor	6	4	10	60%	40%
Dumper place	7	3	10	70%	30%
JCB	1	1	2	50%	50%
Tipper	4	2	6	67%	33%
Total	46	32	78*	60.6%	39.4

^{a&b} Computed from the given information in the letter from AMC to PC dated 24.7.2012.

In the third year of operations and just before the contract termination, vehicle downtime increased to over 60 percent, reducing the operational capacity of the vehicle fleet of Antony Waste Handling Cell Private Limited to just about 39.4 percent. This provides clear evidence of the undermined and constricted vehicular capacity of the private company, whereas it could not even keep 80 percent of its fleet operational as per the standard operational guidelines of MoUD (2000, p. 239), not even including the additional 33 percent surplus required to compensate for downtimes.

Finally, excess load and off load time and fill loss also impacted vehicle productivity. Since MSW is still labour intensive in the city, the loading takes place almost entirely through manual mechanisms with the AMC. Whereas in the case of the private company, the door-to-door mini tippers were manually loaded and the rest of the system was largely based upon hydraulic operations, thereby decreasing loading times. However, it was off loading at the landfill that caused significant delays, causing a loss of vehicle productivity while fill loss was not an issue with the company, as they tried to achieve maximum tonnage per vehicle; it was the AMC vehicles where fill loss was observed. As an interviewee remarked, “*the AMC vehicles took less tonnage and were less efficient, whereas the private company’s compactors took 10-15 tonnes on average*” (NGO member 1).

6.5 Inferences and conclusions

Arguing on grounds of MSW being a public good not requiring a justification on profitable returns on the investment, MoUD (2000, p. 438), emphasises that due justification on investment is still required for it being a cost effective option towards achieving economic

efficiency. In tune with this line of thought, this chapter delved deeper into the economic side of the sustainability prism, weaving a narrative encompassing both explicit and implicit dimensions of economic sustainability of privatised MSW operations in the case study. In doing so, the chapter also produces a body of empirical parametrical evidence and analysis that can clear the air around the most popular perception surrounding privatised waste delivery as being highly economically efficient (Ahmed & Ali 2004 p.474; Massoud & El-Fadel, 2002 p. 621; Vyas & Luk, 2012, p.323; Post, Broekema & Obirih-OPAREH, 2003, p,838; Cointreau-Levine, 2000; Simoes, Cruz & Marques, 2012, p. 214).

Based upon the analysis of this chapter, a scale of economic sustainability is developed, as indicated in table 36, accompanied by a sustainability radar diagram (figure 33) that summarises graphically the findings emanating from the analysis in the chapter wherein neither the AMC nor the private company are able to achieve economic sustainability in context of the applied criteria.

Table 36 Scale of economic sustainability

Scale	Economic efficiency	Labour productivity	Vehicle productivity
Low (1)	High total costs/ MSW tonne Low allocative efficiency No competition or contestability	Low waste clearance/worker Higher worker number/ MSW tonne Higher labour cost/MSW tonne	High total vehicle costs/MSW tonne Low MSW tonnage/vehicle Unoptimal trip rate High vehicle down times Lower vehicle number as per norms
Medium (2)	Moderate total costs/ MSW tonne 50 percent allocative efficiency Some competition or contestability	Moderate waste clearance/worker At least 50 percent worker number Moderate labour cost/MSW tonne	Moderate total vehicle costs/MSW tonne Moderate MSW tonnage/vehicle At least 50 percent trip rate as per norms Between 60-70 percent operational vehicles Lower vehicle number as per norms
High (3)	Low total costs/ MSW tonne 100 percent allocative efficiency High competition or contestability	High waste clearance/worker Optimal worker number as per norms Low labour cost/MSW tonne	Low total vehicle costs/MSW tonne High MSW tonnage/vehicle Optimal trip rate as per norms Above 80 percent operational vehicles Vehicle number as per norms with a 33 percent surplus

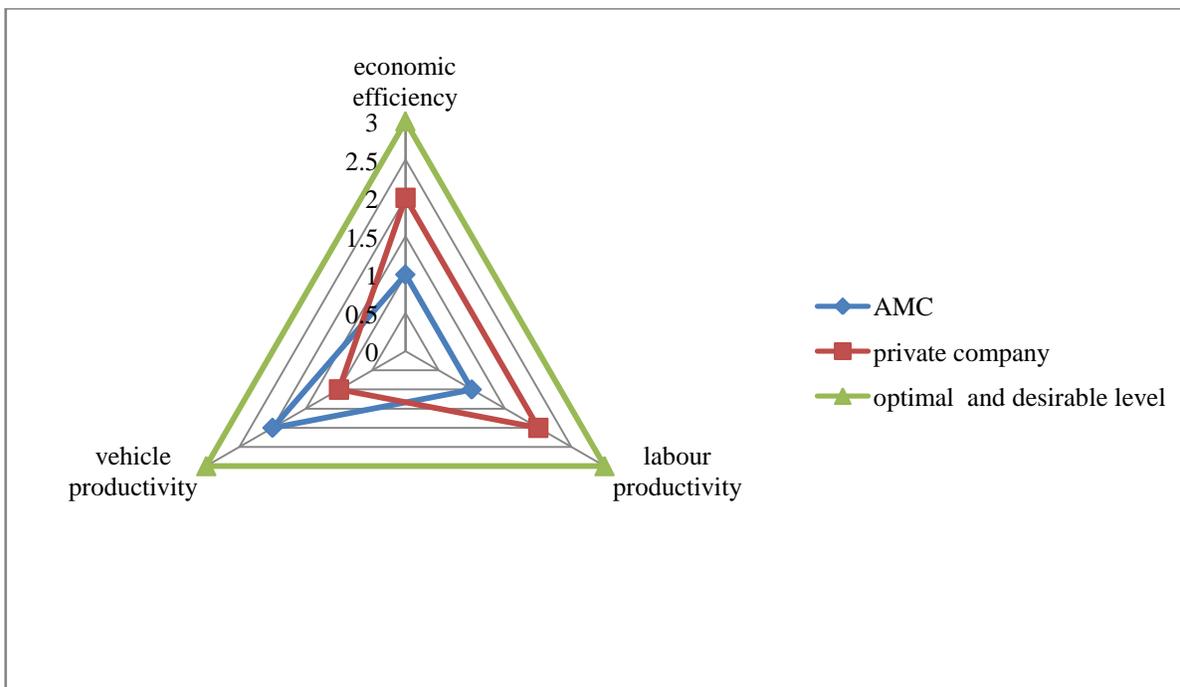


Figure 33 Status of economic sustainability

The discussion on productive efficiency demonstrates exorbitant costs per tonne of MSW post-privatisation to the AMC, owing to factors such as the additional cost of paying tipping fees to the private company, staff recruitment drives and reduced tonnage post-privatisation. Simultaneously, allocative efficiency, which was previously also dismal, dropped further in the absence of implementation of user charges and no recycling and recovery of waste that would lead to generation of revenues. While contestability enhanced collection efficiency, it did not translate into a natural cost advantage to AMC.

Regarding the private company, there remains little doubt that private rationality indeed was the key driver and cost cutting, especially in labour wages, led to reduced input costs in comparison with AMC. However, the fact that the company accrued only marginal profit in the first year of operation followed by a down slide and accumulated losses thereafter, brings to the fore a question as to why the company continued for another two and a half years when it was unable to break even, and this is perhaps best answered by a staff member of the company (PC managerial staff 2), who said “*our company wanted to establish a hold in the market.*” Establishing credibility and a niche for itself in the MSW market on a long term basis also emerges as the driver propelling privatised operations

within the broader confines of the principle of private rationality, till an absolute breaking point was reached.

The discussion succinctly suggests that the influence of implicit factors on economic efficiency cannot be overstated. The tipping environment at the landfill accelerated the cost per tonne while the undercurrents of collusionary practices point to the occurrence of hidden costs in such alliances, as in the case study. In summary, the project was economically inefficient to both the AMC and the private company. Contextual operational problems beyond the ambit of theoretical presumptions and expectations governed the actual outputs, as the discussion demonstrates.

The analysis on the productivity front also breaks the perception of higher productivity post-privatisation. Again, contrary to norms, the AMC had to incur higher cost per tonne of collected waste whereas labour costs per tonne were drastically low for the private company by resorting to unfair wages and hiring lower numbers of workers relative to the actual requirements. While the prevailing socio-political environment led to compulsive labour recruitments by the AMC, the same environment enabled cost cutting by the private company by exploiting its workers economically, thereby yielding lower worker costs per collected tonne but a higher waste clearance rate per worker. From a purely economic angle this may qualify as being productive, but from a holistic dimension, inclusive of implicit factors, the productivity advantage does not stand ground and therefore is not justified as sustainable.

In terms of vehicle productivity, the analysis reveals lower costs to AMC prior to privatisation of MSW services and a rise thereafter. This contradicts the logic of reduced vehicle costs (on trips and fuel) post-privatisation, leading to substantial cost reductions and savings to the public sector. Rather, decreased tonnage but increased collection efficiency by deploying its vehicles in its jurisdiction led to higher costs to the AMC. In comparison, although the difference is not very significant, the private company rendered higher vehicle costs per tonne due to higher depreciation value of its vehicle fleet. Relatively higher costs in the last year of operations were largely due to reduced collection efficiency and thus lowered productivity of its vehicle fleet. Again, the implicit factors adversely affected

vehicular productivity and mounted costs to both AMC and Antony Waste Handling Cell Private Limited.

The inferences from the chapter present an antithesis to the economically efficient and naturally productive paradigms often hyped under the neoliberal dynamics of privatisation of MSW service delivery. This chapter therefore, substantiates with robust evidence, the reality and rhetoric of economic dimension of sustainability and dispels many perceptions and assumptions surrounding the economic gains of privatised MSW service delivery. However, at the same time, it is emphasised that contextuality has underpinned the results in this case study. While generalisation is possible in contexts with largely similar socio-political geographies, a universalisation of issues and results is constrained and shall still require a contextual approach, to which this chapter serves as a theoretical, methodological and an empirical directive.

Chapter VII

Sustainability Assessment of the Environmental Dimension

“A sustainable city is one that relates its use of resources and its generation and disposal of wastes to the limits imposed on such activities by the planet and its organisms”.

Chi, et al. (2006, p.105)

7.0 Introduction

Whether or not privatisation delivered on its economic potentials was the subject of discussion in the previous chapter, of no less optimism has been the environmental promise of privatisation of urban services. Koppenjan & Enserink (2009, p.288) remark that the private sector “in urban infrastructure may contribute to sustainability by improving the effective use of resources and the introduction of innovative technologies or ideas, resulting in better projects or solutions.” In the context of waste management, Lovei & Gentry (2012, p.1) opine that privatisation brings in improvements that assure environmental benefits through efficient use of resources, possibilities of clean technologies and access to markets for services and goods that are market friendly.

Enhancing environmental performance is thereby a key deliverable while resorting to privatised waste management services. Naturally, the quest in this chapter moves to evaluating the environmental dimension of the sustainability prism. As in the previous two chapters, the criteria and indicators devised under the sustainability assessment framework pertaining to the environmental dimension have been applied in the case study to strain out factual evidence. The chapter aims to offer a crucial insight into the environmental dimension by examining the waste management operation from its generation at source to the final stage of disposal.

The data was collected from archival and documentary evidences, semi-structured interviews with stakeholders, household surveys and the direct observation method. As is well known, MSW operations can have significant environmental repercussions if not managed properly. Therefore, for the successful implementation of effective waste management strategies, benchmarking is required, as it enables goal oriented comparison of

various systems from an environmental sustainability viewpoint (Kaufman, Krishnan & Themelis, 2010, p. 5949). In resonance, the following section reviews desirable practices and norms pertaining to the dimension under scrutiny and more so for evaluating the practices in the case study.

7.1 A brief review of environmentally sustainable MSW practices

The review herein has been compiled from legislation and policy documents of the Government of India as *The Municipal Solid Waste (Management and Handling) Rules (MoEF, 2000)*, *Manual on Municipal Solid Waste Management (MoUD, 2000)*, *Handbook of Service Level Benchmarks (MoUD, 2011)*, *The Technological EIA (Environment Impact Assessment) Guidance Manual for Common MSW Management Facilities (MoEF, 2010)*, *Planning Commission (2014)* and *Toolkit for Solid Waste Management (MoUD, 2012)*.

According to Lovei & Gentry (2012, p.5), the major issues to be considered while privatising environmental services such as waste management, are the coverage and quality of the service to be provided, as well as the environmental and public health goals to be met. The activities associated with MSW can thereby be categorised into system elements, such as *waste generation, primary and secondary storage and segregation, waste collection, waste transportation, waste treatment and waste disposal*. For the operations of each of the elements to be environmentally conducive, it is important to be compliant with set directives. In this regard, the MSW Rules (MoEF, 2000) framed compliance criteria and the MSW Manual (MoUD, 2000) elaborated on the same for environmentally sustainable MSW operations to ensue. The service level quantitative benchmarks (MoUD, 2011) were also framed to target effectiveness in waste management operations in Indian cities and towns. Table 37 provides an amalgamated picture of the system elements with systematic application of the waste hierarchy and ISWM principles, along with the set compliance criteria and benchmarks to be achieved.

Further, in terms of the system elements, the MoUD (2000) also provides guidelines for the segregation and storage infrastructure. The primary level storage at household level should have three bins for recyclable, domestic hazardous and bio-degradable wastes. At the community level, the container should be large enough to hold waste generated by the

member households and also include another container for recyclable waste collection. In slum areas, community bins of size 0.04-0.1 cu.m should be placed at suitable locations.

Table 37 Compliance criteria and benchmarks for MSW system elements

Municipal waste management elements	Application of waste hierarchy principle and ISWM	Service level benchmarks for MSW	MSW Rules (MoEF, 2000) compliance criteria
Waste generation:	Waste prevention/reduction	None	Generator of waste should avoid littering and ensure collection and segregation as notified by the municipal body. User and polluter pay principle.
Primary waste storage and segregation at source	Reuse at source or sorting for recycling/recovery	Extent of segregation of MSW-100%	In order to encourage citizens, the municipal body shall organise awareness programmes and ensure community participation in waste segregation. Regular meetings with local residents and NGOs should be arranged. Separate dry recyclables and organic waste matter. Sell to itinerant waste buyer to enter recycling value chain. Collected by service provider for recycling.
Secondary waste storage and segregation	Sort for recycling/recovery	Extent of segregation of MSW- 100%	Secondary storage facility in an area must be established, based upon waste generation quantity and population density. Separate storage of hazardous waste, garden waste and inert. Storage facility should not be exposed to open atmosphere. Easy to operate design of bins for hydraulic handling. Manual handling prohibited. Three bin system- biodegradable (green), recyclables (white), others (black). Sorting at secondary bin not desirable and may be undertaken only till source segregation is established. Intermediate or centralised material recovery facility for recycling or recovery. Use of protective gear while sorting.
Waste collection	Segregated and mechanical collection.	Coverage of MSW services- 100% Efficiency of collection of MSW- 100%	House to house collection in suitable vehicles on regular pre-informed timings and scheduling. Doorstep collection of waste through containerised handcarts/tricycles or vehicles as suited. Doorstep or lane wise or secondary bin collection from slums as suitable. Service must be reliable and regular. Collection from secondary containers based on frequency of containers becoming full. Separate collection of inert waste, hazardous, garden and animal waste.
Waste transportation	In covered vehicles as per specification and route optimisation	--	Vehicles used for waste transport must be covered. Transportation of waste should be done to ensure that containers are cleared before they start overflowing. In cities above 500,000 population, hydraulic vehicles must be used. In cities with disposal sites more than 10 kilometres, transfer stations should be provided with large containers; 15-20 cu.m.

Municipal waste management elements	Application of waste hierarchy principle and ISWM	Service level benchmarks for MSW	MSW Rules (MoEF, 2000) compliance criteria
Waste treatment	Recovery of recyclables	Extent of MSW recovered- 80%	Municipal body shall adopt suitable technology or a combination to reduce the landfill burden. Physical, biological or thermal (energy) treatment for recovery of resource. Biodegradables shall be processed through composting, vermin-composting, anaerobic digestion or any other biological process. Mixed waste containing recoverable resources shall be recycled and, if suitable, incineration with or without energy recovery including pelletisation can be also used. Waste transformation to reduce toxicity or volume before final disposal.
Waste disposal	Maximise landfill diversion and minimal disposal	Extent of scientific disposal of waste-100%	Landfilling shall be restricted to non-biodegradable, inert waste and those not suitable for recycling/biological processing. Landfilling of mixed waste shall be avoided unless found unsuitable for processing till instalment of alternate facilities, landfilling shall be done as per norms.

Source: Derived from MoEF (2000), MoUD (2000), MoUD (2010), MoUD (2011), MoEF (2010), MoUD (2012), Klundart and Anschutz (2001)

In case this is not viable, then large containers matching the transportation system should be provided (MoUD, 2000, pp.173-175). Commercial and institutional areas should have adequate containers and with a 100 percent spare capacity to hold waste for unforeseen delays or extra loads.

The container should have twice the capacity to prevent overflows in the event of an unforeseen delay in collection⁵⁸. Thereby a city must place twice the capacity of the actual waste to be transported to have a 100 percent spare capacity to avoid overflows.⁵⁹ Also, as and when worn out, the containers should be replaced (MoUD, 2000, pp.222-227). Regarding construction and demolition waste, the guidelines suggest that it be stored in a skip or container provided for that purpose and at a cost specified by the municipal body. Garden waste should be stored in large bags or bins on site and collected weekly on a payment basis by the municipal body, however, as much as possible; it should be composted and reused on site (MoUD, 2000, p.181). In terms of the frequency of collection, regular and daily collection is mandatory from residential, commercial and institutional areas.

⁵⁸For example, if the expected waste at a location is 2 tonnes, the placed container capacity should be 4 cu.m. The density of Indian waste is 500 kg/cu.m, thereby a container of 1 cu.m = 500 kgs or 0.5 tonnes.

⁵⁹For example, if the waste to be transported is 100 tonnes, meaning a requirement of 200 cu.m, the total available capacity must be 400 cu.m.

According to the Planning Commission (2014, p.38), “a judicious choice of technology is essential for treatment and disposal of municipal solid wastes”. In this context, for the purpose of recycling and recovery from MSW, the MoUD (2000), MoEF (2010), MoUD (2012) and Planning Commission (2014) have provided guidelines that can be adopted by the municipalities for recovering city wastes through various technological options, as indicated in figure 34.⁶⁰

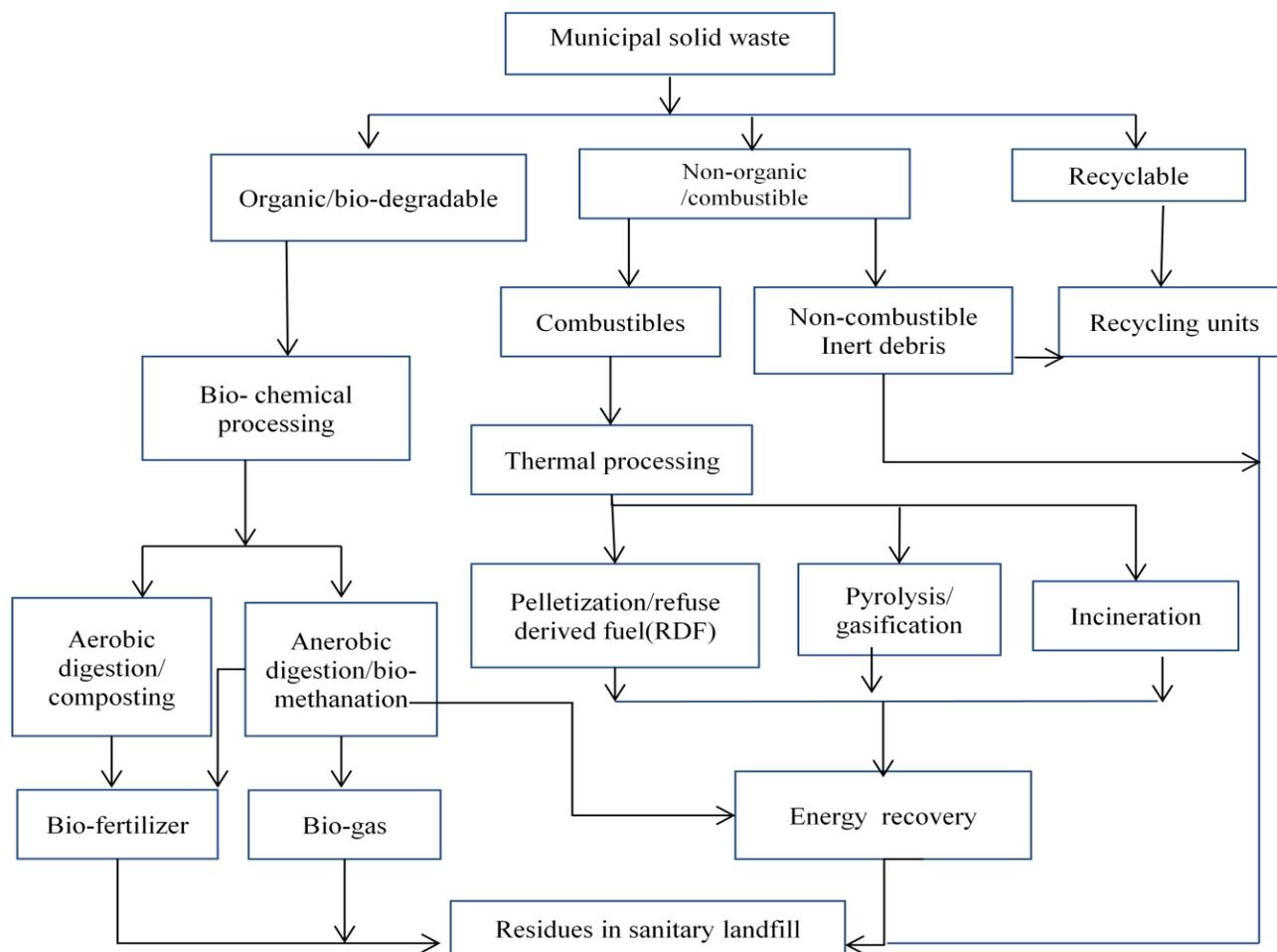


Figure 34 Technological options for MSW treatment

Source: Derived from Planning Commission (2014, p.39), MoEF (2010, p.3-12), MoUD (2012, p.14)

While thoughtfulness towards adoption of these technologies is necessary from all angles, such as contextual waste characteristics, capital investment, operational costs, managerial

⁶⁰ A comparative explanation of the technological options is given in Appendix I, table 61 and specific environmental risk is mentioned in Appendix I, table 58.

and social feasibility and revenue generating potential, of particular significance is the environmental burden that adoption of such technologies can bring.

It is worth noting here that the Indian experience with MSW processing technologies has been limited to date and largely unsuccessful, especially the waste to energy plants based on thermal processing, such as incineration, RDF and gasification, for reasons of improper choice of technology, unsuitable or poor quality of feedstock, non-availability of right amount and quality of waste and also due to public outcry (Planning Commission, 2014)⁶¹.

Looking at the surmounting waste problem in the country and in order to scrutinise the application and feasibility of the waste to energy projects more elaborately, the Government of India constituted a Task Force under the aegis of the Planning Commission of India in 2013. The Report of the Task Force (Planning Commission, 2014, p.ii), assuming a favourable position, mentions that it is “imperative to minimize the wastes going to the landfill by at least 75 percent through processing of MSW using appropriate technologies”.⁶² The Task Force (Planning Commission, 2014, p. 70) recommends a combination of both bio-chemical and thermal processing options⁶³ for treating MSW.

Regarding the last system element, disposal, the MSW Rules (MoEF, 2000) suggest it to be undertaken in such a manner so as, “to prevent contamination of ground water, surface water and ambient air quality.” Sanitary landfilling is therefore the recommended method, with landfilling being restricted to non-biodegradable and waste not suitable for recycling or processing. In addition to the compliance criteria (table 36), Schedule III of the MSW Rules (MoEF, 2000) is related to specifications for landfill sites including site selection, site facilities, specifications for landfilling, pollution prevention, water quality monitoring, ambient air quality monitoring, plantation of site, as well as mechanisms for closure and

⁶¹The Planning Commission (2014) mention examples of such failures as the closure of the incineration plant of 3.75 Megawatt power from 300 tonnes/day at Timarpur, Delhi due to low calorific value of MSW received. Also, a bio-methanation plant of 5 megawatt capacity at Lucknow city was shut down soon after operations began due to non-supply of appropriate quality of MSW to the plant.

⁶²According to the Planning Commission (2014, p.ii), the waste produced currently in the country has a potential of generating 439 MW of power from 32,890 tonnes/day of combustible wastes including RDF, 1.3 million cu.m of biogas per day or 72 megawatts of electricity from biogas and 5.4 million metric tonnes of compost annually to support agriculture

⁶³Refer Appendix I, table 61 for comparative analysis of MSW processing technologies.

post-care of the landfills.⁶⁴ Landfills across the country are therefore required to comply with the specifications.

The review of environmentally sound practices and guidelines would not be complete without a reference to the occupational and environmental risks related to waste management. According to MoUD (2000, p.454), an occupational and health risk is involved in all system elements of MSW management and especially from its improper handling and disposal. Communicable and non-communicable diseases, such as gastrointestinal disorders, jaundice, diarrhoea, nausea, respiratory infections, skin diseases, eye diseases and poisoning can result from improper handling, storage and disposal of MSW. In addition, occupational injury due to mixed wastes, such as sharps, needles, glass, metal and wood, can adversely impact waste handlers. The MoUD (2000, p.455) mentions that an environmental and health impact assessment of the MSW management operations and the proposed waste management procedures and facilities must be undertaken to mitigate the associated risks.

In relation to the system elements, the contract agreement between AMC and Antony Waste Handling Cell Private Limited mentions door to door collection of waste wherein the contractor “shall ensure that the source segregated waste is collected and transported in segregated manner upto the processing facility” (Article V, clause 5.2,c, iii, AMC, 2009, p.13). The contract agreement also makes a provision for regular disinfection and periodic washing of containers to maintain hygiene standards. Further, it mentions that the bidder shall determine the requirement of machinery, vehicles and equipment based upon operational requirements and ensure sufficient quantity and replacement when needed (Article V, clause 5.3 a, m, AMC, 2009, pp.14-15). In clause 5.10, the segregated waste is to be collected regularly, once or twice everyday as per an approved time schedule by the AMC so that collection can be completed by 11 a.m. every day.

The contractor, as well as the AMC, is expected to encourage house to house waste segregation by creating awareness and encouraging households (Article V, clause 5.4, 5.10,g,i-iii, AMC, 2009, p.15,17,18). Also, the contractor shall be responsible for all health, environment and safety aspects during the contract agreement and also be responsible for

⁶⁴Refer Appendix I, table 62 for landfill specifications.

taking care of occupational health and accidents, as per Article XII, 13.1 and 13.3 (AMC, 2009, p.37,38). The contract agreement does not make any provisions for the manner in which disposal would be conducted until a recovery plant, as well as a sanitary landfill, is established as per the MSW Rules (MoEF, 2000). Regarding the obligations of the AMC, the contract agreement (Article IV, clause 4.4, AMC, 2009, p.7) states that the day to day operations shall be duly monitored by the municipal body by fixing up performance monitoring criteria and levying penalties, as per the schedule specified under Article VII (clause 7.2, c,i, AMC, 2009, p.20,21).

A discursive ground with a compilation of guidelines has been prepared herein to guide analysis in the case study. In conjunction, the following sections disentangle the environmental dimension of privatisation of waste management operations in pursuit of the sustainability answer.

7.2 Waste generation

As stated in section 7.1, the contract agreement between the AMC and Antony Waste Handling Cell Private Limited had a clause to create awareness amongst the waste generators to support source segregation, but it did not include source reduction of waste. In a tipping fee model of privatisation based upon payment by weight, as in the case study, the principle of waste reduction would not go down well since greater generation and collection would mean more profit, suiting the private stakeholders best. *“Reduction at source would not suit them. They have to make profit at all costs”* (NGO member 1). Commenting on the desire of the private company to maximise its profit, an itinerant waste buyer lamented, *“Our access to household recyclable waste reduced when they came. They would ask the household to give all waste including saleable waste such as bottles, iron and metal scraps, newspapers, etc.”* (itinerant waste buyer 2). Further, *“so much so, even stones and construction debris which was beyond their scope of work was picked up by them.”* (AMC union leader 1). In fact, this is confirmed from a directive issued by the AMC to the company in one of the minutes of a meeting between AMC and Antony Waste Management Cell Private Limited (dated 3 June 2009) wherein, *“the company is directed not to pick any inert as this is not included in the contract agreement.”* The allegation that the households might have actually been motivated to generate more waste since the

service was available to them at the door step, as well as the company adopting an encouraging approach to collect more waste, is proved partially from the response to questions of the household survey presented in table 38.

Table 38 Household attitude towards waste generation post-privatisation

Questions	Number	%
Were you/ your household ever involved in any waste awareness programme at area/city level (n =194)		
Yes	3	1.5
No	191	98.5
If yes, how were you involved (n=3)		
Recycling activities	0	0.0
Waste segregation awareness	1	33.3
Waste reduction at household level	0	0.0
Any other activity	2	66.7
Did you notice any change in your waste disposal behaviour after the private company began operations in your area (n= 181)		
Yes	24	13.3
No	42	23.2
Can't say for sure	115	63.5
If yes, what were the changes (n= 24)		
I/my household disposed of more waste then before	8	33.3
I/my household began segregating the waste	0	00.0
No change in waste disposal pattern	12	50.0
Can't say for sure	4	16.7

Source: Household survey (May, 2014)

The response to questions in table 38 indicates that no awareness was raised towards waste reduction at source and 33.3 percent respondents who noticed a change in their behaviour post-privatisation admitted that they generated more waste then before. It is evident that waste generation and its reduction is not an issue that can get cognizance in the current form of privatisation by the tipping fee model. Privatisation, to some extent, encouraged rather than discourage households to generate more waste and add to the environmental burden. Indeed, this is antithetical to the principles of sustainable waste management which aim at reducing waste generation at source.

7.3 Waste storage and segregation

Even though the contract agreement between the AMC and Antony Waste Handling Cell Private Limited included a clause on source segregation, it was palpably ignored or sidelined, as the evidence indicates. So much so that when asked about the segregation clause in the contract, both the AMC and the private company feigned ignorance. “No, the contract did not specify segregation” (PC managerial staff 1). “No, the company did not

segregate waste. Why should we? It should have been done by the company which would install the waste management plant, not us. Our job was only to collect and dump at landfill” (PC managerial staff 2). *“No, segregation was not a part but creating awareness about it was”* (AMC managerial staff 1). Further, affirming that segregation was not on the agenda of the company nor AMC, a member of a local NGO answered, *“segregation at source was not implemented. In the contract it was said that segregation would be at source and awareness camps would be organized by private company to make people aware and motivate them to segregate. So segregation did not happen actually and awareness camps were not held”* (NGO member 1).

At this juncture it may be pertinent to remind the reader that, as discussed in chapter IV (section 4.4.1), bricolage practices are embedded in the Indian waste management traditions at household levels and therefore saleable material is put back into the recycling chain by selling it to the itinerant waste buyers. Despite this, the remaining mixed waste comprising of hazardous waste, such as batteries, sanitary napkins, plastic bags, some paper, glass, inerts and organic kitchen waste,⁶⁵ after resorting by waste pickers to retrieve resalables, ends up at its final destination, the city landfill. From the point of maximising recycling, an informal waste contractor said it best. *“If households gave segregated waste it will be very good. Now in mixed, we are able to retrieve only 50 percent, rest gets spoilt and unfit for recycling. If it was segregated then nothing would be wasted. This will lead to an overall business of two crore rupees (0.39 Million AU\$) per day. Recycling will also increase”* (waste contractor 1). Whatever recycling occurs, it has been in the informal sector pre- and post-privatisation. On average, about 21.2 tonnes of recycled waste is retrieved per day, with no municipal or formal private sector participation.

Understandably, the household waste storage practices did not change with the commencement of the privatised operations in the city, with a majority of households (96.36%) storing their mixed waste in a single bin storage container of metal, plastic, carton or a plastic bag (table 39). Further, 76.5 percent of the surveyed households stated that the private company never asked them to separate waste, while only 23.5 percent answered in the affirmative. Twenty percent of the respondents stated that the private company had

⁶⁵The components are identified by probing the contents of some of the waste bags from households by the researcher, taken for weighing purposes to judge the quantity of waste generated from the sample households.

given them information about the waste recycling possibilities. Looking at the set of conflicting opinions, the researcher's further investigation revealed that at the beginning of the operations a pamphlet was printed on behalf of the private company and distributed in some parts of the city and that was the only tool used in the life of the operations to spread awareness about segregation and recycling possibilities.

Table 39 Primary and secondary storage and segregation practices in the privatisation milieu

Questions	Number	%
How did you store your household waste (n= 199)		
Metal/plastic container	29	14.6
Carton container	86	43.2
Polythene bag	77	38.7
No storage done	6	3.0
Any other way	1	0.5
Did the private company ask/request you to segregate waste into wet and dry separately (n= 179)		
Yes	42	23.5
No	137	76.5
Was there any initiative by the private company to give you information about the importance of waste recycling (n =200)		
Yes	40	20
No	137	68.5
Not sure	23	11.5
Do you think the placement of the secondary container from your house was accessible (n= 200)		
Yes	34	17
No	106	53
Can't say	60	30
In your opinion how was the quality of the secondary container in terms of adequate size and design (n= 163)		
Very Bad	19	11.7
Bad	32	19.6
Good	16	9.8
Very Good	4	2.5
Excellent	0	0.0
Not sure	92	56.4
Did you find the container usually overflowing/ littering by animals/rodents (n= 172)		
Never	40	23.2
Sometimes	43	25.0
Often	17	9.9
Very often	7	4.1
Always	7	4.1
Not sure	58	33.7

Source: Household Survey (May, 2014)

In context of the secondary storage, again in contravention to the MSW Rules (MoEF, 2000), separate storage provisions for hazardous waste, inerts⁶⁶ and garden waste was not provided at city level. In addition, the three bin system (biodegradables, recyclables and others) was not provided. What the private company provided was a 1.1 cu.m and a 4.5 cu.m covered containers placed on roadsides with no fixed criteria for location, nor following the norm of 100 metres for 1.1 cu.m and upto 500 metres for 4.5 cu.m containers. *“The bins were placed randomly along roadsides as per requirement of the area”* (AMC managerial staff 2). The survey response from the households shows that a majority of the households (53%) felt that the secondary containers were not accessible and, in terms of adequacy of capacity and design, only 12.3 percent considered it to be appropriate. 43.1 percent of the respondents found the containers overflowing and littering by animals and rodents, the response varying between sometimes to always.

An observation on the inadequacy of the containers was also made by an interviewee from a local NGO (NGO member 1) who remarked, *“The roadside bins deteriorated fast. When the waste was not lifted for long time, the chemical reactions led to corrosion of the metal. The waste should have been shifted in stipulated time. Their covers were stolen and broken. In my observation, the capacity was low. If transport was regular, capacity does not matter much. See if you keep big bins in front of people’s door, they will object. No one will be ready. In fact small bins are better solution for this problem. Size was OK but number of bins should have been increased.”*

The issue of inadequate secondary containers was also raised by a local newspaper (Dainik Bhasker, 24 September 2011) which observed, *“Waste bins are full due to which there is spillage on surrounding roads.”* On a query about the adequacy of secondary bins, a managerial staff from the private company defended, *“yes it was adequate. Some days the bins did not fill up to capacity. On other days it filled more than once and was collected again”* (PC managerial staff 2). Table 40 indicates that the storage infrastructure was not as per the norms prescribed by MoUD (2000, p.443). In absolute terms, the private company’s infrastructure displays a shortfall of 17.03 percent. From the observations of the

⁶⁶The inert in the form of demolition and construction waste was not to be collected by the private company. Skip bins for inert debris have never been provided by the AMC and such waste, if the quantity is small, is collected as mixed waste. Larger amounts of inert are transferred by the generator by hiring a tractor-trolley directly to the landfill.

interviewees and also direct observation, the storage infrastructure depleted fast and in the absence of any measure to replace or supplement it, the problems of capacity and location came to the fore.

Table 40 Storage infrastructure norms and provisions

Infrastructure type	Requirement as per norms of MoUD (2000)	Number		Shortfall of containers	Container capacity based upon waste collection	
		AMC	PC		AMC	PC
4.5 cu.m container	200	90	100	10	45	50
1.1 cu.m container	900	0	400	500	0	200
240 litre bins	894	0	60	834	0	7.2
Polemounted litter bins (60 litres)	800	0	0	800	0	0
10 cu.m container	Not given	10	0	--	5	0
7 cu.m container	333	0	0	333	00	0
Waste generation (tonnes)					290	310
Total storage infrastructure capacity (tonnes)					50	257.2
Shortfall (tonnes)					240	52.8
Percent shortfall					82.75	17.03

1 cu.m. =1000 litres, 1cu.m = 0.5 tonnes

Finally, regarding the service level benchmark for segregation given by MouD (2011),

Extent of segregation

$$= \frac{\text{quantum of segregated waste}}{\text{total waste collected (by municipality and, or service provider)}} \times 100$$

AMC and private company - $\frac{0}{310+290} \times 100 = 0\%$

Informal waste sector- $\frac{21.2}{600} \times 100 = 3.53\%$

The informal waste sector segregated 21.2 tonnes of the waste generated in the city for recycling, making it 3.53 % of the city waste. It can be said therefore that the private company did not contribute to source segregation or secondary segregation on a tangible basis. The approach of both the AMC and the private company reflect the lack of interest in maximising source segregation.

7.4 Waste collection and transportation

On the morning of 10 February 2009, a headline of a local newspaper (Amritsar Tribune, 10 February 2009) flashed, “*Residents jubilant over collection of door- to-door garbage.*” The story reads, “*Spared from dumping of garbage blues, people residing in the localities selected for collecting waste for the solid waste management project are a delighted lot. Majority of the area falling under the garbage collection scheme in the first phase belongs to the civil lines⁶⁷ of the city.*” The quote provides an insight into the high expectations of the community from privatised services, and also that the private company was allocated relatively affluent areas of the city. As an NGO representative points out, “*Actually they were given those localities that were affluent. Where the task was difficult, they were not given, like the walled city. So where things were already relatively better and cleaner and well to do people, that component was given to them, most slums were not given. Easier sectors were given where transport was possible*” (NGO member 1).

Confirming this, a managerial staff member from AMC (AMC managerial staff 2) mentioned “*All VIP⁶⁸ area is outside the walled city and they (private company) wanted the VIP areas like Mall Road, Green Avenue, etc.*” Thus the geographies of income and influence played a significant role in the allocation of areas for the collection and transportation services. Amidst high expectations and the contract agreement, door to door service coverage was mandatory in the private company serviced wards. However, table 41 contradicts the claims of the company’s managerial staff (PC managerial staff 2), who claimed, “*yes, we were collecting door to door in all our wards and it was very good. All people had access to good service.*”

Primary household survey in the private company wards indicate that door-to-door operations were not undertaken in all the wards under its jurisdiction. 38.4 percent of the respondents answered in the negative when asked a question about door to door service by the private company. In the absence of a door to door collection, 37.7 percent households disposed of waste in the secondary containers, while the remaining either dumped it on the adjoining road or vacant plot of land. “*They did not collect door to door in all of their*

⁶⁷One of the elite locations in the city.

⁶⁸VIP meaning ‘Very Important Person’ is a commonly used abbreviation in India. A majority of the city’s elite and politically connected people live in the wards that were serviced by the private company.

wards” (NGO member 1). Confirming this, one of the staff from the private company (PC sanitary worker 2) stated, “*In VIP areas we would ring the doorbell where as in other areas we would blow the horn, people would come out on their own.*”

Table 41 Coverage and collection efficiency

Questions	Number	%
Did the private company collect the waste from your doorstep (n=198)		
Yes	122	61.6
No	76	38.4
If no door-to-door service was offered in your area by private company then how did you dispose of your waste (n= 61)		
Thrown on the road directly	14	23.0
Thrown in the adjoining/nearby vacant plot	21	34.4
Thrown in the nearby drain	1	1.6
Thrown directly in the secondary container	23	37.7
Any other way	2	3.3
What was the frequency of waste collection door- to- door by private company (n= 121)		
Daily	101	83.5
Alternate days	14	11.5
Thrice a week	2	1.7
Twice a week	0	0.0
Once a week	1	0.8
Less than once in two weeks	1	0.8
Any other	2	1.7
What was the frequency of waste collection from the secondary container by private company (n= 200)		
Daily	23	11.5
Alternate days	10	5
Thrice/week	9	4.5
Twice a week	5	2.5
Once a week	0	0.0
Less than once a week	1	0.5
Don't know	152	76
Did you notice any improvement in your area owing to waste collection by the private company in comparison to the previous/current status when the waste was being managed by the municipal corporation (n= 188)		
Yes	78	41.5
No	42	22.3
Can't say for sure	68	36.2
What kind of improvement did you notice (n= 200)		
Cleaner surroundings, no waste on streets	98	49
No overflowing secondary containers	4	2
No rodents/ animals around secondary containers	0	0
Any other	1	0.5
Can't say	97	48.5
Was the improvement level in your area same after one year of operation of the private company (n =200)		
Yes	55	27.5
No	16	8
Some decline in service	25	12.5
Can't say for sure	104	52

Source: Household Survey (May, 2014).

In terms of the regularity of service, a majority of households (83.4%) who had door to door service answered that their waste was collected on a regular basis, while a majority (76%) of the respondents were unsure about the regularity of collection from the secondary bins. Responses from interviewees reveal that the first year of operations saw regularity but thereafter there was a considerable drop. *“For the first year, people were happy that there was not a single day they did not come. On every vehicle it was written, if there is a problem, call this number. As soon as you called, the supervisor would come to you. But after, everything deteriorated. You may call them and they would say that they are not around. The people started complaining that they would not come in their lane.”* (NGO member 2). *“The company’s first year performance was good in terms of collection and transportation but diminished thereafter. This was also largely due to laxity on part of AMC to pay their dues and also not being able to monitor the operations appropriately.”* (Newspaper correspondent 1). Table 41 also reveals that while 41.5 percent of the households felt that there were tangible improvements in cleanliness of the area post-privatised services, 12.5 percent reported decline of service after the first year of operations, whereas a majority (52%) remained unsure.

When asked the about the decline of services, the AMC managerial staff (1) agreed and said, *“the company did not collect waste appropriately. First year was OK, after it declined. In the first year the company deployed the required infrastructure and operations were efficient but in the second year the company withdrew some of its machinery like compactors and JCB loaders as a result of which the operations in the city suffered. We imposed penalties sometimes. For instance a penalty of Rupees 28,000 (549.87 AU\$) was imposed once when the company did not collect waste appropriately. Maintenance of infrastructure was also not good.”*

Citing labour reasons, an NGO member (1) reasoned, *“Practically after a few months, its operations became slower because the workers did not have any training, facility or salary. So worker dropout was high. This impacted the working and it was like the old AMC run system.”* Referring to the loss and breakage of vehicle covers in hydraulic tippers, a company staff (PC sanitary worker 2) lamented, *“We were told to cover vehicles under pressure as mayor or commissioner is coming. How we could cover, we had no material.”*

So some spillage occurred.” It appears quite evident that there was a decline in door to door collection as well as regularity within a year of the operations.

The decline can be attributed to a number of factors, such as the shortage and lack of optimal utilisation of infrastructure⁶⁹ and poor labour and asset maintenance and replacement by the private company, irregularity of payments by the AMC after the first year of operations and, above all, inadequate monitoring of the operations by the AMC. *“For the first three-four months it operated all right but then the quality of work diminished. Overtime the enthusiasm that company would do better was lost. It did not deploy whole infrastructure. When there were 10 trucks, they deployed only 3-4. Monitoring was only done irregularly. But AMC’s own state of affairs is very bad and it does not have relevant staff capacity. Sanctioned posts are not filled. So monitoring was difficult and low. As an NGO, we did try to monitor. We met the municipal commissioner and told him that this many vehicles were not working and standstill. But nothing much was done.”* (NGO member 1).

Further observations to this effect were also made by AMC staff themselves, as well as a correspondent of a leading local newspaper who stated, *“the AMC was not able to monitor the company operations effectively due to its own constraints”* (Newspaper correspondent 1). *“Hardly any monitoring took place. It was just an eyewash to satisfy people and show that company was doing good work”* (AMC sanitary union leader 1). *“Even the penalty was a formality, if ever levied to the company, was a farce to demonstrate the strictness of AMC which was in fact not at all so”* (AMC sanitary union leader 2).

Analysing the information related to the penalties imposed during the life of the operations, it was revealed that there were twenty one instances of penalty over the forty two months life of the privatised service delivery, as indicated in table 42. The schedule of penalties as given in article VII, clause 7.2 of the contract agreement contains sixteen conditions and amounts to be levied. However, other than penalties imposed randomly on uncollected or overflowing roadside bins (figure 35), penalties were not imposed, even though there was a clear case.

⁶⁹The details of vehicle infrastructure have been discussed in Chapter VI.

Table 42 Schedule of penalties

Year	Total months of operation	Number of penalties	Penalty amount ^a	Average amount over all months of operation
2009	11	3	17,000	1545.5
2010	12	10	40,500	337.50
2011	12	6	87,000	1208.33
2012	7	2	109,000	7785.71
Total	42	21	253,500	258.97@ 42 months

^a All costs are in rupees. The exchange rate equivalent for Indian currency (23 October 2016) is; 1 Euro=Indian Rupees 72.84, 1 US Dollar=Indian Rupees 66.92, 1 Australian Dollar= Indian Rupees 50.92.
Source: Schedule of penalties compiled from correspondence letters between AMC and PC.

For instance, direct observation revealed that company staff did not observe regularity in wearing uniforms and safety gear, such as gloves, the penalty for which was Rs 500 (9.81 AU\$) per day per worker. “*The fine was mainly on unemptied bins and if the municipal commissioner or other official such as sanitary inspector saw an overflowing bin*” (PC managerial staff 1).



Figure 35 Overflowing waste bin and illegal dumping by private company

Source: Sandhu (19 July 2011)

In terms of the service level benchmarks of the MoUD (2011, p.8) for coverage and collection efficiency,

$$\text{Coverage} = \frac{\text{total number of households \& establishments with daily doorstep service}}{\text{total number of households and establishments in service area}}$$

Based upon the household survey conducted, the respondents receiving daily doorstep coverage made up 61.6 percent. The remaining 38.3 percent did not have access to door-to-

door service. Therefore, the 100 percent coverage benchmark was not achieved in privatised service delivery.

Secondly, $collection\ efficiency = \frac{total\ collected\ MSW\ by\ the\ service\ provider}{total\ generated\ MSW\ (or\ allocated\ collection\ amount\ to\ the\ service\ provider)}$

As an answer to this benchmark, the first year of privatised operations achieved a high collection efficiency (90%). However, thereafter regularity, which is an integral part of collection efficiency, declined and so did the number of vehicles deployed in collection operations leading to a decline in collection efficiency to 80.6% in 2010 and further to 64.45% in 2011 and 2012.

7.5 Waste treatment

While constructing the backdrop and the details of privatised service delivery, it has been clarified in Chapter IV that waste treatment and recovery was a part of Phase II of the waste management project to be implemented on a private sector participation model and also that Phase II of the project could not take off due to reasons mentioned therein. However, the space for the MSW processing plant was allocated and, if implemented, would have had its impacts, as can be seen from the ensuing discussion.

The waste hierarchy principle entails the maximum recovery of recyclables from waste and a maximum landfill diversion to take place. In conjunction, the GOI benchmarks (MoUD, 2011, p.8) emphasise 80 percent recovery and the remaining waste residue to be landfilled as 20 percent. Based upon the discussion on the MSW compliance criteria (MoEF, 2000) in section 7.1, it can be seen that the methods proposed for treatment of waste in the case study subscribe to the compliance criteria therein. Accordingly, the waste treatment proposal for the city to be operated through the private sector comprised the following components:

- Bio-remediation⁷⁰ and closure of old dumpsites and reclamation of land at Bhaktanwala site.

⁷⁰ Bio-remediation implies treatment of old dumpsites through biological acceleration and mechanical stirring up of heaps aimed at volume reduction and recovery of stabilised earth.

- Establishing therein, an integrated MSW processing and treatment facility⁷¹ of 600 TPD⁷² comprising a material sorting and recycling unit, windrow composting plant (350 TPD), RDF plant (100 TPD), recycling unit (50 TPD) and a sanitary landfill (100 TPD).

The MSW plant was to be established with the private sector on a BOOT basis⁷³ with a thirty-year concession period wherein the project site would be provided by the AMC. As per the contract agreement (AMC, 2008, p.28,29), the plant operator would have ownership rights over the incoming waste and would be free to sell finished products derived from waste with a minimum condition of supplying cost free thirty tonnes of compost per month to AMC and an amount of Rs 10 lakh (19638.5 AU\$) per annum during the entire concession period. Regarding waste management through the MSW plant, table 43 indicates the breakup of 600 tonnes/day if the plant had been established and put in operation.

Table 43 Proposed treatment methodology

	Tonnes per year	%
Total waste collection@600 tonnes/day	219,000	100
Recovery through composting/recycling/RDF	98,856	45.14
Disposal at sanitary landfill	43,800	20
Moisture and bio-oxidation losses	76,344	34.86

Source: AMC (2009, p.178)

Out of the total waste collected, 45.14 percent (270.84 tonnes/day) would be recovered through composting, RDF and recycling, the remaining would be accounted as bio-oxidation and moisture losses and 20 percent residual waste would be landfilled. Table 44 focuses on recovery and displays the actual recovery and discards from the waste processing facility, had it been operated. The actual landfill residue minus the moisture and bio-oxidation losses (209.16 TPD) would be 120.1 tonnes or 20 percent of the total collected waste.

⁷¹ Also referred to as the MSW plant, as per the contract agreement (AMC, 2009, p.13)

⁷² Tonnes per day.

⁷³ BOOT refers to build, own, operate, transfer

Table 44 Estimation of derived product from MSW components

Waste	% content	Actual TPD	Recycled TPD	Derived product	% efficiency	Discards TPD	% Discards
Easily bio degradable waste	54.10	342.6	137.01	Compost	39.99	205.59	60.00
Long term bio degradable	14.5	87	60.88	RDF pellets	69.97	26.12	30.02
Recyclable plastic	6.5	39	20.99	Recycled plastic	53.82	18.01	46.17
Recyclable glass, metal	2.8	16.8	8.39	Recycled glass/metal	49.94	8.41	50.05
Inert	14.5	87	43.47	Ecobricks	49.96	43.53	50.03
Non-recyclable	4.60	27.6	0	--		27.60	100.0
	100	600	270.74				

Source: computed from AMC (2009, p.49, 178)

Further, in order to judge the environmental impacts of the actual practice of waste treatment and disposal and the alternative that was proposed, the WARM software model⁷⁴ was applied to assess the environmental dimension from the green house emission and energy savings in the traditional and proposed setup.⁷⁵ The GHG emissions under the traditional approach adopted by both the AMC and the private company led to 602.7 MTCO₂E daily. The adoption of the MSW plant had the potential to reduce the GHG emissions to 123 MTCO₂E, and also incur significant energy savings, as figures 36 and 37 indicate.

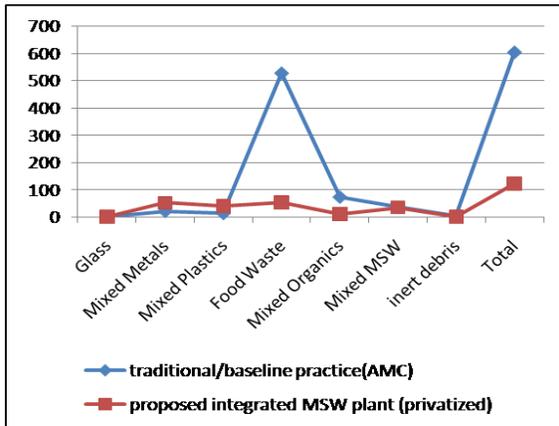


Figure 36 Comparison of GHG emissions

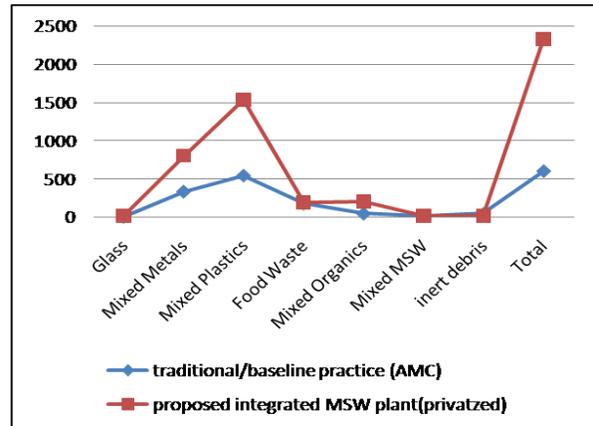


Figure 37 Comparison of energy savings

Source: Computed from WARM model

⁷⁴ The WARM model was developed by the U.S Environmental Protection Agency (EPA) to estimate greenhouse emissions and energy outputs from waste management practices, such as source reduction, landfilling, composting, recycling and combustion. The model is available as open source on the EPA website (epa.gov/warm).

⁷⁵ Refer Appendix I for detailed tables (59, 60).

While the treatment practices under AMC as well as the privatised operations did not adhere to the compliance criteria in almost all respects, as discussed, the integrated MSW plant project was designed to meet the compliance requirements. However, it is the location and siting of the plant itself which is the most critical aspect and therefore merits attention in this discourse.

As previously mentioned, the current landfill site, Bhaktanwala is surrounded on three sides by habitation and a regional grain market. The plant was proposed to be constructed within the existing landfill site after bio-remediation of the old site. Naturally, the locational aspect of the MSW plant invoked mass protests that continue to date. *“Our main contention is that the current site is not suitable. No waste management system takes care of toxics such as mercury and toxins. It leads to cancer. There are heavy metals and cause diseases”* (NGO member 1). The concerns of the affected residents and NGOs spearheading the resistance as the PCC are not unfounded. Siting the MSW plant on the current location would mean exposing the surrounding population to risk, albeit from an organised MSW management mechanism replacing the unsanitary landfill⁷⁶.

Finally, a waste treatment plant in the immediate vicinity, other than the health reasons as cited above, is also aesthetically regarded as an eyesore, impacting the commercial and spatial value of the adjacent landuses. Little wonder that the location of the waste treatment plant has been on the NIMBY centre stage since its conception and protests continue, although the AMC has still not budged from its initial stand of setting up the plant at Bhaktanwala landfill. This discussion is summed up in the words of one of the interviewees who lamented, *“putting a waste plant there means killing the residents. The condition there is already pitiable. It should be beyond the municipal corporation limit”*⁷⁷ whereas currently it is very much within it” (AMC union leader 2).

7.6 Waste disposal

The lack of appropriate waste disposal mechanism in terms of a secure sanitary landfill and the continued traditional practice of indiscriminate disposal without any treatment has been the practice in the city. Since Phase II (treatment by establishing the waste management

⁷⁶ Refer Appendix II, table 58 on public health risk associated with the proposed MSW plant components.

⁷⁷ Refers to the urban boundary under the jurisdiction of the AMC.

plant) did not take off, the disposal practices adopted by the private company did not vary at all from the AMC. On being asked about the waste disposal practices of the private company, one of the interviewees (Bhaktanwala Resident Association member 1) remarked, *“it was the same as the AMC, there was no difference. They were also undisciplined just like the AMC. During the rainy season the vehicle, even if it was strong, it does not climb the dump and so as a shortcut they took the vehicle upto where it went and then dumped it there. The private company worked no differently. They followed the path of least resistance.”* Further, one of the AMC sanitary union leaders in his interview to a local newspaper (Dainik Bhaskar, 24 November 2011) commented, *“the private company is spoiling the system. The AMC team settles the waste at the dump with the JCBs but the company dumps waste enroute to the landfill and nearby entry, blocking the route to the landfill.”*

At this juncture it may be pointed out that the contract agreement did not include any clause that bound the private company to dispose of waste in accordance with the compliance criteria. The scope of the private company was limited to simply dumping of waste at the landfill site (figure 38).



Figure 38 Weighbridge surrounded by a sea of garbage and location adjacent to residential area

Source: Sandhu (15 December 2014)

For instance, when asked about soil cover after compaction of waste, an interviewee (Bhaktanwala Resident Association member 1) responded, *“no soil cover was ever put on*

landfill. However, once when the case was going on they would bring a trolley of mud and put it to mislead the court⁷⁸ and prove that they were putting mud.”

To top this situation as described, the NIMBY issues erupting due to the rejection by the surrounding residents also posed an obstacle to the private company, as can be gleaned from the interviewee comments, *“the grain market committee and the Bhaktanwala Resident Association fought and gave stiff resistance to us. Resultantly the company vehicles could not offload and were parked for hours causing us losses. When we complained to AMC, they asked us to dump at Naraingarh and Chabal road old dumpsites. However, the problem of public resistance and height and space of dumps was there and so dumping could not continue there for long. Some dumping was also done along old jail road area, but only for 5-6 days and abandoned later”* (PC managerial staff 1).

Pointing to the worsening conditions at the Bhaktanwala landfill site, a local newspaper (Dainik Bhaskar, 24 November 2011) reported, *“Since capacity is exhausted and vehicles are unable to go there, collecting waste in the city is not taking place. Due to political and citizen pressure, if waste has been lifted from these areas, it is dumped in nearby areas only.”* Direct observation verified that waste was indeed being offloaded in areas other than the landfill, indicating that the private company also indulged in illegal dumping in non-designated areas (figure 35). However, challenges at the landfill can in no way be taken as a justification for unorganised dumping. Meanwhile, the local newspapers continued to report the deteriorating conditions at the landfill and poor disposal practices at the landfill during the lifespan of the privatised operations and beyond. For instance, headlines from the Amritsar Tribune Newspaper read, *“Mismanagement of solid waste makes residents life hell”* (26 October 2011). *“Overflowing dump yard, poor sanitation haunt residents”* (9 January 2012).

The discussion shows that waste disposal methodologies did not improve in any way with privatisation. Rather they became more cumbersome and introduced an element of discord between the community, the AMC and the private company. Table 45 provides insights into the status of disposal in comparison with the compliance criteria as well as the unchanged conditions pre-and post-privatisation in the case study. It illustrates clearly that

⁷⁸Refers to the Punjab and Haryana High Court where the writ petition number 2032 was being deliberated upon (details in chapter IV).

none of the compliance criteria for landfills was observed and the business of dumping indiscriminately with the private company joining hands in throwing compliance norms to the wind.

Table 45 Landfill compliance conditions, pre- and post-privatisation

Compliance criteria	Conditions pre- and post-privatisation
Landfill site location <i>Before 2009 (pre-privatisation)</i>	<ul style="list-style-type: none"> • Bhaktanwala landfill adjoining grain market and residential localities. • Site falls within air space 13 kms from the airport (crow flight) • Only 1.5 kms from heritage site, The Golden Temple
<i>2009-2012</i>	<ul style="list-style-type: none"> • No change
Substantive statements/quotes	<p>“The dump yard has outlived its capacity and the garbage has started spilling on the roads...consequently about 30,000 residents in Bhaktanwala are forced to live under most unhygienic conditions” (Amritsar Tribune, 12 March 2012).</p> <p>“They (AMC) have got all approvals and also from airport authority” (Bhaktanwala Resident Association leader 1).</p>
Site level facilities <i>Before 2009</i>	<ul style="list-style-type: none"> • No fence or hedge around the landfill • Unsecure and open to human and animal trespassing. • No paved approach road. Entry through grain market or the Tarn Tarn road through surrounding residential area. • No waste inspection facility. • No provision of weighbridge • No facilities, such as lighting or for workers.
<i>2009-2012</i>	<ul style="list-style-type: none"> • No change except that a weighbridge was installed by the private company in the landfill. • However, due to its poor location and uncontrolled dumping of waste, it could not operate for even a month before drowning in a sea of garbage (figure 38). • Some political announcements were made to improve the landfill by making a boundary wall, but this remained unimplemented.
Substantive statements/quotes	<p>“...Sitting MLA⁷⁹ had announced to raise a boundary wall around the dump yard so as to minimize its hazardous impact on the residents of the nearby areas. But the wall too could not see the light of the day till date” (Amritsar Tribune, 9 January 2012).</p> <p>“ While MP (member of parliament) and MLA (Amritsar South) had announced to erect a wall around the dumping site, but nothing has been initiated yet” (Amritsar Tribune, 26 February 2012).</p> <p>“ We put a weigh bridge at the landfill at a cost of Rupees 4.25 lakhs (8346.4 AU\$). It operated for not even a month as it became inaccessible due to waste piling around it” (Private company managerial staff 2).</p>
Landfilling modalities <i>Before 2009</i>	<ul style="list-style-type: none"> • Random compaction of waste or soil cover • Unscientific dumping without any treatment • No provision for storm water drainage
<i>2009-2012</i>	<ul style="list-style-type: none"> • No change
Substantive statements/quotes	<p>“Chain bulldozers are used for compacting the site. Sometimes mud cover is put but not regularly” (AMC sanitary inspector 1)</p>
Pollution prevention <i>Before 2009</i>	<ul style="list-style-type: none"> • No measures were taken to manage leachate and resulting pollution of ground water.
Substantive statements/quotes	<p>“10-15 people have died due to polluting water drawn from the handpumps. The leachate from the dump has polluted all water in this area” (Bhaktanwala Resident Association leader 1)</p>
Water quality monitoring <i>Before 2009</i>	<ul style="list-style-type: none"> • No measures to monitor ground water quality.
<i>2009-2012</i>	<ul style="list-style-type: none"> • No change

⁷⁹MLA is the abbreviated form for Member of state legislative assembly and MP stands for Member of Parliament at national level.

Compliance criteria	Conditions pre- and post-privatisation
Substantive statements/quotes	<i>Same as previous statement</i>
Ambient air quality	<ul style="list-style-type: none"> No measures adopted to monitor air quality
2009-2012	<ul style="list-style-type: none"> No change
Substantive statements/quotes	<i>“The waste occasionally catches fire and the landfill dust flies to the grain market and pollutes the grain.” (PC managerial staff 2).</i>
Site plantation Before 2009	<ul style="list-style-type: none"> Plantation effort was made a few times but not successful due to lack of care and maintenance, as also the extreme conditions at the landfill.
2009-2012	<ul style="list-style-type: none"> No change
Substantive statements/quotes	<i>“A green belt would be established around the dumping site to give it a cleaner look.” (Dainik Bhaskar, 24 November 2011.</i> <i>“...A 30 metre wide greenbelt area will be developed around the periphery of the site.” (16 March 2012).</i>

7.7 Environmental and occupational risk

From the analysis of the practices so far, it is evident that the incorporation of privatised waste management in the city did not come with a guarantee to minimise occupational and environmental risks associated with it. While it may be agreed that visible cleanliness from regular collection was observed, especially in the first year of privatised operations, the lack of waste treatment and its disposal practices did not decrease the risks to the stakeholders, the company workers, due to their association with waste handling and the community, in particular the residents adjoining the city landfill. So, while the city residents did benefit from clean surroundings and aesthetical improvements, the environmental and health burden was transferred to the landfill and its surrounding residential localities and the Bhaktanwala grain market.

Between the year 2007 and 2014, local newspapers have highlighted several times, the plight of the people living in localities adjoining the landfill. *“The lives of thirty thousand people are getting buried under the landfill. Poisonous gas and foul smell is causing havoc to the people’s health but the AMC is not interested and dumping continues there unabated”* (Dainik Bhaskar, 7 July 2007). A quote from the Amritsar Tribune (5 November 2012) reads, *“70% of population had been suffering from various health problems due to smoke emanating from the dump yard. Seema,⁸⁰ a resident of the area said she had recently lost her husband as he was suffering from acute respiratory problems. Another resident said, ‘I have lost my 25 year old son. He was also suffering from breathing problems.’”*

⁸⁰ Name changed to protect identity.

Another quote (Amritsar Tribune, 6 November 2014) reads, *“Contaminated ground water is leading to many diseases. People are losing their family members due to medical problems whereas authorities have shown casual approach towards their case. Diseases such as hepatitis are rampant in the area. There cannot be a single house where the family members are not on medicines which cost Rs 200-500 daily.”*

A first-hand account of the health conditions and suffering around the landfill was provided by a leader of the Bhaktanwala Resident Association (member 1) of the affected locality who stated, *“Diseases like asthma are quite common here. Many people have fallen sick. After 10 deaths in the area, the local MLA gave Rs 10,000 to those families as compensation. But it was not of much help. It was to pacify them so that they don’t agitate. The people in the surrounding localities are very poor. They cannot sell their house and go to another place. Another 10-15 people died due to polluted water from the hand pumps. The leachate from the dump has polluted ground water in this area. Go to any house in this area, you will find sick people. Everyday people spend Rs 100-150 on medicines. All these eucalyptus trees along the rail track have burnt with the smoke. Both smoke and ground water have impacted us.”*

The survey of the households conducted in the localities around the landfill (table 46) reveals that a majority of the households (79.6%) were disturbed due to the presence of the landfill and largely by the foul odour (81.6%). In terms of diseases associated with proximity to the landfill, 61 percent respondents stated that they or their family had suffered from respiratory disorders, 29.3 percent from skin infections and the remaining from vector borne diseases, such as malaria, dengue, cholera and diarrhoea.

Further, 30 percent of the respondents answered in the affirmative when asked about death in the family probably due to landfill related health risks. 85.75 percent, an over whelming majority of households, wanted to shift to another location but had not been able to do so, either due to a lack of buyer for their property (71.4%) or the low value offered (16.7%) or low rents that enabled the occupiers, mostly poor residents, some form of housing access in the city.

Table 46 Health impacts from the landfill

Questions	Number	%
Does being closely sited to the landfill disturb you (n= 49)		
Yes	39	79.6
No	10	20.4
Can't say	0	0.0
If yes, how (n =49)		
Foul odour	40	81.6
Air pollution	4	8.2
Leachate and water pollution	0	0.0
Visual pollution	0	0.0
Disturbance from animals and rodents	5	10.2
Anyother	0	0.0
Have you or your family members faced any of the following health issues in the near past (n =41)		
Respiratory disorders	25	61.0
Skin infections	12	29.3
Water borne diseases like diarrhoea/cholera/ gastroenteritis/others	1	2.4
Malaria/dengue	3	7.3
Any other	0	0.0
Can you recall deaths in your family due to landfill problems ever since you moved here (n =40)		
Yes	12	30
No	28	70
Have you wanted to shift to another location (n= 49)		
Yes	42	85.7
No	7	14.3
If yes then why have you not shifted yet (n= 42)		
No buyer for this house	30	71.4
Low value offered	7	16.7
Lower rents here than other locations	5	11.9
Any other reason	0	0.0
Have you ever made a complaint to the authorities about the landfill (n= 48)		
Yes	44	91.7
No	4	8.3
If yes, what action was taken (n =42)		
No action	37	88.09
Proposal to shift the landfill	0	0
Proper disposal mechanism assured	5	11.90
Any other	0	0

Source: Household Survey (May, 2014)

The private company continued to follow the AMC practice of ruthless dumping of untreated waste, without following the compliance criteria. While the adverse impact on the health of people in the adjoining localities had started long before the privatised operations began in the city, it can be said that the turn to privatisation did not improve the conditions. The presence of the landfill and the decline in public health status of the area also impacted property values.

Also, due to the lack of safety gear, waste workers from all the three sectors, public, private and informal, were exposed to occupational risks due to manual handling of waste, non-treatment and disposal. *“We were given only uniforms at the beginning of operations. No gloves or boots were given. We handled waste manually many times. Me and my colleagues often suffered from respiratory problems and skin infections”* (PC sanitary worker 2). An interviewee from the informal waste sector commented, *“I often suffer from typhoid and skin diseases. I get sick occasionally because of waste handling. My friend Ravi, who collects waste at the landfill, gets hurt very often by glass and dog bites”* (waste picker 6). *“We get allowance only for uniform but it is very small. Our work is very difficult but no one realizes that. Because of handling waste, I fall sick occasionally”* (AMC sanitation worker 1).

All the interviewees at the labour level from across the three sectors reported occupational risks and it can be concluded that due to inept waste management practices, as discussed in this chapter, both occupational and environmental risks persisted during the life of the privatised waste management operations

7.8 Inferences and conclusions

Do larger environmental gains result from perceptively sound and capacity backed privatised waste management endeavours? This question has been investigated in this chapter and the ensuing analysis of all system elements of the waste management system has made certain revelations to the contextual setting. Based upon the derivations from the analysis, it is possible to situate the context of privatised service delivery on a scale of environmental sustainability, as table 47 indicates, and is accompanied with an environmental sustainability radar diagram (figure 39) that summarises graphically the findings emanating from the chapter and indicating lower levels of sustainability with respect to all the criteria discussed therein.

Table 47 Scale of environmental sustainability

scale	Waste generation reduction	Waste storage & segregation	Waste collection & transportation	Waste treatment & recycling	Waste disposal	Environmental & occupational risks
Low (1)	No use of awareness tools towards source reduction to households. No source reduction practiced.	Poor storage infrastructure not matching compliance standards. No separate bins for primary and secondary waste segregation. No awareness programmes about segregation. Households do not practice segregation.	Less than 50% door to door collection. Below 50% collection efficiency. Poor frequency of collection.	No treatment and recycling. Contextually suitable technological options not adopted.	Totally unscientific waste disposal into an unsanitary landfill not meeting compliance criteria for landfills.	Above 20% respondents reporting illness and fatality amongst the community living in landfill influence area. Above 50% of interviewees report having experienced occupation risk.
Medium (2)	Some use of awareness tools towards source reduction. Less than 50% households practice source reduction	At least 50% separate bins for primary and secondary waste segregation. Some awareness programmes about segregation. At least 50% households do practice segregation.	50-80% door to door collection. 50-80% collection efficiency. Moderate frequency of collection.	Below 60% waste treated and recycled through contextually suitable technological options/ appropriate indigenous waste practices.	Waste disposal into a sanitary landfill matching 50% of compliance criteria for landfills.	Below 20% reporting of illness and fatality amongst the community living in landfill influence area. Below 50% of interviewees report having experienced occupation risk.
High (3)	Intensive use of awareness tools towards source reduction 90-100% source reduction practiced.	Storage infrastructure matching compliance standards. Separate bins for primary and secondary waste segregation. Periodic awareness programmes about segregation. 90-100% households practice segregation.	80-100% door to door collection. 80-100% collection efficiency. Regular frequency of collection.	60-100 % waste treated and recycled through contextually suitable technological options/appropriate local waste practices.	Waste disposal into a sanitary landfill matching 100% of compliance criteria for landfills.	No reports of illness and fatality amongst the community living in landfill influence area. None of the interviewees report having experienced occupation risk.

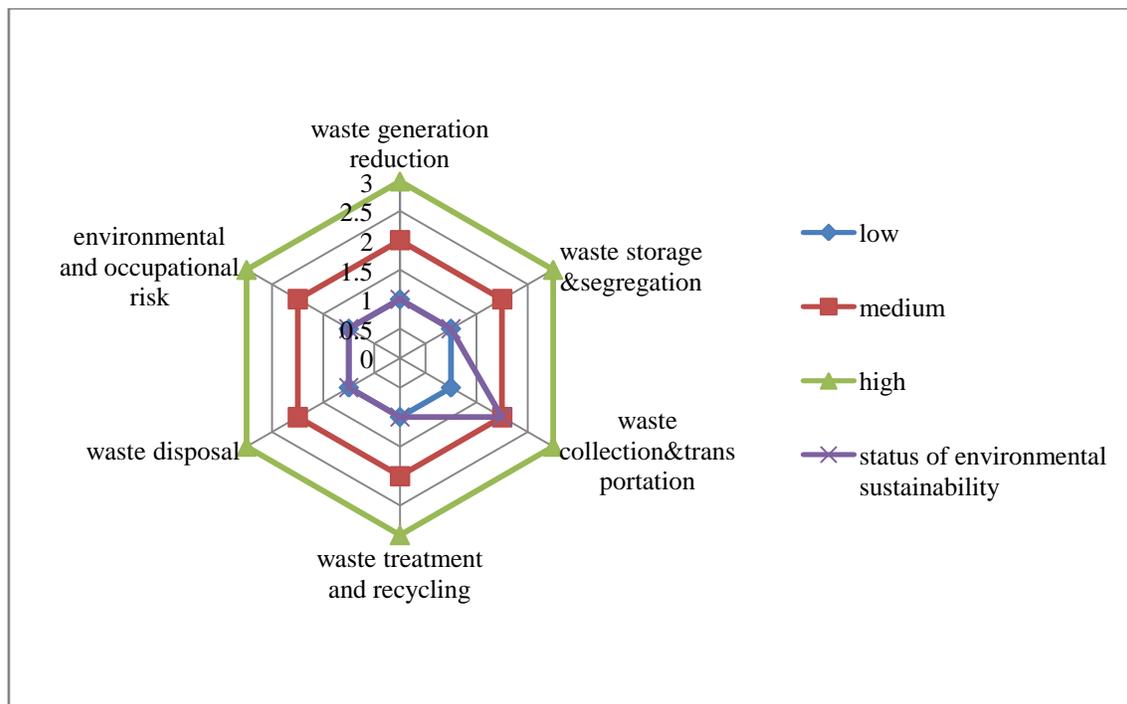


Figure 39 Status of environmental sustainability post-privatisation of MSW

Quite contrary to the principle of sustainable waste management, i.e. waste reduction at source, there was no endeavour whatsoever to encourage households towards generating less waste. Practically, this principle was not appealing to the private company in its pursuit of making larger profit through more waste collection. Rather, the tipping fee model encouraged the private company to collect even inert debris and indulge in illegal practices, aimed at enhancing weight for fiscal gains.

Despite a clear clause in the contract agreement, waste segregation was completely ignored and no separate storage containers at primary or secondary level were placed. As a consequence, mixed waste, along with hazardous and inert, filtered into the municipal solid waste collected by the private company. While conducting awareness programmes targeting waste segregation was a part of the contract agreement, other than the distribution of a pamphlet to households once in some neighbourhoods, no other efforts were made. The analysis also reveals that storage infrastructure norms, as laid down by MoUD (2000), were not followed and damaged containers were not replaced.

In terms of the waste system element of waste collection and transportation, the operations opened amidst great expectations of a seamless service. However, analysis reveals that the

private company defaulted on door to door collection, largely in low income localities, on the pretext of lower waste generation not requiring daily collection. Disparity is also observed in elite areas where door step collection was made, whereas in other areas either a blow horn method was followed or simply the waste from secondary bins was collected.

Within a year of operations, the level of service diminished and acquired an ephemeral character with a decline in regularity. The passive role of the AMC towards monitoring service quality and checking decline of operational efficiency of the private company cannot be overstated. Lack of capacity and inadequate monitoring of the operations effectively, plus its own default in providing regular payments to the private company, incapacitated the AMC as an institution worthy of ensuring effective service quality and environmental standards. Based upon the analysis, it can be aptly stated that both coverage and waste collection efficiency did not fully meet the compliance criteria and fell short of specified benchmarks.

In the context of waste treatment, Phase II of the operations did not commence, the actual implications could not be brought to the preview of investigation in this research. The research presented a possible scenario, comparing the existing traditional modus operandi with the situation if the MSW plant had been established and operated as planned. However, as pointed out, the location of the plant that poses a potential health and environmental hazard to the immediate surrounding residential and commercial land uses. Citing evidence from the literature, the research builds the case to follow the compliance criteria by locating the MSW plant and sanitary landfill away from the habitation cluster. Returning to the actual situation, since no treatment was undertaken, none of the compliance criteria was met for waste treatment and recovery during the life of the privatised operations.

Finally, the end of pipe disposal methodologies in the most inappropriate location as indicated merits serious attention in the debate on sustainable waste management involving the private sector. The analysis reveals the geographic location of the disposal site in the heart of human habitation. NIMBY protests and the health risks were visibly ignored by both AMC and the private company, which also indulged in clandestine dumping practices besides routinely offloading at Bhaktanwala landfill without treatment. None of the

compliance criteria were followed, playing havoc with the lives of the residents around the landfill. A lack of clause on disposal compliance in the contract agreement left the private company free of obligations of safe disposal and, just like the AMC, it followed a *go as you please* approach, thereby contributing to the hazard rather than diminishing it.

Resultantly, the survey from surrounding localities revealed the acute vulnerability of the surrounding residents to ill health and even fatality. The norms of both occupational and environmental health were overstepped by AMC as well as the private company. It is the landfill that partially struck a death knell on the privatised operations with the private company asking the AMC for alternative landfill in the wake of deteriorating conditions at Bhaktanwala landfill and the inability of the AMC to meet this requirement.

Based on the analysis of all the waste system elements in reference to the norms and compliance criteria, it can be conclusively stated that other than in matters of collection efficiency, the private company did not show a marked difference of operations contributing to environmental gains and sustainability. Without a doubt, lack of effective monitoring capacity of the AMC is responsible. But again, it can be argued that environmental sustainability is not the driving agenda behind the performance of the private company. Rather, its contribution to the environmental benefits is a by-product of the actual objective and pursuit of private rationality of profit. If not monitored effectively, the private company's work quality shows a tendency to become ephemeral and slip into work ethics and operations largely similar to the public sector bodies like the AMC. The analysis also displays that even though elaborate compliance criteria exist to achieve environmental sustainability of MSW operations, the very institutions that are responsible to implement them become party to flouting and disregarding them.

The chapter has offered insights and analysis into the context of privatisation and environmental sustainability, examining all the system elements of the municipal solid waste management system, as well as associated public health risks. It substantiates with suitable evidence the environmental realities of the case study; dispelling the notion and indicating that privatised operations may not necessarily, or as expected, translate into environmental gains and health risk reduction.

Chapter VIII

Sustainability Assessment of the Institutional Dimension

“Waste is a result of inadequate thinking. The traditional approaches to waste management of ‘flame, flush or fling’ are outmoded customs which have resulted in an unsustainable society.”

(Seadon, 2010, p.1639)

8.0 Introduction

The previous three chapters have, in concurrence with the sustainability assessment framework, elaborated the social, economic and environmental dimensions of sustainability of privatised waste management operations in the case study. The analysis and arguments have established the status of sustainability in each of the three dimensions. In continuation of the pursuit of the key research question, this chapter constructs a grounded scrutiny of the last dimension in the sustainability prism, i.e. institutional. The success and sustainability of private sector participation depends heavily on the institutional structures to develop, sustain and generate value from such alliances between the public and private sector. According to Davies (2008, p.15), an institutional and governance perspective enables evaluation of not only technical matters or scientific reasoning, “but also of the social, cultural, political and economic contexts that shape waste landscapes.” In resonance with the sustainability assessment framework, the scrutiny of institutional dimension spans pre-requisites, key contractual arrangements and inter-organisational relationships. The institutional structures governing the contextual setting have been elaborated in Chapter IV. Hence this chapter does not restate, but focuses on the institutional dynamics and their impacts on the operations.

The analytical construct is erected from archival and documentary information encompassing the municipal documents, newspapers and semi-structured interviews with stakeholders from both AMC and Antony Waste Handling Cell Private Limited. As in the previous chapters, a review is undertaken pertaining to relevant and specific literature from international, as well as Government of India, documents and guidelines to enable scrutiny of the criteria underlining the institutional dimension of sustainability.

8.1 A brief review of institutional sustainability dynamics

Central to the geographies of waste governance are the institutional dynamics and inter-relationships that determine the sustainability outcomes, thereby underpinning the success or failure of privatised waste management operations. Therefore, by rational extension, the review constructs a compilation of desirable practices while incorporating privatised service delivery operations into waste governance systems. The criteria and indicators to evaluate the institutional dimension as provided in the sustainability assessment framework systematise the explanations herein.

8.1.1 Pre-requisite framework for private sector participation

Guided by the criteria and indicators mentioned in the sustainability assessment framework, the desirable pre-requisites for sustainable institutional apparatus for waste governance in a privatised mode are explained as follows.

Appropriate regulatory and policy framework: The existence of enabling regulatory and policy environments is of critical importance to developing sustainable privatised operations within the larger gamut of waste governance (Koppenjan & Enserink, 2009, p. 93; Massoud & El-Fadel, 2002, p. 627; UN-Habitat, 2010, p.121; ADB, n.d. p.14; Schubeler, 1996, p.22). In the same vein, the MoUD (2010, p.84) toolkit for private sector participation in MSW management emphasises policy clarity and legal capacity in order for the urban local bodies to engage with the private sector in waste management operations. In India, The Public Procurement Bill, 2012 includes the award of private sector participation projects as included in the premise of public procurement and thereby mentions general procedures thereof. Specific to the context of MSW, the MoUD (2010, p.26) details out six stages of procurement that must be followed to enable efficient and transparent procurement process leading to selection of a capable private operator. This includes, *preparation and bidding documentation in the form of RFQ (Request for Qualification) and RFP (Request for Proposal), Notice inviting applications, Issue of RFP to qualified private operators, pre-bid meeting and issue of clarifications, receipt and evaluation of proposals and finally, issue of letter of award followed by contract signing.*

Adequate public sector institutional capacity: Highlighting the importance of institutional structures, UN-Habitat (2010, p.26) opines that, “even when services are provided by the private sector, considerable responsibility remains with the public sector.” Therefore, the public regulator should have the authority, as well as the resources and capacity, to regulate and monitor private sector participation effectively (Koppenjan & Ensink, 2009, p.286; Cointreau-Levine, 2000, p. 351; Schubeler, 1996, p. 32; GTZ, 2005, p.24). Further, numerous sources (ADB, n.d, p.52; MoF, 2010, n.p; MoUD, 2000, p.121) stress that existing public sector institutions need to build their capacities in order to take on private sector participation.

Adequate private sector capacity: The MoF guidelines (MoF, 2010, n.p) state that the potential private companies should have the capability to meet the technical, operational and financial aspects of the projects. Also, an essential pre-requisite is the existence of market competition in terms of a substantial number of private players in the market possessing adequate skills and investment credibility to provide efficient MSW services (MoF, 2010, n.p). Quoting the example of developing countries, Cointreau-Levine (2000, p.15) states that since the markets are still too weakly developed to enable competition, an element of contestability must be incorporated into MSW operations with the city government retaining some parts for running operations. To create contestability, the private company should serve no more than 70 percent of the city.

Political commitment and support: According to Schubeler (1996, p.25), the public processes of policy making and implementation and the political dynamics of administration have an impact on the governance of the MSW system. Other researchers (Bartone, et al, 1991, p.506; UN-Habitat, 2010, p.124; ADB, n.d. p.26) also mention the role of political will and support to nurture and sustain privatised operations. The MoUD (2010, p. 84) toolkit for PPPs lists political commitment as imperative for successful privatised operations. Further, MoF (2010, n.p) substantiates that a PPP project that is supported and promoted by a strong political *champion* has a greater chance of sustaining and meeting its objectives.

Establishing stakeholder support mechanism: Arguing for creating a local stakeholder base, Dorvil (2007, p.246) opines that involving them shall enhance the capacity of the

waste management system and increase service effectiveness. Engaging with the community, informal sector, NGOs and other community organisations, as well as the local labour unions of municipal sanitation employees, and including them in waste management initiatives in a privatised mode can contribute positively to the project (UN-Habitat, 2010, p.125-128; ADB, n.d, p.84). In the Indian context, MoUD (2010, p.84) emphasises the ULBs proactively engaging with a wider set of stakeholders, “creating a groundswell of support among all stakeholders.” The MSW manual (MoUD, 2000, p.430-431) suggests including waste pickers, NGOs and CBOs in waste management processes in Indian cities.

Technical and fiscal clarity: In terms of the system elements of MSW, Schubeler (1996, p.45) states that technical specifications require data on waste composition, volumes, expected variations and also a thorough understanding of requirements of heterogeneous user groups. In line, the GOI toolkit (MoUD, 2010, p.vii) emphasises the availability of good quality baseline information on the quality and quantity of waste generation as essential for planning an effective service delivery mechanism. In addition, fiscal clarity is sine qua non to privatised operations wherein the public authority should be able to “share the sources of income and demonstrate financial capacity to make payments” and establish appropriate tariff guidelines for cost recovery (MoUD, 2010, p.90). Technical specifications also require transparent tendering and bidding procedures to be in place (MoF, 2010, n.p)⁸¹.

While pre-requisites set the ground for a partnership to develop, it is the key contract specifications that can lead to sustainability in garbage governance in a partnership mode.

8.1.2 Key contract specifications

Risk allocation: MoUD (2010, p.3) states that privatised arrangements must contain appropriate governance structures to ensure adequate performance and to minimise the risk associated with using private players in a public sector environment (Torres & Pina, 2001 cited in MoUD, 2010, p.3). Accordingly, the risk allocation must be judiciously performed for sustained project operations (CAGI, 2009, p.50, MoF, 2010, n.p) “unlocking the

⁸¹In this context Volume IV of the GOI toolkit (GOI, 2010) provides model templates for bid documents comprising RFQ (request for qualification), RFP (request for proposal), bid details for system elements of MSW along with financial modalities.

efficiency benefits” of the private sector involvement. The MoF (2010, n.p) divides the typical risks in MSW private sector participation projects into the six major categories, as table 48 highlights.

Dispute resolving procedures: The procedures for dispute resolution must be stated in the contractual agreement (Cointreau-Levine & Ganeshan, 2000, p.5; GTZ, 2005, p.100; Dorvil, 2007, p.247). Specific to the Indian context, CAGI⁸²(2009, p.16) envisages an inbuilt dispute resolution mechanism in the contract for resolving conflicts speedily without disruption to the service. The MoF toolkit (MoF, 2010, n.p) suggests a clause in the contract for dispute resolution through amicable discussions or arbitration.

Table 48 Risks in a MSW collection and transportation project

Risk type	Content
Maintenance and repair risk	Risk associated with maintenance and machinery to meet performance benchmarks
Volume risk	The situation where service demand might vary from initial assumptions. In such cases, the generated revenues over project life shall vary from the initial forecasts and expectations.
Payment risk	The lack or inadequacy of fiscal cost recovery in a tipping fee model; the payment to the private player is made by the municipality.
Financial risk	The risk arising out of the privately financed components of the MSW project can lead to additional cost of operations.
Environmental health and safety risk	The extent of public health and occupational risk involved in MSW operations and environmental damage in access of the environmental impact mitigation plan in place.
Terminal risk	<p><i>Concessionaire event of default-</i> If the company fails to deliver due to its management failure, poor performance, indebtedness, etc. and is thereby unable to fulfil its contractual obligations, and the public authority is unable to enforce those obligations or recover compensation for the incurred loss.</p> <p><i>Government event of default-</i> when the municipal body proves to be a poor project manager and also does not fulfil its contractual obligations and the company is unable to enforce those obligations and secure compensation in lieu of the loss incurred.</p> <p><i>Force majeure-</i> The risk from events beyond the control of either party, resulting in an adverse impact on contractual obligations of either party.</p> <p><i>Changes in law-</i> Risk from change in law or regulatory regime that could have an adverse impact on the project.</p>

Source: Derived from MoF (2010, n.p)

Adherence to the principle of sustainable waste management: Dorvil (2007, p.212) states that the contractual agreement should follow the principles of sustainable waste management and also achieve a smooth workable inter-organisational relationship to enable sustained operations in waste management involving the private sector.

⁸² The CAGI (2009, p.49) states that in case of the private company default, the risk is to be borne by the public sector and in case of government default, the risk is borne by the private sector

Optimal timeframe for operations: In management contracts as in the case study, to enable enough time for economic depreciation of assets, contractual arrangements for waste collection should, according to Cointreau-Levine (2000, p.14), be at least five years. In the Indian context, the MSW manual (MoUD, 2000, p.435) mentions a period of not less than three years.

Provision for contract amendment: GTZ (2005, p.97) and Cointreau-Levine (2000, p.48) opine that contracts must be flexible to accommodate certain changes that cannot be forecast, such as cost inflation, large variations in waste generation rates and changes in transfer and disposal arrangements. In line, the MoF (2010, n.p), in Indian situations, stresses the need for contracts to be flexible to amendments in order to “maintain the balance of risk and rewards” between the stakeholders, to be fair to both.

Performance requirements for waste system elements: Cointreau-Levine (2000, p.28) states that the performance requirements, waste quantum and norms must be clearly specified in contractual agreements, with the “penalties being commensurate with the seriousness of any failure in performance.” In Indian conditions, MoF (2010, n.p) mentions setting performance criteria for all system elements included in the contract, such as collection, frequency, timing and disposal standards, in order to maintain a high quality of service.

Mechanism for review and monitoring: Researchers (Dorvil, 2007, p.239; Cointreau-Levine, 2000, p.29; UN-Habitat, 2010, p.124; GTZ, 2005, p.96) consider performance monitoring to be the essence of privatised services in MSW management. There must be a provision for monitoring the “main outputs from the project”, such as service frequency and quantity (MoF, 2010, n.p). Also, the contract should contain the methodology to inspect operations and evaluate performance (MoUD, 2000, p.434). While monitoring by the public sector underpins operational efficiency, MoF (2010, n.p) states that the private player will also be monitoring the ULB’s approach and especially if it upholds its responsibilities as in the contractual agreement.

Provision for inclusion of stakeholders: According to MoF (2010, n.p), the interests of affected communities (such as the informal waste sector) should be taken into consideration. In this context, the MSW manual (MoUD, 2000, p.430) states that the waste

pickers should be encouraged in waste collection partnerships to “provide them an opportunity to improve their working conditions and income.” Community awareness and support is essential to a sustainable MSW management project. Tasks related to consulting, informing and involving the community by both public and private sectors should be clearly mentioned in the contractual agreement (UN-Habitat, 2010, p.125).

Provision for appropriate labour welfare: Cointreau-Levine (2000, p.25) states that since MSW management has high occupational risks related to disease and injury, care is needed to ensure that the contractual agreements have provisions for labour protection. In this context, the MSW manual (MoUD, 2000, p.520) states that provisions should ensure that exploitation of labour does not take place and that workers are given adequate protection and healthcare facilities.

Fiscal and tariff provisions: UN-Habitat (2010), ADB (n.d) and Cointreau-Levine (2000) are univocal in emphasising explicit fiscal and tariff provisions in the contract agreement that address financial payment, fiscal obligations of privatised delivery, tariff level and structure, targeted subsidies and provision for the overall financial structure to be viable and adjustable over the life of the operations. In this context, the MSW manual (MoUD, 2000, p.438) opines that user tariffs for MSW services must be levied with a provision for cross subsidy for slum dwellers and a mechanism for rate revision at specific intervals.

Service disruption and termination modalities: The MoF (2010, n.p) stresses the need to establish clarity in the event of disruption of services or termination of contract by either of the public or private stakeholders, including force majeure, when the event is beyond the control of either party.

The review has elaborated upon the desirable conditions that could underpin institutional sustainability and contribute to waste management in the privatised setup. Inter-organisational relationships have been evaluated applying the theory of neo-institutionalism elaborated in Chapter II (section 2.9).

8.2 Pre-requisites framework

The following section applies the sustainability assessment framework in the case study, relying upon the compendium as a yardstick.

8.2.1 Appropriate regulatory and policy framework

On one hand, the regulatory framework supplemented by GOI guidelines on private sector participation (MoUD, 2010) indicates an enabling environment to privatised service delivery, yet on the other hand, the governance inadequacies at both state and local level (Sawney, n.d; Gupta & Teotia, 2006; Sandhu & Teotia, 2013) did not ensure a smooth ride and a level of maturity to develop. Since the nodal agency PWSSB was inept at MSW management projects, its basic functional domain being water and sewerage, the private company IL&FS Limited was given the mandate to develop the bid and contractual documents on behalf of the AMC. Based upon the interviews from the AMC officials and the private company (AMC managerial staff 1, PC managerial staff 1) as well as documentary sources (AMC, 2008, AMC, 2009) it is quite clear that the procurement procedure was developed by IL&FS Private Limited in conjunction with the MoUD (2010) guidelines and also followed. In July 2008, RFQ were invited by AMC. As per guidelines, the operators with above five years experience in waste management and a turnover of at least 25% of the total capital cost of the project were considered. A pre-bid meeting was also organized between the AMC finance and contract committee members and the potential private bidders. Following this the RFPs were invited and five were evaluated by the finance and contract committee of AMC. The sole criteria of evaluation was the amount per tonne of waste. The Antony Waste Handling Cell Private Limited emerged successful from the process and was awarded the contract.

While the procedures were followed, it can be observed that the selection of the lowest bidder in the RFP evaluation could have been faulty (though none of the interviewee mentioned this) since the cost/tonne quoted by Antony was fairly low as the analysis of the profits and costs revealed (Chapter VI, table: 29, p.189). Only marginal profits were incurred in the first year of operations followed by losses to the company and higher operational costs. A better evaluation might have given weight to more realistic cost quoting and potentially different outcomes from the operations on ground.

However, the regulatory role that the state government nodal agency would play to ensure smooth operations in terms of providing fiscal aid in case of the weak financial capacity of the AMC was not considered and therefore did not become a part of the contract, leaving it to the AMC to deal with the issues that arose during the life of the privatised waste management operations. Thus, as Sawney (n.d, p.49) concludes, “though the institutional framework for reforms is in place, there is a huge governance deficit on the implementation front.”

8.2.2 Local government capacity

Chapter IV elaborated on the privatisation process adopted for delivery of MSW management services in the city and revealed that the state level nodal agency, initially the PWSSB and later the PMIDC, were instrumental in overseeing the privatisation process, strongly supported by IL&FC Limited, a private firm undertaking procedure implementation in the local bodies. This reveals that local government capabilities to privatise and develop bid and contract agreements on their own were constrained. Managerial staff from AMC admitted that, “*the AMC did not have any knowledge or capacity to undertake PPP and encountered many problems in dealing with the private company.*” (AMC managerial staff 2).

Ironically, no capacity building programme was initiated at the AMC level to sensitise its officials to privatised mechanisms and the manner in which the day to day dealings and operational formalities would be conducted. In terms of credibility to sustain such operations, especially the tipping fee model, the financial creditworthiness of the AMC was essential to build investor confidence and the same was highlighted through the proposed JNNURM contributions by the centre and state towards the project finances. However, at the project termination stage the AMC blamed the centre for not releasing its share of funds due to which regular and timely payments could not be made to the private company and financial bottlenecks became one of the major reasons for the failure of the project. “*The burden of the financials was on AMC as the JNNURM grant from central government did not come through. AMC had to give from its own and its capacity was limited*” (AMC sanitary supervisor 2). This also indicates that on its own, the AMC did not have the financial capacity to sustain privatised delivery of services.

8.2.3 Private sector capacity

The private company Antony Waste Handling Cell Private Limited is one of the thirteen branches of the Antony Group of Companies, established in 2010. The company's motto is *sustainability with growth* and it claims to be the pioneer in the field of MSW management in India, having experience of collection and transportation of around 4000 TPD in 22 projects across India till 2012. On the face of it, the perception was that the company had adequate experience to handle collection and transportation services in Amritsar but, in reality, the staff capacity at the local level was inadequate. Even the manager did not have experience in solid waste management matters, as admitted, “*no I have not worked in MSW management before*” (PC managerial staff 1). The inexperience of the labour staff is also apparent from these interviewee comments, “*no they did not give us any special training*” (PC managerial staff 2). “*No training was imparted to the labour to handle waste*” (PC sanitation staff 1).

Affirming these statements, the letter from AMC to the private company (dated 12 October 2011), blaming the company for operational inefficiency, reads, “*the drivers and labour engaged by the company are also unskilled.*” Lamenting the inadequate capacities of the private company, a managerial level employee (1) from AMC stated that, “*the private company was inexperienced even though they had done some solid waste management work in some other cities.*” This also indicates that the private company did not take the collection and transportation project seriously enough to deploy or train skilled manpower and professionals. This had an adverse impact on the operational efficiency of the project. In terms of fiscal capacity, the company was able to demonstrate financial creditworthiness with an average annual turnover of Rs 1350 million (26 million AU\$) that guarantees bank loans and the ability to make capital cost investments in the project. While contestability was ensured with 24 of the 41 city wards (37%) under AMC, lack of competition in the waste management market ensured a single company monopoly over the city garbage, discouraging competitiveness and higher operational efficiencies to emerge.

8.2.4 Political commitment and support

On the 4th of February 2009, one of the headlines of the local *Amritsar Tribune* newspaper read, “82 crores project (16 million AU\$), first in Punjab, brainchild of Sidhu⁸³.” Politicians often become the face of a potentially desirable project in a bid to cash in on the vote bank politics and this evidently serves as a case to the point. The local Member of Parliament from the ruling coalition alliance claimed the credit for privatised waste delivery services in the city. The significance of the political dimension to the success of the privatised operations can also be gauged from the fact that when the AMC sanitation unions went on strike in protest against the privatised operations, the ruling party politicians stepped in to intervene, “since they did not want any impediment in the working of the plant⁸⁴ as they were projecting it to move the heart of the electorate in the forthcoming lok sabha elections⁸⁵” (Amritsar Tribune, 6 February 2009).

Ironically, while political will enabled privatised operations to take shape, clash of political egos also comes across as a reason for its downfall, as is opined by a local NGO representative, “there were contradictions in the political circles, specifically the Minister of Local Bodies and the local Member of Parliament were engaged in an undesirable personality clash. One said that I have got the work allotted to the private firm and the other said that the company is not performing properly. Also some of the politicians supported the local sanitation unions against the private company. Such like political contradictions led to its failure” (NGO member 1). It is evident that while political support and endeavour led to the initiation of the privatised operations, it could not do much to sustain the operations at a local level. Inherent political contradictions and inner power struggles also created an adverse environment for the project operations.

8.2.5 Stakeholder support

At the local level, the support of four major groups should have formed the foundation of the stakeholder support: the community, the NGO/CBOs, AMC sanitation unions and the informal waste sector. Analysis reveals that none of the stakeholders except the sanitation

⁸³ Surname of the ex-member of Parliament of Amritsar.

⁸⁴ In reference to the MSW plant, phase II of the project.

⁸⁵ Lok Sabha refers to the House of the Commons in the Parliament, elected every five years in India.

unions, who were very vocal in their concerns and protests, were considered important enough to involve actively, or even passively, to ensure a viable project grounding. *“Our union went on an indefinite strike after we heard of privatized takeover of waste operations. The local Member of Parliament and other office bearers pacified the union with assurances of no retrenchment and reduction of work burden. They also said that let it be an experiment and in all likelihood it may not work. Based upon such assurances, the union withdrew its agitation but we never supported the private company and remained skeptical. We often complained about their poor work to our AMC officers and political leaders”* (AMC union leader 1). It may be mentioned that despite the assurances to the sanitation unions, they continued to put up stiff resistance throughout the life of the privatised operations and demonstrated an attitude of non-cooperation, particularly at the landfill site, that became one of the major reasons for the failure of the operations.

In the case of the informal sector, as has been elaborated in Chapter V, they were neither approached nor included in the dialogue and procedures leading to the privatised operations on ground. *“Neither the AMC nor the private company ever approached us. Infact when they came, they neither let us work nor they did it properly themselves. Even though we don’t have a union, we support AMC union against privatization”* (waste picker 2). The NGOs, CBOs and the local community were also not considered important enough to be involved in creating a conducive and inclusive environment for the privatised waste services to operate. As an NGO representative pointed out, *“our government still does not have attitudes and will towards community involvement. We are just like a watchdog but not really a pressure group”* (NGO member 1).

As is evident, none of the other stakeholders other than the sanitation unions of AMC were given due cognizance in setting the grounds for the privatised services to take shape. Resultantly, hostile conditions on the ground by the sanitation unions in particular, the livelihood losses to the informal waste sector, the high expectations but passivity of the community, and the protests by the Bhaktanwala Resident Association against the landfill disposal continued during the life of the privatised operations.

8.2.6 Technical and fiscal clarity

Towards fulfilling the technical specifications as a prelude to setting up the bid for the privatised operations, a DPR was prepared by an independent consultant and data related to the waste generation quantity was compiled (wardwise) from a sample based household primary survey and the chemical analysis was conducted by the Centre of Biochemical Technology and Eco Save Systems Private Limited (AMC, 2008, p.48). Based upon this, the total generation figure of 600 tonnes daily was arrived at, along with the breakup percentage of the waste components and chemical constituents. Besides, an attempt to achieve fiscal clarity was also made by presenting the yearly statements of revenue income and expenditure of the AMC from 2001 onwards. In fact, the DPR mentions that, “*Amritsar is a very important city of Punjab state, however its financial health is not sound*” (AMC, 2008, p13). However, the DPR asserts the means of finance for the project (Phases I and II) through contributions from the Government of India under JNNURM to a tune of 50 percent, 20 percent by the state government and the remaining 30 percent to be borne by the AMC (table 49).

Table 49 Financial breakup for privatised MSW management project

Means of finance	Amount (in crore rupees)
Assistance from GOI under JNNURM@ 50%	36.24
Contribution by state government@20%	14.50
Required contribution from AMC@ 30%	21.75
Total cost	72.49

Source: AMC (2009, p.18)

Further, the DPR also proposed two options of user charge levy and collection, estimating a collection of Rs 10 crores (1.9 million AU\$) annually to supplement AMC expenses imposed by privatised service delivery. Accordingly, the user charge would be collected by the door to door waste collection agency on a monthly basis and deposited with the AMC. The AMC may allow some percentage of the user charge to be retained by the private company as an incentive. In the other option, the AMC would collect the user charge along with other taxes imposed on households, such as water supply and sewerage or property based tax, as indicated in table 50.

Table 50 Proposed user charges

Landuse activity	Proposed user charge
Normal residential units	Rs 50/month or 600/annum
Shops/commercial establishment	Rs 100/month or 1200/annum
Small houses (as in slums) and vendors with kiosk	Exemption of user charges
Estimated total collection	Rs 10 crores annually

Source:AMC (2009, p.70)

When it comes to the mechanism and procedures for selecting the private company, in the words of the AMC managerial staff (1), a “*proper tendering system was followed*” starting with an *Expression of Interest* advertisement (Number 404, dated 5 July 2008). Thereafter the tender was called and its terms and conditions were evaluated prior to selection of the private company. “*Five companies had made the bid for the collection and transportation Phase I. The AMC only made comparative statement analysis and compilation. It is the state body which takes the decision about whom to allot the tender*” (NGO member 1). Assisted by IL&FS Limited, as well as the state nodal agencies, the PWSSB and later the PMIDC, the decision to allot work to Antony Waste Handling Cell Private Limited was made vide AMC resolution (number 295) on 19 September 2008.

While irregularities surfaced in the case of Phase II (Amritsar Tribune, 7 September 2012) leading to the cancellation of the contract by the State Department of Local Government, no such irregularity or discrepancy is indicated in the allocation of Phase I to Antony Waste Handling Cell Private Limited. It is clear that a technical and fiscal mechanism was in place to ensure streamlined private operations in the city. At the same time, high dependency on the state level administration is visible, both in technical and fiscal matters, implying that local capacities are weak and also that such initiatives are controlled by the state governments in a top down hierarchical manner. While the pre-requisites framework indicate the environmental characteristics under which the private sector participation was initiated, the key contractual specifications discussed below reveal the institutional performances, interactions and dichotomies that shaped the geographies of garbage governance on the ground in the case study.

8. 3 Key contract specifications

Cointreau Levine (2000, p.44) lists eleven items specifically in the context of MSW projects in privatised mode to be considered in the contract agreement. Table 51 indicates that while most of the requirements of the contractual design were met and included in the contract agreement, one of the most important considerations, risk management was largely ignored. In addition, performance monitoring measures were not directly mentioned however a list of penalties was included to regulate and monitor the work of the private company. Further, the key contract specifications are elaborated in the succeeding discussion. Further, the key contractual specifications are discussed as follows.

Table 51 Theoretical contractual requirements and their compliance in contract design in the case study

Issues to be covered in the contractual design (Cointreau-Levine, 2000, MoUD, 2010)	Aspects included in the design of the contract agreement
Parties to the agreement	Article I, II relate to parties to agreement and list of definitions and interpretations therein.
Objective and scope of technical services	Article V, clause 5.2, Day to day operations of the facility
Objective and scope of financial requirements	Article VII, Payments to the Contractor
Duration of the agreement	Article II, Clause 2.2, Contract period
Rights and obligations of the private sector	Article V, Contractor's obligations
Rights and obligations of the grantor (public sector)	Article VI, Municipal Body's obligations
Regulatory requirements	Article III, Project site and Facility, Article XIII, Miscellaneous: clause 13.1, Labour
Management of key risks	No article is specific to this requirement in contract design.
Performance measurement, monitoring	Article IV, Monitoring of the facility. No clause on performance management, however clause 7.3 mentions schedule of penalties.
Ownership and use of assets	Article X, Hand back of the facility,
Dispute resolution and arbitration	Article VIII, Events of Default, Article XII, Dispute resolution

8.3.1 Risk allocation

The contractual agreement between AMC and Antony Waste Handling Cell Private Limited treats risks rather vaguely, homogenising them without clear reference to the nature and type of risks involved. Also, by a paragraph to this effect, the AMC sought to transfer a majority of the risk to the private company, as Article XI, clause m reads, *“the contractor also acknowledges and hereby accepts the risk of inadequacy, mistake or error in or relating to any of the matters set forth above and hereby confirms that municipal body shall not be liable for the same in any manner whatsoever to the contractor”* (AMC, 2008,

p.34). Further, in Article V; “*contractor shall be solely responsible for the adequacy of the operations plan and the conformity thereof with the design and construction requirements and collection and transportation requirements*” (AMC, 2009, p.11).

This clause allocates all the risk in the system operations to the private company, whereas in Article VI, municipal obligations absolve the AMC of all risk by not mentioning a single clause that can point to its share of operational risk. For instance, who would be responsible and thereby the bearer of risk in the case of the dumping site constraints, as happened in the case study. Similarly, clear obligation of the AMC, particularly in financial matters (Article VII), in terms of the manner in which the private company would be paid, led to allocation of both payment and financial risk to the private company, eventually becoming the key reason for the termination of the project.

Based upon the critical evaluation of the contract agreement and actual operations on the ground, table 51 presents a category wise risk analysis, along with factors leading to risk accumulation and its impacts. Six categories of risk are analysed, providing a clear indication that contextual circumstances led to transfer of risk mainly to the private company, and the AMC as an institution was unable to reduce risk and rather contributed to it, leading subsequently to non-viability of operations.

The maintenance risk was aggravated due to delayed and irregular payments by the AMC, while the conditions at the dump depreciated the vehicles at a faster rate, leading to a higher requirement of repair and maintenance. The burden of the volume risk also had to be borne by the private company since there was no clause in the contract pertaining to flow control and the mechanism to deal with it, should the waste generation increase or decrease. However, the issue herein is not so much the decline of waste or wrong estimates, as claimed by the private company, but lower collection of waste, again due to the hostile offloading conditions at the dumpsite that stranded vehicles for days, as well as inadequate infrastructure deployed by the private company.

Table 52 Risk accumulation factors and impacts

Risk category	Factors leading to risk accumulation	Impacts
Maintenance risk	-Delayed payments by AMC. -Poor maintenance of landfill by AMC and exhaustion of its capacity. - Diversion of vehicles to other cities, reducing vehicles in the case study.	Reduced collection efficiency
	<i>"The AMC should give us money then we can buy and repair our vehicles. But if AMC is not giving us regular payment, we don't have money even to repair our vehicles" (PC managerial staff 1).</i>	
Volume risk	-Inadequate waste collection due to lack of vehicular infrastructure. -Private company claimed wrong estimates by AMC. -Restriction on inert debris collection.	Lower margins of profit for the private company.
	<i>"Amritsar city does not generate 600 TPD. It is only a theoretical assumption...which is completely wrong. In our case the details given to us at the time of last tender were wrong due to which we are facing major financial losses in the ongoing project" (Antony Waste Handling Cell, pre-bid meeting, 17 June 2011).</i>	
Payment risk	-Delayed payments by AMC -No user charges for revenue generation - Funds not released from centre government	Information asymmetry Uncordial inter-organisational relationships Reduced collection efficiency.
	<i>"We withdrew mainly because of payment issues. Company would not have problem if payment was on time. AMC said that it had no money as funds had not come from centre" (PC managerial staff 2).</i>	
Financial risk	-Capital cost of infrastructure to private company -Constrained capacity to pay labour and repair vehicles/infrastructure.	Labour strikes Reduced private company efficiency Uncordial inter-organisational relationships
	<i>"In collection and transportation project, the investment for entire infrastructure is done by the contractor. There are no capital reimbursements from government. Maximum risk is taken by the contractor" (Antony Waste Handling Cell , pre-bid meeting, 17 June 2011).</i>	
Environment health and safety risk	-Private company's disregard of labour laws -Overflowing bins, especially in the last year of operations -Lack of AMC monitoring mechanisms -Poor conditions at dumpsite	Labour unrest and strike Reduced collection efficiency Protests/ resistance by Bhaktanwala Resident Association against dumping.
	<i>" The waste vehicles come through the mandi route or tarn taran road which is narrow causing major health risk to surrounding locality residents" (Bhaktanwala Resident Association member 1)</i>	
Termination risk	-Irregular payments by AMC -Adverse conditions at dumpsite	Pre-mature contract termination Serious MSW crisis post-withdrawal Transaction costs
	<i>"..with respect to outstanding payments and pathetic condition of the dumping ground that shows no sign of improvement, we are constrained and forced to take a decision for mutual termination of this project under the clause, municipal event of default" (PC to AMC letter dated 19 June 2011).</i>	

Regarding the payment risk, in theory, the prime risk bearer is the public body, but the design of the contextual fiscal model ensured that the risk was transferred to the private company, owing to the AMC's weak fiscal capacity, non-levy of user charges and undue delay in release of funds by the central government. In the event of non-payment by AMC, the private company reportedly accumulated huge losses to a tune of 1.8 crores (0.35 Million AU\$) besides transaction losses due to maintenance of assets, payment of staff salary and other expenditure, bringing it to a precipice where it seems to have had no other option but to withdraw from operations.

In theory, both the sectors are responsible for environmental health and safety risks; in the case study, this was borne largely by the private company. While the AMC was responsible for the disposal ground and its allocation to the private company for dumping, the Bhaktanwala Resident Association, fearing health concerns, offered stiff resistance to the private company and caused it further delays in offloading. Also, in the city, heavy penalties, particularly towards the last few months of operations, were levied on the private company for poor collection and overflowing bins. The company, on its part, contributed to the occupational health risks of its employees by not providing them with basic facilities and additional health cover, leading to discontent and strikes that affected operations.

Finally, the terminal risk had to be borne by both AMC and the private company, the AMC suffered a loss of credibility since it defaulted on payments and that eroded its market standing as a reliable institution. Consequently, to date, the AMC has not been able to find another private company, despite many requests for proposals to this effect, and those interested quote exorbitant prices, largely to offset the payment and terminal risks that were faced in this case. In addition, the private company made a claim of Rs 3.8 crores (0.74 million AU\$) from the AMC for the losses it had incurred. On the other hand, the private company was fined Rs 4.8 lakhs (9426.46 AU\$) by the AMC, besides getting embroiled in two court cases, one with the AMC and the other in the local labour court by the employees of the private company, who blamed it for their abrupt termination and non-payment of compensation therein.

8.3.2 Dispute resolution procedures

Article XII of the contract agreement pertained to dispute resolution wherein clause 12.1 favoured seeking an amicable solution in the first instance, followed by arbitration (clause 12.2) in case the dispute was not amicably resolved. The decision of the arbitrator would be final and binding on both parties. The procedure also called for continuation of obligations pending the resolution of the dispute during the life of the waste management project (AMC, 2008, p.35). The elements of discord that led to dispute and finally termination of the contract prematurely are listed in table 52.

Table 53 Default actions by AMC and private company

AMC default	Private company default
Erratic/delayed payments	Inadequate infrastructure deployment
Prolonged delay in providing escalation price	Insufficient labour capacity and welfare
Poor maintenance and access to the city landfill	Falling collection rate and overflowing bins
Non-cooperation by sanitary unions	Irregular and reduced door to door collection frequency.
Imposition of heavy penalties at later stage on the company without improving landfill conditions.	Lack of repair/maintenance of assets.
Imposing additional transaction cost to the private company, such as the non-usable weighbridge.	

Source: Compiled from correspondence letters, newspapers and semi-structured interviews

Ground operations threw up challenges and issues that led to the dispute between the AMC and the private company, with the company wanting to withdraw operations in just two-and-a-half years of operations in September 2011, as a letter to AMC reveals, “ *with reference to the above cited subject matter (ninety days’ notice for mutual termination of contract under the clause of the municipal body in the event of default) and the various letters submitted by us to the AMC with respect to the outstanding payments and pathetic conditions of the dumping ground that shows no sign of improvements, we are constrained and forced to take a decision for mutual termination of this project. Municipal body has failed to make any payment due to contractor and the same is due for a period exceeding 90 days. We did not get timely payments for entire 2010-2011*” (19 September 2011).

Further, in relation to the non-acceptance of penalties, the letter reads, “*AMC has imposed penalties on us.... however the same department is very much aware about the fact that garbage is not lifted because of the non-availability of the dumping ground (which is AMC’s scope of work). These kinds of penalties can’t be acceptable to us till the time the*

dumping ground facility is in perfect working conditions.” In response to this, the AMC, in its letter (dated 12 October 2011) states, *“AMC has been regularly making payments upto 30-40 days of submission of bill. The inner side of the dumping ground has immense capacity to handle garbage but due to negligence of staff of Antony, almost all entrance points of dumping ground have been blocked.”* Before the final withdrawal, the private company gave at least three notices to the AMC, *“each time they were pacified after releasing a few lakhs to them but thereafter it was the same situation again”* (NGO member 2).

Subsequently, in their letter dated 26 July 2012 to AMC, the private company informed that they had terminated all the employees due to an illegal strike by workers on account of non-payment of dues by AMC and on 1 August 2012, offered six conditions to continue work till a new arrangement was made. The intent of the company to discontinue at all cost is evident from the same letter that reads, *“even though we are going to make further losses on infrastructure investment, we want to come out of the contract due to default in duties by AMC from last two years and continuous harassment and we can’t take it anymore.”* Further, *“we are looking for amicable solution in order to avoid legal issues which can be time waste for both of us. If required, AMC can appoint an arbitrator to prepare an amicable closure mechanism for the same.”*

Not willing to accept the private company conditions, the AMC in their letter (dated 21 August 2012) threatened to (in reference to clause 5.1.4 c and 5.1.5 of the contract agreement) hire a third party for the services and claim 120 percent of expenses incurred from the company, thus aggravating the conflict. Further, in their letter (dated 11 September 2012) the AMC (based on a meeting held on 28 August 2012) stated, *“you are directed to resume the work of collection and transportation immediately, failing which the whole responsibility will lie upon the company in case of spread of epidemic in the city.”*

The pending issues between the AMC and the company could not be resolved and neither was an arbitrator appointed as per the contract agreement. As the dispute worsened, in their letter (dated 25 September 2012) the AMC wrote to the Police Commissioner of the city to register a FIR (first hand report) against Antony Waste Handling Cell Private Limited for having *“deliberately and illegally omitted from performing the duty, hereby creating a*

situation leading to spread of epidemic in Amritsar city.” Not to be left behind, the private company approached the Punjab and Haryana High Court and on its directions, the Deputy Commissioner of Amritsar was appointed the arbitrator. However, more than four years after termination of the operations, at the time of writing this analysis, the case was still pending and the dispute has not been resolved.

8.3.3 Sustainable waste management components in contract agreement

The waste hierarchy principles underpinning sustainable waste management were not given due cognizance in the contract agreement. The only aspect to this effect mentioned as one of the obligations of the private company is source segregation. Article V (c, iii) reads, “*the contractor shall ensure that the source segregation waste is collected and transported in segregated manner up to the processing facility*” (AMC, 2008, p.11). On ground, this clause was never implemented. The private company collected mixed waste and the AMC did nothing to ensure that segregation takes place. So much so, the list of penalties fails to mention any penalty related to unsegregated waste. The contract agreement had no clause towards waste reduction at source or its appropriate disposal till Phase II of the project was established. Institutional apathy and lack of understanding of the principles of sustainable waste management by the AMC in particular is visible. Besides the state level organisations, the PWSSB and the IL&FS Limited, responsible for framing the contract agreement also overlooked this dimension and its inclusion, indicating ignorance on their part. In the absence of incorporating the sustainability principles, the operational aspects of the waste system elements, and disposal in particular, were highly indiscriminate, with no adherence to the MSW Rules 2000.

8.3.4 Timeframe of operations

The contract mentioned a timeframe of seven years during which the contractor was authorised to operate and maintain collection and transport facilities. The timeframe is appropriate from the point of view of economic depreciation of infrastructure and enabling the investor to recover costs and build a margin of profit. However, the same clause (Article II,2.2) also mentions that the “*termination date can be triggered earlier due to event of default(s) and other provisions under this agreement*” (AMC, 2008, p.6). As is seen, the private company could not complete its full term of seven years and the

termination was triggered after three-and-a-half years of operations due to the aforementioned reasons that led to accumulation of losses by the company. In fact, in one of its letters (1 August 2012) to the AMC, the private company stressed that “*the AMC must not forget that we have invested on these special purpose equipments (capital cost Rs 8.5 crores, 1.6 Million AU\$) considering a contract period of seven years and we will be making further loss by discontinuing at this stage.*”

8.3.5 Contract amendment provisions

According to the contract agreement, “*the contractor shall not create any encumbrances, liens, rights, obligations and interests on the project facility and or this agreement except after seeking written approval from the municipal body*” (Article II, clause 2.4, p.6). This implies that while the contract agreement reflects inbuilt flexibility, it still leaves some room for manoeuvre. In the real situation, the company did try to negotiate the terms and conditions of operations after withdrawal but the AMC did not relent, as an interview with AMC managerial staff (2) reveals, “*yes, they tried to negotiate but no change was made to the contract.*” Further, the conditions imposed by the company for continuing work post-withdrawal vide their letter (dated 1 August 2012) were not accepted, followed by another letter of new conditions vide letter dated 22 February 2013. However, the contract agreement was not amended to include the new conditions and finally on 20 March 2013, it was declared null and void by the AMC, citing reasons of private company default.

8.3.6 Performance requirements for waste system elements

The private company’s obligations in relation to operations of the waste system elements are outlined in Article V of the contract agreement. The contract has no mention of the amount of waste to be collected by the private company or even the number of wards to be allocated to the private company which was in fact required to deal with the issue of waste quantum as well as clarity on spatial divisions. Nor did the contract agreement include any performance standards or benchmarks against which the service could be evaluated. Consequently, the penalties for underperforming imposed by AMC became a subject of discontent and dispute, with the company accusing the AMC of adhoc levy of penalties on an *as it pleased* basis. The contents of the contract agreement and its operational status on the ground are presented in the table 53.

Table 54 Privatised waste system elements and its operational status

Contractor obligations (<i>Article V, Contract Document</i>) ^a	Performance of tasks			
	Appropriate	Partial	Highly inadequate	Missing
Deployment of skilled and trained manpower				
Door to door collection and waste removal from streets				
Source segregation of waste				
Bin washing facility				
Start door to door collection in all allocated wards within two months of start of operations.				
Replacing vehicles, equipment, machines, implements, materials and other consumables found defective.				
Appropriate deployment of workforce				
Follow specified timing for waste collection and transportation (by 11.a.m once everyday in residential and twice in commercial areas).				
Household segregation of waste be conducted as a joint responsibility of AMC and private company				

^a AMC (2008)

Against the requirement in the contract agreement, the private company did not provide door to door services in all its allocated wards even four months after the start of operations. In the minutes of the meeting between AMC officials and the company (3 June 2009), it was pointed out that door to door operations had still not commenced in a number of localities. On its part, the AMC did not take any system elements obligations upon itself as the contract agreement reveals. So much so, even the clear responsibility of managing the dumpsite and its use for disposal till Phase II of the project began was not mentioned in the agreement. Besides, the private company also offloaded its vehicles at undesignated dumpsites. Resultantly, a major part of the dispute centred around the landfill, with neither of the stakeholders taking serious responsibility, culminating in adverse conditions at the dumpsite. The schedule of penalties to monitor and control system performance did not include any penalty on low or unqualified manpower deployment, irregular or no door to door service, unsegregated waste, collection of user charges in some localities by the private company employees, and illegal disposal in undesignated sites.

8.3.7 Review and monitoring mechanism

Article IV of the contract agreement deals with monitoring of the project by providing for a joint committee of both the stakeholders to oversee the overall functioning of the project while the day to day operations would be monitored by the appointees of the AMC. Clause 4.4(b) also mentions fixing *performance monitoring criteria* in terms of the penalties to be

levied in case of non-performance of its obligations. However, the detailed modalities of monitoring regarding manner, frequency, reporting procedures and other self-monitoring mechanisms in terms of the AMC's obligations, were missing in the agreement. The inadequate organisational capacity of the AMC is also reflected in its monitoring mechanisms, as the comment from an interview reveals, *“some monitoring was done but AMC's own state is very bad, it does not have relevant qualified staff”* (NGO member 1). Further, *“their sanitary inspectors used to do site visits sometimes. Nothing was fixed as per the contract about the penalties. It depended on the AMC dealing officials”* (PC managerial staff 1). Out of the 16 penalties in the schedule in the contract agreement, only four types were levied during the entire life of the operations as figure 40 indicates.

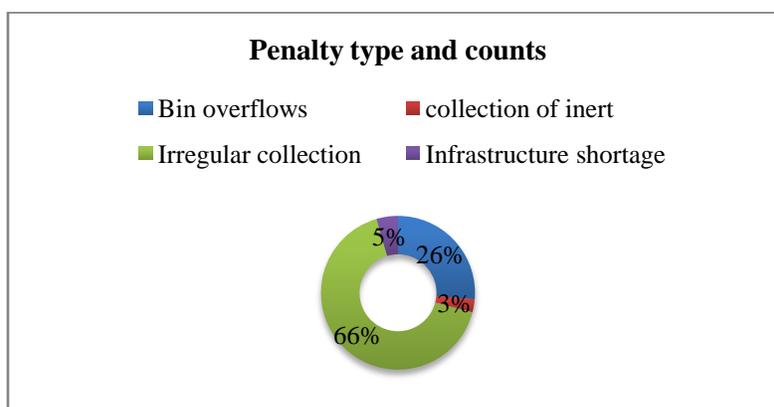


Figure 40 Penalty types and counts over the operational lifespan of privatised operations

The researcher directly observed various violations such as company staff not wearing uniforms, bin/collection vehicle replacement, and uncovered transport of waste were never levied, as the analysis of penalty details⁸⁶ indicates. This implies that the staff capacities of AMC and the practical monitoring mechanisms were inadequate. The issue of exaggeration of the weight of collected waste was also not addressed in the penalty schedule.

8.3.8 Inclusion of key stakeholders

Clause 5.4 of Article V, contractor obligations, mentions engagement of NGOs and states that, *“the contractor should try and engage NGOs for the purpose of community education and community participation to spread the culture of litter free streets and neighbourhoods*

⁸⁶Based upon analysis of penalty details obtained from the AMC as a series of letters to Antony Waste Handling Cell Private Limited through Right to Information Act, 2005.

and also benefits of providing segregated waste.” However, in reality, nothing of this nature was initiated by either the private company or the AMC. As is evident from the words of an NGO representative, “*as an NGO we were not given importance or involved*” (NGO member 1).

Further clause 5.5 mentions that “*the contractor can engage as also encourage rag pickers or make use of the services of the ragpickers association for the purpose of segregation of MSW and/or disposal of recyclable material.*” The informal waste sector was entirely excluded from the waste management operations, which also adversely impacted their livelihoods. It is clear that the mention in the contract agreement was nothing more than a formality, as further to this there are no modalities as to how the waste pickers would be involved. In terms of community involvement, there was none and the contract had no clause specific to it except clause 5.10 (ii) which makes an oblique reference to the “*joint responsibility of the AMC and the contractor to educate the people for segregation*” (AMC, 2008, p.18).

8.3.9 Provision for appropriate labour welfare

Clause 5.7 of Article V (contractor obligation) deals with facilities and benefits for the workforce, making the provision of uniform, hand gloves, mask, safety shoes and gum boots by the private company essential. However, other than a penalty for not wearing uniform (which was never levied), there is no mechanism in the contract agreement to ensure workforce welfare. Further, adherence to the state labour laws is governed by Article XII of the contract, but again the violation of labour rights and laws is not addressed in the contract agreement, leaving it to the private company’s discretion. Resultantly, labour unrest was high and also led to operational breakdowns during the life of the project. “*We had to fight even for our basic rights. No additional money was given for overtime. Only uniform was given once, no gloves or boots or vaccination was given* (PC sanitary worker 2). A letter given by the workers union to the company management (table 54) highlights the callous attitude adopted by the private company towards its workers and confrontations therein.

Table 55 Demands of the employees of private company

Charter of Demands
<ol style="list-style-type: none">1. <i>Salary as per D.C rates.</i>2. <i>Salary to be given till 10th of every month.</i>3. <i>Provision for water cooler for labour.</i>4. <i>Shed for labour resting.</i>5. <i>Identity cards be issued to labour.</i>6. <i>Two winter and two summer uniforms.</i>7. <i>Provision of annual bonus.</i>8. <i>No salary cut for leave.</i>9. <i>Gloves, soap and other necessary waste collection items as basket and spade be provided.</i>10. <i>From 1st Sept, increase the salary by 6.67% as per D.C rates.</i>
<p>“If our demands are not met, we will have to take further action as per union directions.”</p>

Source: Letter from Greenfield Worker Union to Antony Waste Handling Cell Private Limited (dated 20 October 2011.)

Repeated confrontations with the staff also became a factor for the contract termination. In its letter to AMC (dated 26 July 2012), the company states, “*we must inform you that illegal procedures are being adopted by the employees are nothing but their malafide intentions for personal gains by sabotaging the contract and by creating nuisance to the common public. Hence we hereby would like to inform you that we have terminated services of all employees of the company w.e.f⁸⁷ today 26 July 2012.*” The termination of its employees in this manner, without any notice or compensation, indicate the non-compliant approach of the private company to the labour laws and in effect the company using the labour strike as a means to come out of the contract which was no longer a remunerating proposition.

8.3.10 Service disruption and termination modalities

Continued and disruption-free service is desirable in MSW management due to its health implications and taking cognizance of this requirement, the contract agreement in clause 5.1.4 of Article V (contractor obligations) states that, “*if the contractor fails to undertake the activities as communicated by the municipal body then without any prejudice to its other rights under this agreement, the municipal body shall undertake the same by engaging the services of any third party and claim 120% of the expenses so incurred by it from the contractor.*”

⁸⁷W.e.f is a short form used here for *with effect from*.

Despite service disruption at least three times (ranging from 3-5 days due to labour strike) during the life span of the operations, this clause was not invoked till the final service disruption when the private company terminated all its employees, forcing the AMC to invoke the clause. In its letter (dated 21 August 2012) to the company, AMC states, “*none of the terms and conditions of the agreement permit the company to stop the work of sanitation which is of essential nature. The omission to perform the duty conferred upon the company in pursuance to the agreement tantamounts to the commission of serious nature of offence creating the circumstances wherein the epidemic and sudden rise of disease is bound to occur.*”

However, despite negotiations, the sides were not able to reach a solution. Consequently, a penalty of Rs 4.8 lakh (9426.46 AU\$) was imposed on the company for service disruption but was not paid due to the situation culminating in a major dispute (that has not been settled to date). Article VIII deals with the termination modalities in the event of default by either stakeholder. Table 55 indicates the default components as given in the contract agreement and the acts of default by AMC or the private company.

Table 56 Contractual default components and status, AMC and PC

Default components as per contract agreement	No default	Partial default	Full default	No obligation
Failure to adhere to collection/transportation requirements.		<input type="checkbox"/>		<input checked="" type="checkbox"/>
Failure to make timely payments			<input checked="" type="checkbox"/>	<input type="checkbox"/>
Abandoned project facility	<input type="checkbox"/>			<input checked="" type="checkbox"/>
Unlawfully repudiated the agreement ^a	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
Voluntary winding up operations			<input type="checkbox"/>	<input checked="" type="checkbox"/>
Operating outside designated area		<input type="checkbox"/>		<input checked="" type="checkbox"/>
Collecting inert debris		<input type="checkbox"/>		<input checked="" type="checkbox"/>
Failure to prepare operations plan		<input type="checkbox"/>		<input checked="" type="checkbox"/>
AMC <input checked="" type="checkbox"/> Private company <input type="checkbox"/>				

^a For instance, unreasonable or delayed grant of approvals related to operations.

Insufficient details of obligations, material breach, performance standards and levy of penalties caused the dispute to escalate to a point of no return. Further, a termination notice in the event of default of 60 days was not served by the private company at the time of the termination of employees and hence stoppage of operations and neither did the AMC do the same when, after months of negotiation, it declared the contract null and void, rejecting the conditions of the company to restart and continue operations. In this, both parties violated the termination clause 8.2.4 (AMC, 2008, p.26) which states that, “*until termination the parties shall fully discharge their respective obligations, as may be reasonably possible so as to sustain the operations of the project facility.*”

8.3.11 Fiscal and tariff modalities

Article VII of the contract agreement deals with the payments to the company and clearly mentions the payment of Rs 500 (9.81 AU\$) per tonne, based on a tipping fee model, leaving it on the company to make an assessment of the waste generation in its area, thereby absolving itself (AMC) of any responsibility of volume risk. There was a provision of escalation in fee at the rate of 3 percent from the second year of operations for 3 years and 5 percent thereafter for the remaining time period. Besides, a user tariff was to be levied by AMC and collected by the private company; however, this clause did not become operational due to the non-levy of user charges for the aforementioned reasons of political repercussions. As is already stated, the AMC was irregular in making payments to the company, which became the cause of disenchantment and continued frictions between both stakeholders.

Clause 7.3 clearly states that “*the municipal body shall calculate the amounts to be payable as determined from the provisions under the agreement herein and remit within 30 days of the receipt of the complete set of bill/documents.*” However, the AMC claimed a period of 90 days within which payments shall be made, referring to clause 8.12 which mentions a default on the part of AMC if the period exceeds 90 days. This misinterpretation by the AMC is visible in their letter (dated 12 October 2011) to the private company which reads, “*AMC can avail 90 days for making payment but AMC has been regularly making payments after 30-40 days of submission of bills.*” Further, there were also issues around payment of escalation charges, as can be gleaned from the letter (dated 1 August 2012)

from the private company to AMC, *“there is no such rule in contract agreement that AMC shall pay us only when it gets the grant under UD-11⁸⁸ from the Government. It is very clear in the agreement that tipping fee shall be escalated every year from second year of operations. However, to get the approval for the same, it took long time, several correspondence and too many meetings then only it was approved by AMC and the overdue payment was released very late. Escalation due to us was not paid for more than two years. Finally, it was paid recently without any interest.”* Clause 8.2 discussed the termination payment in the event of default as an entitlement of the company to withdraw performance security upon AMC default. In the case of company default, the municipal body shall invoke the performance guarantee⁸⁹ as also not make any pending payments to the company. In the context of the case study, neither of the stakeholders accepted its default, and termination payments have been pending due to the ensuing dispute.

8.4 Inter-organisational relationships

“Initially the dealings with AMC were fine but later delayed payments became central issue especially from March 2011” (PC managerial staff 1). *“Initially no weighing was done and private company enjoyed the patronage of AMC higher officials and were paid without being weighed in collusion with AMC supervisory staff”* (AMC union leader 2). However, it seems this bonhomie soon turned sour with the issue of irregular payments and dumping ground insufficiency. Besides, there was an element of traditional vertical hierarchical approach adopted by the AMC, and considering the private company to function as subordinate also created frictions, as is evident from the words of an interviewee (PC managerial staff 2). *“The AMC wanted the company to be under them and obey their dictates. But why would it be under them? It was working for money in exchange for service delivery, nothing else.”* A joint committee of representatives from both parties was to meet regularly (as per clause 4.2 of the contract agreement) and, under any circumstances, the period between successive meetings could not exceed 90 days. The meetings aimed at ensuring information exchange and amicable resolution of issues if any.

⁸⁸UD-11 refers to one of the budgets of the Municipal Corporation.

⁸⁹ As a condition of the contract agreement, a performance bank guarantee as per the RFP document was mandatory for the private company. In 2008, after contract allocation, a performance guarantee was furnished amounting to Rs 50 lakh (98192.59 AU\$) as of 17 March 2013.

“Initially there were regular meetings but thereafter no fixed pattern was there and it became need based” (PC managerial staff 1).

The dispute relating to the issue of the dumpsite and irregular payment by AMC and the decline in collection efficiency of the private company in the final year of operations created strain between the two stakeholders. The resulting blame game and use of harsh language in written communication is evidence to this effect. In a letter from the private company to AMC (dated 1 August 2012), a comment reads, *“even after so many reminders to AMC, it did not take the matter seriously, even just trying and putting all efforts in finding our faults here and there to harass us. The AMC has no right to impose any penalties on our company for whatsoever reasons. The entire default is with AMC and our company tried our best to support AMC, even after continuous harassment in terms of defaults by AMC. We have pulled along this contract for the last two years, even after AMC not supporting us as per agreement.”*

In its response, the AMC letter (dated 25 September 2012) stated, *“this offence is punishable under the law laid down under section 276, 302, 323 and 324 of The Punjab Municipal Act 1976 as well as under Indian Penal Code. You are required to remove the rubbish and filth from all places/areas allocated to you immediately failing which the company will be prosecuted through its manager in the competent court of law.”* In theory, three aspects that underpin smooth inter-organisational relationships (section 2.9, chapter, II) are the levels of opportunism of the stakeholders (agency theory); the extent of lack or inadequate knowledge of the other’s plan and actions (information asymmetry); and level of transaction costs elaborated as under.

8.4.1 Agency theory; the principal and agent’s impasse

According to Trafford & Proctor (2006, p.122) organisations that work in tandem with the other should develop a common objective, and be truly committed to achieving a mutually desired and accurate outcome, otherwise the relationship will never succeed in the true sense of the word. Analysing the entire web of operations, a goal divergence becomes obvious. The two organisations did not have or work towards a goal symmetry. The AMC looked upon the private company as a means to complete its civic responsibility; the private company viewed the project as a means to reap profits through waste service delivery. The

contract agreement was not followed in totality, rather each stakeholder, both the AMC (principal) and private company (agent) tried to interpret it in rational utility maximising behaviour by pursuing their own agendas.

The elements that were vaguely spelt out in the contract or not mentioned at all, such as the issue of the weighbridge and disposal, were interpreted and manipulated by the AMC, leading to higher transaction costs to the private company and increasing tensions. While the contract agreement mentioned the levy of user charges, political opportunism prevented the AMC (through the ruling political party) from levying user charges. The contract termination confrontation with both the principal and agent holding the other responsible, refusing to accept their share of the blame, also points towards the self-interest and protectionist measures pursued by them. The AMC did not make timely payments and operated at its own pace and convenience, without being sensitive to the needs of maintaining a responsible disposition as a facilitator of the privatised operations. While the private company indulged in practices such as collecting inert and waste from outside the city, colluding with the AMC officials initially and disposing of waste at illegal dumpsites is also a reflection of opportunistic behaviour of the principal and agent in pursuit of their respective divergent goals.

8.4.2 Information asymmetry

The AMC, again because of its own lack of capacity, hired a private consultant to prepare a DPR inclusive of local information on waste generation and its characteristics in the city, based on which the private company was confident of collecting a profitable tonnage daily. However, ground conditions led the private company to believe that the estimates were wrong and the contract was based on incorrect information. The AMC did not authenticate the estimates made in the DPR. Moreover, the issue of the waste weighbridge and disposal and its inadequate clarity in the contract agreement led to information asymmetry with both sides making their own interpretations, and the resultant transaction costs therein. Towards the later period of the operations, the private company did not provide its operation plans to the AMC and also reduced its infrastructure and diverted vehicles to other cities. When levied penalties on this account, the private company questioned the AMC's performance monitoring mechanism, refusing to accept the penalties imposed.

As mentioned, the AMC's mechanism of monitoring remained unclear and adhoc. Further, the AMC did not pass on correct information to the private company regarding the manner in which financials would be dealt with and when delays would occur. This added to the transaction costs of the private company, particularly leading to labour unrest on account of delays in salary payment. On its part, the information regarding the withdrawal and breaking of contract by the private company was also sudden and unexpected by the AMC. As a result of the same, complete system failure occurred in the city for at least a fortnight before the AMC could step back into its traditional role of service provider for the entire city.

8.4.3 Transaction costs theory

The contract agreement, as has been analysed, leaves room for greater risk allocation to the private company. Despite the disproportionate risk allocation, the AMC also had to face its share of transactional costs arising out of less than smooth operations of the private waste collection and transportation services. As revealed in Chapter VI, the economic burden of AMC increased substantially with the turn to privatised waste management services. In addition, there were non-tangible costs to the AMC, such as the opposition by the sanitation unions and the need to pacify them with a no retrenchment policy. Besides, the abrupt termination and the bitter dispute around it led to a claim of an amount of Rs 3.8 crores (0.74 Million AU\$) with 18 percent interest by the private company and a court case for which the AMC had to hire a lawyer and the pending arbitration case, which added to the transaction costs of operations.

Regarding the private company, in addition to the losses incurred due to irregular payments by AMC, transaction costs accumulated on account of unclear allocation of responsibility in the contract agreement with respect to disposal, as well as the weighbridge operations, as can be gauged from this letter. *“We have incurred more than Rupees 50 lakhs (98192.5 AU\$) in operating JCB and dozer inside this ground which was not reimbursed by AMC, neither it was in our scope of work. Losses on repair and maintenance are above 50 lakhs (98192.5 AU\$) in last two years. We have been incurring weigh bridge charges which was neither in our scope of work nor in the tender. We were only supposed to provide a weighbridge machine at the weigh bridge facility made by the AMC. We have made another*

loss of more than 10 lakhs (19638.5 AU\$) to date on weighbridge charges. The weighbridge facility provided by us was not functional due to the failure of AMC in maintaining the area surrounding the weighbridge site” (letter from PC to AMC, 1 August 2012). Apart from these “the AMC was to allocate us land for office and weighbridge but they did not. So we had to rent ourselves with payment of Rupees 30,000 (589.15 AU\$) per month” (PC managerial staff 1). The private company continued to pay rent for the space, along with water and electricity charges amounting to Rs 15000 (294.57 AU\$) per month, for up to two years after the collapse of the operations and in the process of arbitration decision that is still pending. In the meantime, some of the vehicles which were not redeployed in other cities showed visible signs of fast depreciation (direct observation by researcher, 13 February 2014).

In addition to the lawyer’s monthly charges of Rs 1.5 lakhs (2945.78 AU\$), the company also faced the possible loss of Rs 50 lakhs (98192.59 AU\$) towards performance bank guarantee and an additional penalty of Rs 4.8 lakhs (9426.46 AU\$) levied by the AMC post-termination. Besides the harassment and risk caused to its workers due to the poor dumpsite conditions, disenchantment amongst labour due to non-payment of salaries, resistance from sanitary unions and the Bhagtanwala Resident Association at the dumpsite could count towards the intangible loss to the private company. However, a common intangible loss to both the stakeholders would have been a dent to their market credibility and erosion of reputation which plays a role in instilling confidence amongst both the stakeholders. For instance, the fact that the private company was somewhat concerned about its market credibility is revealed through their letter to AMC (19 September 2011). *“We believe in quality services and our service is admired all across the country. We cannot risk the name of our company under such non favourable situation where we have no role to play and our overall service is affected.”*

8.4.4 Mutual institutional capacity building and knowledge transfer

There is no instance that can demonstrate any effort towards additional value addition to either major stakeholders through knowledge transfer for better waste management operations in the city. Pointing to the lack of such initiatives, an AMC managerial staff member mentioned *“We had no interaction with the private company in this regard. They*

did their work and we did ours” (AMC managerial staff 2). In fact, as already indicated, the relationship between the two stakeholders soured over a period of time, leaving little room for mutual institutional capacity building possibilities to develop. Rather, lack of any concrete mention to this effect in the contract agreement and also the hostile approach of the AMC sanitation union towards the private company did not lead to any initiative from either stakeholder to seek mutual capacity building.

8.5 Inferences and conclusions

This chapter set out with the aim to explore the institutional dimension of sustainability through the criteria presented in the sustainability assessment framework. An analysis of the pre-requisites, key contractual specifications and inter-organisational relationships that shaped the waste governance landscape in a privatised setting revealed a rather unstable trajectory in the ambit of the neo-liberal reforms of which privatisation constitutes the main component. Based upon the analysis and the inferences drawn in this chapter, a scale of economic sustainability is developed, as indicated in table 56, accompanied with a sustainability radar diagram (figure 41) that summarises graphically the status of institutional sustainability when analysed upon the basis of the chosen criteria.

Table 57 Scale of institutional sustainability

Scale	Institutional Pre-Requisites										
	Regulatory framework	Public institutional capacity	Private institutional capacity	Political support	Stakeholder support	Technical/fiscal capacity					
Low (1)	Non-existent or weakly developed.	Weak	Inexperienced and lack of local competition & contestability.	None	None	None					
Medium (2)	Existent but poorly implemented	Moderate	Partially inexperienced and some local competition/contestability.	Partial	Partial	Partial					
High (3)	Well developed and implemented	Developed	Experienced and local competition/contestability.	Strong	Strong	Strong					
Scale	Key contract obligations										
	Risk allocation	Dispute resolution procedures	Adherence to waste hierarchy principle	Operational timeframe	Provision of contract amendment	Functioning of waste system elements	Monitoring mechanism	Inclusion of key stakeholders	Labour welfare mechanisms	Termination modalities	Fiscal/tariff modalities
Low (1)	Imbalanced	None	None	Less than required	None	Weak	None	None	None compliance to labour laws	Non-existent	Weak
Medium (2)	Partial	Partial	Partial	Close to required	Partial	Partially	Partially	Partial	Partial compliance	Partial	Partial
High (3)	Balanced	Adequate	Fully	As per required	adequate	Adequate	Adequate	Inclusive	Full compliance	Adequate	Adequate
Scale	Inter-organizational relationships										
	Agency theory	Information asymmetries	Transaction costs								
Low (1)	Significant rational utility maximising behaviour	High	High								
Medium (2)	Moderate	Moderate	Moderate								
High (3)	Low	Low/none	Low/none								

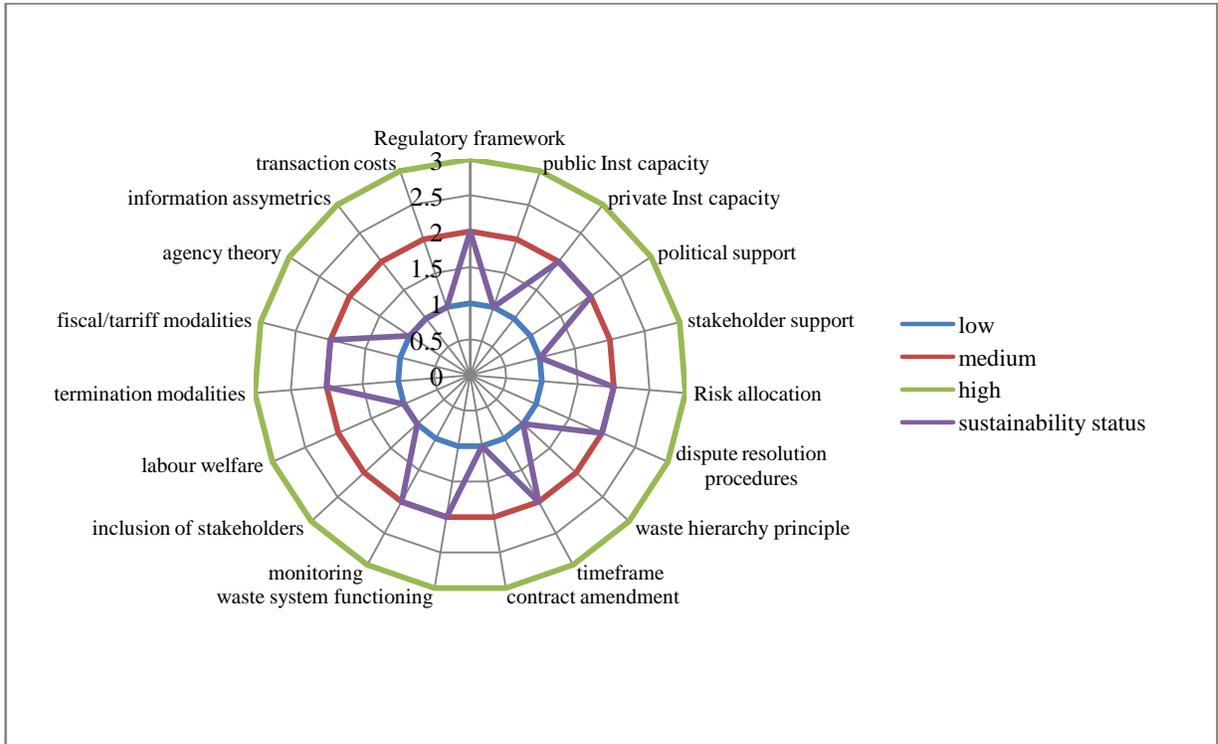


Figure 41 Status of institutional sustainability

The pre-requisite framework reveals the existence of the institutional framework, in place procurement procedures for MSW management through private sector and legislation to create an enabling environment for such like initiatives to develop and operate. However what stands out is the noticeable deficit in the capacity of the concerned nodal institutions at state level to ensure a smooth transition to privatisation. Neither could they overcome the fiscal shortcomings and lend support towards project continuity in the case study. At the local level, the concerned body, the AMC, displayed acute shortcomings in governing the privatised operations with its own inadequate technical, managerial and monitoring capacities, besides poor creditworthiness to sustain the privatised operations on its own. The private company, contrary to expectations, exhibited a level of irresponsibility by hiring inexperienced staff to undertake operations that contributed to the inefficiency of the whole project.

The privatisation of waste management initiatives in the city was a result of political support and measures taken, not only to convey an impression of the seriousness of the ruling state government but mainly to advance political agendas and draw electoral

mileage. However, political support can be a double-edged weapon, as was revealed when personality clash and inner power struggles clouded the operational manoeuvres of the privatised waste delivery services through resistance and bottlenecks created by the sanitary unions in the city.

Stakeholder support is an important pre-requisite and from the analysis, it is revealed that this support was extremely weak, if not non-existent. While the informal waste sector was thought to be voiceless and extraneous and therefore sidelined, the civil society actors, such as the local NGOs/CBOs, despite being self-proclaimed de-facto watchdogs, were considered largely irrelevant. The community was relegated to the status of a passive stakeholder; the only stakeholder group that was given some recognition was the sanitary unions of AMC, that too by using the instrument of pacification and bargain. It can be seen that stakeholder support was weak and the eruption and continuation of NIMBY protests at the Bhaktanwala dumpsite serves as a case in point. Technical and fiscal clarity as a pre-requisite indicates a visible mechanism in place to streamline privatised operations, while at the same time revealing that local incapacities led to hiring a DPR consultant and reveal the control of the state bodies on finalising local tender and choice of private stakeholder.

An analysis of risk allocation reveals the gap between theory and actual risk bearing. Inappropriate risk allocation as a part of the contract agreement led to the majority of the six categories of risk being transferred to the private sector. It also brings to the fore the fact that not only was the AMC not able to neutralise the risk, it actually added to it. Though dispute resolving procedures were incorporated into the contract agreement, neither party followed the laid down procedures, such as appointing the arbitrator when the confrontation worsened, and only did so at the direction of the high court. This indicates that the contract agreement was not followed in spirit which leads to a larger question of dispute resolution mechanisms in the event of such situations as emerged in the case study.

The waste hierarchy principle that underpins environmental sustainability of waste management operations was largely overlooked as a part of the contract agreement so much so that one of the mentioned aspects, i.e. segregation, was not even enforced, again due to the weak monitoring capacities of the AMC. It is clear that both the state and local government institutions were concerned only about making waste invisible in terms of

collection and dumping. Sustainability norms did not matter and could be conveniently ignored.

While the timeframe requirement of the contract was theoretically appropriate, the operational risks led to a premature contract termination. This indicates that setting a required timeframe does not guarantee or manifest a definite fiscal advantage, as happened in the case study due to abrupt termination and accumulation of fiscal losses. Even though the contract agreement had some space for manoeuvre, the actual conditions proved to be inflexible, as the AMC and the state bodies did not accept the new conditions suggested by the private company. This suggests two things: first, the company may want to negotiate on terms and conditions after the agreement is signed in its bid to maximise its rational utility behaviour; and second, once the contract agreement is sealed, the government institutional structures may not be open to a renegotiation simply for discouraging such trends or rather treating the private company as a subordinate in a typical bureaucratic hierarchy.

Further, the contract agreement did not in actual terms include any performance standards or benchmarks for evaluating the quality of service, leaving wide scope for the private company to default, fuelled by the highly inadequate monitoring mechanisms exhibited by the AMC due to its own lack of capacities. Stakeholder support as a part of the pre-requisite framework was weak and therefore, while the contract agreement made an oblique reference to engaging NGOs or using waste pickers, none of this was more than a formality. On the ground, none of the key stakeholders were included, even marginally. This illustrates that mentioning in the contract agreement is not enough, a framework must be in place to involve stakeholders and viably integrate them into the total gamut of the waste management operations.

Despite a mention to this effect in the contract agreement, labour rights were violated by the private company, bringing in confrontation that adversely impacted operations. While this indicates that the private company tried to exploit the labour following its normative course of private rationality to the fullest extent possible, a failure of the AMC institutional mechanism to enforce contract agreement measures in this regard created conditions for occupational risk and unrest amongst the labour. It is also evident that despite the termination modalities being in place, the continuity for an essential service like MSW

management was not adhered to and neither party abided by the termination clause in the agreement, owing largely to the contextual conditions that emerged, particularly with respect to the failure of the AMC towards its fiscal responsibilities.

Regarding inter-organisational relationships, again, despite a commitment to amicable relations and dispute resolution, as in the contract agreement, the relations became strained to a point of no return and a never ending blame game ensued. The inter-organisational relationships also conform to the underpinnings of the agency theory wherein the emergence of the principal-agent impasse is almost inevitable in such relationships and operations devoid of a common goal convergence. The relationships also reveal the prevalence of information deficit in such operations if care is not taken to be transparent about one's agenda and information held by both stakeholders.

Consequently, the nature of the inter-organisational relationships imposed higher transaction costs on both stakeholders and these continued to accumulate even post-termination of the contract. According to Trafford & Proctor (2006. p.122), "Strategic alliances lack alliance strategies" and this fact appears quite visible in the evaluation of the waste governance settings in the city.

In summation, the chapter unveils the shaky grounds underpinning the geographies of waste governance in the case study. In doing so, it also validates the arguments by researchers (UN-Habitat, 2010; Post, Broekema & Obirih-Oparah, 2003; Cointreau-Levine, 2000; MoUD, 2010) that inadequate governance structures and capacities of the local bodies exist in the context of privatised initiatives in service delivery in the developing countries, as in India. The chapter contributes empirical evidence to the decisive debate about the way in which state and local government adopt and implement privatised waste agendas and demonstrates that weak institutional instruments hinder the achievement of the environmental, social or economic goals of the sustainable waste management paradigm.

PART C

CONCLUSIONS

Life is an art of drawing sufficient conclusions from insufficient premises.

(Samuel Butler)

Chapter IX

Findings, Reflections and Recommendations

“Unless the structure and causes of this failure are discerned and pointedly addressed, our cities may become veritable agents of danger and overall human degradation, through epidemics, and visual as well as ecological devastation.”

(Omuta, 1987, p.77)

9.0 Introduction

As I pen this last chapter, reflecting upon the research journey and more so the purpose of undertaking it, this valuable quote by King & Harrocks (2010, p.14) seems to provide clarity, “the purpose of research is to enhance knowledge, to in some way enable us to know more.” Beyond doubt, the research trajectory guided through the sustainability assessment framework and its application to the case study of Amritsar has enabled pertinent knowledge in the domain of MSW management to be revealed. Through the methodological framework of a pragmatic research approach, the study has answered the key research question of whether private sector participation contributes to sustainable MSW management.

In order to answer this key question, five sub-questions were constructed, four of them contributing to create a theoretical-empirical spectrum for grounding the sustainability assessment framework for application in the research. The first sub-question enabled inquiry into the theoretical concepts and debates surrounding sustainable MSW management, allowing the researcher to glean the sustainability principles in management of municipal solid wastes.

The second sub-question enabled the context of privatisation to be investigated in both theoretical and empirical settings, aiding in understanding and sieving out relevant criteria and indicators to incorporate into the sustainability assessment framework. The third sub-question, focusing on the specialised space of private sector participation in MSW management, helped to direct and strengthen the criteria and indicators constituting the sustainability assessment framework, shaping it for contextual application.

The fourth sub-question focused on understanding the dimensions of sustainability and narrowing down to the most suitable sustainability assessment dimensions, in this case, the sustainability prism, that could enable a structured and systematic coverage of the sustainability aspects while researching private sector participation in MSW management. Based upon the detailed examination of the theoretical and empirical literature, the sustainability prism with its four dimensions was appropriated as the foundation for constructing the sustainability assessment framework applied in the study.

Having constructed the sustainability assessment framework, the fifth sub-question of the research mandated its empirical application in a single case study, Amritsar, conducting an ex-post evaluation of private sector participation in MSW management, bringing out implications and experiences from the vantage point of sustainability. This question, through an intense empirical investigation, was addressed in chapters V, VI, VII and VIII of this thesis. The answers therein have revealed the levels of social, economic, environmental and institutional sustainability in MSW privatisation, while also pointing to the key factors underpinning the outcomes. The analytical summary of the findings detailed in the said chapters is presented in the following section.

9.1 An analytical summary of findings

Chapter IV of this thesis chronicled the temporal development of Amritsar, its waste management trajectory and governance landscape. Besides an analysis of waste generation trends and the physio-chemical analysis of waste in the city, the chapter also highlighted the contemporary inadequacies in all system elements of MSW, starting from waste storage at source to its disposal. Despite inherent bricolage practices and salvaging recyclables by the informal waste pickers, only a small fraction of waste is recycled (3.5%) and the remainder is discarded in the city's unsanitary landfill and undesignated dumpsites. Inadequate MSW management is seen as one of the biggest public service concerns by the community (77%), as findings from the household survey revealed.

Further, the issue of improper waste management has merited concerns serious enough to have attracted litigations, the most significant being the complaint 42-1999 to the PSHRC and CWP-2032 of 2006. The litigations also contributed to the decision of the Punjab Government to experiment with privatisation of waste, Amritsar being the first initiative of

its type in the state. However, the larger impetus for privatisation resulted from the liberalised macro-economic shift of policy and the succeeding reforms initiated by the national government. Accordingly, the state of Punjab constituted an institutional mechanism to push privatisation in infrastructure development and service delivery in the state. However, swinging between traditional institutional structures and the neo-reform architecture, the continued centralisation of decision making at state level compelled the local municipal corporation into an alliance with the private sector to manage the solid waste generated in the city.

Returning to the core subject under scrutiny in this research, applying the sustainability assessment framework to the case of private sector participation in MSW management in Amritsar, the following findings emerged on the four dimensional prism of sustainability.

9.1.1 Social sustainability dimension

Dealing with the sustainability of the social dimension and unravelling the impacts on the major stakeholders involved in the waste management process, the research points to the contribution of the informal waste sector in managing the city waste, while revealing the callous attitude on the part of both the AMC as well as the private company by sidelining the informal sector in the design of privatised operations the city. Privatisation hit the informal waste pickers the hardest, reducing their access to waste, leading to a drop in income, and forcing them to adopt other livelihood options. Prejudice against the waste pickers, fuelled by a weak state and national policy (MSW Rules, 2000), and disregard in the local contract agreement led to the informal sector being ignored and isolated. By bringing out explicitly the impacts of privatisation on the informal stakeholders, this research also validates assertions of other researchers such as Samson (2010) and Mishra (n.d) regarding adverse implications for the sector as an outcome of privatisation.

The research also exposes the mismatch between the theory and reality wherein layoff and retrenchments of public sector employees is a natural consequence (Batch 2000, Martin 2001, Chandler & Feriella, 1994). Contrary to this assertion, retrenching municipal permanent workers did not happen in the case study. While some contractual workers faced the axe post-privatisation, additional contractual workers were actually regularised and made permanent under political patronage. Political clientelism emerged as a factor

responsible for the same, hinting at the predominance of politically defined goals as preceding social and economic implications of additional requirements and no retrenchments.

Blatant disregard of labour laws by the private company in the light of extremely poor enforcement by the AMC resulted in adverse implications for the private company sanitation staff in terms of higher disenchantment, turnover and strike down, thereby building a state of continuous conflict amongst the managerial staff and the employees. This also contributed to the untimely demise of the operations. As has been highlighted, the civil society stakeholders, such as the NGOs and the community itself, remained as peripheral actors in the whole modus operandi, largely due to neither the AMC nor private company giving cognizance to their active engagement in achieving the objectives of the contract, particularly waste segregation at the source. The element of selective exclusion of low income areas from access to public service delivery, largely due to the cost cutting tendency of the private company and the passive attitude of AMC, also emerged as an adverse outcome. Based on the evidence emerging from the research, it can be deduced that privatisation did not perform appropriately on the social sustainability front. Institutional apathy on the part of the AMC and an element of private rationality pursuance by the private company underpinned this outcome.

9.1.2 Economic sustainability dimension

The research provides comprehensive insights into the economic dimensions of the sustainability woven through both explicit and implicit factors, as guided by the sustainability assessment framework. The findings dispel the theoretical connotations of privatisation in solid waste rendering a *win-win* for both the public and private sector. It revealed that, far from marginal economic benefit, the move to privatise imposed exorbitant costs to the AMC, further decreasing the economic efficiency. To cap it, hesitation to impose a user charge and an absence of revenue generation due to non-recycling and waste recovering lead to a decreased allocative efficiency. It can therefore be stated affirmatively that resorting to privatisation of waste service delivery does not manifest a natural cost advantage to the public sector institutions. Furthermore, institutions with weak fiscal service, as in the case of AMC, cannot sustain such initiatives on their own and depend

upon fiscal aid from state/central level institutions towards operational sustenance and continuity.

In the case of the private company, the principle of private rationality remained the key driver, in resonance with the observations of its critics (Anderson, 2011; Weizsacker, Young & Finger, 2005). At the same time, in order to gain a wider foothold in the market segment, the private players were willing to accommodate relative losses in the short term. The private company did not reap substantial economic gain; rather it accumulated losses to a point that left no option for it but to discontinue the operations in the city. The ventures proved to be financially sustainable neither to the AMC nor to the private company. The contributory role of contextual environment, such as the deteriorated conditions at the landfill, cannot be overstated and became one of the instrumental factors in accelerating losses to the private company in the form of equipment damage and lost tonnage.

Contrary to claims, privatisation in the case study did not enhance labour productivity of the AMC sanitation workers due to the surplus emerging from the non-retrenchment policy, as also with the politically motivated recruitment drive undertaken by the AMC. One can argue that with reduced area of operation and a surplus, privatisation actually contributed to lowering public sector productivity. While on the face of it, labour productivity for the private company was high, an analysis of implicit factors revealed to the contrary, indicating a high labour turnover, disenchantment, work strikes and poor skills that impacted the productivity negatively. Similarly, when evaluated for vehicle productivity, an important component of economic sustainability, analysis revealed findings contrary to the expectation of reduced costs and high vehicle productivity in privatisation. Neither could optimal trip rates be achieved by both AMC and the private company. Inclusion of the cost of depreciation of vehicles, in particular, indicated a high vehicle cost per tonne for both stakeholders, thereby dispelling the perception of enhanced vehicular productivity in privatised operations.

In conclusion, the private operations were neither economically efficient nor sustainable. The weak fiscal structure of the AMC coupled with unreliable financial flows from the centre/state governments, lack of adequate monitoring and evaluation by AMC to ensure

efficiency of its own operations as well as those of the private company, accounted for the poor economic performance.

9.1.3 Environmental sustainability dimension

Privatisation of services did not translate into significant environmental gains and this finding challenges the hype and assertions around private sector in MSW management as a panacea for environmental outcomes of waste management (Koppenjan & Enserink, 2009; Lovei & Gentry, 2012; Cointreau-Levine, 2000). The analysis of all the system elements of MSW revealed an account of default and a lacklustre performance. Waste reduction at source in sync with the waste hierarchy principle of sustainable MSW management was not practised, also because it contradicts the operations of the tipping fee model, where more waste collection manifests as higher profits. Contrary to this would discourage private players from entering the market. Also, since both the AMC and the private company failed to conduct awareness as well as levy user charges on households and other waste generators, source reduction of waste could not be initiated.

Furthermore, despite a clause in the contract agreement, segregation of waste, both at source and secondary level, was not initiated, with the AMC and the private company expressing complete ignorance of the same. Inadequate implementation of this clause by AMC, by way of monitoring and cutting the resources required for managing source and secondary segregation by the private company, emerge as the main reasons. On the collection efficiency front, while initially the private company performed better, very soon, the level of service diminished, acquiring an ephemeral outlook. Irregularity of payments by AMC to the private company, its lack of monitoring, as well as cost cutting modalities adopted by the private company, undermined collection efficiency from reaching optimal levels.

The dangerous location of the landfill site and its unsuitability for establishing the MSW plant was factually analysed. The primary survey conducted in the habitation clusters around the Bhaktanwala landfill revealed ill health and even fatality amongst the surveyed households. Without a doubt, environmental norms were ignored completely. Untreated waste continued to be dumped at the landfill adjoining the grain market and residential area, despite clear mention of the landfill siting standards in The MSW Rules (2000). The

findings of this research indicate that environmental gains did not accrue from the privatised operations. While environmental concerns are not the key driver behind privatisation initiatives, unarguably it is the AMC's incapability to ensure enforcement of environmental norms and standards and its own tendency to flout them. The same contributed to the unsustainable nature of operations from the environmental perspective.

9.1.4 Institutional sustainability dimension

Providing detailed insights on the pre-requisite framework, the key contractual specifications and inter-organisational relationships, the research succinctly underpins the institutional structures and deficiencies that govern, implement and regulate the private sector modalities in MSW management.

The scrutiny of the pre-requisite framework through the six chosen indicators revealed a paradoxical picture. Despite the existence of institutional architecture, procurement procedures for private sector operations in MSW and legislation arising out of the post liberalisation reform movement in Punjab, the governance immaturity and its deficit both at state and local level (AMC) constrained regulatory actions and policy implementation. The local government's constrained capacity and poor fiscal health sans state support became one of the substantial reasons for the fallout of the privatisation operations. Institutionally, the private company also demonstrated weak knowledge and capacity of its workforce, again quite contrary to the theoretical assertions of being high on skill and technical knowhow.

The investigation also revealed the dichotomy of political support, where on one side pushed the privatisation agenda, not surprisingly to further political interests and gain electoral dividends. On the other hand, political vested interests and ego clashes created bottlenecks through the AMC sanitary worker unions, creating a hostile environment for the operations to sustain. Stakeholder support from the civil society actors was either not sought or ignored. The informal sector was completely sidelined and the local NGOs/CBOs and community was not involved in the operational matters. Despite the reforms (74th CAA, 1992) advocating decentralised and participatory governance, the institutional actors at both state and local levels followed a traditional non-participatory approach in implementation of MSW management operations in a privatised mode.

The examination of the eleven key contractual specifications also brought out the missing elements in the agreement, such as the waste reduction, and threw light on the gap between the contractual obligations and actual working on the ground. For instance, source segregation was not practiced despite a clause to this effect in the agreement. Similarly, a faulty risk accumulation structure and its uneven distribution between AMC and the private company also added to the risk of stalling the operations. It also emerged that the dispute resolution procedures, though elaborated in the contract, were in principle not followed, bringing in the High Court intervention to resolve the matter, which still remains inconclusive even after four years of contract termination. The inadequacy of the contract can also be judged from the fact that performance benchmarks were not included and penalties to be levied were inadequately detailed and levied in an adhoc manner. Deliberate violations of labour rights by the private company, despite mention in the contract agreement to this effect, indicate the failure of the AMC as an enforcement and regulatory institution.

9.2 Contribution of the research

Petre & Rugg (2010, p.14) argue that making a contribution “means adding to knowledge or contributing to the discourse – that is, providing evidence to substantiate a conclusion that’s worth making.” Further, “knowledge claims can be small and still have a role in discourse” (Petre & Rugg, 2010, p.14). In resonance, this research has made a perhaps humble but definitive contribution to the debates and discourse surrounding the privatisation-waste-sustainability triangle in the realm of the prevailing neo-liberal macro-economic paradigms. At the outset, the limitations of this research as being narrow and content specific are acknowledged, which naturally constrains the capacity to universalise truths. However, nesting the limitations on Stake’s (2000, p.22) arguments that “knowledge is a form of a generalization,” nevertheless, there is some scope for universalising. The contribution of this thesis thereby is structured in tripartite layers as theoretical, methodological and empirical contributions.

The research makes a *theoretical contribution* to the subject by extending the understandings around privatisation of MSW in relation to sustainability dimensions. The key research question demanded the formulation of a sustainability assessment framework

for the conduct of empirical analysis. While the review of the existing literature revealed some attempts in this regard (Cointreau-Levine, 2000; Dorvil, 2007; ADB, 2008), none of the frameworks of criteria and indicators was prepared from a comprehensive sustainability assessment angle and more so, none could be directly relevant to the context of the research setting. The researcher built on the theoretical-empirical readings and direct observations from the case study to construct a comprehensive sustainability assessment framework that deliberately offers a normative emphasis on sustainability outcomes of privatisation in waste management operations. The itinerant process of improvising and refining the same continued through the course of the research, building on ground revelations during data collection as well to mould it to its final shape. The framework can be used as a template or applied with modifications as the case may be, to carry out research in other contexts.

The second contribution of the research is towards the generic context of privatisation and sustainability in the backdrop of the liberalisation and urban governance reform movements in developing world countries like India. The study figuratively points out that the theoretical assumptions surrounding private sector participation in MSW management are neither consistent nor definitive. Contextual environments determine the outcomes. Secondly, the outcomes of the same rest heavily on the capability of the public sector institutions to regulate and create mechanisms for optimal sustainability outcomes. Left to itself, privatisation may not deliver on the sustainability thresholds.

Operating within the larger confines of the principle of private rationality, if not regulated; privatised waste delivery services do not respect distributive equity. When the state is unable to effectively monitor its performance, the quality of service delivery becomes ephemeral. Contrary to absorbing, privatised services in MSW cause displacement of stakeholders in the informal waste sector, thereby diminishing the argument's relevance to poverty reduction. Since operations largely depend upon the contract agreement, oversight in including components (such as adherence to source segregation) and its weak administration can create enough manipulatory space for both the key stakeholders to reduce or overlook their scope of activities.

In the event of contestability with low or no retrenchments and a tipping fee model of payment, economic gains to the public sector cannot accrue. Environmental concerns are

subservient to operational and economic gains in such alliances. Inter-organisational relationships have a significant bearing on sustaining and creating favourable grounds for such initiatives.

While generalisation is not the intention, as mentioned, the research provides evidence against privatisation as being inherently sustainable and efficient when evaluated against a backdrop of the contemporary socio-political and governance structures in which it is positioned. In fact, what emerges from this research is a privatisation narrative that bears no significant semblance to its theoretical assumptions and premise.

The comprehensive sustainability assessment framework is also a *methodological contribution* of this work. The sustainability assessment framework was prepared after extensive review of related literature and grounded situations. Consequently, it guided the methodological course of the research. Its application resulted in a meticulous context specific investigation and sieving out findings underpinning the four dimensional foundations of sustainability in privatisation endeavours in MSW. Depending upon the context, the sustainability assessment framework is a heuristic tool that can be further improvised or remodelled to suit other similar research settings and subjects.

A useful feature of the sustainability assessment framework is its extent of coverage of the subject, systematically sequenced under four sustainability arms with an elaborate set of pertinent criteria and indicators. It may be stated that without a methodological framework, the conduct of empirical applied research of this nature would have been difficult to contain, scope and encapsulate.

In terms of *empirical contribution*, through the detailed scrutiny of a single case study of Amritsar city, the research claims its place as one of the first comprehensive documentation and research on the implications of privatisation of MSW operations when examined through the lens of sustainability in India. While there are several research studies in MSW management, there is hardly any in-depth research on the subject in question in India (MoUD, 2010; Anderson, 2011). According to Rubin (1983, p.6, cited in Neuman, 2006, p.23), “the objective of applied social research is to use data so that decisions can be made.” The research undertaken bears the potential to address and inform policy and practice at both the macro and micro scales of decision making. This research has led to the

building of a strong evidence of the implications and barriers to the sustainability aspects of waste privatisation. It is therefore relevant towards providing knowledge of the ground realities to the public sector institutions and politicians who initiate such initiatives with insufficient information of its outcomes towards achieving sustainability objectives.

The thesis undertakes the exploration through the dimensions of sustainability and in doing so, it is able to pinpoint the determinants of sustainability in waste privatisation and the need to incorporate the same in policy formulation in a three tier administrative setup, the national, state and local level. By pointing to the lacunae and retarding factors, the thesis provides vital lessons to both the public sector institution as well as the private player to conduct a detailed introspection into their own shortcomings. Furthermore, major decisions as to whether or not to involve the private sector or how to improve ground operations by altering policy design within the privatised mode can be built on the evidence and reflection that this piece of research embodies.

Bayliss & Kessler (2012, p.20) state that, “there is little empirical support for preferring privatization of public services.” To this end, this research creates a context-specific body of evidence that public institutions can draw from. It calls for greater resourcefulness which can be mobilised through the multiple stakeholders in MSW sustainability endeavours and are therein “enabled not only to influence policy but also to contribute their capacity to implement it” (Martin, 2001, p.35). The findings of the empirical analysis fill up a long standing research gap between the hype and veracity of privatised operations in MSW management in India. The study can also serve as a constructive template for such research to be conducted in other cities across the country.

9.3 Critical reflections

The iterative cycle of thinking, reason and research is accompanied by limitations. In conjunction, I acknowledge the several limitations that constrain the ability of this research to make strong causal statements or be relied upon to generalise at a wider varying socio-economic-political-geographic spectrum, looking at the single case study research design adopted in this study. The single case study design was motivated by the need to enable in-depth study through application of the comprehensive sustainability assessment framework, while also considering the limits of time and resources a multiple case study design would

pose. However, a multiple case study design would enable generalisation and a more reliable base for informing discourse on privatisation of MSW services in India cities, as well as in similar settings. Also, since the researcher is an Indian citizen, the bias towards selection of a relevant Indian case study was natural. Moreover, looking at the geo-political and economic context wherein privatized operations in waste management are being actively considered and adopted, Indian cities became a fit case for investigation.

The second limitation that needs to be mentioned is related to the data collection for this research. Following the pragmatic research methods approach, data was to be gathered from four principle sources: documents and archives, semi-structured interviews, household questionnaires and direct observations. In the case of official government documents/records, the non-public accessibility of the same was a major issue. Consequently, the researcher had to resort to making three applications under The Right to Information Act, 2005, which consumed substantial time and resources before the information, and that too quite piecemeal and thereby inadequate, was provided to the researcher. For instance, the data on AMC's income and expenditure on MSW items such as details of worker salaries, vehicular maintenance and repair, etc., were not provided. As such, the researcher made estimations through information from semi-structured interviews or documentary/archival evidences.

In the case of semi-structured interviews, prior to the field visit, I shortlisted fifty potential interviewees across multiple institutions and organisations. However, a majority of the officials/stakeholders in the government, as also in the private company, refused to be interviewed, citing reasons of unavailability/unable to disclose anything related to the topic as a part of their work ethics or simply fearing the use of the interview proceedings in press/social media. In addition, a majority who agreed to be interviewed did not want to sign the consent forms. This posed a major challenge and was communicated to the Ethics Department at Griffith University, who asked me to proceed with interviews based on verbal consents. Some interviewees refused to be recorded, so I had to write hand notes. One of the limitations of taking hand notes is that it may corrupt quotes. Besides this, since all the interviews as well as some official documents and archives were in the Punjabi language, the translation to English may have unintentionally contaminated some of the originality of the statements or thoughts.

Further, the household questionnaires were prepared to gauge community responses to MSW operations post-privatisation to evaluate the efficiency of the service, community involvement and equal access to the service in wards under the private company. Since this was only one part of the research study for a specific purpose, a relatively smaller sample size, based on a purposive sampling method across 20 out of the 41 privatised wards, was taken based upon the researcher's knowledge, since information of the socio-economic structure across the geographic spread of the city was not available. However, in specific studies that depend primarily on the results of household questionnaires, such as community perceptions of MSW management post-privatisation, and where demographic data is available, a probability sampling method with random selection of households would be more appropriate.

The limitations reflected upon herein constrain considering this piece of research as all-encompassing. Therefore, there is a need to identify future research areas that can widen and build on this research.

9.4 Propositions for future research

The scope of this research study was limited to finding answers to the context of private sector participation in MSW when viewed through a four sided sustainability prism. The findings that emerged were contrary to the notion of sustainability of privatised services in managing MSW in the context of the specific case study of Amritsar. Leaning on the premise of naturalistic generalisation (Stake, 2000, p.22), derivations were made towards informing both theory and policy. However, by itself, this research cannot be labelled as exhaustive and further research is needed in this area towards producing knowledge. Accordingly, some of the salient research directions that need focus and investigation are discussed as follows.

Accepting the limits that a study of this nature poses on generalisation, it would be of immense significance to scale up the research to regional or country level, covering towns/cities that have experienced privatisation in MSW since its inception as a tool for public service delivery. Such research would provide a wider canvas of actual experiences and implications to be captured and thereby become a more defining basis for informing theory and policy. This research encompasses four dimensions of sustainability and has

therefore tried to provide due coverage to the scope within the limits imposed towards mining further micro level insights. It is therefore suggested that each of the dimensions can be taken up independently for further elaboration and documentation of the experiences emerging both in pre- and post-privatisation modus operandi. It is also possible to extend the subject matter of each of the sustainability dimensions. For instance, in social sustainability, social stratification and caste based occupational domination has not been subject to deeper analysis. Privatisation of waste threatens such age old occupational structures, but research is still inadequate to explore the implications and temporal outcomes. Also, the research has not touched on gender as a part of social dimensions. In the Indian context in particular this remains a major research gap to be addressed.

Further, while the dimension of environmental sustainability included a discussion on technologies applied for treatment of MSW, in the context of India, this is a highly under-researched area, especially when most policy documents of the Government of India (Planning Commission, 2014; MoUD, 2010) promote waste-to-energy initiatives. Paradoxically, privatised waste-to-energy endeavours are also rife with stories of failure more than their successes (Planning Commission, 2014). There is a need to thoroughly investigate the reasons behind the lack of sustainability of such operations to feed policy re-alignments and decision making.

As has been asserted, privatised operations rest on the capability of the government and the local municipal institutions to achieve welfare and social objectives. However, as Jourdar (2000, p.319) states, the perpetual poverty of India's local institutions in terms of their organisational structure and financial capabilities is well known. Research is needed to address intricately the system failures and inadequacies that lead to poor governance of such initiatives and their malfunctioning. Geographies of waste governance in India deserve their rightful place in the waste privatisation literature.

Further, at the cost of a perceptible emphatic bias towards the informal waste sector and waste pickers in particular, it was observed that research in the Indian context is few and far between. The role of waste pickers in the waste management systems, and especially recycling activities, demands full-fledged research into their operations, encompassing the socio-economic and environmental outcomes of their occupational presence. At the same

time, it is also important to take up larger and more structured studies to evaluate the detailed impacts of privatisation on these stakeholders.

Inter-organisational relations, as this study has demonstrated, can play an important role in making or breaking such alliances. However, this area can also be numbered among major research gaps when it comes to evaluating privatised operations in MSW and their impacts. Research focussing on the determinants of success or failure of privatisation to deliver on sustainable MSW management practices needs to further develop, especially from ethical and value based perspectives, to contribute to producing knowledge on the multi-dimensional complexities of relationships between public and private stakeholders.

The economics of waste privatisation with factual data and a holistic analysis encompassing all dimensions needs to be researched in-depth to enable the claims of economic sustainability and efficiency to be made or negated with robust evidence.

A question unanswered by this research is a detailed systematic comparative analysis of MSW operations in public and private modes. Should privatisation of MSW continue to be used as a “revolutionary public policy tool” (Leavitt & Morris, 2007, p.328) or should its shortcomings pave way for re-municipalisation? Credible research insights are required to inform this level of decision making.

There could be many more suggestions emerging from this research if one goes to further depths. Thereby, just sieving the principle ideas, one final submission merits attention. While this research has pertained to demonstrating sustainability in privatised operations in MSW, a similar research is also required in other public services in India that have been/are being privatised in recent times, such as water supply, sewerage and electricity. That would produce more comprehensive documentation towards answering the larger and perhaps the most pertinent question: in the contemporary socio-political environs, privatisation and sustainability can the twain meet? If yes, how? If not, why? And most of all, where do we go from here?

9.5 Recommendations for progression towards MSW sustainability

At the time of nearing completion of this research, the Solid Waste Management (SWM) Rules 2016 were notified in India. The revised rules are more comprehensive than the MSW (Management and Handling) Rules, 2000 and provide general guidelines for managing different waste streams comprising MSW. Therefore, the recommendations herein are drawn from the findings of the study, as well as after referring to important documents, such as Planning Commission (2014), MoUD (2010), AMC (2008), UNEP (2015).

As mentioned previously, the thesis has not argued against privatisation of solid waste management operations but has rather set out to unravel its impacts in the context of the four sustainability dimensions. Therefore, to recommend for or against privatisation in the contextual or generic sense is not in the scope of this work. Even the most recent government policy documents (Planning Commission, 2014; MoEF, 2016) continue to emphasise encouragement of privatised waste services. What is needed therefore is a critical appraisal of the privatised operations that a study of this nature has tried to undertake and a methodology towards achieving sustainable MSW management within the ambit of privatisation in Indian cities, or even outside as the case may be.

Regarding how the system in general can work better, the comprehensive sustainability assessment framework has been built in a manner to be able to evaluate or build sustainability in MSW operations in privatised service mode. Further, the reviews in each of the four core sustainability assessment chapters are built around the practices that, if followed, could lead to achieving sustainability thresholds in MSW management involving the private sector. A large body of literature, both empirical and theoretical, has gone into constructing the sustainability assessment framework and reviews. Further, this section proposes broad recommendations in the case of Indian and developing world cities with situations similar to Amritsar to progress towards the objective of achieving higher levels of sustainability across the four dimensions.

9.5.1 Enhancing social sustainability

One of the defining principles of ISWM is involving all key stakeholders towards achieving sustainability of MSW management operations. Therefore, institutionalising and strengthening the informal waste sector and reinforcing its capacities is of paramount significance where a large population is involved and depends upon waste collection and recycling in sustaining their livelihoods. Privatisation can no longer be seen as the only solution to a city's garbage problems, but a more pragmatic model integrating the informal sector, and specifically the waste pickers, into the entire process must be formulated. Looking at the immense recycling activity in the informal sector and its potential of generating and supporting substantial livelihoods and as a means of poverty eradication, the local governments must take the initiative to recognise the informal waste sector and integrate the same in any policy related to the city's waste management. As so rightly stated by Grisales⁹⁰ (cited in WIEGO, 2013, p.2), "waste pickers without access to waste are like farmers without land or fishermen without fish". Thus the customary right of the waste pickers, the itinerant waste buyers and the other stakeholders in the informal waste sector must be respected and considered in all aspects of solid waste policy making.

Prizzia (2003) argues that the widening sphere of privatisation tends to focus narrowly on economic gains emanating from it, but ignores the context of social justice for those who are most affected. The vulnerable groups, particularly at the bottom rung of sanitation workers in both public⁹¹ and private sectors, is usually adversely affected and these segments of the workforce remain at the margins of the cumulative benefits accrued through privatisation manoeuvres. Privatisation has a better chance of succeeding if the governments and monitoring agencies in particular are able to give due emphasis to early development of strategies that can provide social safety nets to the employees in both public and private sectors. Therefore, more fundamental reforms that target inclusion of social safety nets and in-built monitoring mechanisms are required. Such reforms could minimise the adverse implications and win employee cooperation towards such initiatives. Strict enforcement of labour laws for private sector employees must be there to prevent their exploitation and disenchantment that ultimately affects level of service.

⁹⁰Name of a waste picker union organizer in Bogota, Columbia.

⁹¹In reference to the contract sanitation workers.

The issue of retrenchment is contentious, as in the case study. If large scale retrenchments are involved, alternative courses of labour readjustment should be planned in advance. Kikeri (1997) suggests that, in such circumstances, a socially viable approach could be to resort to the policy of natural attrition (through retirement). Alternatively, other restructuring options, such as premature retirement, voluntary departure programmes or inter-department reshuffling, depending upon the worker norms, could be considered. In the case of retrenched contract employees, there could be a provision of a reserved worker share in the private company to absorb such employees. Such programmes have been used in a wide range of sectors, as in Argentina, Bolivia and Chile, where the government employees had 3 to 10 percent of job reservation in the private workforce. It may also be emphasised that regular review and monitoring from a social perspective can enhance efficiency and social sustainability and this is stressed as one of the major requisites in the event of private sector participation.

Further, community involvement in creating awareness and achieving waste segregation at source must be promoted, and equal access to all areas, regardless of the income group, must be ensured through adequate monitoring and civil society involvement in the interest of distributive equity, which again underpins social sustainability. Civil society actors, such as the NGOs and CBOs, must be encouraged to play an important role in creating awareness, especially for source segregation of solid waste and can also act as a formal watchdog in service monitoring processes.

9.5.2 Enhancing economic sustainability

ISWA (2013, p.5) stresses that the waste sector must achieve economic sustainability through cost savings, enhancing economic value of waste recyclable materials and creation of jobs in related enterprises. In the study, it has been demonstrated that the pricing mechanisms were faulty and losses were incurred instead of cost savings. Clarity of fiscal procedures in the contractual documents and, more so, adopting a pricing mechanism with built-in incentives towards waste reduction and landfill diversion may prove to be more useful in operations involving the private sector. Economic efficiency is achieved through higher landfill diversion and more intensive recycling practices that translate into economic gains. Allocative efficiency must be achieved through levying of a differential user charge

in conformity with the polluters pay principle. Optimal labour cost per MSW tonne can be achieved by optimising manpower and productive deployment, but not at the cost of salary deductions and lack of leave facility, as was resorted to in the case study. Deploying relevant vehicles as per norms and the presence of intermediate (decentralised) material recovery/recycling centres can reduce extra trips to the landfill and help in reducing vehicle operating costs while transporting more MSW tonne per vehicle. The implicit factors, such as insufficient data and collusion practices, play an important role in determining the actual economic status. Therefore, such factors must be minimised through their identification and taking remedial measures for controlling them.

9.5.3 Enhancing environmental sustainability

In terms of environmental sustainability, the overarching objective of resource efficiency through application of the waste hierarchy principle should be observed (ISWA, 2013, p.4). In this light, while framing policies enabling private sector participation, the design of contract documents should be based upon waste reduction, reuse and recycling principles that the waste hierarchy entails. As such, public awareness programmes built into the contractual documents and strongly implemented by the local government to encourage bricolage and reuse to achieve source reduction must be encouraged. The design should enable and enforce source segregation of the three major waste streams: biodegradable waste, non-biodegradable waste and domestic hazardous waste, as specified in MSW Rules, 2000 and the recent Solid Waste Management Rules, 2016. Collection of construction and demolition waste should be undertaken separately, as per the Punjab Municipal Corporation Act, 1976, and Solid Waste Management Rules, 2016, which elaborates further the norms for managing construction and demolition wastes.

Provision of separate secondary waste storage containers, as per requirements and norms suggested therein, should be adhered to by the service providers through appropriate enforcement measures by the regulating agency. Decentralised material recovery and recycling centres depending upon waste quantum and availability of space should be provided to recover as much recyclable waste as possible with the involvement of the informal waste sector. In line with the recommendations of the Planning Commission (2014, p.114) only those technological options (such as composting, bio-methanation and

RDF) which are contextually feasible, financially viable and environmentally sustainable for treating MSW waste streams should be established.

Landfill sites that are dangerously located and not suitable for further dumping (as in the case of Amritsar) should be closed in compliance with the Solid Waste Management Rules, 2016, and treated with bio-remediation measures to reclaim the land for other purposes. Other discontinued landfill sites should also be capped through the same specified procedures. The sites chosen for establishing a sanitary landfill or setting up a waste to energy plant must follow the locational guidelines specified in the Solid Waste Management Rules, 2016, as being at least 200 metres away from habitation clusters. Maximum landfill diversion should be achieved through recycling and recovery and the final discards should be disposed of in a sanitary landfill, as per the Solid Waste Management Rules, 2016 specifications.

Further, health and occupational risk amongst the employees, both from the municipal and private sectors, must be minimised by enforcing use of protective gear through regular monitoring. In the same vein, occupational risk amongst the waste pickers should be minimised by enabling their access to segregated dry waste at source or material recovery/recycling centres. This can be also done by engaging the NGOs in periodic health checks for all workers engaged in MSW management from across the public, private or informal sectors.

9.5.4 Enhancing institutional sustainability

UNEP (2015, p.187, 228) states that, more often than not, government institutions lack the competence required to successfully initiate and manage privatised service delivery models which are quite different from the traditional public sector procurement models. As such, an elaborate contractual document with clarity on every aspect, and especially risk allocation and finance modalities, can be a key to ensuring beneficial privatised service delivery. Going a step further, Witjes & Lozano (2016, p.39) emphasize on devising procurement procedures that allow for incorporation of social, environmental specifications into the procurement process. This should be considered in the procurement modalities in the Indian context specifically so that not only financial or economic efficiencies but also

social and environmental compliance is evaluated while selecting private operators in MSW management services.

In order for the private sector to operate and be regulated appropriately, it is imperative to have stable governance structures in place. Without these, the social, environmental or economic sustainability goals of MSW through private sector participation cannot be realised. The Planning Commission (2014, p.132) recommends the establishment of a MSW management cell with appropriately qualified technical and supervisory staff. Under the 74th CAA Act provisions, the local governments should conduct comprehensive training programmes to upgrade the staff capacity towards self-implementation, as well as for preparing, monitoring and reviewing services initiated through private sector participation.

As a pivot institution in managing the city's waste, the city municipalities, with support from central and state government (through policy guidelines), must prepare an inclusive MSW management programme that builds on the strengths of all the involved stakeholders, the informal sector in particular. Accurate data is a pre-requisite to a management response and hence detailed surveys must be undertaken to determine the quantum of waste in quantitative and qualitative terms in the city. While involving the private sector, it is of importance that the pre-requisite framework be considered and the contract agreement be meticulously prepared with an appropriate dispute resolution framework, and enforced to sustain the operations while minimising conflicts. Financial capacity of the local government institutions to execute such projects, with or without private sector involvement, must be strengthened by making MSW management remunerative and charging differential user tariffs based on the polluter pays principle.

The state administrative machinery must play a supportive role by helping in building its own, as well as local, capacity and rendering both technical and fiscal support as per need, till local self-sufficiency is achieved. Stress on better inter-organisational relationships between public and private sector institutions to create efficiency and sustainable operations by reducing information asymmetry and transaction costs is emphasised. Proper adherence to the contract agreement and regular review and monitoring by the regulatory institution can enhance efficiency and sustainability on all four dimensions and this is

stressed as one of the major requisites in the event of both private sector participation or undertaking operations by local government itself.

Figure 42 proposes a conceptual framework for MSW management in Indian cities or similar contexts by integrating the key principles from across the four dimensions: social (integrating the informal waste sector), economic (provision for cost recovery), environmental (application of waste hierarchy principle) and institutional (identifying review/monitoring stakeholders).

Figure 42 Conceptual framework for MSW management

Waste hierarchy principle	Major MSW streams	MSW generators	Segregation	Collection	Technological options	Managing stakeholders	Monitoring stakeholders
Recover	Organic short-term biodegradables (food waste)	Households, hotels, vegetable/fruit markets, abattoir	Primary /secondary source segregation	AMC/ Private company	Composting/ Bio-methanation	AMC/Private company	Civil society, AMC
Recover	Organic long-term biodegradables (wood, textiles, paper products)	Household, institutional gardens, city parks, roadside landscaping,	Primary /secondary source segregation	AMC/ Private company	Composting after shredding/ resale of wood for fuel/RDF pellets without power	AMC/ Private company	Civil society, AMC
Reuse/ recycle	Recyclables Glass, paper, metal, plastics	Households, commercial, institutional, other landuses	Primary segregation/ segregation at material recovery centre	Informal waste sector: waste pickers, itinerant buyers	Recycle to alternate products in recycling factories.	Existing recycling shops/ factories	Civil society
Recycle	Construction/ demolition waste	Households, commercial, institutional, other landuses	Separate collection/ transportation	AMC	As fillermaterial in construction / recycled eco-brick	AMC/ Private company	Civil society, AMC
Recycle	Sweeping inert debris	Roadside sweepings	Separate collection/ transportation	AMC	As filler material in construction	AMC	Civil society
Reduce	Domestic sanitary waste	Households, institutional, other landuses	Primary/secondary source	AMC/ Private company	Incinerate with the biomedical sanitary waste	Private bio-medical waste handling companies	Civil society, AMC
Reduce	Non-recyclable discards	Households, commercial, institutional, other landuses	Primary segregation/ segregation at materialrecovery centre	AMC/ Private company	Sanitary landfilling	AMC/private company	Civil society, AMC

DISPOSAL

Sanitary landfilling of rejects with 80% diversion rate

Source: Constructed with inputs from Planning Commission (2014), MoUD (2016), AMC (2008), MoUD (2011)

9.6 Conclusions

As the world is catapulted to its distinctly urban future, one of its most visible accomplices is waste. A by-product of consumerism in the realm of post-liberalised pace of development, managing solid waste is indeed a formidable challenge, more so in the developing countries where the UN-Habitat (2010, p.11) cautions, it “can easily become a crisis if ignored.”

The entire operations of the MSW management system as unravelled in this research are indicative of a “conventional reductionist approach” (Seadon, 2010, 1650) which falls short of being anything but sustainable. It goes, perhaps, without saying that the task of managing waste sustainably is woven with complexity to which there are no easy fixes.

Logically, then, this research should meet its natural culmination, having answered the key research question. The aspiration, however, is to look at this study not as an end but as a means to open more avenues to research in a quest for better resolution of the waste complexities.

At the time this research was in its final stages, the United Nations unveiled seventeen Sustainable Development Goals (SDG), 2030 for transforming the world. *Goal Seventeen* stresses partnerships between governments, the private sector and civil society in pursuit of successful sustainable development. It also emphasises the need for the public sector to establish a clear direction with better reviewing and monitoring frameworks, regulations and incentive structures and legislation that can reinforce sustainable development. Simultaneously, *Goal One* emphasises poverty reduction through inclusion in decision making processes and equitable economic opportunities, paying particular attention to the needs of the disadvantaged and marginalised. *Goal Six* is for access to water and sanitation for all.

From the perspective of solid waste, this can be interpreted as moving towards shaping our policy and governance to leverage the potentials of all the stakeholders, the public sector waste governing institutions, the private waste management sector, the informal waste sector, as well as the civil society comprising the Non-Government Organisations, the Community Organisations and the community. From the point of poverty alleviation, in the

context of waste, it is the informal waste sector whose livelihood is worst affected if they lose their access to waste. Thereby, in line with *SDG Goal One*, the livelihood of the most vulnerable groups, such as the waste pickers, cannot be disregarded while deciding on policy initiatives regarding a city's waste problems. It is also not sufficient to just mention it on paper (as in the case study), but provisions must be made for its enforcement as well. Equitable access to the service by all city residents, irrespective of income disparities, is essential, keeping in mind that waste service is a public good, even when delivered through the private sector. As a final word, the pursuit of sustainable solid waste management must be considered from all the four sustainability dimensions, as elaborated in this research.

On the home turf (India), the MSW (Management and Handling) Rules 2000 have been revised and notified as the Solid Waste Management (SWM) Rules, 2016. Additions have been made therein as promoting strict segregation of waste at source, integrating the informal waste sector and building the capacities of the public sector sanitation staff and other stakeholders. Another beginning is on the anvil. It is hoped that the new rules, unlike the old ones, shall be strictly enforced and be able to make a difference on the Indian waste horizon.

Management of MSW in the cities of the developing world is by no means a small task and requires a pragmatic approach grounded in the realities of our cities. While the realities appear grim, this should not lead to pessimism. Critical appraisals of prevailing interventions and the search for innovation and improvisation in solid waste management and governance must, nevertheless, go on.

References

Adam, S.U, Shamsudin, M.N, Sidique, S.F, Rahim, K.R & Radam, A 2015, Determinants of privatized solid waste management service provision in Lagos, *Journal of Environmental Planning and Management*, vol.58, no.10, pp.1804-1826, DOI:10.1080/09640568.2014.962126

Ahmed, S.A & Ali, M 2004, 'Partnerships for solid waste management in developing countries: linking theories to realities', *Habitat International*, vol.28, pp. 467-479, viewed 13 January 2013, Science Direct, [http://dx.doi.org.libraryproxy.griffith.edu.au/10.1016/S0197-3975\(03\)00044-4](http://dx.doi.org.libraryproxy.griffith.edu.au/10.1016/S0197-3975(03)00044-4).

AMC 2005, *Past, present and future, municipal corporations –Amritsar* (P 850-2005), Amritsar.

AMC 2008, *Agreement for collection and transportation of MSW in the city of Amritsar- Punjab*, Municipal Corporation, Amritsar.

AMC 2009, *Integrated solid waste management system for Amritsar Municipal Corporation*, Detailed Project Report, volume I, main proposal, prepared by Eco Save System (P) Limited, Mumbai.

Anderson, B 2011, *Privatization, a formula for provision or perversion of municipal solid waste management?*, viewed 20 November 2012, http://www.environmentportal.in/files/privatisationofmswm_0.pdf

Anestina, A, Adetola, A & Odafe, I.B 2014, 'Performance assessment of solid waste management following private partnership operations in Lagos State, Nigeria', *Journal of Waste Management*, vol.2014, pp.1-8, viewed 12 February 2015, Directory of open access journals, <http://dx.doi.org/10.1155/2014/868072>

Arbulu, I, Lozano, J & Rey-Maqueira, J 2016, 'The challenges of municipal solid waste management systems provided by public-private partnerships in mature tourist destinations: The case of Mallorca', *Waste Management*, vol. 51, pp. 252–258, viewed 21 April 2016, Science Direct, <http://dx.doi.org.libraryproxy.griffith.edu.au/10.1016/j.wasman.2016.03.007>

Armitage, A 2007, *Mutual research designs: redefining mixed methods research design*, viewed 30 March 2013, <http://www.google.co.in/webhp?ssrp=1&hl=en#hl=en&sclient=psy-ab&q=Armitage%2C+A.+2007%2C+Mutual+research+designs:+redefining+mixed+methods+research+design&oq>.

Asian Development Bank n.d. *Public-private partnership handbook*, viewed 14 January 2014, http://www-wds.worldbank.org/external/default/WDSContentServer/WDSP/IB/2011/06/10/000386194_20110610054146/Rendered/PDF/624230PUB0Publ00Box0361478B0PUBLIC0.pdf

Asian Development Bank 2008, *Public-private partnerships*, viewed 21 August 2013, <http://www.adb.org/documents/public-private-partnership-ppp-handbook>.

Athena Infonomics 2012, *Public private partnerships in solid waste management*, viewed 18 January, 2016, https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/186990/ReportPPMunicipalSolidWasteManagement270812.pdf

Attar, AA, Gupta, AK, Desai, D.B 2012, 'A study of various factors affecting labour productivity and methods to improve it', *IUSR Journal of Mechanical and Civil Engineering (IOSR-JMCE)*, pp. 11-14, viewed 22 April 2013, [http://iosrjournals.org/iosr-jmce/papers/sicete\(civil\)-volume1/3.pdf](http://iosrjournals.org/iosr-jmce/papers/sicete(civil)-volume1/3.pdf)

Babbie, E 2013, *The Practice of social research*, Belmont, CA : Wadsworth Cengage Learning.

Bach, S 2000, *Decentralization and privatization in municipal services, the care of health services*, International Labour Office, Geneva, viewed 20 December 2012, <http://www.ilo.org/public/english/standards/relm/gb/docs/gb283/pdf/jmmsr.pdf>

Baker, R, Brick, J.M, Bates, N.A, Battaglia, M, Couper, M.P, Dever, J.A, Gile, K.J & Tourangeau, R 2013, *Report of the AAPOR task force on non-probability sampling*, viewed 24 April, 2014, https://www.aapor.org/AAPOR_Main/media/MainSiteFiles/NPS_TF_Report_Final_7_revised_FN_L_6_22_13.pdf

Barata, E 2002, "Municipal waste" in K. Bisson & J. Proops (eds.), *Waste in ecological economies*, Edward Elgar Publishing, Cheltenham, pp. 117-143.

Barrows, D, Macdonald, H.I, Supapol, A.B, Dalton-Jez, O & Harvey-Rioux, S 2011, *Public private partnerships in Canadian health care; A case study of Brampton civil hospital*, OECD, viewed 20 September 2012, www.oecd.org/gov/budgetingandpublicexpenditures/47814779.pdf

Bartone, C.R, Luiz , L, Triche, T & Schertenleib, R 1991. 'Private sector participation in municipal Solid waste service: experiences in Latin America', *Waste Management and Research*, vol. 9, pp. 495-509, viewed 12 January 2013, Science Direct, doi:10.1016/0734-242X(91)90050-H

Batish, N.K 2014, 'Some alternative solutions in MSW management in South Asian countries: a case study of municipal corporations of Punjab', *International Journal of Scientific Research*, vol. 3, no. 3, pp. 351-354, viewed 19 January 2015, [http://www.worldwidejournals.com/international-journal-of-scientific-research-\(IJSR\)/file.php?val=March_2014_1393939612_fabeb_120.pdf](http://www.worldwidejournals.com/international-journal-of-scientific-research-(IJSR)/file.php?val=March_2014_1393939612_fabeb_120.pdf)

Batley, R 2001, "Public-private partnerships for urban services" in M. Freire & R.Stren (eds.) *The challenge of urban government policies and practices*, World Bank , Washington D.C, pp.199-212.

Baumeister, R.F & Leary, M.R 1997, 'Writing narrative literature reviews,' *Review of General Psychology*, vol.1, no.3, pp. 311-320.

Bawa, J.S 1977, *The Heritage of Amritsar*, Faqir Singh and Sons, Amritsar.

Bayliss, K & Kessler, T 2006, 'Can privatization and commercialization of public services help achieve the MDG's? an assessment,' viewed 12 October 2012, <http://www.ipc-undp.org/pub/IPCWorkingPaper22.pdf>

Beall, J 2006, 'Dealing with dirt and the disorder of development: managing rubbish in urban Pakistan', *Oxford Development Studies*, vol.34, no.1, pp. 81-97, viewed 21 March 2014, Taylor & Francis online, <http://dx.doi.org.libraryproxy.griffith.edu.au/10.1080/13600810500496087>

Bel, G & Costas, A 2004, *Do public sector reforms get rusty? An empirical analysis on privatization of solid waste collection*, viewed 7 June 2014, <http://econwpa.repec.org/eps/pe/papers/0409/0409014.pdf>

- Bel, G. & Mur, M 2008, *Intermunicipal cooperation and privatization of solid waste service among small municipalities in Spain*, Working Paper 2008/16, Research Institute of Applied Economics, viewed 14 March 2013, http://www.ub.edu/irea/working_papers/2008/200816.pdf.
- Bel, G. & Warner, M 2007, *Privatization of solid waste and water services: what happened to costs savings?* Working Paper, Cornell University, Ithaca, NY, viewed 21 October 2012, http://www.ub.edu/gim/articles%20web/2008/4_belwarner_RCR.pdf
- Biber, S.N.H. & Leavy, P 2006, *The practice of qualitative research*, Sage Publication, London.
- Bolaane, B & Isaac, I 2015, 'Privatization of solid waste collection services: Lessons from Gaborone', *Waste Management*, vol.40, pp. 14–21, viewed 10 December 2015, <http://www.ncbi.nlm.nih.gov/pubmed/25818381>, doi:10.1016/j.wasman.2015.03.004
- Bouin, O & Michalet C.A 1991, *Rebalancing the public and private sectors : developing country experience*. Development Centre of the Organisation for Economic Co-Operation and Development, Paris.
- Brand, R n.d. *The Ulysses approach to sustainable development*, viewed 13 February 2013, <https://webpace.utexas.edu/cherwitz/www/ie/samples/brand.pdf>
- Bryman, A 2004, *Social research methods*, Second Edition, Oxford University Press, Oxford.
- Burgess, R, Carmona, M & Kolstee, T 1997, "Cities, the state and the market, in R, Burgess, M, Carmona & T. Kolstee (eds.), *The challenge of sustainable cities*, Zed Books, London.
- CAGI 2009, *Public private partnerships (PPP) in infrastructure projects*, Public auditing guidelines, viewed 16 September 2013, http://planningcommission.nic.in/sectors/ppp_report/reports_guidelines/Public%20Auditing%20Guidelines%20for%20PPP%20Projects.pdf
- Centre for Environment Education (CEE) 2007, *Sustainable development: an introduction*, Internship Series, volume I, viewed 30 November 2012, <http://www.sayen.org/Volume-I.pdf>
- Ceolin, D, Nottamkandath, A, & Fokkink, W n.d, *Bridging gaps between subjective logic and semantic web*, viewed 12 November 2015, <http://www.cs.vu.nl/~wanf/pubs/bridging-gaps.pdf>
- Champlin, D 1999. 'Social capital and the privatization of public goods', *International Journal of Social Economics*, vol. 26, no.10, pp. 1302-1314, viewed 12 December 2012, Emerald insight.
- Chandler, T & Feuille, P 1994, 'Cities, unions and the privatization of sanitation services', *Journal of Labour Search*, vol.15, no.53, pp. 53-71, viewed 12 December 2012, <http://link.springer.com/article/10.1007/BF02685675>, doi:10.1007/BF02685675.
- Chen, C, Hubbard, M & Lias, C.S 2013, 'When public-private partnerships fail: analysing citizen engagement in public-private partnerships-case studies from Taiwan and China', *Public Management Review*, vol.15, no.6, pp.1-19, viewed 17 January 2014, Taylor & Francis online, doi: 10.1080/14719037.2012.698856

Chi, Y, Walsh, E, Wang, T, Shi, H, Babakina, O, Pennock, A & Gradel, T.E 2006, 'Case studies in quantitative urban sustainability', *Technology and Society*, vol.28, pp.105-123, viewed 13 November 2013, Science Direct, doi:10.1016/j.techsoc.2005.10.009.

Coad, A 2005, *Private sector involvement in solid waste management; avoiding problems and building on success*, viewed 22 January 2013, <http://www.skat.ch/publications/prarticle.2005-09-29.7288084326/skatpublication.2005-11-11.0299659281/file>

Coates, J B 1980, 'Productivity: What is it?', *Long Range Planning*, vol. 13, pp. 90-97, viewed 13 November 2013, Science Direct, doi:10.1016/0024-6301(80)90083-7

Cointreau-Levine, S 1995, *Private sector participation in municipal solid waste services in developing countries*, volume.1, The formal sector, Urban Management Program, viewed 2 June 2012, http://www-wds.worldbank.org/servlet/WDSContentServer/WDSP/IB/1994/04/01/000009265_3970128111924/Rendered/PDF/multi_page.pdf

Cointreau-Levine, S 2000, 'Guidance pack, private sector participation in Municipal solid waste management, part II, guidance note,' SKAT, viewed 9 September 2011, rru.worldbank.org/Documents/Toolkits/waste_fulltoolkit.pdf

Cointreau-Levine, S & Coad, A 2000, 'Guidance pack, private sector participation in municipal solid waste management, part I, executive overview,' SKAT, viewed 9 September 2011, rru.worldbank.org/Documents/Toolkits/waste_fulltoolkit.pdf.

Cointreau-Levine, S & Gopalan, P 2000, 'Guidance pack, private sector participation in municipal solid waste management, part II, tools for preparing for private sector participation', SKAT, viewed 9 September 2011, rru.worldbank.org/Documents/Toolkits/waste_fulltoolkit.pdf.

Connett, P n.d, *Zero Waste: A key move towards a sustainable society*, viewed 16 October 2012, <http://www.americanhealthstudies.org/zerowaste.pdf>.

Cook, P & Kirkpatrick, C 2003, "Assessing the impact of privatization in developing countries" in D. Parker & D. Saal, 2003, *International handbook on privatization*, Mass Edward Elgar, Northampton, pp. 209-217.

Cooper, D & Greenaway, M 2015, *Non-probability survey sampling in official statistics*, Office for National Statistics, viewed 19 April 2015, web.ons.gov.uk/.../mwp3-non-probability-survey-sampling-in-official-statistics.pdf

Cordelli, C 2013, 'How privatization threatens the private', *Critical review of international social and political philosophy*, vol. 16, no.1, pp. 65-87, viewed 13 October 2012, Taylor & Francis online, <http://dx.doi.org.libraryproxy.griffith.edu.au/10.1080/13698230.2011.640482>

CPCB 2000, *Management of municipal solid waste*, Central Pollution Control Board, Ministry of Environment Forests, Government of India, viewed 12 November 2012, http://www.cpcb.nic.in/divisionsofheadoffice/pcp/management_solidwaste.pdf

CPHEEO 2005, *Report of the technology advisory group on solid waste management*, viewed 22 January 2014, http://cpheeo.nic.in/tech-report/tag_swm.pdf

Creswell, J.W 1998, *Qualitative inquiry and research design, choosing from among five traditions*, Sage Publications, London.

Danson, M & Arshad, N 2014, "The literature review," in A. O’Gorman & R. MacIntosh (eds), *Research Methods for business and management, a guide to writing your dissertation*, Goodfellow Publishers Ltd, Oxford, pp 37-56.

Davies, A.R 2008, *The geographies of garbage governance: interventions, interactions, and outcomes*, Ashgate, Burlington.

Department for Environment, Food & Rural Affairs, 2003, *Waste legislation and regulations*, viewed 23 August 2012, <https://www.gov.uk/waste-legislation-and-regulations>

Deng,Z, Song,S & Chen,Y 2016, 'Private participation in infrastructure project and its impact on the project cost', *China Economic Review*, vol. 39, pp.63–76, viewed 12 May 2016, Science Direct, <http://dx.doi.org.libraryproxy.griffith.edu.au/10.1016/j.chieco.2016.04.004>

Dhamija, U 2006, *Sustainable solid waste management, issues, policies and structures*, Academic Foundation, New Delhi.

Doabia, T.S 1987, *The Punjab Local Acts, unified and regional laws (1825-1987)*, vol. III, Punjab Law Agency 1987, law Book Publishers and Distributors, Chandigarh.

Dohrman J & Aiello, J 1999, 'Public-private partnerships for waste management: challenges for policies and procedures' in *Development Southern Africa*, vol.16, no.4, pp. 691-704, viewed 12 November 2012, Business Source Complete.

Dorvil, L 2007, *Private sector participation in integrated sustainable solid waste management in low- and middle income countries*, University of St Gallen, viewed 21 March, 2012, www1.unisg.ch/www/edis.nsf/SysLkpByIdentifier/.../dis3381.pdf.

Du Pisani, J 2006, 'Sustainable development historical roots of the concept,' *Environment Sciences*, vol. 3, no.2, pp. 83-92, viewed 22 November, 2012, Taylor & Francis online, <http://dx.doi.org/10.1080/15693430600688831>

Dutta, V.K 1967, *Amritsar past and present*, 1967, The Municipal Committee, Amritsar.

Emery, A, Davies, A, Griffiths, A & Williams, K 2007, 'Environmental and economic modelling: A case study of Municipal solid waste management scenario in work', *Resources, conservation and recycling*, vol. 4, pp. 244-263, viewed 23 December, 2012, http://www.hia21.eu/dwnld/20131229_Environmental%20and%20economic%20modelling.pdf, doi:10.1016/j.resconrec.2006.03.016

Ezebilo, E.E. & Animasaun, E.D 2011, 'Economic valuation of private waste management services', *Journal of Sustainable Development*, vol. 4, no.4, pp. 38-46, viewed 11 October 2013, Freely accessible science journals.

Furniturwala, I n.d. *Setting a trend in waste processing, a story from India*, viewed 7 July 2013, www.proparco.fr/webdav/site/.../SPD15_Irfan_furniturwala_uk.pdf

GAIA 2013, *Understanding refuse derived fuel*, Global alliance for incinerator alternatives, viewed 12 August, 2015, <http://www.no-burn.org/downloads/RDF%20Final.pdf>

Gauba,A, 1988, *Amritsar; a study in urban history (1849-1947)*, ABS Publications, Jalandhar.

Gauld, R 2007, 'Principal agent theory and organizational change; lessons from New Zealand health information management,' *Policy studies*, vol 28, no.1, pp. 17-34, viewed January 2015, EBSCO host,

Gelo, O.C.G 2012, 'On research methods and their philosophical assumptions, raising the consciousness of researchers, again', *Psychotherapie und Sozialwissenschaft*, vol. 2, pp. 109-125, viewed 11 January

2014,https://www.unisalento.it/c/document_library/get_file?folderId=1083272&name=DLFE-113516.pdf

Gertsakis, J & Lewis, H 2003, *Sustainability and the waste management hierarchy*, a discussion paper prepared for Ecorecycle Victoria, viewed 11 January 2013, [http://www.ecorecycle.vic.gov.au/resources/documents/TZW_-_Sustainability_and_the_Waste_Hierarchy_\(2003\).pdf](http://www.ecorecycle.vic.gov.au/resources/documents/TZW_-_Sustainability_and_the_Waste_Hierarchy_(2003).pdf)

Ghobadian, A, Gallear, D, O'Regan, N & Viney, H 2004, "PPP: the instrument for transforming the public services" in A.Ghobadian, D. Gallear, N. O'Regan & H, Viney (eds), *Public-private partnerships : policy and experience*, Houndmills, Basingstoke, Palgrave Macmillan, New York, pp. 1-10.

Gibson, R.B 2006, 'Beyond the pillars: sustainability assessment as a framework for effective integration of social, economic and ecological considerations in significant decision-making,' *Journal of Environmental Policy and Management*, vol. 8, no.3, pp. 259-280, viewed 11 May 2013, <http://www.worldscientific.com/doi/pdfplus/10.1142/S1464333206002517><http://dx.doi.org/10.1142/S1464333206002517>

Gingery, T 2009, *Sampling demystified: probability vs. nonprobability sampling*, viewed 24 April 2013, <http://survey.cvent.com/blog/market-research-design-tips-2/sampling-demystified-probability-vs-nonprobability-sampling>.

Gladding, T.L 2002, "Health risks of materials recycling facilities", in R.E Hester & R.M Harrison (eds.), *Environmental and health impact of solid waste management activities; issues in environmental science and technology*, Royal Society of Chemistry, Cambridge, pp. 53-72.

GOI 2009, *The report of the expert group to review the methodology for estimation of poverty*, Planning Commission, viewed 21 January 2014, http://planningcommission.nic.in/reports/genrep/rep_pov.pdf

GOI 2009, *The solid waste management sector in India*, viewed 20 September 2012, http://164.100.52.24/pdf/ppp_position_paper_solid_waste_mgmt_112k9.pdf.

GOI 2011, *Census of India 2011*, viewed 22 January 2013, http://www.censusindia.gov.in/2011census/hlo/pca/pca_data.html

GOI 2016, *Database of infrastructure projects in India*, viewed 15 April 2016, <https://infrastructureindia.gov.in/sector-wise>

Godfrey, L & Todd, C 2001, *Defining thresholds for freshwater sustainability indicators within the context of South African water resource management*. 2nd WARFA/Waternet Symposium: Integrated Water Resource Management: Theory, Practice, Cases, Cape Town, South Africa, viewed 13 October 2012, <http://www.waternetonline.ihe.nl/aboutWN/pdf/godfrey.pdf>

Gorman, G.E & Clayton, P 1997, *Qualitative research for the information professional: a practical handbook*, Library Association Publishing, London.

Goswami, V.G 1999, *Labour and Industrial Laws*, Central Law Agency, Allahabad.

Government of Punjab 2006, *The Third Punjab Finance Commission Main Report*, Government of Punjab, Chandigarh, viewed 18 February, 2015, <http://www.iipa.org.in/upload/3rd%20Punjab%20Finance%20Commission%20Report.pdf>

Government of Punjab 2015, *Punjab Government Gazetteer*, Department of Labour, http://pblabour.gov.in/pdf/notifications/ns8_revised.pdf, 2009, 2010, 2011, 2012.

GTZ 2005, *Private sector involvement in solid waste management*, German Technical Cooperation, viewed 15 September 2012, https://www.eawag.ch/fileadmin/Domain1/Abteilungen/sandec/E-Learning/Moocs/Solid_Waste/W2/Private_Sector_Involvement_2005.pdf

Gupta, S.K 2004, *Rethinking waste management*, viewed 21 August 2011, <http://www.indiatogether.org/2004/apr/env-rethink.htm>

Gupta, J.P & Teotia, M 2006, *Urban local self government institution in Punjab, history, structure, capacity and emerging challenges*, viewed 4 February 2015, https://www.academia.edu/4304048/Urban_Local_Self-Government_Institution_in_Punjab_History_Structure_Capacity_and_Emerging_Challenges

Guthrie, G 2010, *Basic research methods, An entry to social science research*, Sage Publications, New Delhi.

Hafkamp, W 2002, "Comparision of national solid waste regimes in trajectories of change", in N.Bucket (ed.), *Municipal Waste Management in Europe*, Kluwer Academic Publishers, Norwell, pp. 7-25.

Hall, D, Motte, R.D.L. & Davies, S. 2003, *Terminology of public-private partnership (PPPs)*, Public Service International Research Unit (PSIRU), viewed 2 June 2011, epsu.org/IMG/doc/PPPs-defs-2.doc

Hanrahan, D, Srivastva, S & Ramakrishna, A.S 2006, *Improving management of municipal solid waste in India*. New Delhi: Environment and Social Development Unit, South Asia Region, World Bank, Washington, D.C, viewed 28 February 2012, http://www-wds.worldbank.org/external/default/WDSContentServer/WDSP/IB/2006/08/24/000090341_20060824102258/Rendered/PDF/370700IN0Munic1ver0P08436401PUBLIC1.pdf

Harris, J.M 2003, *Sustainability and sustainable development*, International Society for Ecological Economics, viewed 3 December 2012, <http://isecoeco.org/pdf/susdev.pdf>

- Harrison, E 2007, *Compost facilities: off-site air emissions and health*, viewed 20 October 2015, <http://cwmi.css.cornell.edu/compostairemissions.pdf>.
- Hayami, Y, Dikshit, A.K. & Mishra, S.N 2007, 'Waste Pickers and collectors in Delhi: poverty and environment in an urban informal sector,' *The Journal of Development Studies*, vol.42, no.1, pp. 41-69, DOI: 10.1080/00220380500356662.
- Hodge, G.A. 1999, *Privatization: an international review of performance*, Westview Press, Boulder.
- Holcombe, R.G 1997, 'A theory of the theory of public goods', *Review of Australian Economics*, vol. 10, no.1, pp.1-22, Phase I, concepts and facts, viewed 20 September 2012, https://mises.org/journals/rae/pdf/RAE10_1_1.pdf
- Huang, Y, Pan, T & Kao, J 2011, 'Performance assessment for municipal solid waste collection in Taiwan', *Journal of Environmental Management*, vol. 92, pp. 1277-1283, viewed 20 January 2013, Science Direct, <http://dx.doi.org.libraryproxy.griffith.edu.au/10.1016/j.jenvman.2010.12.002>
- Hunt Jr, J.B, Howes, J.B. & Hunt, G.E 1997, *Analysis of the full costs of solid waste management for North Carolina local governments*, NC Department of Environment, Health and National Resources, viewed 23 October 2015, <http://infohouse.p2ric.org/ref/01/00369.pdf>
- ISWA 2012, *Globalization and waste management*, viewed 27 July 2012, www.iswa.org/index.php?eID=tx_iswatfg_download&fileUid=36
- ISWA 2013, *Sustainable solid waste management & the green economy, key issue paper*, viewed 11 June 2015, file:///C:/Users/s2772837/Downloads/Waste_and_the_Green_Economy_Paper_Final_01.pdf
- Jamali, D 2004, 'Success and failure mechanisms of public private partnerships (PPPs) in developing countries, insights from the Lebanese context,' *The International Journal of Public Sector Management*, vol.17, no.5, pp. 414-428, viewed 12 November 2012, Emerald Insight, <http://dx.doi.org/10.1108/09513550410546598>
- JBIC 2010, *Japan Bank of International Cooperation special assistance for project formation (SAPROF) for Amritsar water supply and sewage project*, Draft Final Report, JBIC, Amritsar.
- Jean, n.d, *Ontology & Epistemology: is the world real? How do you know god is real?* viewed 19 March 2013, <http://www.flavoryellow.com/2012/08/20/ontology-epistemology-is-the-world-real-how-do-you-know-god-is-real/>
- Johnson, R.B. & Onwuegbuzie A.J 2004, 'Mixed methods research: a research paradigm whose time has come', *Educational Research*, vol. 33, no.7, pp.14-25, viewed 23 January 2013, JSTOR.
- Jøsang, A 2012, *Subjective logic*, University of Oslo, viewed 13 January 2016. http://folk.uio.no/josang/papers/subjective_logic.pdf
- Jourdar, S.D 2000, 'Urban residential solid waste management in India, issues related to institutional arrangements', *Public Works Management and Policy*, vol.4, no.3, pp.319-330, viewed 11 March 2015, Sage Journals.

Kaufman, S.M, Krishnan, N & Themelis, N.J 2010, 'A screening life cycle metric to benchmark the environmental sustainability of waste management systems', *Environment Science & Technology*, vol.44, no.15, p.5949-5955, viewed 10 October 2012, PubMed, doi: 10.1021/es100505u

Keiner, M n.d, *History, definition(s) and models of sustainable development*, viewed 21 January 2013, <http://e-collection.library.ethz.ch/eserv/eth:27943/eth-27943-01.pdf>

Kessler T & Alexander, N, 2005, "Essential Services: shifting the burden of proof" in E.U.V Weizsacker, O.R.Young, M, Finger & M, Beisheim (eds.), *Limits to Privatization, how to avoid too much of a good thing : a report to the Club of Rome*, Routledge, London, pp. 228-235.

Khan, M.T, Khan, N.A, Ahmed, S & Mehmood, K 2012, 'Privatization effects on human Resources (review research)', *Universal Journal of Management and Social Sciences*, vol. 2, no. 6, pp. 121-133, viewed 16 January 2013, <http://ofuturescholar.com/paperpage?docid=989885>

Kikeri, S 1997, *Privatization and labour: what happens to workers when governments divest?* World Bank Technical Paper 396, The World Bank, Washington DC, viewed 13 March, 2012, <http://info.worldbank.org/etools/docs/library/74184/winter2002/proceedings/pdfpapers/mod4sk.pdf>

King, N. & Horrocks, C. 2010, *Interviews in qualitative research*, Sage Publications, London.

Klundert, A.V.D. & Anschutz 2001, *Integrated sustainable waste management the concept, tools for decision makers*, viewed 18 September 2011, www.waste.nl/sites/waste.nl/files/.../files/tools_iswm_concept_eng1.pdf

Koppenjan, J.F.M. & Enserink, B. 2009, 'Public-Private Partnership in urban infrastructure: reconciling private sector participation and sustainability', *Public Administration Review*, vol. 69, no.2, pp. 284-294, viewed 10 October 2012, JSTOR.

Kumar,A 2003, *Industrial Law*, Vol. II, Altantir Publishers and Distributors, New Delhi.

Kundu,A 2011, *Trends and processes of urbanization in India*, IIED and UNFPA, viewed 12 February 2013, <http://pubs.iied.org/pdfs/10597IIED.pdf>

Lavee, D & Khatib, M 2010, 'Benchmarking in Municipal solid waste recycling', *Waste Management*, vol. 30, pp. 2204-2208, viewed 12 February 2013, Science Direct, <http://dx.doi.org.libraryproxy.griffith.edu.au/10.1016/j.wasman.2010.03.032>

Leavitt, M & Morris, J.C 2007, 'Public works service arrangements in the 21st century: the multiple –sector partnership as an alternative to privatization,' *Public Works Management and Policy*, vol. 12, no.1, pp. 325-330, viewed 18 November 2012, Sage Journals.

Lovei, M & Gentry, B.S 2002, *The environmental implications of privatization: lessons for developing countries*, World Bank discussion paper number 26, World Bank, viewed 20 February 2013, <http://documents.worldbank.org/curated/en/478951468749758065/The-environmental-implications-of-privatization-lessons-for-developing-countries>.

Martin, B 2001, *Privatization of municipal services: potential, limitations and challenges for the social partners*, International Labour Office, Geneva, Sectoral Activities Working Paper, viewed 11 January 2013, unpan1.un.org/intradoc/groups/public/documents/ilo/unpan025477.pdf

Masood, M & Barlow, C.Y 2013, 'Framework for integration of informal waste management sector with the formal sector in Pakistan', *Waste Management and Research*, vol. 31, no. 10, pp. 93-105, viewed 18 November 2012, Sage Journals, doi:10.1177/0734242X13499811

Massoud, M & El-Fadel, M 2002, 'Public-private partnerships for solid waste management services' *Environment Management*, vol.30, no.5, pp.621-630, viewed 10 October 2012, Springer Link, doi: 10.1007/s00267-002-2715-6

Medina, M 2002, *Globalization, development and municipal solid waste management in third world cities*, viewed 25 September 2012, http://depot.gdnet.org/cms/conference/papers/5th_pl5.2_martin_medina_martinez_paper.pdf.

Medina, M 2007, *The world's scavengers: salvaging for sustainable consumption and production*, Altamira Press, Plymouth

Megginson, W.L & Netter, J.M 2003, "History and methods of privatization" in D. Parker & D. Saal (eds), *International handbook on privatization*, Mass Edward Elgar, Northampton, pp.25-33.

Meunier, D & Quinet E 2010, 'Tips and Pitfalls in PPP design' *Research in Transportation Economics*, vol.30pp.126-138, Science Direct, doi: 10:1016/j-retrec.2010.10.013.

Ministry of Corporate Affairs n.d, *The Companies Act, 2013*, viewed 13 June 2015, <http://www.mca.gov.in/Ministry/pdf/CompaniesAct2013.pdf>

Mishra, R n.d, *The informal waste-pickers and model of exclusion, a study of Lucknow city*, viewed 12 January 2014 from http://www.academia.edu/2905641/The_Informal_Waste_Pickers_and_a_model_of_Exclusion_A_Study_of_Lucknow_City

Mitchell, J.C 2000, "Case and situation analysis", in R. Gomm, M. Hammersby & P.Foster (eds.), *Case study method*, Sage Publication Limited, London, pp. 81-100.

MoEF 2000, *Municipal Solid Waste (Management and Handling Rules) 2000*, viewed 21 July 2011, <http://envfor.nic.in/legis/hsm/mswmhr.html>.

MoEF 2010, *Technological EIA guidance manual for common MSW management facilities*, viewed 23 November 2015, http://environmentclearance.nic.in/writereaddata/Form-1A/HomeLinks/TGM_%20Comman%20Municipal%20Solid%20Waste%20Management_160910_NK.pdf

MoEF 2016, *Solid Waste Management (SWM) Rules, 2016*, viewed 23 May 2016, <http://www.moef.gov.in/sites/default/files/SWM%202016.pdf>

MoF 2010, *PPP toolkit for improving decision making processes, sector:solid waste management*, viewed 21 July 2011, <http://toolkit.pppinindia.com/solid-waste-management/module1-intro.php?links=intro1>

Mogalakwe, M 2006, 'The use of documentary research methods in social research,' *African Sociological Review*, vol.10, no. 1, pp.221-230, viewed 7 July 2013, www.codesria.org/IMG/.../Research_Report_-_Monageng_Mogalakwe.pdf

Moglia, M, Sharma, A, & Maheepala, S 2012, 'Multi-criteria decision assessments using subjective Logic: methodology and the case of urban water strategies,' *Journal of Hydrology*, pp.180–189, viewed 3 May 2014, Science Direct, <http://dx.doi.org/10.1016/j.jhydrol.2012.05.049>.

Mongan-Rallis, H 2014, *Guidelines for writing a literature review*, viewed 10 June 2016, <http://www.duluth.umn.edu/~hrallis/guides/researching/litreview.html>

MoUD n.d, *Guidance note, municipal solid waste management on a regional basis*, Ministry of Urban Development, Government of India, viewed 20 March 2013, http://moud.gov.in/urbanwater2/guidance_note

MoUD, 1992, *The Constitutional (Seventy Fourth Amendment) Act, 1992*, viewed 16 December 2012, <http://moud.gov.in/legislation/constiution>

MoUD 2000, *Manual on municipal solid waste management (first edition)*, CPHEEO, Ministry of Urban Development, Government of India, New Delhi.

MoUD 2010, *Toolkit for Public private partnership frameworks in municipal solid waste management volume I- Overview and success*, viewed 15 September 2012, www.urbanindia.nic.in/programme/.../SWM_PPP_Toolkit-Volume-I.pdf

MoUD 2011, *Handbook of service level benchmarking*, viewed 26 November 2012, http://www.wsp.org/sites/wsp.org/files/publications/service_benchmarking_india.pdf

MoUD 2012, *Toolkit for solid waste management*, Jawaharlal Nehru Urban Renewal Mission, viewed 13 September 2014, <http://jnnurm.nic.in/wp-content/uploads/2012/11/SWM-toolkit.pdf>

Mullen, A 2005, *The British left's 'great debate' on Europe: the political economy of the British left and European integration, 1945-2004*, viewed 7 June, 2012, <http://www.andymullen.com/html/research5.html>

Munasinghe, M 2010, *Addressing sustainable development and climate change together using sustainomics*, viewed 19 January 2013, <http://www.mohanmunasinghe.com/pdf/WILEY-Wires-CC-SD-Oct2010.pdf>

Munasinghe, M n.d, *Sustainomics framework*, viewed 19 January, 2013, <http://www.mohanmunasinghe.com/pdf/WILEY-Wires-CC-SD-Oct2010.pdf>

Mushtaq, U.M 2009, *Public health in British India: a brief account of the history of medical services and disease prevention in colonial India*, viewed 13 March 2015, <http://medind.nic.in/iaj/t09/i1/iajt09i1p6.pdf>

Navia, R & Ross, D 2009, 'Sanitary landfills, foundation of the waste hierarchy inverted pyramid', *Waste Management and Research*, vol. 27, no.5, pp. 407-408, viewed 20 March 2013, Sage Journals, doi: 10.1177/0734242X09342122

Nee, V 2003, *New Institutionalism, economic and sociological*, Centre for the Study of Economy and Society, viewed 3 September 2012, <http://www.soc.cornell.edu/faculty/nee/pubs/newinstitutionalism.pdf>.

Neuman, W.L 2006, *Social research methods, qualitative and quantitative approaches*, 6th Edition, Pearson Education Inc, New York.

Ngowi, H.P n.d, *Public-Private Partnership (PPPs) in the management of municipalities in Tanzania-issues and lessons of experience*, viewed 12 December 2012, unpan1.un.org/intradoc/groups/public/documents/.../UNPAN025581.pdf

NHRC 1993, *The Protection of Human Rights Act, 1993*, viewed 2 May 2015, http://nhrc.nic.in/documents/Publications/TheProtectionofHumanRightsAct1993_Eng.pdf

NIUA 2009, *Improved collection and transportation of municipal solid waste through public private partnership in Amritsar*, Documentation of best practices, Vol. 3, PEARL, National Institute of Urban Affairs, New Delhi, viewed 12 January 2013, <http://www.indiaurbanportal.in/Bestpractices/Bestpractices6/Bestpractices60.PDF>

O'Brein, M 2008, *A crisis of waste? : understanding the rubbish society*, Routledge, New York.

Obser, A 2005, "Privatization and development" in E.U.V. Weizsacker, O.R. Young, M. Finger & M. Beisheim (eds.), *Limits to Privatization, how to avoid too much of a good thing : a report to the Club of Rome*, Routledge, London, pp. 252-306.

Oduro-Kwarteng, S & Dijk, M.P.V 2013, 'The effect of increased private sector involvement in solid waste collection in five cities in Ghana', *Waste Management & Research*, vol. 3, no.10, pp. 81-92, viewed 15 January 2013, Sage Journals.

Oescher, J, n.d *Subjects, participants and sampling*, viewed 23 April 2014, <http://www2.southeastern.edu/Academics/Faculty/joescher/edf600/resources/r5/ch51.pdf>

Oliver.V n.d, *Vehicle productivity*, viewed 5 April, 2015, <http://www.focusontransport.co.za/regulars/vics-view/474-vehicle-productivity.html>

Omann, E.V.I 2004, *Multi-criteria decision aid as an approach for sustainable development analysis and implementation*, viewed 24 February 2013, seri.at/wp.../Omann_2004_SustainableDevelopment-and-MCDA_PhD.pdf

Omuta, G.E 1987, 'Urban solid waste generation and management in Nigeria, towards an environmental sanitation policy', *Habitat International*, vol.11, no.2, pp.77-87, viewed 11 April, 2013, Science Direct, doi:10.1016/0197-3975(87)90058-0

Pansiri, J. 2005, 'Pragmatism: a methodologies approach to researching strategic alliances in tourism', *Tourism and Hospitality Planning and Development*, vol. 2, no.3, pp. 191-206, viewed 22 April, 2013, <http://www.cecc.com.au/clients/sob/research/docs/jpansiri/TourismandHospitalityPlanningandDevelopment.pdf>

Panzeri, S, Magri, C & Carraro, L 2008, 'Sampling bias', Scholarpedia, viewed 24 April, 2013, http://www.scholarpedia.org/article/Sampling_bias

Pautasso, M 2013, Ten simple rules for writing a literature review, *PLOS Computational Biology*, vol. 9, no. 7 pp. 1-4, viewed 10 June 2016, <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3715443/>

- Pereira, A.M n.d, *Policy analysis and institutionalism: some elements for analysis of decentralization and regionalization in the Brazilian health policy*, viewed 16 September 2012, <http://cors.edubit.com.br/files/6.pdf>
- Petre, M & Rugg, G 2010, *The unwritten rules of PhD research*, open up study skills, Open University Press, Berkshire.
- Petticrew, M & Roberts, H 2006, *Systematic reviews in the social sciences, a practical guide*, Blackwell publishing, Oxford.
- PIDB 2002, *Punjab Infrastructure (Development and Regulation) Act, 2002*, viewed 12 October 2013, <http://www.pidb.org/act2002.html>
- Pillai, K.M 1996, *A Text Book on Labour and Industrial Laws, 6th Edition*, Allahabad Law Agency, Allahabad.
- Planning Commission, 2002, *State development report on Punjab*, viewed 18 February 2015, http://planningcommission.nic.in/plans/stateplan/sdr_punjab/sdrpun_cont.pdf
- Planning Commission 2014, *Report of the task force on waste to energy (volume I), in the context of integrated MSW management*, viewed 21 January 2015, http://planningcommission.nic.in/reports/genrep/rep_wte1205.pdf
- Pongrácz, E ,Phillips, P.S & Keiski, R.L n.d, *Evolving the theory of waste management – implications to waste minimization*, viewed 23 July 2012, <http://www.ewp.rpi.edu/hartford/~ernesto/S2014/SHWPCE/Papers/SW-Collection-Mgmt/Pongracz2004-TheoryofWasteManagement.pdf>
- Pongrácz, E 2002, *Re-defining the concepts of waste and waste management, evolving the theory of waste management*, viewed 11 September 2012, <http://jultika.oulu.fi/files/isbn9514268210.pdf>
- Post, J, Broekema, J & Obirih-OPAREH, N 2003, ‘Trial and error in privatization: experiences in urban solid waste collection in Accra (Ghana) and Hyderabad (India)’, *Urban Studies*, vol.40, no. 4, pp.835-852, viewed 13 November 2012, Expanded Academic ASAP,
- Post, J & Obirih-OPAREH, N, 2003, ‘Partnerships and the public interest: assessing the performance of public-private collaboration in solid waste collection in Accra’ *Space and Policy*, vol. 7, no.1, pp. 45-63, viewed 15 January 2013, <http://dx.doi.org.libraryproxy.griffith.edu.au/10.1080/13562570309244>
- Prizzia, R 2003, ‘An international perspective of privatization: the need to balance economic and social performance,’ *American Review of Public Administration*, vol.33, no.3, pp.316-332.
- PUDA 2010, *Draft Masterplan Amritsar 2010-2031*, Punjab Urban Planning and Development Authority (PUDA), Mohali.
- Punch, K.F 1998, *Introduction to social research*, Sage Publication, London.
- Raiser, S & Volkman, K 2005, ‘Conclusions- setting the frame for private solutions’ in K, Segbers, K. Raiser & S.Volkman (eds), *Public problems--private solutions? : globalising cities in the South*. Ashgate Publishing Ltd, Burlington, pp. 395-401.

- Rodriguez-Boetsch, L 2005, 'Public service privatization and crisis in Argentina', *Development and Practice*, vol.15, no.3, pp.302-315, viewed 18 December 2012, <http://web.pdx.edu/~leopoldo/privcrisis.pdf>
- Rousse, J 2006, *Embracing not displacing: involving the informal sector in improved solid waste management*, viewed 12 July 2011, <http://www.threads.ch/prarticle.2006-01>
- Royte, E 2005, *Garbage land : on the secret trail of trash*, Little, Brown, New York.
- Sahoo, S 2006, 'A new institutionalists approach to the study of rural credit institutions in Orissa: a theoretical note' Indian Institute of Dalit Studies, New Delhi, viewed 20 August 2012, http://depot1.gdnet.org/kb/fulltext/Sahoo_Rural_Credit_Institutions.pdf.
- Samson, M 2010, *Refusing to be cast aside: waste pickers organizing around the world*, Chapter 6: confronting and engaging privatization, viewed 16 February 2013, <http://wiego.org/sites/wiego.org/files/publications/files/Samson-Refusing-to-be-Cast-Aside-Wastepickers-Wiego-publication-English.pdf>
- Samson, M 2003, *Dumping on women: gender and privatization of waste management*, viewed 15 October 2015, <http://www.gdrc.info/docs/waste/005.pdf>
- Sandhu, K & Dhillon, R 2008. "Urban poverty and deprivation among the ragpickers of Amritsar city: pragmatic insights", in R.S. Sandhu, J. Sandhu & B.Arora, B (eds.), *Urban poverty in developing countries*, Concept Publications, Delhi
- Sandhu, K. & Gill, G.S. 2010, 'Impact of neo-urban Paraphernalia on Amritsar city: of transformations and transgressions', *Sri Lanka Journal of Real Estate*, vol.4, pp. 1-17, viewed 11 December 2014, <http://journals.sjp.ac.lk/index.php/SLJRE/article/download/126/50>.
- Sandhu, R.S. & Teotia, M.K 2013, *The state of cities in North-Western India: a case of selected JNNURM cities (study focus city: Amritsar)*, Centre for Research in Rural and Industrial Development (CRRID), Chandigarh, viewed 17 March 2014, <http://hudco.org/WRITEREADDATA/Amritsar%20Study.pdf>
- Sartori, S, Silva, F.L & Campos, L.M.D.S 2014, *Sustainability and sustainable development: a taxonomy in the field of literature*, Ambiente and Sociedade, Sao Paulo, XVII, n.1, pp 1-20, viewed 19 March 2013, http://www.scielo.br/scielo.php?pid=S1414-753X2014000100002&script=sci_arttext&tlng=en.
- Sawney, U n.d, *Subnational reforms and public policy issues in Punjab*, viewed 26 January 2015, http://www.global.ucsb.edu/punjab/journal/v19_1/3-UpinderSawhney19_1.pdf
- Saxena, S, Srivastava, R.K. & Samandar, A.B. 2010, 'Towards sustainable municipal solid management in Allahabad city', *Management of Environmental Quality: An International Journal*, vol. 21, no.3, pp.308-323, Viewed 11 October, 2012, Emerald Insight, <http://dx.doi.org/10.1108/14777831011036876>
- Scalar, E.D 2000, *You don't always get what you pay for : the economics of privatization*, Cornell University Press, London.

- Schepper, S.D, Haezendonck, E & Dooms, M 2015, Understanding pre-contractual transaction costs for Public–Private Partnership infrastructure projects, *International Journal of Project Management*, vol. 33, pp.932–946, viewed 8 December 2015, Science Direct, <http://dx.doi.org.libraryproxy.griffith.edu.au/10.1016/j.ijproman.2014.10.015>
- Schübeler, P 1996, *Conceptual framework for municipal solid waste management in low-income countries*. SKAT (Swiss Centre for Development Cooperation in Technology and Management), viewed 19 March 2012, ww.worldbank.org/urban/solid_wm/erm/.../conceptualframework.pdf
- Seadon, J.K 2006. ‘Integrated waste management – Looking beyond the solid waste horizon’, *Waste Management*, vol. 26, no. 12, pp. 1327-36, viewed 20 January 2013, <http://dx.doi.org.libraryproxy.griffith.edu.au/10.1016/j.wasman.2006.04.009>
- Seadon, J.K 2010. ‘Sustainable waste management systems,’ *Journal of Cleaner Production*, vol. 18, pp. 1639-1651, viewed 20 January 2013, Science Direct, <http://dx.doi.org.libraryproxy.griffith.edu.au/10.1016/j.wasman.2006.04.009>
- Segbers, K 2005, “ City regions between global competitiveness and internal viability- the difficult road towards new forms of governance”, in K.Segbers, K. Raiser&S.Volkman, (eds), *Public problems--private solutions? : globalising cities in the South*, Ashgate Publishing Ltd, Burlington, pp.2-10.
- Sharholly, M, Ahmed, K. Mahmood, G. & Trivedi, R.C 2008, ‘Municipal solid waste management in Indian cities –a review’, *Waste Management*, vol. 28, p. 459-467, viewed 22 January 2013, <http://dx.doi.org.libraryproxy.griffith.edu.au/10.1016/j.wasman.2007.02.008>
- Shirley, M.M 1992, ‘The what, why and how of privatization: a World Bank perspective’, *Fordham Law Review*, vol. 60, no.6, pp. 23-32, viewed 22 October 2012, <http://ir.lawnet.fordham.edu/cgi/viewcontent>
- Siddaway,A n.d,*What is a systematic literature review and how do I do one?*, viewed 11 June, 2014, <https://www.stir.ac.uk/media/schools/management/documents/centregradresearch/How%20to%20do%20a%20systematic%20literature%20review%20and%20meta-analysis.pdf>
- Simoës, R, Cruz, N.F & Marques, R.C 2012, ‘The performance of private partners in the waste sector,’ *Journal of Cleaner Production*, vol. 29, no. 30, pp. 214-221, viewed 15 January 2013, Science Direct, <http://dx.doi.org.libraryproxy.griffith.edu.au/10.1016/j.jclepro.2012.01.027>
- Simons, D, Mason, R & Gardner, B 2006, ‘Overall vehicle effectiveness’, *International Journal of Logistics, Research and Applications: A Reading Journal of Supply Chain Management*, vol. 7, no.2, pp.119-135, viewed 13 March 2013, Taylor & Francis, <http://dx.doi.org/10.1080/13675560410001670233>
- Singh, R.K, Murty, H.R, Gupta, S.K & Dikshit, A.K 2009, ‘An overview of sustainability assessment methodologies’, *Ecological Indicators*, doi: 10.1016/j.ecolind.2008.05.011, pp. 189-212, viewed 11 November 2012, Science Direct, <http://dx.doi.org.libraryproxy.griffith.edu.au/10.1016/j.ecolind.2011.01.007>
- Skowronek, D & Duerr, L 2009, ‘The convenience of non probability’, *College and Research Library News*, vol.70, no.7, pp.408-415, <http://crln.acrl.org/content/70/7/412.full>

- Stake, R.E 2000, "The case study method in social inquiry", in R. Gomm, M.Hammersley & P.Foster (eds.), *Case study method*, Sage Publications, Ltd, London, pp. 19-25.
- Swan, J.R.M, Kelsey, A, Crook. B & Gilbert, E.J 2003, *Occupational and environmental exposure to bioaerosols from composts and potential health effects: a critical review of published data*, Research Report 130, HSE Books, Norwich, viewed 13 September 2014, <http://www.hse.gov.uk/research/rrpdf/rr130.pdf>
- Taxman Allied Services (P.) Ltd 2001, *Labour Laws*, Tan Prints (India) Pvt. Ltd., Jhagir, Haryana.
- Technology Review 2010, 'Solid waste management', *Technology Review*, vol.2, no.7, cybermedia publication, viewed 4 January 2013, <http://www.technologyreview.in/energy/25746/>
- Teixeira, CA, Russo, M, Matos, C & Bentes, I 2014, 'Evaluation of operational economic and environmental performance of mixed and selective collection of municipal solid waste: collection of municipal solid waste: Porto case study,' *Waste Management and Research*, vol. 32, no. 12, pp. 1210-1218, viewed 14 December 2014, Sage Journals, doi:10.1177/0734242X14554642
- Thompson, M 1994, 'Blood, sweat and tears' *Waste Management and Research*, vol. 12, pp. 199-205, viewed 25 February 2013, Science Direct, doi:10.1006/wmre.1994.1010
- Tin, A.M, Wise, D.L, Su, W, Reutergardh, L & Lee, S 1995, 'Cost benefit analysis of the municipal solid waste collection system in Yaxgon, Myanmar', *Resources, Conservation and Recycling*, vol. 14, pp. 103-131, viewed 9 February 2014, Science Direct, doi:10.1016/S0921-3449(95)80004-2
- Trafford S & Proctor T 2006, 'Successful joint venture partnerships: public-private partnerships,' *International Journal of Public Sector Management*, vol.19, pp. 117-129, viewed 15 March 2013, Emerald Insight, <http://dx.doi.org/10.1108/09513550610650392>
- UNEP 2005, *Solid waste management, volume I*, viewed 4 March 2012, <http://www.unep.org/ietc/InformationResources/Publications/SolidWasteManagementPublication/ta/bid/79356/Default.aspx>
- UNEP 2015, *Global waste management outlook*, viewed 12 April 2015, <http://www.unep.org/ietc/Portals/136/Publications/Waste%20Management/GWMO%20report/GWMO%20full%20report.pdf>
- UNESCAP 2000, *Sustainable Asia- waste*, viewed 12 September 2012, <http://www.unescap.org/esd/environment/soe/2000/documents/CHO8.PDF>
- UN-Habitat 2009, *Solid waste management in world's cities*, viewed 7 August 2011, http://www.sswm.info/sites/default/files/reference_attachments/UN%20HABITAT%202010%20Solid%20Waste%20Management%20in%20the%20Worlds%20Cities_0.pdf
- Un-Habitat 2010, *Collection of municipal solid waste in developing countries*, viewed 2 December 2012, http://www.eawag.ch/fileadmin/Domain1/Abteilungen/sandec/ELearning/Moocs/Solid_Waste/W1/Collection_MSW_2010.pdf
- United Nations 1997, *Glossary of environment statistics*, Department of Economic and Social Information and policy analysis, Statistics Division, Series, F, No.67, viewed 18 December 2012, http://unstats.un.org/unsd/publication/SeriesF/SeriesF_67E.pdf

United Nations 2012, *World urbanization prospects, the 2011 revision*, Department of Economic and Social Affairs, viewed, 12 January 2013, http://esa.un.org/unup/pdf/WUP2011_Highlights.pdf.

UNCSD 2012, *Issue briefs, produced by UNCSO secretariat, no. 6, current ideas on sustainable development goals and Indicators*, viewed 12 March, 2013, www.uncsd2012.org/meetings_sidevents.html

US Environmental Protection Agency n.d, *Basic information about the waste reduction model (WARM)*, viewed 15 June 2015, <https://www.epa.gov/warm>

Vyas, M 2009, 'Unionization as a strategy in community organization in the context of privatization: The case of conservancy workers in Mumbai,' *Community Development Journal*, vol 44, no. 3, pp.320-335, viewed 12 March 2014, Oxford Journals, doi: 10.1093/cdj/bsp023

Vyas, L & Luk, S 2012, 'The protruding implications of privatization: attractive potentials leading to unpleasant consequences', *Journal of Asian Public Policy*, vol 5, no. 3, pp. 322-332, viewed 12 March 2014, Taylor & Francis online, <http://dx.doi.org.libraryproxy.griffith.edu.au/10.1080/17516234.2012.740786>

Walsh, K 1995. *Public services and market mechanisms: competition, contracting and the new public management*, Macmillan , Basingstoke.

WCED 1987, *Ours common future, Chapter 2, towards sustainable development*, viewed 10 June 2015, <http://www.un-documents.net/ocf-02.htm>.

WEIGO 2013, *The right to be recognized as workers*, viewed 22 November 2014, <http://wiego.org/sites/wiego.org/files/resources/files/WIEGO-Waste-Pickers-Position-Paper.pdf>

Weingart, J 2007, *Waste is a terrible thing to mind: risk, radiation and distrust of government*, Rutgers University Press, Rutgers.

Weizsacker, E.U.V, Young, O.R & Finger, M 2005, " Limits to privatization", in E.U.V Weizsacker, O.R. Young, M. Finger & M. Beisheim (eds.), *Limits to privatization*, Routledge, London, pp. 3-14.

Weizsacker, E.U.V, Young, O.R, Finger, M & Beisheim, M 2005, " Limits to privatization", in E.U.V Weizsacker, O.R. Young, M. Finger & M. Beisheim (eds.), *Limits to privatization*, Routledge, London, pp.351-362.

Wheeler, P.A, Stewart, I, Dumitrean, P & Donovan, B 2001, *Health effects of composting: a study of three sites and a review of past data*, R&D Technical Report P1-315/TR, Bristol.

Whitworth, J 2007, *Product stewardship and extended producer responsibility, as a policy approach for waste reduction*, State of Oregon, Department of Environmental quality, viewed 22 December 2012, <http://www.deq.state.or.us/lq/pubs/docs/sw/WPSBkgd08.pdf>

Wilkinson, D 2002, " Waste law" in K. Bisson & J. Proops (eds.) *Waste in ecological economies*, Edward Elgar Publishing, Cheltenham, pp. 101-113.

Wilson, D.C 2007, 'Development drivers for waste management', *Waste Management and Research*, vol. 25, no. 198, pp.198-206, viewed 27 April 2013, Expanded Academic ASAP.

Wilson, D.C, Rodic, L, Schunberg, A, Velis, C.A & Alabaster, G 2012. 'Comparative analysis of solid waste management in 20 cities', *Waste management and Research*, vol. 30, no 3, pp. 237-254, viewed 10 October 2014, Sage Journals, doi: 10.1177/0734242X12437569

Witjes,S & Lozano,R 2016, 'Towards a more Circular Economy: proposing a framework linking sustainable public procurement and sustainable business models', *Recources, Conservation and Recycling*, vol.112, pp.37-44, Elsevier, doi.org/10.1016/j-reconrec.2016.04.015

World Resources Institute 2003, *Privatization: Can the private sector deliver public goods*, viewed 16 February 2013, <http://archieve.wri.org/page.cfm?id=1750&Z=?>

Yedla, S & Kansal, S 2003, 'Economic insights into municipal solid waste management in Mumbai: a critical analysis', *International Journal of Environment and Pollution*, vol. 19, no 5, pp. 516-527, viewed 5 March 2015, http://www.seas.columbia.edu/earth/wtert/sofos/Economic_insight_to_municipal_solid_waste_management_in_Mumbai_a_critical_analysis.pdf

Yescombe, E.R 2007, *Public-private partnerships : principles of policy and finance*, Elsevier Ltd, Oxford.

Yigitcanlar, T. & Dur, F 2010, 'Developing a sustainability assessment model: the sustainable infrastructure, land use, environment and transport model', *Sustainability*, vol.2, pp. 321-340, viewed 18 March 2013, Directory of Open Access Journals, doi:10.3390/su2010321

Yin, R.K 1994, *Case study research*, Sage Publications, London.

Zero Waste International Alliance 2004, *Zero waste definition*, viewed 17 January 2013, <http://www.zwallianceuk.org/wpzw01/wp-content/uploads/ZWIA-Peer-reviewed-Definition.pdf>

Zhu, D, Asnani, P.U, Zurbrugg, C, Anapolsky, S & Mani, S 2008, *Improving municipal solid waste management in India, a sourcebook for policy makers*, World Bank, viewed 22 October 2012, http://www.tn.gov.in/cma/swm_in_india.pdf.

Appendix I Supplementary Figures and Tables

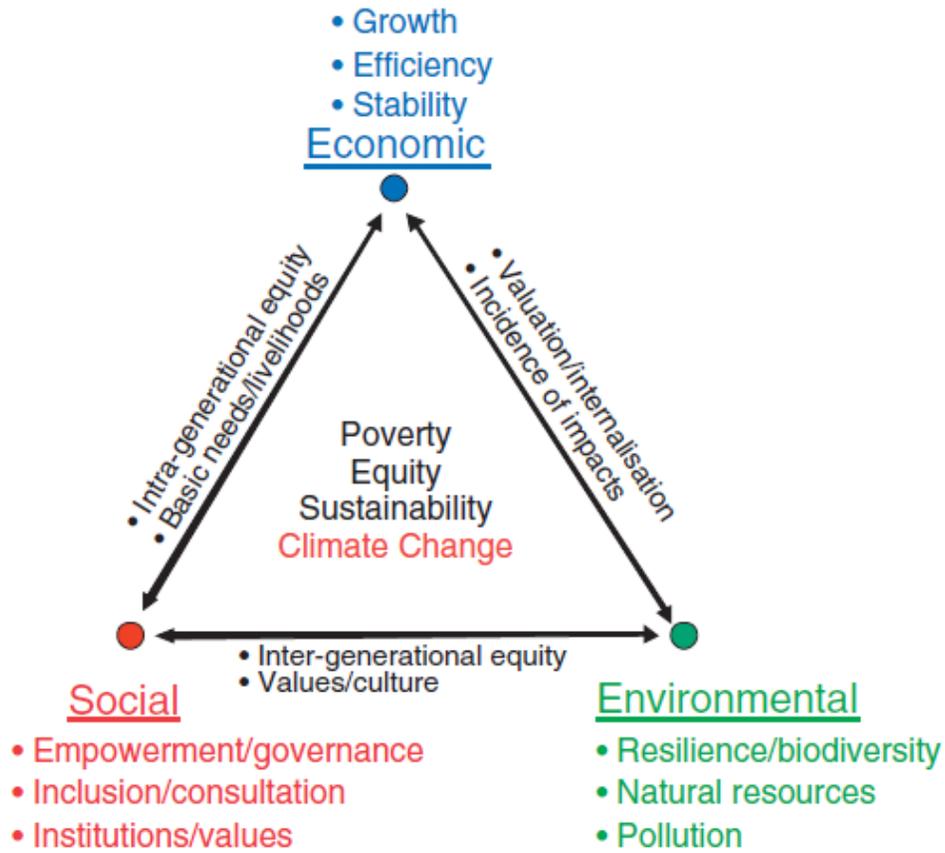


Figure 43 The sustainability triangle

Source: Munasinghe (2010, p.4)

Table 58 Labour laws

<p>Economic and Welfare Legislations</p> <p><i>Minimum Wages Act, 1948:-</i> The appropriate state government shall fix the minimum rate of wages payable in an employment and review at intervals as it may deem fit (also known as Deputy Commissioner Rates). The government may also fix hours of work and provide for a day of rest in every seven days with payment of remuneration.</p> <p><i>Payment of Wages Act, 1936:-</i> Wages should be paid within a month and before the expiry of the seventh day after the last day of the wage period.</p> <p><i>Industrial Employment (Standing Orders) Act, 1946:-</i> Provision for construction of standing orders relating to eleven matters such as intimating the workers regarding work periods, hours of work, holiday, grant of leave, closure of establishment, etc.</p> <p><i>The Punjab Industrial Establishment (National and Festival Holidays and Casual and Sick Leave) Act, 1965:-</i> Notwithstanding any contract to the contrary, every worker shall for each of the national and festive holidays and of casual or sick leave, be paid by the employer wages at a rate equivalent to his daily average wage.</p> <p><i>Contract Labour (Regulation and Abolition) Act, 1970:-</i> Intermittent work extending to over 120 days in 12 months in not deemed as casual work. Where contract labour is over 100, provision of canteen, restroom, drinking water, wash rooms and first aid should be made. The Punjab Contract Labour (Regulation and Abolition) Rules, 1973 constituted under the said Act to provide for welfare and health of contract labour through facilities as mentioned and also for provision of wages as per The Minimum Wages Act, 1948 and Payment of Wage Act, 1936.</p> <p><i>The Punjab Municipal Safai Karamchhari Service Rules, 1984:-</i> The Rules (Rule 14-1) prohibits employing contractual workers unless there are specific reasons for doing so. In case of such employment, remuneration specified by D.C. Rates is applicable. Leave rules shall be same as permanent workers and equipment (<i>bucket, tosla, kassi, scrappers, wheel burrows</i>) and provision of uniform, dark glasses, gumboots and washing allowance at rates fixed by state government.</p>
<p>Conflict Settlement Legislation</p> <p><i>Industrial Disputes Act, 1947:-</i> Unfair labor practices in strikes, layoff's retrenchments and closure of establishments is addressed. No worker who has been in continuous service for not less than one year shall be retrenched until he has been given three months' notice in writing and paid in lieu of such notice, wages for the period of notice. In case of closure, the worker whose services stand terminated is entitled to notice and wages amounting to fifteen days average pay for every completed year of continuous service. If closure is due to circumstances beyond the employer's control, compensation is reduced to a payable amount not exceeding his average pay for three months. In case of dismissal or discharge, one month wages to be given. The Industrial Disputer (Punjab) Rules, 1958 under the said Act provide for such like conflict resolution rules.</p>
<p>Social Security Legislations</p> <p><i>The Employees Provident Fund and Miscellaneous Provisions Act, 1952 :-</i> Both employer and employees should contribute towards the provident fund at 8.33% of the wages and daily allowance and retaining allowance.</p> <p><i>The Employees State Insurance Act, 1948:-</i> Both employees and employer shall contribute 2.3% of the wages and the employer is prohibited from reducing wages of any employees either directly or indirectly on the ground of making a contribution. Employer cannot dismiss or punish employee during period of sickness.</p> <p><i>Payment of Bonus Act, 1965:-</i> Every employee shall be entitled to be paid by his employer in an accounting year, bonus in accordance with provisions of the Act which shall be 8.33% of the wage earned by the employee during the accounting year or one hundred rupees, whichever is higher.</p> <p><i>Worker Compensation Act, 1923:-</i> Employer is liable to pay compensation to workmen in events as personal injury, accident and occupational diseases arising out and in course of employment. The amount and quantum of compensations is based on schedule III (list of occupational diseases and schedule IV (factors for working out compensation).</p>

Source: Compiled from Goswami (1999), Pillai (1996), Taxmann (2001), Kumar (2003), Doabia (1987)

Table 59 Public health risks associated with MSW management plant components

1.	<p>Material sorting and recycling facility- Based upon research in the UK and other countries, Gladding (2002, p.58) states that material recycling plants especially the ones where mixed waste is sorted, show high concentration of dust, bioaerosols and metal toxins. Whereas Wheeler et al. (2001) and Swan et al. (2003) state that particulate matter may exist within 250 metres of the facility indicating a potential risk to the residents within this range. Gladding (2002, p.66) quotes a study from Denmark that considered bioaerosols to be of significant concern in waste sorting activities. Besides material sorting facilities are also vulnerable to fires and the noise and vibrations emanating from the plant also pose public health and occupational risks.</p>
2.	<p>Composting activities- Literature review (Harrison, 2007) reveals the potential negative impacts that composting activities may have in situ and in immediate adjacent areas. For instance, microbial decomposition of organic materials leads to production of CO², N²O, CH⁴ in addition to microbial population organisms which are potentially pathogenic. Secondly leachate so produced may contain high concentration of pathogens, organic components, metals or nutrients that can negatively impact water quality. Thirdly, the bio-aerosols⁹² concentrated downwind of outdoor composting facilities are present within distance of 200 to 500 metres. They are known to cause a wide range of health effects and infection (Harrison, 2007, p.2, 12). Finally, odour can be a persistent problem at composting sites especially if improperly managed compost pits deplete the supply of oxygen leading to anaerobic conditions (Harrison, 2007, p.12).</p>
3.	<p>RDF plant- According to GAIA (2013, p.9), people residing near RDF plants are exposed to high levels of dioxins and furans which are highly poisonous and can damage the reproductive system, immune system and hormonal imbalance and even cause cancer (GAIA, 2013, p.6). Also the heavy metal emissions can accumulate in the body and emitted nano particulate matter can enter human blood stream and cause damage to central nervous system, cardio-vascular and respiratory system, liver and kidneys.</p>
4.	<p>Sanitary landfill- In case of sanitary landfills, there is always a risk of flies, mosquitoes, rodents, birds and more so if there are lapses in maintaining it with a daily compaction and soil cover. As such, birds, rodents in particular can pose a serious hazard to aircrafts and nuisance to the surrounding population. Besides, the landfill is a potential source of unpleasant odour that may occur at the time of waste delivery and decomposition of waste and leachate formation (UNEP, 2005, p.363). A sanitary landfill is also subject to noise from landfill operating equipment and collection vehicles. The noise is quite similar to heavy construction activity and this is potential disturbance to surroundings. In addition, soon after or during the process of waste delivery, wind blown litter and bio-aerosols are a source of discomfort to the surroundings besides the landfill being a potential source of fire either due to self combustion (incase gas extraction is not conducted properly) or through receipt of hot ambers as waste components, sparks from collection vehicles or other equipment.</p>

Source: Compiled from Harrison (2007), Gladding (2002), GAIA (2013), UNEP (2005), Swan et al. (2003)

⁹² Bio-aerosols are particles of microbial plant or animal origin and may be called organic dust. They can include live or dead bacteria, fungi, viruses, allergies, bacteria, andotoxins and toxins (Harrison, 2007, p.12).

Table 60 GHG emissions from traditional and proposed MSW treatment

GHG Emissions from Baseline/traditional management of MSW (AMC and PC)										
Material	Baseline Generation of Material (TPD)	Estimated Recycling (TPD) ^a	GHG Emissions from Recycling (MTCO ₂) ^b	Estimated Landfilling (TPD)	GHG Emissions from Landfilling (MTCO ₂ E)	Estimated Combustion (TPD)	GHG Emissions from Combustion (MTCO ₂ E)	Estimated Composting (TPD)	GHG Emissions from Composting (MTCO ₂ E)	Total GHG Emissions MTCO ₂ E
Glass	4.8	2.0	(0.6)	2.8	0.1	0.0	0.0	0.0	0.0	(0.5)
Mixed Metals	12.0	5.0	(21.9)	7.0	0.3	0.0	0.0	0.0	0.0	(21.6)
Mixed Plastics	39.0	14.0	(14.5)	25.0	0.9	0.0	0.0	0.0	0.0	(13.6)
Food Waste	342.6	0.0	0.0	342.6	526.4	0.0	0.0	0.0	0.0	526.4
Mixed Organics	87.0	0.0	0.0	87.0	73.2	0.0	0.0	0.0	0.0	73.2
Mixed MSW	27.6	0.0	0.0	27.6	35.5	0.0	0.0	0.0	0.0	35.5
Concrete /bricks/ inert debris	87.0	0.0	0.0	87.0	3.2	0.0	0.0	0.0	0.0	3.2
Total	600.0	21.0	(36.9)	579.0	639.7	0.0	0.0	0.0	0.0	602.7
GHG Emissions from proposed alternative management of MSW										
Glass	4.8	4.8	(1.3)	0.0	0.0	0.0	0.0	0.0	0.0	(1.3)
Mixed Metals	12.0	12.0	(52.5)	0.0	0.0	0.0	0.0	0.0	0.0	(52.5)
Mixed Plastics	39.0	39.0	(40.4)	0.0	0.0	0.0	0.0	0.0	0.0	(40.4)
Food Waste	342.6	0.0	0.0	0.0	0.0	0.0	0.0	342.6	(53.2)	(53.2)
Mixed Organics	87.0	0.0	0.0	0.0	0.0	87.0	(12.1)	0.0	0.0	(12.1)
Mixed MSW	27.6	0.0	0.0	27.6	35.5	0.0	0.0	0.0	0.0	35.5
Concrete /bricks /inert debris	87.0	43.5	(0.5)	43.5	1.6	0.0	0.0	0.0	0.0	1.1
Total	600.0	99.3	(94.7)	71.1	37.1	87.0	(12.1)	342.6	(53.2)	(123.0)

^aTPD= tonnes/day. ^bMTCO₂E = metric tonnes of carbon dioxide equivalent. All recycling mentioned takes place in the informal waste sector.

Source: computed from WARM model (www.epa.gov/warm).

Table 61 Energy savings from traditional and proposed treatment/disposal approach

Energy savings from baseline/traditional management of MSW in BTU(AMC and PC)										
Material	Baseline Generation of Material (TPD)	Estimated Recycling (TPD)	Annual Energy Consumption from Recycling (million BTU)	Estimated Landfilling (TPD)	Annual Energy Consumption from Landfilling (million BTU)	Estimated Combustion (TPD)	Annual Energy Consumption from Combustion (million BTU)	Estimated Composting (TPD)	Annual Energy Consumption from Composting (million BTU)	Total Annual Energy Consumption (million BTU)
Glass	4.8	2.0	(4.3)	2.8	1.4	0.0	0.0	0.0	0.0	(2.9)
Mixed Metals	12.0	5.0	(333.4)	7.0	3.5	0.0	0.0	0.0	0.0	(329.9)
Mixed Plastics	39.0	14.0	(550.0)	25.0	12.6	0.0	0.0	0.0	0.0	(537.4)
Food Waste	342.6	0.0	0.0	342.6	172.8	0.0	0.0	0.0	0.0	172.8
Mixed Organics	87.0	0.0	0.0	87.0	43.9	0.0	0.0	0.0	0.0	43.9
Mixed MSW	27.6	0.0	0.0	27.6	13.9	0.0	0.0	0.0	0.0	13.9
inert debris	87.0	0.0	0.0	87.0	43.9	0.0	0.0	0.0	0.0	43.9
Total	600.0	21.0	(887.8)	579.0	292.1	0.0	0.0	0.0	0.0	(595.7)
Energy savings from proposed alternative management of MSW (BTU)										
Glass	4.8	4.8	(10.4)	0.0	0.0	0.0	0.0	0.0	0.0	(10.4)
Mixed Metals	12.0	12.0	(800.2)	0.0	0.0	0.0	0.0	0.0	0.0	(800.2)
Mixed Plastics	39.0	39.0	(1,532.2)	0.0	0.0	0.0	0.0	0.0	0.0	(1,532.2)
Food Waste	342.6	0.0	0.0	0.0	0.0	0.0	0.0	342.6	187.0	187.0
Mixed Organics	87.0	0.0	0.0	0.0	0.0	87.0	(202.0)	0.0	0.0	(202.0)
Mixed MSW	27.6	0.0	0.0	27.6	13.9	0.0	0.0	0.0	0.0	13.9
inert debris	87.0	43.5	(6.3)	43.5	21.9	0.0	0.0	0.0	0.0	15.6
Total	600.0	99.3	(2,349.1)	71.1	35.9	87.0	(202.0)	342.6	187.0	(2,328.2)

Source: Source: computed from WARM model (www.epa.gov/warm). BTU is British Thermal Units, a measure of energy

Table 62 Comparative analysis of MSW technologies

Efficiency Aspects	Composting	Biomethanation	Pelletization/RDF	Pyrolysis/gasification	Incineration
Waste characteristics	Moisture content > 50% Organic matter > 40% C/N ratio between 25-30	Moisture content > 50% Organic matter > 40% C/N ratio between 25-30	Moisture content < 45% Volatile matter > 40% C/N ratio between 25-30	Moisture content < 45% Net Calorific value > 1200 Kcal/kg	Moisture content < 45% Net Calorific value > 1200 Kcal/kg
Waste moisture efficiency	high	high	low	low	Very low
Suitability based on Indian waste characteristics	Suitable	Suitable	Not suitable. Needs additional auxiliary fuel	Not suitable. Needs additional auxiliary fuel	Not suitable. Needs additional auxiliary fuel
Need for segregation	Very high	Very high	high	high	low
Land requirement @ 500 TPD	6 hectares	4 hectares	3 hectares	10 hectares	4 hectares
Volume reduction	45-55%	55-65%	55-65%	> 80%	> 80%
Air pollution	low	low	high	low	high
Leachate pollution	Medium-high	Medium-high	medium	medium	Medium-high
Ability to tackle bio-medical and low hazard waste mixed in MSW	No	No	No	To some extent	Yes
Solid waste due to rejects/sludge formation	high	low	low	low	low
Capital costs (for a 500 tonne plant in Indian Rupees)	INR 17-20 crores	INR 75-80 crores	INR 17-20 crores	INR 80-90 crores	INR 80-90 crores

Source: Derived from Planning Commission (2014, p.65), MoEF (2010, p.3-31), MoUD (2012, p.20-22)

Table 63 Landfill specifications (MSW Rules, 2000)

landfill sites Aspects	Desirable specifications
Site selection	<p>Selection of landfill sites shall be based on examination of environmental issues.</p> <p>The landfill sites shall be selected to make use of nearby wastes processing facility. Otherwise, wastes processing facility shall be planned as an integral part of the landfill site.</p> <p>The existing landfill sites which continue to be used for more than five years shall be improved in accordance of the specifications given in this Schedule.</p> <p>The landfill site shall be large enough to last for 20-25 years.</p> <p>The landfill site shall be away from habitation clusters, forest areas, water bodies' monuments, National Parks, Wetlands and places of important cultural, historical or religious interest.</p> <p>A buffer zone of no-development shall be maintained around landfill site and shall be incorporated in the Town Planning Department's land-use plans.</p> <p>Landfill site shall be away from airport including airbase. Necessary approval of airport or airbase authorities prior to the setting up of the landfill site shall be obtained in cases where the site is to be located within 20 km of an airport or airbase</p>
Site level facilities	<p>Landfill site shall be fenced or hedged and provided with proper gate to monitor incoming vehicles or other modes of transportation.</p> <p>The landfill site shall be well protected to prevent entry of unauthorised persons and stray animals. Approach and other internal roads for free movement of vehicles and other machinery shall exist at the landfill site.</p> <p>The landfill site shall have wastes inspection facility to monitor wastes brought in for landfill, office facility for record keeping and shelter for keeping equipment and machinery including pollution monitoring equipments.</p> <p>Provisions like weigh bridge to measure quantity of waste brought at landfill site, fire protection equipments and other facilities as may be required shall be provided.</p> <p>Utilities such as drinking water (preferably bathing facilities for workers) and lighting arrangements for easy landfill operations when carried out in night hours shall be provided.</p> <p>Safety provisions including health inspections of workers at landfill site shall be periodically made.</p>
Landfilling modalities	<p>Wastes subjected to land filling shall be compacted in thin layers using landfill compactors to achieve high density of the wastes.</p> <p>Wastes shall be covered immediately or at the end of each working day with minimum 10 cm of soil, inert debris or construction material till such time waste processing facilities for composting or recycling or energy recovery are set up.</p> <p>Proper drainage berms shall be constructed to divert run-off away from the active cell of the landfill. After completion of landfill, a final cover shall be designed to minimize infiltration and erosion.</p>
Pollution prevention	<p>Diversion of storm water drains to minimize leachate generation and prevent pollution of surface water and also for avoiding flooding and creation of marshy conditions.</p> <p>Provisions for management of leachates collection and treatment shall be made. The treated leachates shall meet the standards specified</p>
Water quality monitoring	<p>Before establishing any landfill site, baseline data of ground water quality in the area shall be collected and kept in record for future reference. The ground water quality within 50 metres of the periphery of landfill site shall be periodically monitored to ensure that the ground water is not contaminated.</p>
Ambient air quality monitoring	<p>Installation of landfill gas control system including gas collection system shall be made at landfill site to minimize odour generation, prevent off-site migration of gases and to protect vegetation planted on the rehabilitated landfill surface.</p>
Site plantation	<p>Selection of locally adopted non-edible perennial plants that are resistant to drought and extreme temperatures shall be allowed to grow</p>

Source: MSW (Management and Handling) Rules, 2000 (MoEF, 2000)

Table 64 Monetary units

Indian	Western
One Lakh	One Hundred Thousand
Ten Lakh	One Million
One Crore	Ten Million
Ten Crore	Hundred Million

Table 65 Depreciation of vehicles, AMC and PC (in rupees)

Vehicle type	Number of vehicles		Vehicle capital cost	Total Capital Cost ^a		Typical economic life span of the vehicle ^b	Depreciation cost / annum/ vehicle ^c	Depreciation cost / annum/ all vehicles		Depreciation cost / month all vehicles		Depreciation cost / day all vehicles	
	AMC	PC		AMC	PC			AMC	PC	AMC	PC	AMC	PC
Dumper Placer	5	10	1000000	500000	1000000	7	142857.14	714285.71	1428571.42	59523.80952	119047.6	1956.947	3913.89
Tipper (TATA 1210)	4	6	1000000	400000	600000	7	142857.14	571428.5714	857142.85	47619.04762	71428.571	1565.557	2348.33
Mini Tapper (TATA Ace)	0	50	450000	0	2250000	7	64285.714	0	3214285.71	0	267857.14	0	8806.26
Large Truck (TATA 1613)	2	0	1285000	257000	0	7	183571.42	367142.8571	0	30595.2381	0	1005.870	0
Small Truck (TATA 709)	5	0	864000	432000	0	7	123428.57	617142.8571	0	51428.57143	0	1690.80	0
Tractor Trolley	48	0	600000	2880000	0	10	60000	2880000	0	240000	0	7890.41	0
Tempo	1	0	125000	125000	0	5	25000	25000	0	2083.333333	0	68.49	0
JCB (front and loader)	3	2	800000	240000	160000	10	80000	240000	160000	20000	13333.333	657.53	438.35
Bulldozer	2	0	900000	180000	0	10	90000	180000	0	15000	0	493.15	0
Water Sprinkler	3	0	500000	150000	0	7	71428.57	214285.7143	0	17857.14286	0	587.08	0
Hand Carts	50	0	7000	350000	0	3	2333.33	116666.6667	0	9722.222222	0	319.63	0
Cycle rickshaw	0	60	15000	0	90000	3	5000	0	300000	0	25000	0	821.91
Compactors	0	10	2400000	0	2400000	7	342857.14	0	3428571.42	0	285714.28	0	9393.34
Total Depreciation costs								5925952.381	938857.429	493829.3651	782380.95	16235.48	25722.1

^a & ^b Capital costs and economic life span information is taken from GOI (2009, p. 67), MoUD (2000, p.433), UN-Habitat (2010, p. 115). All costs are in Indian Rupees.

^cThe straight depreciation method applied herein does not include any operating or recurrent costs. Also it does not make allowance for inflation (the expected increase in the price of the asset during its economic life).

Table 66 Comparative vehicle operating costs^a (energy) (in rupees)

Vehicle type	Number of vehicles		Trips/ vehicle		Trips all vehicles		Fuel Consumption /trip		Fuel Consumption/ all trips / day		Fuel Consumption/ vehicle @landfill		AMC Fuel Consumption/all trips / day 2009 onwards (post-privatisation)
	AMC	PC	AMC	PC	AMC	PC	AMC	PC	AMC	PC	AMC	PC	
Dumper Placer	5	10	4	3	20	30	6	3	120	90	0	0	
Tipper (TATA 1210)	4	6	4	3	16	18	6	3	96	54	0	0	
Mini Tapper (TATA Ace)	0	50	0	4	0	200	0	2	0	400	0	0	
Large Truck (TATA 1613)	2	0	4	0	8	0	6	3	48	0	0	0	
Small Truck (TATA 709)	5	0	4	0	20	0	6	0	120	0	0	0	
Tractor Trolley	48	0	4	0	192	0	6	0	1152	0	0	0	
Tempo	1	0	2	0	2	0	4	0	8	0	0	0	
Compactors	0	10	0	3	0	30	0	3	0	90	0	0	
JCB (front and loader)	3	2	0	0	0	0	0	0	0	0	25	17	
Bulldozer	2	0	0	0	0	0	0	0	0	0	12	0	
Water Sprinkler	3	0	0	0	0	0	0	0	0	0	25	0	Total trips in 2009-10 = 161 trips
Total	73	78			258	278			1544	634	62	17	161
Total Fuel consumption including landfill vehicles									1606	651			1002.19
AMC trips all vehicles (2008)					258								
Trips all vehicles (2009)					161	278							
Fuel cost @Rs. 35 (2008)									56210				
Fuel cost @Rs. 35 (2009)									35076.65	22785			
Fuel cost @Rs. 41 (2010)									41089.79	26691			
Fuel cost @Rs. 42 (2011)									42091.98	27342			
Fuel cost @Rs. 42 (2012)									42091.98	27342			

^aVehicle downtime is not considered here due to lack of reliable data. Besides it is assumed that the down times may be compensated to some extent by increasing trip rates and therefore fuel consumption may not vary much.

Table 67 Vehicle operation costs (repair and maintenance) (in rupees)

Vehicle type	Number of vehicles		Vehicle capital cost	Repair & maintenance cost @8% / vehicle/annum	Vehicle repair and maintenance cost/annum	
	AMC	PC			AMC	PC
Dumper Placer	5	10	1000000	80000	400000	800000
Tipper (TATA 1210)	4	6	1000000	80000	320000	480000
Mini Tapper (TATA Ace)	0	50	450000	36000	0	1800000
Large Truck (TATA 1613)	2	0	1285000	102800	205600	0
Small Truck (TATA 709)	5	0	864000	69120	345600	0
Tractor Trolly	48	0	600000	48000	2304000	0
Tempo	1	0	125000	10000	10000	0
JCB (front and loader)	3	2	800000	64000	192000	128000
Bulldozer	2	0	900000	72000	144000	0
Water Sprinkler	3	0	500000	40000	120000	0
Hand Carts	50	0	7000	560	28000	0
Cycle rickshaw	0	60	15000	1200	0	72000
Compactors	0	10	2400000	192000	0	1920000
Total repair and maintenance/annum					4069200	5200000
Total repair and maintenance /day					11148.49315	14246.57534

Table 68 Comparative vehicle capacity and tonnage

Vehicle type	Number		Trips/vehicle		All trips		Vehicle capacity (cu.m)	All vehicle capacity (cu.m)		MSW (In Tonnes)	
	AMC	PC	AMC	PC	AMC	PC		AMC	PC	AMC	PC
Dumper Placer	5	10	4	3	20	30	4.5	90	135	45	67.5
Tipper (TATA 1210)	4	6	4	3	16	18	6	96	108	48	54
Large Truck (TATA 1613)	2	10	4	0	8	0	10	80	0	40	0
Small Truck (TATA 709)	5	0	4	0	20	0	4	80	0	40	0
Tractor Trolley	48	0	4	0	192	0	3	576	0	288	0
Tempo	1	0	2	0	2	0	1.5	3	0	1.5	0
Compactors	0	10	0	3	0	30	12	0	360	0	180
MSW collection 2008-09										462.5	
MSW collection 2009-12										290	301.5

Capacities from AMC (2009, p.630), UN-Habitat (2010, p.73,95). MSW conversion from cu.m to tones, 1 cu.m= 0.5 tonnes of MSW

Table 69 Comparative equipment number, depreciation and maintenance cost (in rupees)

Infra type	Req. ^a as per norms	Number		Capital cost	Economic life	Total capital cost		Total depreciation cost/ annum		Total depreciation cost/ month		Total depreciation cost/ day		Equipment maintainance cost /annumm		Equipment maintainance cost /day	
		AMC	PC			AMC	PC	AMC	PC	AMC	PC	AMC	PC	AMC	PC	AMC	PC
4.5 cu.m container	200	90	10 0	56000	5	50400 00	5600 000	1008000	1120 000	84000	93333	2800	3111.1 1	403200	448000	1104.66	1227.40
1.1 cu.m container	900	0	40 0	29500	3	0	1180 000	0	3933 333	0	327777	0	10925. 93	0	944000	0.00	2586.30
240 litre bins	894	0	60	4450	3	0	2670 00	0	8900 0	0	7416	0	247	0	21360.00	0.00	58.52
polemoun ted litter bins (60 litre)	800	0	0	0	0	0	0	0	0	0	0	0	0.00	0	0	0	0
10 cu.m container	0	10	0	62000	5	62000 0	0	124000	0	10333	0	344. 44	0	49600	0.00	135.89	0.00
7 cu.m container	333	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total depreciation cost								1132000	5142 333	94333	428527	3144	14284	452800	1413360	1240.55	3872.22

^aReq. Refers to requirement

Table 70 Schedule of payments by AMC to PC (2009-2012) (in rupees)

Months	Amount 2009	Amount 2010	Amount 2011	Amount 2012	Escalation charges
January	0	4058925	3089850	2123000	927785
February	0	5726925	3040938	0	946175
March	2342244	3341915	3158645	0	946115
April	5228998	2944415	3245035	0	0
may	5593120	3252550	3290247	1854370	0
June	5481643	3608760	2930134	2298149	0
July	4947215	3405010	2641278	2123368	0
August	4237233	3318450	2560800	0	0
Sept	4554810	3263655	1996780	0	
Oct	3464347	3450560	2572530	0	0
Nov	3845425	3577430	2645079	0	0
Dec	3845425	3305650	3298194	0	0
Total	43540460	43254245	34469510	8398887	2820075
Grand total of all payments	132483177				
Average payment/month	4354046	3604520.417	2872459.167	1199841	90970.16129
Adding escalation charges per month (2010-2012)	0	90970.16129	90970.16129	90970.16129	
Average payment/month with escalation charge	4354046	3695490.578	2963429.328	1290811.161	
Average payment/day	145134.8667	123183.0193	98780.9776	43027.03871	

Table 71 Summary of costs to private company

Costs/day		2008	2009	2010	2011	2012
Total Vehicle cost/ day						
		0	62753.68	66659.68	67310.68	67310.68
Labour cost/ day						
		0	48073.67	43400	45395.83	45395.83
Equipment depreciation/ day						
		0	14284.25	14284.25	14284.25	14284.25
Maintainance cost of equipments/ day						
		0	3872.21	3872.21	3872.21	3872.21
Administration over head cost @ 5% of labour cost						
		0	2403.68	2170	2269.79	2269.79
Total costs/day						
		0	131387.49	130386.14	133132.76	133132.76
Total monthly costs			3941624.7	3911584.2	3993982.8	3993982.8
costs/annum			39416247	46939010.4	47927793.6	27957879.6
annual payments to PC			43540460	43254245	34469510	8398887
escalation charges paid to PC	2820075					
Total costs to PC during its operations	162240931					
Total payment by AMC to PC	132483177					
cost or benefit to PC	-29757754					

Appendix II Interview Protocols and Survey Instruments

Protocol Number ENV/28/13/HREC

Project title: Private Sector Participation in Municipal Solid Waste Management in Indian Cities and its Implications

Interview Protocol- Informal Waste Pickers

Key Questions for Semi Structured Interview

Part A Questions related to socio-economic status and occupation.

1. Please could you let me know your age and education level?
2. What is your occupation within the waste sector?
3. Why do you work in the waste sector and what are your relative earnings per month?
4. What is the size of your household?
5. How many members from your household are engaged in waste management and why?
6. How long have you been engaged in the informal waste sector and what are your reasons for working in waste sector?
7. In which areas (zones) do you operate and do you undertake door to door waste collection?
8. From how many houses and in what manner do you collect waste? Please mention your experiences.
9. How much is the fees that you charge for door-door collection and how is it fixed? Do you think it is appropriate with your work level? Why/why not?.
10. Is there any other transaction between you and the households? Please explain.
11. Do you/your household members collect waste from the landfill and or community containers? If yes, explain the manner and experiences in accessing and collecting waste.
12. How much waste do you collect per day?
13. Please describe the recyclable components of waste that you collect, segregate and sell and the monetary value of each. Also describe the sorting to selling process, how and where it is conducted and the problems you face.
14. Do you get a fair price for the recyclable waste that you collect? Please explain.
15. Do you use any protection while collecting waste? How/ why not?
16. What kind of problems do you face in sorting and selling? Please explain.
17. What kind of obstacles have you faced so far in undertaking work operations.
18. Describe your encounters with the Amritsar municipal corporation authorities.
19. Do you ever feel discriminated against due to the nature of occupation you pursue? If yes, please describe your experience.
20. If yes, How you believe that this situation can be improved?
21. Do you have an organization/network that can fight for your rights as important stakeholders in the waste management process? If yes, please explain the work done so far.
22. If no, then in order to safeguard your occupational interests are you willing to organize yourself into a micro enterprise and negotiate with the municipality to consider you for contract awarding? If no, why not?
23. Do you think by the virtue of your pursuing this occupation, you have the natural right over access to waste in the city?
24. What do you perceive would happen to you/ your community if you lose your right to access waste at household/community containers/landfill level?

Questions related to Private Sector

25. Are you aware of the time period when the private company was engaged to manage the city's waste?
26. Being an important stakeholder in waste management in the city, were you given any information by the municipality of their intention to hire a waste management company?
27. Have you ever approached the municipality to negotiate or formalize your role in city's waste management operations?
28. Describe your encounters with the private company.
29. How did private company impact your operations in terms of employment and livelihood especially in terms of income?

30. What impact and alternatives do you foresee for yourself if the private company takes over completely and you no longer have access to waste?
31. Have you ever been approached by the Municipality or the private sector company to become involved as an employee in the waste management operations to be undertaken by them?
32. What are your perceptions and views about privatization of waste management in the city?
33. If an integrated model is proposed would you be keen to be integrated with formal waste management operations in the city? If yes, suggest how. If no reason why not.

.....

Interview Protocol- Private Sector Participants (Managerial)

Key Questions for Semi Structured Interview

1. Please describe your previous experience in municipal solid waste management.
2. What does sustainable municipal solid waste management mean to you as a private enterprise?
3. In your opinion what is public- private partnership and what it entails?
4. In your opinion/experience, did the Municipality have adequate knowledge and capacity for engaging with a private sector as it did? Explain how/why not?
5. Please describe the experience of the bidding process and the mechanism in place by the virtue of which you were allotted the contract.
6. Please explain the contents of the contract (including time period of contract for collection, time period and nature of concession of fixed facility as WTE/landfill).
7. Did you receive any fiscal help(tax concessions, etc) from the municipal corporation when you began operations in the city? Describe.
8. Was a feasibility analysis conducted by your company to assess the suitability of private sector participation in waste management?
9. Were the roles of the private sector and the municipality clearly allocated in the contract? Describe how.
10. What mechanisms were put in place for sharing information and schedule of meetings, recording of minutes?
11. Could you highlight the risk coverage and allocation between the municipality and the private company as in the contract?
12. Was there a specific PSP cell set up within the municipal corporation before embarking on engaging the private company?
13. Explain how the tariff was designed(how payments were to be made, whether it varied based upon the level of difficulty in providing service in an area, amount of waste to be collected,etc), agreed upon and if there were provisions for adjustments.
14. Describe the manner in which the operations of the private company were evaluated and monitored by the municipal corporation.
15. While the private company was in operation was there an instance that its services were found inadequate by the municipal corporation? If yes, then on what grounds and what were the penalties?
16. What do you think were the fiscal benefit and savings to the municipality by engaging the private company?
17. Why did the private company withdraw its services suddenly and without any indication or prior notice to the municipality?
18. What have been the consequences of this withdrawal to you as a private company and what lessons can be learnt in your opinion?
19. What do you see as the principal flaws in the contract that led to the outcomes?
20. In retrospect what do you think were the weaknesses or strengths of the contract?
21. When you began operations in the city what were your expectations from the city administration and the municipality in particular?
22. Could you elaborate upon the waste managing operations performed by your company in the city.
23. How and why do you think the company was providing appropriate waste management services to the city?
24. Are you aware of the Government of India Municipal Solid waste management manual and how did you abide by it?
25. Were you able to share municipal assets? How/why not?
26. How/why not was waste segregation practiced?
27. Was there any provision for establishing transfer stations? How/why not?
28. How/ why not did the private company claim a right over the waste produced in the city?
29. Please elaborate upon the specific problems encountered by your company in the waste management operations.
30. What waste disposal practices were adopted by you and why?
31. Did you encounter any problems in the tipping fee model? Please explain if encountered.

32. Do you think that the technological option chosen, i.e. the Waste to energy plant is the most viable option for waste management?
33. Why did the WTE plant not come up?
34. Do you think the waste disposal practices adopted were scientific and environmentally sound? How/why not?
35. What kind of problems did you encounter from the community during service delivery?
36. What kind of problems did you encounter from your working staff?
37. How would you describe your relations with the Amritsar municipal corporation?
38. As you know about the informal waste pickers, was there any move on your part to integrate them by means of employment, etc into the waste management processes? How/why not?
39. If they operated parallel, what would you do to counter them?
40. What methodology do you follow to hire workers/staff?
41. How do you ensure that they are adequately trained?
42. What facilities are available to them?
43. How did you involve the community in the waste collection process? How/why not?
44. Please describe the manner in which grievances were addressed and customer satisfaction achieved.
45. Please describe the financial viability of the venture to your company and the issues therein.
46. What additional transactional costs were incurred by the company while running the operations?
47. Did you absorb any workers from the public sector? How/why not?
48. What were the reasons that led to the breakdown of the operations and the final contract breakdown?
49. Could you highlight the risk coverage and allocation in the contract?
50. What do you see as the principal flaws in the contract that led to the outcomes?
51. What do you see as the major positives of the contract that could be considered favourable to your operations?
52. If the contract has to be re negotiated, what clause would you like to add or delete?
53. How was information exchanged between your company and the municipality?
54. Did your company in any way contribute or organize capacity building programmes with the public sector? How/why not?
55. Did the municipality organize any programmes to transfer its working knowledge of the city to your staff?
56. Did the municipality or the private party ask for a contract re-negotiation/modification? If yes, why?
57. Did any changes to the original contract occur post the private operations? If yes what were the changes?
58. If the contract has to be re-negotiated or initiated for a new private venture, what clause would you like to add or delete?
59. Did any institutional capacity building/ knowledge transfer take place between the municipality and the private sector? How/why not?
60. What transactional costs have been incurred by the private company as a result of its deal with the municipal corporation?
61. Could you please describe the series of litigations and court cases either by municipality or the private company and what has been their outcome so far.
62. If you have to take up a contract towards waste management in the city again, what conditions would your company ensure are in place?

Interview Protocol- Stakeholders from the Public Sector (worker Unions)

Key Questions for Semi Structured Interview

1. Please tell me when this union was set up and what circumstances led to its establishment.
2. Please describe how many MC employees were engaged in solid waste management before the private company began operations in the city.
3. How many were permanent and how many casual/ contract based?
4. Please describe the work done by the sawai sewaks/ drivers/ labourers including total area and hours.
5. Please describe the payments and other benefits given by MC to the permanent/ casual and contract based employees.
6. Were salaries given regularly before the coming of the private company?
7. Describe worker problems before private company came and what kind and how many agitations were organized.
8. What were the demands of the worker unions before private company came?
9. How did MC conceded to these demands?
10. Please describe the situation when you heard that a private company would take over waste management operations in the city. What was your reaction?
11. Were there fears that you and other workers would be asked to leave especially the casual/temporary workers?
12. Did the municipality terminate/retrench any employees, how many in your knowledge?
13. How did you negotiate with the municipality?
14. Was any offer made by the municipality in terms of alternate absorption in other departments or any other option given to you?
15. Describe the situation post the private sector operations, how it affected your work in any way?
16. Did the private sector operations reduce or affect your work in terms of duration leading to any salary cuts?
17. Were you/ any of your colleagues offered work opportunity with the private sector?
18. Have there been any possibilities for exchange of knowledge and information with the private sector?
19. Please describe the demands and worker agitations and the outcomes post the announcement of private company by the municipality.
20. In your opinion what is public- private partnership and what it entails?
21. How do you recall it when the private sector was managing the waste operations in the city. Please describe its operations in the city.
22. In your opinion what factors were responsible for its success or failure as you see them?
23. How does the municipality look at its own performance compared to the private company and what difference is observed?
24. In your opinion/experience, did the Municipality have adequate knowledge and capacity for engaging with a private sector as it did? Please describe the preparation process.
25. Please explain the contents of the contract (including time period of contract for collection, time period and nature of concession of fixed facility as WTE/landfill).
26. Explain how the tariff was designed (how payments were to be made, whether it varied based upon the level of difficulty in providing service in an area, amount of waste to be collected, etc), agreed upon and if there were provisions for adjustments.
27. Was any kind of a tax exemption given to the private company? If yes please explain.
28. Describe the manner in which the operations of the private sector were evaluated and monitored.
29. Please describe the asset sharing mechanism between the public and the private sector.
30. While the private sector was operation was there an instance that its services were found inadequate? If yes, then on what grounds and what were the penalties?
31. What is your opinion about the informal waste pickers?
32. Has there ever been an attempt or thought to involve them into the formal waste management mechanisms? How/why not?
33. Are you aware that in the event of the door-door collection of waste and the coming of the waste to energy plant, the informal waste pickers would lose their livelihood?

34. With the coming of the private sector, what kind of resistance was faced from the labour unions and what steps were taken by the municipality to deal with it? Please describe in detail all agitations and its outcomes.
35. Did any retrenchment or salary cuts or freeze on recruitments thereafter take place? How? Did the municipality offer any support to its casual (retrenched) workers to help them by absorbing them in other works within the municipality or helping them in gainful employment with the private company?
36. What were the fiscal benefit and savings to the municipality by engaging the private sector?
37. Was there a situation when the benefits became ephemeral and not as much as they were perceived initially?
38. Why did the private company withdraw its services suddenly and without any indication or prior notice?
39. What have been the consequences of this withdrawal and what lessons can be learnt in your opinion?
40. Did the municipality or the private party ask for a contract re-negotiation/modification? If yes, why?
41. Did any institutional capacity building/ knowledge transfer take place between the municipality and the private sector? How/why not?
42. What transactional costs have been incurred by the municipality as a result of its deal with the private company?
43. Could you please describe the series of litigations and court cases either by you or the private company and what has been their outcome so far.
44. Do you think private sector should be involved again the waste management in the city? Why/why not?
45. What should be done to ensure successful municipal solid waste management in the city henceforth?

Interview Protocol- Stakeholders from the Public Sector (Managerial)

Key Questions for Semi Structured Interview

1. Please describe the status of municipal solid waste in the city.
2. In your opinion what is public- private partnership and what it entails?
3. How do you recall it when the private sector was managing the waste operations in the city.
4. In your opinion what factors were responsible for its success or failure as you see them?
5. How does the municipality look at its own performance compared to the private company and what difference is observed?
6. In your opinion/experience, did the Municipality have adequate knowledge and capacity for engaging with a private sector as it did? Please describe the preparation process.
7. When private sector arrangements were being initiated, what external fiscal or technical assistance did the city receive from state/central government or from other agencies?
8. Was engaging the private sector imposed upon as part of an agreement or a way to get grant from the central/state government?
9. Was any kind of staff capacity building procedure undertaken? How/why not?
10. Please describe the process by which the private firms were approached and awarded the contract.
11. Please explain the contents of the contract (including time period of contract for collection, time period and nature of concession of fixed facility as WTE/landfill).
12. Please describe the implementation procedures and mechanisms that were put in place to enable private sector to participate in waste management operations (regarding the contract such as concession rights, dispute resolution mechanism, labour issues).
13. What in your opinion/experience was lacking in setting up the implementation procedures and mechanisms?
14. Was a feasibility analysis conducted to assess the suitability of private sector participation in waste management?
15. Were the roles of the private sector and the municipality clearly allocated in the contract? Describe how.
16. What mechanisms were put in place for sharing information and schedule of meetings, recording of minutes?
17. Could you highlight the risk coverage and allocation between the municipality and the private company as in the contract?
18. Was there a specific PSP cell set up within the municipal corporation before embarking on engaging the private sector?
19. Explain how the tariff was designed(how payments were to be made, whether it varied based upon the level of difficulty in providing service in an area, amount of waste to be collected, etc), agreed upon and if there were provisions for adjustments.
20. Was any kind of a tax exemption given to the private company. If yes please explain.
21. Describe the manner in which the operations of the private sector were evaluated and monitored.
22. Why was only one private company involved and not some others also? That would have ensured some contestability and competition.
23. Please describe the asset sharing mechanism between the public and the private sector.
24. While the private sector was operation was there an instance that its services were found inadequate? If yes, then on what grounds and what were the penalties?
25. Why do you think the technological option Waste to energy was preferred over others?
26. Was there a provision for minimum guaranteed flow control in terms of quantity of waste to be delivered to a landfill site?
27. What mechanism was in place in case of reduction in waste quantity?
28. How do you think it was the best option for managing the city waste?
29. What did the waste to energy plant not come up as proposed?
30. In the absence of the waste to energy plant, how was a safe and environmentally sound disposal system ensured?
31. Please describe the manner in which the private company was directed to segregate and recycle waste.

32. What is your opinion about the informal waste pickers?
33. Has there ever been an attempt or thought to involve them into the formal waste management mechanisms? How/why not?
34. Are you aware that in the event of the door-door collection of waste and the coming of the waste to energy plant, the informal waste pickers would lose their livelihood?
35. With the coming of the private sector, what kind of resistance was faced from the labour unions and what steps were taken by the municipality to deal with it?
36. Did any retrenchment or salary cuts or freeze on recruitments thereafter take place? How? Did the municipality offer any support to its casual (retrenched) workers to help them by absorbing them in other works within the municipality or helping them in gainful employment with the private company?
37. Was the community involved in the waste management processes? How/why not?
38. What were the fiscal benefit and savings to the municipality by engaging the private sector?
39. Was there a situation when the benefits became ephemeral and not as much as they were perceived initially?
40. Why did the private company withdraw its services suddenly and without any indication or prior notice?
41. What have been the consequences of this withdrawal and what lessons can be learnt in your opinion?
42. What do you see as the principal flaws in the contract that led to the outcomes?
43. What do you see as the major positives of the contract that could be considered favourable to your operations?
44. Did the municipality or the private party ask for a contract re-negotiation/modification? If yes, why?
45. Did any changes to the original contract occur post the private operations? If yes what were the changes?
46. If the contract has to be re-negotiated or initiated for a new private venture, what clause would you like to add or delete?
47. Did the municipality initiate user charges? How/why not?
48. Did any institutional capacity building/ knowledge transfer take place between the municipality and the private sector? How/why not?
49. What transactional costs have been incurred by the municipality as a result of its deal with the private company?
50. Could you please describe the series of litigations and court cases either by you or the private company and what has been their outcome so far.
51. What should be done to ensure successful private sector participation in municipal solid waste management henceforth?
52. Do you still wish to involve the private sector in waste management operations in the city? Reasons for yes/no.

Interview Protocol-Private Sector employees (field operations)

Key Questions for Semi Structured Interview

1. Describe your occupation level, skills and experience in waste management sector.
2. Did you have any waste management skills/experience when you joined the private company?
3. Have you been imparted any special training to perform your job by the private company?
4. What work were you required to do when you were hired ?
5. Did you need to any additional tasks. Describe.
6. What was the wage given to you?
7. Were there any deductions on your salary? Describe if any.
8. How long did you work for the company?
9. Why did you leave?
10. Describe the working conditions in waste management operations undertaken by you.
11. What was the normal duration of shift you were required to undertake?
12. Did you work overtime and were you paid for it? At what rate?
13. Was the waste handling undertaken by you manual or tool based?
14. During the course of operations did you ever experience any mishap/accident? If yes, describe.
15. Have you experienced health issues related to your occupation? If yes, describe them and why do you think they are related to your occupation?
16. Did you have accident protection in terms of insurance or any other form of security?
17. Were you given protective clothing such as uniform, shoes, gloves, masks and provided with protective vaccination?
18. What benefits were offered to you in terms of employee provident fund, allowances,etc?
19. Describe your experience with the employers? Did at any point of time you felt that you were being exploited? If yes, describe.
20. Describe your experiences and interactions with the community/households while you were working.
21. Describe your experiences with the municipality during the course of your work operations.
22. How do you rate your level of satisfaction with the private company in terms of
 1. Wages
 2. Leave
 3. Security/allowances
 4. Protective clothing
 5. Overtime payments
 6. Work environment
 7. Any other..
23. DO you remember of any incident in which workers made some specific demands from the employers? If yes, what were the demands and how were they handled by the private company?
24. Describe the workers strike if any and the conditions leading to them and the outcomes.
25. Did you have any information from the company that they would withdraw operations as they did?
26. If yes, did the company make financial compensation to you for job loss.
27. How did this have an impact short term as well as long term on your income and quality of life?
28. How long did you have to wait before getting another employment and what is its nature?
29. Did you have a legal service agreement with the company?
30. If yes could you describe its contents.
31. Do you think that the company fulfilled all its obligations as an employer in terms of the service agreement?
32. What do you think could have been done by the company instead of withdrawal?
33. What could have been done by the company for better worker conditions and job satisfaction?

Interview Protocol- Public Sector Employees (field operations)

Key Questions for Semi Structured Interview

1. Please describe your occupation, skills, working hours and experience in the waste management sector.
2. Do you have access to uniforms/shoes/gloves and other safety wear including masks and vaccination as a part of the municipal staff to manage waste?
3. Are you temporary or casual employee with the municipality
4. Please describe the situation when you heard that a private company would take over waste management operations in the city. What was your reaction?
5. Were there fears that you and other workers would be asked to leave especially the casual/temporary workers?
6. Did the municipality terminate/retrench any employees, how many in your knowledge?
7. How did you negotiate with the municipality?
8. Was any offer made by the municipality in terms of alternate absorption in other departments or any other option given to you?
9. Describe the situation post the private sector operations, how it affected your work in any way?
10. Did the private sector operations reduce or affect your work in terms of duration leading to any salary cuts?
11. Were you/ any of your colleagues offered work opportunity with the private sector?
12. Have there been any possibilities for exchange of knowledge and information with the private sector?
13. Describe the benefits that you get as a permanent staff/casual staff with the municipality.
14. If you had a choice would you work with the municipality or the private sector? Why?
15. In your opinion what factors hamper waste management operations in the municipality?
16. Please describe the demands and worker agitations and the outcomes post the announcement of private company by the municipality.

Interview Protocol- Small scrap dealers/kabadiwallahs

Key Questions for Semi Structured Interview

Part A Questions related to socio-economic status and occupation.

1. Please could you let me know your age and education level?
2. What is your occupation within the waste sector?
3. What are your relative earnings per month?
4. What is the size of your household?
5. How many members from your household are engaged in waste management?
6. How long have you been engaged in the kabari (waste) work and what are your reasons for working in waste sector?
7. In which areas (zones) do you operate and do you undertake door to door waste collection?
8. From how many houses at an average per month/per day) and in what manner do you collect waste? Please mention your experiences.
9. Why do you think that the community sells its waste to you? Is it only for money or any other reason?
10. Do you perceive of a situation when the community would not sell its waste to you and choose to discard it since the money is small?
11. Which section of the community does not sell its waste to you as on today?
12. How much is the fees/ payment that you make for door-door collection and how is it fixed?
13. Please explain the waste recyclables collected by you and its pricing. Eg, iron, steel, glass, paper and newspapers, plastic bags, wood waste, plastic bottle, glass bottles, human hair, and other important components .
14. Is there any other transaction between you and the households? Please explain.
15. Do you also buy waste from the rag pickers? Describe the most common contents that rag pickers bring to you and what amount is given to them for each.
16. How much waste do you collect per day from households/ from rag pickers?
17. Please describe the waste collection to sorting to selling process, how and where it is conducted, by whom (you, family members, hired workers) and the problems you face.
18. Do you get a fair price for the recyclable waste that you collect? Please explain.
19. Do you use any protection while collecting waste? How/ why not?
20. What kind of problems do you face in sorting and selling? Please explain.
21. What kind of obstacles have you faced so far in undertaking work operations.
22. Describe your encounters with the Amritsar municipal corporation authorities.
23. Do you ever feel discriminated against due to the nature of occupation you pursue? If yes, please describe your experience.
24. If yes, how you believe that this situation can be improved?
25. Do you have an organization/network that can fight for your rights as important stakeholders in the waste management process? If yes, please explain the work done so far.
26. If no, then in order to safeguard your occupational interests are you willing to organize yourself into a micro enterprise and negotiate with the municipality to consider you for contract awarding? If no, why not?
27. Do you think by the virtue of your pursuing this occupation, you have the natural right over access to waste in the city from the households and the rag pickers?
28. What do you perceive would happen to you/ your community if you loose your right to access waste at household or from rag pickers?

Questions related to Private Sector

29. Are you aware of the time period when the private company was engaged to manage the city's waste?
30. Being an important stakeholder in waste management in the city, were you given any information by the municipality of their intention to hire a waste management company?

31. Have you ever approached the municipality to negotiate or formalize your role in city's waste management operations?
32. Describe your encounters with the private company.
33. How did private company impact your operations in terms of employment and livelihood especially in terms of income?
34. What impact and alternatives do you foresee for yourself if the private company takes over completely and you no longer have access to waste?
35. Have you ever been approached by the municipality or the private sector company to become involved as an employee in the waste management operations to be undertaken by them?
36. What are your perceptions and views about privatization of waste management in the city?
37. If an integrated model is proposed would you be keen to be integrated with formal waste management operations in the city? If yes, suggest how. If no reason why not.

Protocol Number ENV/28/13/HREC

Project title: Private Sector Participation in Municipal Solid Waste Management in Indian Cities and its Implications

Interview Protocol- Stakeholders from the NGO (Pollution Control Committee)

Key Questions for Semi Structured Interview

1. In your organizations perspective, what does sustainable municipal solid waste management mean in context of Amritsar city?
2. In your organizations perspective what does private sector participation in municipal solid waste management stand for?
3. Please describe the status of MSW in the city before the private operations began.
4. Please describe the origin, work of PCC as an NGO and the issues it is engaged with in the city.
5. Please describe the work and issues raised by the PCC prior to the MC contract with private sector company.
6. Did PCC play any role in convincing or creating conditions for the MC to turn to private sector in MSW? How?
7. Please describe the litigations by the PCC before the engagement of the private company.
8. Please describe the privatization process of the MC including bids and contracting and how PCC played a role in any kind of monitoring/suggestions.
9. What were PCC expectations with the coming of the private sector to manage waste in the city?
10. In the PCC's observation please describe the private sector waste management operations in the city.
11. Was there a marked difference before and after engaging the private company? If yes, please describe.
12. In your perspective what was the social, economic and environmental gain to the city by employing the private sector?
13. In your perspective how does the municipality's performance compare to the private company and what difference was observed?
14. In your opinion/experience, did the Municipality have adequate knowledge and capacity for engaging with a private sector as it did? Please describe the preparation process.
15. Was engaging the private sector imposed upon as part of an agreement or a way to get grant from the central/state government?
16. Please describe the process by which the private firms were approached and awarded the contract.
17. Please explain the contents of the contract to your knowledge (including time period of contract for collection, time period and nature of concession of fixed facility as WTE/landfill).
18. Please describe the implementation procedures and mechanisms that were put in place to enable private sector to participate in waste management operations (regarding the contract such as concession rights, dispute resolution mechanism, labour issues).
19. What in your opinion/experience was lacking in setting up the implementation procedures and mechanisms?
20. Was a feasibility analysis conducted by the MC to assess the suitability of private sector participation in waste management.
21. Were the roles of the private sector and the municipality clearly allocated in the contract? Describe how.
22. Could you highlight the risk coverage and allocation between the municipality and the private company as in the contract?
23. Was there a specific PSP cell set up within the municipal corporation before embarking on engaging the private sector?
24. Do you know of any kind of a tax exemption given to the private company. If yes please explain.
25. Describe the manner in which the operations of the private sector were evaluated and monitored by the MC/ the PCC.
26. Please describe the asset sharing mechanism between the public and the private sector.
27. Why do you think the technological option Waste to energy was preferred over others?
28. How do you think it was the best option for managing the city waste?
29. What did the waste to energy plant not come up as proposed?
30. What is your opinion about the informal waste pickers?
31. Has there ever been an attempt or thought to involve them into the formal waste management mechanisms? How/why not?

32. Are you aware that in the event of the door-door collection of waste and the coming of the waste to energy plant, the informal waste pickers would lose their livelihood?
33. With the coming of the private sector, what kind of resistance was faced from the labour unions and what steps were taken by the municipality to deal with it?
34. Did any retrenchment or salary cuts or freeze on recruitments thereafter take place? How? Did the municipality offer any support to its casual (retrenched) workers to help them by absorbing them in other works within the municipality or helping them in gainful employment with the private company?
35. Was the community involved in the waste management processes? How/why not?
36. What were the fiscal benefit and savings to the municipality by engaging the private sector?
37. Was there a situation when the benefits became ephemeral and not as much as they were perceived initially?
38. Why did the private company withdraw its services suddenly and without any indication or prior notice?
39. What have been the consequences of this withdrawal and what lessons can be learnt in your opinion?
40. What do you see as the principal flaws in the contract that led to the outcomes?
41. In your opinion what factors were responsible for its success or failure as you see them?
42. Has the MC given any importance to the opinion of the PCC in determining its course of action towards waste management? How/why not?
43. What in your opinion is the best alternative for sustainable waste management in the city for the future and why?
44. In the light of the experience of privatization, do you think the waste should be managed by the MC?
45. In case of the MC engaging a private company again, what modalities should be put in place to ensure that a failure is avoided?

Interview Protocol- Punjab Pollution Control Board, Amritsar Office

Key Questions for Semi Structured Interview

1. Please describe the role of this office in MSWM in the city till date.
2. What kind of notifications do you issue to the MC from time to time regarding MSW and how do you ensure that MC abides by your notifications?
3. How do you ensure that MSW rules 2000 are properly followed and implemented in the city?
4. As you would know the private company Antony waste handling cell ltd was given the task of managing waste in the city. How was your office involved in this project and what role did you play?
5. Did you have a role in the bidding/contracting process including analysis of DPRs of Phase I and Phase II regarding setting up of MSW plant?
6. Did you think that the private company was well equipped and experienced to undertake waste management efficiently in the city?
7. Do you think it played a good/poor role in sustainable waste management in the city. Please describe your observations/experiences.
8. In your perspective what was the social, economic and environmental gain to the city by employing the private sector?
9. In your opinion/experience, did the Municipality have adequate knowledge and capacity for engaging with a private sector as it did? Please describe the preparation process.
10. What in your opinion/experience was lacking in setting up the implementation procedures and mechanisms?
11. Was a feasibility analysis conducted by the MC/PPCB to assess the suitability of private sector participation in waste management.
12. Describe the manner in which the operations of the private sector were evaluated and monitored by the PPCB.
13. What is your opinion about the informal waste pickers?
14. Has there ever been an attempt or thought to involve them into the formal waste management mechanisms? How/why not?
15. Are you aware that in the event of the door-door collection of waste and the coming of the waste to energy plant, the informal waste pickers would lose their livelihood?
16. Was the community involved in the waste management processes? How/why not?
17. What were the fiscal benefit and savings to the municipality by engaging the private sector?
18. Why did the private company withdraw its services suddenly and without any indication or prior notice?
19. What have been the consequences of this withdrawal and what lessons can be learnt in your opinion?
20. In your opinion what factors were responsible for its success or failure as you see them?
21. What in your opinion is the best alternative for sustainable waste management in the city for the future and why?
22. In the light of the experience of privatization, do you think the waste should be managed by the MC and why?
23. In case of the MC engaging a private company again, what modalities should be put in place to ensure that a failure is avoided?

Data Collection Schedule

General

1. Population trends
2. City area
3. City landuse trends
4. City character
5. City wards and locality names
6. Wardwise population

Solid waste System in the city

1. Solid waste system in the city before the coming of the private sector
 - Classification in sanitary wards/divisions
 - Manpower
 - Collection Vehicles
 - Storage systems (bins,etc)
 - Collection
 - Disposal mechanisms
 - Disposal sites and areas
 - Waste generation trends
 - Characteristics of waste generation and types with %

Solid Waste System

2. What is the current total waste generation in the city?
3. How many sanitary zones/divisions are there in the city?
4. Please give the list of wards in each zone/division.
5. Please give the classification of the city's waste (in tones/%)
6. What amount in % or tones is collected from the city?
7. % Collection by door-door service
8. Waste collection methods- door-door

Transport mode	Collection%
Door to door by pushcart/human drawn rickshaw	
Door-door by animal with baskets	
Door-door by animal with cart	
Door-door by small pickup truck	
Door-door by tractor trolley	
Door-door by open truck	
Door-door by compaction truck	
Door-door by other means(please specify)	

9. Total number and location of secondary/community/roadside storage points in the city.
10. % collection from community/roadside storage points/dumps
11. Collection mechanisms from community/roadside storage points

by pushcart/human drawn rickshaw	
by animalcart	
by small pickup truck	
by tractor trolley	
by open truck	
by compaction truck	
Using skip containers that are lifted and taken away by a truck	
Mechanical emptying of containers	
Using arm-roll containers taken away by truck	
Any other means(please specify)	

12. What is the frequency of collection?

Sanitary divisions/zones	population	Waste generation	Collection frequency			
			Once/w week	Twice/w week	daily	Any other way

8. Please provide the following vehicle characteristics

Vehicle type	number	Capacity in cubic metres	age	Availability (70% of time)	MC owned and operated	MC owned, privately operated	Privately owned and operated on contract	Privately owned, operated by MC on contract
pushcart/human drawn rickshaw								
animalcart								
small pickup truck								
tractor trolley								
open truck with non tipping body								
Open Tipping truck								
Skip container and lift truck								
compaction truck								
Roll-on container and arm roll truck								
Others (please specify)								

9. Mechanism in place for repair and maintenance of vehicles

10. Where does the MC park its vehicles at night?

11. Does the MC have its own repair and maintenance workshop? If yes where is it located and how much is its capacity in terms of space and full time and part time working staff.

12. Please provide the details of the secondary/community/roadside storage containers

Storage type	Total number of containers	Capacity of containers	
Open dumping on road side(no designated point)			
Open dumping roadside designated points			
Dumping in brick bound space			
Dumping in small plastic containers			
Dumping in small iron			

containers			
Dumping in large municipal containers			
Others (pl specify)			

13. Sanitary division/zone wise distribution of secondary storage

Sanitary division/zone	Number of open dumping roadside designated points	Number of brick bound space	Number of small plastic containers	Number of small iron containers	Number of large municipal containers	Others specify

14. Spacing distance between small to small containers

15. Spacing distance between large to small containers

16. Spacing distance between large to large containers

17. Transfer stations predominantly receive medium-sized quantities of solid waste (i.e. loads greater than one cubic meter and less than ten cubic meters) from animal carts and collection vehicles. At these transfer stations the waste is loaded into large transfer vehicles, usually with a capacity of more than 15 cubic meters, which take the waste to a final disposal site. Indicate the number of such transfer stations in the City according to the method by which the waste is loaded into the large transfer vehicles:

- Open ground with clearing by wheeled loaders.....
- Ramp and elevated unloading platform with clearing by wheeled loaders.....
- Ramp and elevated unloading platform served by roll-on containers and arm-roll trucks.....
- Other (Please describe).....

18. How many total people work in solid waste service. How many are

i. permanent staff:

ii. casual/daily employees:

iii. contract employees:

Designation	Number	Permanent/casual/contract	Union representation (yes/no) name of union
Administrative staff			
Sanitary inspectors			
supervisors			
Collection vehicle drivers			
Collection workers (loading/transporting)			
Street sweepers			
Workshop staff			

18. How many workers are engaged in door to door service?

19. How many workers are engaged in collection from community storage and road sweeping?

20. Are the workers provided with safety equipment like gloves/mask/boots for handling waste?

21. How many permanent employees have retired from solid waste management services in the past 5 years?

22. How many workers have been made permanent or hired on permanent basis in the past five years?

23. How many casual/daily and contract workers have been hired in the past 5 years?

24. How many permanent/casual workers in solid waste have been retrenched in the last five years?
25. How many workers in solid waste have been transferred to other departments of the MC in last 5 years?
26. What is the city budget for all services for the last 5 years?
27. What is the budget for solid waste management in the city for last five years?
28. Please give the budgetary expenditure of the MC for the last five years including all subheads and solid waste in particular.
29. What percentage of the budget has come from central government (including JNNURM) for last five years?
30. What percentage of the budget has come from state government(including JNNURM) for last five years?
31. Do households pay a user charge for solid waste services? If yes how much/month?
32. How much do commercial establishments pay for solid waste management services?
33. How much do institutional establishment pay for solid waste services?
34. Is there a tariff structure based on the following?
 - i. Amount of waste generated?
 - ii. Consumer income level
 - iii. Property size
 - iv. Any other way?
35. What percentage of the city's solid waste budget covered by direct user charges for solid waste services?
36. How are the charges collected?
37. How many designated landfill sites(with areas and location) exist in the city?
38. What is the mechanism of disposal practiced at landfill sites?
39. What infrastructure exists are the landfill sites?
40. How does the MC ensure that waste is safely disposed?
41. Please describe the future solid waste management plans for the city and how the MC intends to put them in place.
42. Please describe the MC efforts so far to reduce/recycle solid waste.
43. Please describe the MC efforts towards encouraging household and commercial solid waste segregation.
44. Please describe in detail the entire process of engaging the private sector (Antony waste handling cell) .
45. Please provide the Detailed Project Report (DPR) and a copy of the contract that was signed with the private company.
46. Please provide details of all written correspondence and minutes of all meetings with the private company in relation to execution of its duties towards waste management.
47. Please provide reasons for the breakdown of the contract.
48. Please provide details of all litigations engaged with the private company till date.

Protocol for Direct Observation

Direct observation can substantiate data verification and validity as collected by other methods such as interview and is therefore of immense use in case study research. Photographs and video recording may also provide critical evidence and facilitate interactive visual research. In this study, the research shall apply direct observations in the environmental sustainability domain while making direct unstructured observations of municipal solid waste context to supplement the data in terms of the criteria of storage collection and disposal effectiveness of municipal solid waste management by private operations in the city.

The direct observation data herein subscribes to the contents of section **3.0 Limited disclosure: no deception or active concealment of Booklet 33** of the Griffith University Research Ethics manual.

The student researcher has to make observations of spaces in the city to see the operations and conditions of municipal solid waste management. The indicators as given in table I below detail out what shall be observed by the student researcher. The student researcher will be observing the ways in which waste is stored, collected and disposed of by observing secondary roadside bins and also making periodic observation at the landfill and dumpsites. This activity shall largely pertain to observation of these spaces and operational procedures followed by the private sector company or the municipality. The researcher shall not initiate communication of her data collection, she shall equally not pretending to collect data about something else and shall not be in a 'hide' (section 3.0 of booklet 33). If approached by anyone about what the student researcher is doing, the student researcher shall be overt and provide information about the research project by sharing the information sheet.

The following questions are answered in relation to the direct observation protocol.

1. Is this the only practical way to pursue the objectives of the research?

In such like field study where the student researcher is trying to answer the question of sustainability in municipal solid waste management, direct observation as a data collection tool is immensely important and useful to substantiate the data collected by other means such as questionnaire and interviews and also to triangulate the data collection. In such a subject visual analysis provided by direct observation such as overflowing secondary bins, poor conditions at landfills could prove critical in evaluating municipal solid waste sustainability questions. Therefore the student researcher shall use this tool in data collection.

2. The extent of, and the reasons for, the deception or limited disclosure must be well defined.

The student researcher will be observing the state of municipal solid waste storage, collection and disposal meaning that she will be largely observing spaces. The human involvement in waste management operations is in four instances as highlighted in bold in table 1. The researcher's communication shall depend upon her level of interaction with the subjects. Incase of passive observation only, the researcher shall not overtly communicate about her data collection but at the same time not pretend to hide her motives. If approached by the 'observed' or any curious bystander, the student researcher shall disclose her intent and also provide the person with information sheet about the project.

3. Do the anticipated benefits of the research justify the use of deception or limited disclosure?

Using direct observation shall be immensely useful to the researcher and the study by helping to justify or falsify claims made by the documentary evidences/interviews and questionnaire about the actual operations and conditions of waste management in the city. This shall directly provide visual data for answering the key question of the research.

4. Will the deception or limited disclosure expose participants to a greater risk of harm?

The student researcher perceives no risk to the participants as they shall not be identified and no pictures shall be taken without their consent. In those conditions where the researcher has to interact closely, she shall choose to be overt and disclose the purpose of her observations. Also the field notes shall mention only the operational procedures undertaken and not specify the human's involved.

5. Is it likely that the participants would have consented to the research if they had known all of the details?

Base on her past experiences when the student researcher has been working on similar subject, she believes that the human subjects working in the field such as street sweepers/ vehicle drivers/waste collectors are approachable and cooperative and do not hesitate in sharing information even if they had known all details. As mentioned the researcher shall be overt if the situation demands so.

6. Will the full details of the research be provided to participants at a later point?

This will depend upon the request coming in from the participants to share the findings, the researcher shall not initiate it but neither shall she make an attempt to conceal any part of her research from any of the participants and shall willingly share it if asked.

7. Will participants be able to withdraw their consent and data at this point?

If during the process of overt direct observation, a participant is unwilling to be observed, for example the waste collector indicates that he does not want to be observed collecting waste, the student researcher shall not put any pressure and shall withdraw from that site instantly.

Visual data evidences (in the form of field notes and pictures) derived from direct unstructured observations shall be collected pertaining to the following aspects;

Table 1 Aspects for direct observation

Sustainability Dimension- Environmental Criteria	Observation aspects
Storage effectiveness and waste segregation	<ol style="list-style-type: none"> 1. Provision and placement of containers for secondary storage 2. Provision for segregated secondary waste storage, biodegradable(green), recyclable(white), other disposables(black) 3. covered/open containers 4. Maintenance condition 5. Capacity /type of secondary containers
Collection effectiveness	<ol style="list-style-type: none"> 1. Regularity/frequency of collection service at communal level 2. Street sweeping frequency 3. Waste spillover and conditions near secondary waste bins 4. type of vehicles used in collection service 5. Covered/uncovered vehicles collecting waste
Treatment and disposal effectiveness	<ol style="list-style-type: none"> 1. Provision for segregation of hazardous waste (incase hazardous waste is mixed) 2. Technological option if used in wastetreatment 3. Waste disposed of in landfills and its condition 4. Waste disposed in open dumpsites 5. Technical design and compliance of the landfill to requirement 6. Landfill facilities as weighing 7. Environment controls at landfill site <ul style="list-style-type: none"> -Daily compaction and soil cover -Presence of green buffer around landfill -Presence of animals/rodents at dumpsites/landfill 9. Visual Characteristics of the served/unserved/partially served zones

Household Survey Questionnaire

Community: Municipal solid waste management practices and perceptions towards private sector participation in Municipal Solid Waste Management

Survey Introduction

The following questionnaire comprises of Section A (6 questions), Section B (47 Questions), Section C (31 questions) and section D (10 Questions for residents near landfill). The purpose of this questionnaire is to determine the community perceptions and response to private sector participation in municipal solid waste management. By ticking in your responses you shall be making a valuable contribution to the research as mentioned on the preceding sheet on informed consent. The questionnaire shall take about 25 minutes to fill in. I thank you very much for your time and response.

A. Socio-Economic Information

1. Colony name and ward number.....
2. Respondent's age and gender.....
3. Respondent's education level.....
4. Respondent's occupation.....
5. Respondent's monthly household income.....
6. Total members in the household.....
7. Waste generation per day.....kgs (the researcher shall request the household to allow the waste to be weighted by her in order to judge the waste quantities generated by the households. The same sample information shall be useful to triangulate the information on waste quantities generated as documented by secondary sources as municipality records.)

B. Questions about Municipal Solid waste Management

1. What do you see from the following public services as one of the biggest concerns in your area?
1=Water supply 2=Sanitation 3= Inadequate public transport 4=Electricity supply
5=Municipal solid wastemanagement 6=Other.....
2. In your opinion how is the current municipal solid waste management situation in the city?
1= Very bad 2= bad 3= good 4= very good 5= excellent
3. How would you rate the current municipal solid waste storage (waste collection bins) system in the city?
1= Very Bad 2= bad 3= good 4= very good 5= excellent
4. How would you rate the current solid waste collection system in the city?
1= Very Bad 2= bad 3= good 4= very good 5= excellent
5. How would you rate the current solid waste disposalsystem in the city?
1= Very Bad 2= bad 3= good 4= very good 5= excellent
6. In your opinion how is the current municipal solid waste management situation in your area/ward ?
1= Very Bad 2= bad 3= good 4= very good 5= excellent
7. How would you rate the current municipal solid waste storage (waste collection bins) system in your area/ward?
1= Very Bad 2= bad 3= good 4= very good 5= excellent
8. How would you rate the solid waste collection/transportation system in your area/ward?
1= Very Bad 2= bad 3= good 4= very good 5= excellent
9. How is the disposal system for the waste producedfrom your area/ward?
1= Very Bad 2= bad 3= good 4= very good 5= excellent
10. Is waste littered on the streets/open spaces in your area/ward?
1= never 2 =sometimes 3= often 4= very often 5=always
11. How do you store your household waste?
1= Metal/plastic container 2=Basket/carton container 3= Polythene bag 4=No storage is done 5= any other way.....
12. If no storage is done how waste is managed?
1= Thrown on the road directly 2= Thrown in the adjoining plot 3=Thrown in the drain

- 4=Thrown directly in the secondary container 5 any other way.....
13. Does your household receive a door to door collection service?
1= Yes 2= No
 14. If yes, who is the collector?
1= Municipality worker 2= Private Company 3= Informal waste picker 4=not sure 5= don't know
 15. If yes, what is the frequency of collection?
1=daily 2= alternate days 3= thrice/week 4= twice a week 5= once a week 6= less than once a week 7= less than once in two weeks 8= any other.....
 16. If yes, which vehicle type is used to collect waste from your door step?
1= Rickshaw 2= wheelbarrow 3= open truck 4= covered truck 5= open tractor-trolley 6= covered tractor-trolley 7= animal drawn cart 8= waste picker on foot with sack 9= any other.....
 17. If no door to door service exists then how do you dispose of your waste?
1= Thrown on the road directly 2= Thrown in the adjoining plot 3= Thrown in the drain 4= Thrown directly in the secondary/community container 5 any other way.....
 18. Is there a secondary container in your vicinity?
1= yes 2=no 3= don't know
 19. If yes, do you find it accessible enough to dispose waste in it?
1= yes 2= no 3= can't say
 20. Which vehicle type is used to collect waste from the secondary/community bin that you dispose your waste in?
1= Rickshaw 2= wheelbarrow 3= open truck 4= covered truck 5= open tractor-trolley 6= covered tractor-trolley 7= animal drawn cart 8= waste picker on foot with sack 9= any other.....
 21. How often is the secondary/community container waste collected by the municipality?
1=daily 2= alternate days 3= thrice/week 4= twice a week 5= once a week 6= less than once a week 7= less than once in two weeks 8= any other.....
 22. If your household waste is disposed of on a roadside waste pile/surroundings, how often is it collected by the municipality?
1=daily 2= alternate days 3= thrice/week 4= twice a week 5= once a week 6= less than once a week 7= less than once in two weeks 8= any other.....
 23. If you have hired an informal waste picker how much do you pay him per month?
1= Upto Rs 50 2= Rs 50-100 3= Rs 100-150 4= Rs 150-200 5= More than Rs 200
 24. Does the informal waste picker come to collect waste everyday?
1= Yes- once a day 2= Every alternate day 3= Twice a week 4= Once a week 5= Any other arrangement form.....
 25. How do you rate the service of the informal waste picker
1= Very Bad 2= bad 3= good 4= very good 5= excellent
 26. Do you think waste pickers should be integrated into the organized municipal waste management systems?
1= yes 2= no 3= not sure
 27. If yes, why do you think so (you can tick more than one)?
1= they are very efficient and reliable 2= they charge very low 3= they should be helped as they are poor 4= other.....
 28. If no, why do you think so?
1= They are a nuisance and an eyesore 2= they make you feel insecure and are potential criminals 3 = they are a hindrance to organized municipal waste management systems 4= any other reason.....
 29. Do you know about waste segregation
1= Yes 2= no
 30. Do you practice waste separation at house hold level?
1= never 2 =sometimes 3= often 4= very often 5=always
 31. Do you segregate wet and dry waste into separate storage bins at household level?
1= Yes 2= no
 32. Do you segregate newspapers at house hold level?
1= never 2 =sometimes 3= often 4= very often 5=always
 33. Do you segregate plastic bags/ plastic bottles at house hold level?
 34. 1= never 2 =sometimes 3= often 4= very often 5=always

35. Do you segregate plastic bags/ plastic bottles at house hold level?
1= never 2= sometimes 3= often 4= very often 5=always
36. Do you segregate iron scraps at house hold level?
1= never 2= sometimes 3= often 4= very often 5=always
37. Do you segregate glass waste at house hold level?
1= never 2= sometimes 3= often 4= very often 5=always
38. Do you segregate organic waste from other waste at house hold level?
1= never 2= sometimes 3= often 4= very often 5=always
39. Do you segregate hazardous waste(such as batteries, chemical waste, bio-medical) from other waste at house hold level?
40. What motivates you to segregate waste at household level?
1= I can make money from the scrap dealer(kabariwallah) 2= I can reuse at home 3= I can give it to the waste picker for selling 4= It is environment friendly 5= any other reason
41. If you do not segregate waste , what is the principal reason?
1= I regard it as of no value 2= I see it as waste of time and effort 3= I am not aware that waste can be segregated and reused/recycled 4= It is the responsibility of the service provider any other reason.....
42. Do you practice waste reduction at household level?
1= yes 2= no
43. What according to you are the major issues in municipal solid waste management in your area? (you can tick more than one.)
1= Poor secondary storage infrastructure 2= Poor collection rate 3= Disposal on roadside/surroundings 5= Any other.....
42. Do you pay a user charge for waste collection services to the municipality?
1= Yes 2= No
44. If yes, how much?.....
45. Do you agree that waste disposal should be charged as per its amount generated for disposal?
1= Yes 2= No 3= not sure
46. If you are/have not been charged, how much are you willing to pay for clean surroundings and waste collection services?
1=Rs/Month 2= Will not pay 3= Don't know
47. What is your reason for not willing to pay?
1= Can't afford to pay any money 2= Don't believe that the service will be reliable 3= Don't consider the service important to pay for 4= Believe that taxes in general should cover the service provision
48. Did you ever lodge a complaint to the municipal corporation regarding waste issues in your area in recent times/past?
1= yes 2= no
49. If yes, what was the response in addressing the complaint?
1= Very Bad 2= bad 3= good 4= very good 5= excellent
50. As a responsible citizen of this city would you be willing to act as a model citizen to enhance waste reduction/segregation programmes in the city?
1= Yes 2= No 3= Not sure

C. Questions about the private company involvement in municipal solid waste management

1. Are you aware of the private company that was undertaking waste management services in your area from February 2009 to August 2012?
1= Yes 2= no
2. Did the private company collect the waste from your doorstep?
1= Yes 2= no
3. If yes, which vehicle type was used by the private company to collect waste from your door step?
1= Rickshaw 2= wheelbarrow 3= open truck 4= covered truck 5= open tractor-trolley 6= covered tractor-trolley 7= animal drawn cart 8= waste picker on foot with sack 9= any other.....
4. How do you rate the private company service delivery from your door?
1= Very Bad 2= bad 3= good 4= very good 5= excellent

5. If no door to door service was offered in your area by private company then how did you dispose of your waste?
1= Thrown on the road directly 2= Thrown in the adjoining/nearby vacant plot 3=Thrown in the drain 4=Thrown directly in the secondary container 5= any other way.....
6. Do you think the placement of the secondary container from your house was accessible?
1= Yes 2=no
7. What was wrong with the placement of the secondary container?
1= Too near my house 2=Too far from my house 3= Can't say
8. In your opinion how was the quality of the secondary container in terms of adequate size and design?
1= Very bad 2= bad 3= good 4= very good 5= excellent
9. Did you find the container overflowing/ littering by animals/rodents?
1= never 2 =sometimes 3= often 4= very often 5=always
10. Which vehicle type was used by the private company to collect waste from the secondary/community bin that you disposed your waste in?
1= Rickshaw 2= wheelbarrow 3= open truck 4= covered truck 5= open tractor-trolley 6= covered tractor-trolley 7= animal drawn cart 8= any other.....
11. How do you rate the overall private company service ?
1= Very Bad 2= bad 3= good 4= very good 5= excellent
12. How do you rate the private company service in comparison with the Municipal service?
1=worse 2= similar 3= better 4= much better 5= excellent
13. Did you remove the waste picker once the private company began door to door collections?
1=Yes 2= No
14. If yes, why?
1=Better service by private company 2= free service by private company 3= any other.....
15. How do you rate the private company service in comparison with the informal waste pickers?
1=worse 2= similar 3= better 4= much better 5= excellent
16. What was the frequency of waste collection door-door by private company?
1=daily 2= alternate days 3= thrice/week 4= twice a week 5= once a week 6= less than once a week 7= less than once in two weeks 8= any other.....
17. What was the frequency of waste collection from the secondary/community container by private company?
1=daily 2= alternate days 3= thrice/week 4= twice a week 5= once a week 6= less than once a week 7= less than once in two weeks 8= any other.....
18. Did the waste collection time of the private company fit your needs?
1= never 2 =sometimes 3= often 4= very often 5=always
19. Did you notice any improvement in your area owing to waste collection by the private company in comparison to the previous/current status when the waste was being managed by the municipal corporation?
1= yes 2= no 3 = Can't say for sure
20. What kind of improvement did you notice?
1= Cleaner surroundings, no waste on streets 2= No overflowing secondary containers 3= No rodents/ animals around secondary containers 4=Any other.....
21. Was the improvement level in your area same after one year of operation of the private company
1= Yes 2= no 3= some decline in service 4= can't say for sure
22. Did you notice any change in your waste disposal behaviour after the private company begun operations in your area
1= Yes 2= No 3= Can't say
23. If yes, what were the changes
1= I/my household disposed of more waste then before 2= I/my household began segregating the waste 3= No change in waste disposal pattern 4= Can't say for sure

24. Were you/ your household ever involved in any waste awareness programme at area/city level?
1= Yes 2=No
25. If yes, how were you involved?
1= Recycling activities 2=Waste segregation awareness 3=Waste reduction at household level 4=Any other activity
26. Did the private company ask/request you to segregate waste into wet and dry separately?
1= yes 2=no
27. Was there any initiative by the private company to give you information about the importance of waste recycling?
1= yes 2= no
28. Did you pay a user charge for waste collection services while private sector was operating?
1= yes 2= no
29. If yes, how much did you pay per month?.....
30. Did you ever lodge a complaint while the private sector services were operational?
1= Yes 2=No
31. If yes, what was the response in addressing the complaint?
1= Very Bad 2= bad 3= good 4= very good 5= excellent
32. Do you know that the private company withdrew its services in august 2012?
1= Yes 2=No
33. Did you notice any change in your area interms of waste collection/disposal after the withdrawal in august 2012?
1= The waste conditions deteriorated 2= The service was the same as before
3= The service was better than before 4= Can't say for sure
34. If you have to choose a service provider whom would you choose, rank them in order of your preference from 1-3?
1= Municipality 2= Private company 3=Informal waste picker 4= municipality+ private company partnership 5= municipality+ informal waste pickers partnership 6= private company+informal waste pickers partnership 7= municipality+private company+informal waste picker partnership 4=None of these 5= any other.....
35. Do you think that private company had the required knowledge and managing skills in order to manage waste effectively as compared to the municipality?
1= yes 2=no 3 not sure

Section D Additional questions for residents in proximity to the landfill site

1. How long (years/months) have you lived in this location?.....
2. What is your tenure status?
1= owner 2= rental 3= any other.....
3. Does being closely sited to the landfill disturb you
1= Yes 2= No 3= can't say
4. If yes, how (you can tick more than one)
1= Foul odour 2= Air pollution 3=Leachate and water pollution 4=Visual pollution
5= Disturbance from animals and rodents 6=anyother.....
5. Have you or your family members faced any of the following health issues in the near past? (you can tick more than one).
1= Respiratory disorders 2=Skin infections 3=Water borne diseases like diarrhea/cholera/gastroenteritis/others 4=Malaria/dengue 5= Any other.....
6. Have you wanted to shift to another location?
1= yes 2= no
7. If yes then why have you not shifted yet?
1= No buyer for this house 2= Low value offered 3= low rents here than other locations 4= Any other reason.....
8. Was the landfill existing before you moved to this location?
1= Yes 2= No
9. If yes, then what factors affected your decision to settle here? (you can tick more than one)
1= Land values/rents was low 2=Proximity to work place 3=Proximity to major city infrastructure 4= any other.....

- 10. Have you ever made a complaint to the authorities about the landfill?
1= Yes 2= No
- 11. If yes, what action was taken?
1= No action 2= Proposal to shift the landfill 3= Proper disposal mechanism assured
4= Any other.....
- 12. Can you recall deaths in your family living here ever since you moved here and its cause?.....
.....
.....

Thanks very much for participating in this survey, and for sparing your valuable time and effort.

Appendix III Research Ethics Documentation

GRIFFITH UNIVERSITY HUMAN RESEARCH ETHICS COMMITTEE

15-Jul-2013

Dear Ms Sandhu

I write further to the additional information provided in relation to the provisional approval granted to your application for ethical clearance for your project "NR:Private Sector Participation in Municipal Solid Waste management and its Implications" (GU Ref No: ENV/28/13/HREC).

The additional information was considered by Office for Research.

This is to confirm that this response has largely addressed the comments and concerns of the HREC.

This decision is subject to:

Provision of a signed copy of the Expedited Ethical Review Checklist (advice that this will be returned in due course is acknowledged).

However, you are authorised to immediately commence this research on the strict understanding that these matters are addressed and that you provide details of how they were addressed.

Please note that failure to provide a timely response to these matters may result in this authorisation being suspended or withdrawn. The standard conditions of approval attached to our previous correspondence about this protocol continue to apply.

It would be appreciated if you could give your urgent attention to the issues raised by the Committee so that we can finalise the ethical clearance for your protocol promptly.

Regards

Dr Kristie Westerlaken
Policy Officer
Office for Research
Bray Centre, Nathan Campus
Griffith University
ph: +61 (0)7 373 58043
fax: +61 (07) 373 57994
email: k.westerlaken@griffith.edu.au
web:

Cc:

Researchers are reminded that the Griffith University Code for the Responsible Conduct of Research provides guidance to researchers in areas such as conflict of interest, authorship, storage of data, & the training of research students.

You can find further information, resources and a link to the University's Code by visiting

<http://policies.griffith.edu.au/pdf/Code%20for%20the%20Responsible%20Conduct%20of%20Research.pdf>

PRIVILEGED, PRIVATE AND CONFIDENTIAL

This email and any files transmitted with it are intended solely for the use of the addressee(s) and may contain information which is confidential or privileged. If you receive this email and you are not the addressee(s) [or responsible for delivery of the email to the addressee(s)], please disregard the contents of the email, delete the email and notify the author immediately



Protocol Number ENV/28/13/HREC

Private Sector Participation in Municipal Solid Waste Management in Indian Cities and its Implications

INFORMATION SHEET

Who is conducting the research?

Kirandeep Sandhu
Doctoral Researcher - Urban Research Program,
Griffith School of Environment
Contact Phone: 0091-9501244377, 0414215650
Contact Email: kiran.sandhu@griffithuni.edu.au

Why is the research being conducted?

This research is being carried out by Kirandeep Sandhu of Griffith University as part of a doctoral research project about private sector participation in delivery of public service with focus on municipal solid waste in case of Amritsar city in Punjab state in India. The study is designed to investigate the role of the private sector in delivery of municipal solid waste management services in the city from the angle of environmental, economic, social and institutional sustainability and the factors that contribute to it being successful or failing to deliver sustainable municipal solid waste management.

What you will be asked to do

(For Semi Structured Interview) You will be asked to participate in a private, face-to-face, semi-structured interview, usually at your place of work or as per your choice, lasting about 60 minutes. The interview will, with your consent, be recorded.

(For the structured questionnaire) You are asked to fill in the structured questionnaire and tick the match you think is what you feel most appropriate in your opinion from the listed choices. The questionnaire comprises of 46 questions and shall take about 20 minutes of your time.

The basis by which participants will be selected

Potential participants have been invited to participate on the basis of the range of their involvement as stakeholders directly or indirectly in the domain of municipal solid waste management.

The expected benefits of the research

By undertaking this research, a body of data and evidence shall be generated that will enable evaluation of the outcomes of private sector participation in municipal solid waste management. The research shall provide a direction to the policy and decision makers at various levels to initiate or improve upon existing policies and programmes towards sustainable municipal solid waste management.

Your confidentiality

Data collected from you, including notes and transcripts of interviews, will only be accessible to researcher and research supervisors (Prof. Paul Burton and Dr. Aysin Dedekorkut-Howes), you will not be identified in any reports or publications arising from this research unless you have consented to this in writing. Identifiable data collected during this research will be held securely by me, the researcher and will not be made available to anyone beyond without your prior consent.

Your participation is voluntary

There is absolutely no obligation for you to participate in this research and if you do agree to participate you are free to withdraw from the research at any time.

Questions / further information

If you have any questions about the research or your participation you may contact the researcher, Kirandeep Sandhu, whose contact details are listed above.

The ethical conduct of this research

This project and Griffith University conducts research in accordance with the *National Statement on Ethical Conduct in Human Research (2007)*. If you have any concerns or complaints about the ethical conduct of the research project you should contact the Manager, Research Ethics on (07) 3735 4375 or email research-ethics@griffith.edu.au.

Feedback to you

You will be notified of any publications plans and if you wish you will be sent a draft copy of any report or publication arising from this research and invited to comment on its factual basis and/or on matters of interpretation.

Privacy Statement

The conduct of this research involves the collection, access and / or use of your identified personal information. The information collected is confidential and will not be disclosed to third parties without your consent, except to meet government, legal or other regulatory authority requirements. A de-identified copy of this data may be used for other research purposes. However, your anonymity will at all times be safeguarded. For further information consult the University's Privacy Plan at www.gu.edu.au/ua/aa/vc/pp or telephone (07) 3735 5585.



Private Sector Participation in Municipal Solid Waste Management in Indian Cities and its Implications

CONSENT FORM
PARTICIPANT COPY

Researcher Kirandeep Sandhu
 Griffith School of Environment, Urban Research Program
 Contact Phone:0091-9501244377, 0414215650
 Contact Email:kiran.sandhu@griffithuni.edu.au

By signing below, I confirm that I have read and understood the information package and in particular have noted that:

I understand that my involvement in this research will include face-to-face interview.

I have had any questions about the nature or conduct of the research answered to my satisfaction;

I understand that my participation in this research is voluntary;

I understand that if I have any additional questions I can contact the research team;

I understand that I am free to withdraw at any time, without comment or penalty;

I understand that I will not be identified in any reports or publications arising from this research unless I have consented to this in writing.

I understand that I can contact the Chief Investigator Prof. Paul Burton, telephone: (07) 55527047, p.burton@griffith.edu.au Manager and/or Research Ethics, at Griffith University Human Research Ethics Committee on 3735 4375 (or research-ethics@griffith.edu.au) if I have any concerns about the ethical conduct of the project; and

I agree to participate in the project.

Print name _____

Signature _____

Date _____ / _____ / _____

