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Application of Public Private Partnership in Sustainable Solid Waste Management, Case of Delhi and Manila Metropolises

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Hedaiatullah Saei

Abstract

Population growth, rapid urbanization and industrialization have challenged the public sector responsible for provision of solid waste services in the cities of developing countries. The increasing population and economical development has produced increasing volumes of waste to be managed. Current solid waste management in place has not met the excess demand for proper waste collection and disposal creating a backlog of wastes that accumulate within the urban environment and causing immense health and environmental hazards. Due to inability of public sector in provision of services, the need for reform of municipal solid waste management systems in the cities of developing countries is strongly felt. The challenge for these countries is to improve their solid waste management systems for both economical and environmental reasons. One of the possible solutions that have been repeatedly recommended by some of most influential organizations such as World Bank is private sector involvement in the waste sector.

It has been argued that partnership between public and private sectors lead to improvement in the delivery of solid waste services. The aim of this study was therefore to find out if, how and why the involvement of the private sector has led to better municipal solid waste management in Delhi and Manila metropolises.

A qualitative approach involving interviews used to gather the necessary primary data, while reference to relevant literature provided me with the much needed secondary data. A theoretical framework is developed using sustainable development concept and Social/Environmental justice theory. The theories have been used as a basis to compare theoretical and actual solid waste management practices when analysing the waste systems in both cities.

Table of Contents

I. Introduction

Before 1992 sustainable development as a concept was seen as a fashionable and popular term, while sustainability issues were more dominant and accepted by civil societies, but the Rio de Janeiro UN Conference on Environment and Development (the Earth Summit) in 1992 strengthened the popularity of the concept (Bell 2008). The 1992 world development report entitled 'Development and Environment' attempted to extend the earlier concepts of development to a fuller consideration of the environment and of a policy framework aiming at sustainability. The Rio conference produced two international agreements, two statements of principles and a major action agenda for sustainability at worldwide level, which was accepted internationally, the Agenda 21(for the 21st century).

The main scope and purpose of the concept of sustainable development is generally described as bringing together ecological, economic and social developments. Within the broader framework of sustainable development the concept of sustainable waste management is also an appropriate framework for studying not only the effects of improper waste management on human health and the natural environment but also the implications of current waste management practices for resource conservation and environmental sustainability (Schubeller 1996). One of the major factors that directly contribute to solid waste generation is urbanization and population growth.

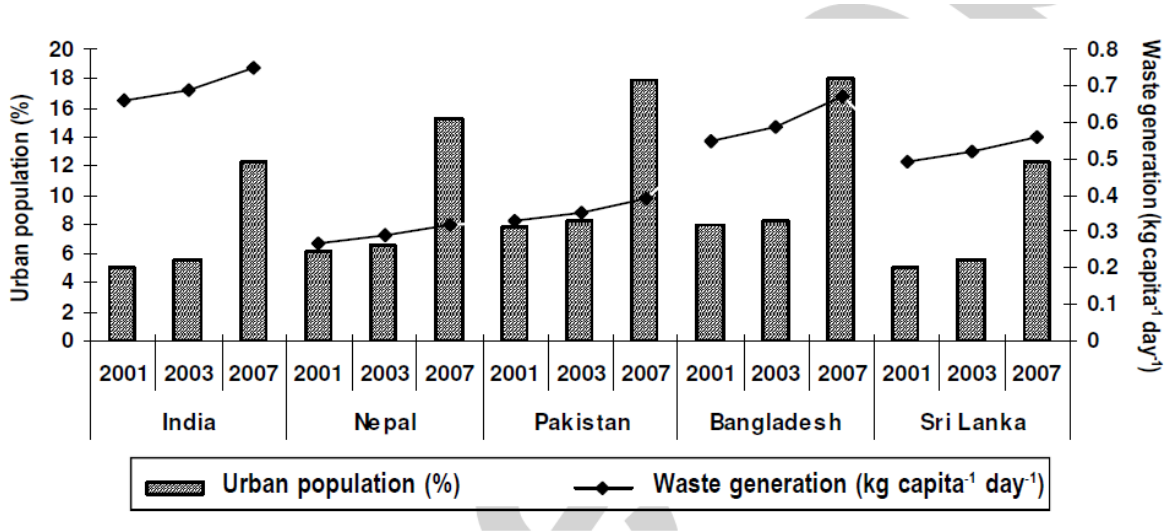

Fig.1.1: *Relationship between urban population and waste generation in five Asian developing countries from 2001 to 2007* (Khajuria 2010).

World population reached seven billion in 2011 and continues to rise with projection nearing 9.3 billion by 2050 (UNFPA 2011). In 2011, 60% of the world population lived in

Asia and according to UNFPA this continent will remain the most populous major area in the world during the 21st century. Urban areas are the most populous areas in the world, especially in developing countries, where people migrate from rural areas to urban areas in search for better life and employment (UNFPA 2011).

The population of urban areas in developing countries grow more than 150,000 every day (UNDESA, 2005, Cointreau, 2007). In fact the number of urban population is going to become double between 1987 and 2015 and almost 90 percent of this increase will happen in developing countries where growth rate exceed three percent a year which is three times more than industrialized countries (Medina 2010).

This increase in population which accompanied by unexpected and unplanned rapid urbanization on the one hand and economical growth in developing countries on the other, have accelerated the generation rate of municipal solid waste (Al-khatib 2010, Awomeso 2010, Medina 2010, Zerbock 2003, UNEP 2005a,).

Within the broader framework of urban environmental management, solid waste management has been a major area of public health and environmental concern in urban areas (cities) of many developing countries (Khajuria 2010, Joseph 2006, Medina 2010, Zerbock 2003, Zurbrugg 2003). But in the recent years, population growth and unplanned rapid urbanization in the cities of developing countries have significantly increased the environmental problems in these countries which have created different challenges for the municipal authorities and this is particularly true in the solid waste management area. The amount of waste produced daily is significantly increasing in the cities of developing countries, while the capacity and effectiveness of municipalities in providing municipal solid waste services remains undesirably low, (UN-HABITAT 2003, Medina, 2010).

Most cities are not able to collect the total amount of solid waste generated and of the waste collected, only a small percentage receives proper disposal, therefore solid waste management in most cities of developing countries is highly unsatisfactory (Schübeler 1996, UN-HABITAT 2010, Medina 2010).

Improper solid waste management leads to substantial negative environmental impacts (for example, pollution of air, soil and water, and generation of greenhouse gases from landfills), and health and safety problems (such as diseases spread by insects and rodents attracted by garbage heaps, and diseases associated with different forms of pollution) (UN-HABITAT 2010). Municipal authorities charged with responsibility of providing municipal solid waste management services have found it increasingly difficult to play this role.

Collection and safe disposal of solid waste in the cities of developing countries represent a huge problem and challenge for the municipalities. Solid waste in these

countries indiscriminately thrown away at different open dumps or at the number of temporary dump sites scattered throughout the city (Khatib, 2010). These open dump sites creates significant environmental problems such as polluting water resources, production of methane due to decomposition of organic waste which can cause fire and explosions and also contributes to global warming and production of strong Lechates due to chemical and biological process which pollutes ground water resources (Awomeso, 2010, Zurbrugg, 2003).

About 90 percent of the collected waste ends up in open dumps or simply burned in the back yards which are the most common disposal methods in developing countries, according to Cointreau, 2007 the rate of safe disposal is extremely low in developing countries as middle income countries and low income countries dispose 30% and 5% of collected waste respectively (Cointreau, 2007, Zurbrugg 2003, Medina, 2010). In another words systems for transfer, recycling and disposal of waste are unsatisfactory from the environmental, economical and financial points of view. Most of these cities have serious problems especially with collection and final disposal of municipal Solid waste.

Despite above mentioned problems, one more thing which is very important the issue of inequity in delivering municipal service for the citizens in the cities of developing world. In most cities of developing countries a significant portion of the population-particularly low income communities- does not have access to municipal services and among them waste collection service (Cointreau 2007, UN-HABITAT 2003, Khatib, 2010, Zurbrugg 2003), Moreover, there is a social and power-relation aspect to the waste problem, since waste in most cases dumped nearby poor or marginalised communities or groups unable to protest, This is not the end of the story, what is not mentioned is the presence of a huge informal sector involved in waste collection and recycling in many cities, using garbage as a source of income, and bearing the burdens of the city's waste. The people collecting recyclable waste are commonly called scavengers and the World Bank estimated that about 1% of the urban population in developing countries survive by scavenging (Medina 2007). This situation shows a kind of social discrimination against a number of citizens, while receiving fairly municipal services is the basic right of every citizen in a country. According to United States Environmental Protection Agency:

"The fair treatment and meaningful involvement of all people regardless of race, colour, national origin, or income with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies. Fair treatment means that no group of people, including racial, ethnic, or socioeconomic group should bear a disproportionate share of the negative environmental consequences

resulting from industrial, municipal, and commercial operations or the execution of federal, state, local, and tribal programs and policies" (USEPA 1998). Alastair Iles 2004 identified several Environmental Justice principals for both developing and industrial nations, one of these principles says:

"No-one should be exposed to potentially harmful health and ecological risks inherent in products and their wastes, or suffer the loss of human resources" (Alastair 2004).

While these definitions may have been given from slightly different perspectives, but they share some basic beliefs, which are: the right to a clean and healthy environment; the need to ensure that the poor or marginalized communities don't suffer disproportionately from negative environmental impacts; and the poor and marginalized have a fair share to the earth's resources (Adebowale 2009).

Existing solid waste management activities and current practices in developing country cities show that social/environmental justice has received less attention than the other concepts in environmental issues. Following these concepts in the current study was, therefore, seen as an opportunity to examine an important environmental problem from a different perspective. Furthermore, many theories can be applied for studying solid waste management, but one single study cannot be embedded within all different theoretical frameworks so a choice had to be made among them, thus, social/environmental justice.

1.1 Problem Statement

On the one hand, the failure in municipal service delivery by national and local governments in many cities of developing countries has often been attributed to inequitable resource allocation, low revenue collection, low service coverage, mismanagement, low institutional capacities, corruption and lack of transparency and accountability. The mentioned problems coupled with the increasing urban growth and waste generation in most of the cities in developing world have overwhelmed the capacity of the municipalities to provide adequate and efficient waste management services resulting in gross urban environmental decay and an increased involvement by informal sector who are in most cases not recognized by the authorities and other actors other than municipalities in solid waste management.

On the other hand, unplanned and rapid urbanization and population growth automatically increases the demand for waste services and this is due to the fact that people moving to the cities and the majority are likely to be migrants from rural areas in search for better life and employment (Khajuria, 2010, Zerbock 2003). Municipal tax and fee revenues, however, are not likely to rise as quickly as the population and in this situation public sector in many cities in developing world is unable to deliver services effectively and the reason behind this is that solid waste management in these countries receives less attention from governments and policy makers than that paid to other urban environmental problems, such as air pollution and wastewater treatment (Schübeler 1996, Zerbock 2003), lack of financial resources is another problem to cope with the increasing amount of generated waste produced by the rapid growing cities, insufficient funds from a central municipal budget cannot finance adequate levels of service (Zurbrugg, 2003). Thus, the formal sector which is administrated by the municipalities tends to be costly and inefficient (Medina, 2010). However not only financial problems affect the efficiency and sustainability of a waste collection service, other factors like operational inefficiencies by municipalities, inefficient organizational procedures, or deficient management capacity of the institutions involved as well as the use of inappropriate technologies also results in inefficient waste management (Schübeler 1996, Zurbrugg 2003).
So in general, solid waste management is given a very low priority in developing countries and as a result, the capacity and knowledge of municipalities in providing proper services remains very low and the levels of services required for protection of public health and the environment are not attained.

Now the question most of the municipalities in the developing countries face is, how these waste management problems can be solved in a sustainable way?
Following the rapid urbanization and population growth and unimpressive performance of the public sector in the provision of municipal services in many cities of middle and low-income countries, the search for alternative strategies for urban environmental services became inevitable. One of the suggested alternatives is private sector participation in urban solid waste management which has also been strongly advocated by the World Bank (Cointreau1994). It has been argued that the partnering of public and private sectors may lead to improvement and betterment in the delivery of municipal social services. Also privatization of urban services can be motivated by some of the following considerations; reducing the cost of public services to the consumers, relieving the financial and administrative burden on the government, satisfying unmet needs, increasing efficiency and promoting competition, adopting innovation and new technologies, proper maintenance of equipments (Cointreau1994, Zurbrugg 2003).

Studies and research on urban solid waste management in the developing countries and this idea shift from public controlled services to private participation in providing the services, started from the concern for public sector reform. According to Cointreau (1994), most studies started by pointing out the failures of public sector (too many workers, few supervisors, few incentives for better performance and lack of financial resources) and suggest different strategies and methods of privatization to circumvent these problems. In most of the available literature, the private sector is endowed with different qualities such as political independence, economic rationality, transparency, efficiency, and innovation; all these qualities make private sector to be measure up favourable to public sector enterprises, but at the same time there was strong recognition that when responsibilities are given to the private sector, necessary steps must be taken in order to ensure appropriate standards, ensure a competitive environment, minimize corruption and inequity, more importantly to avoid monopoly of the municipal services by private sector which are not publicly accountable (Cointreau1994; Rondinelli & Iacono 1996; Burgess, Carmona, & Kolstee 1997). Therefore, privatization of municipal services usually implies some kind of public–private arrangement or better known as public private partnership. In such situations, the government keeps some control, while saving on costs, and reducing political interference.

Since the capacities in the public sector in developing world are different, however, one question still stands whether the involvement of the private sector in solid waste management in the cities of developing countries considers the above mentioned issues and therefore leads to an improvement in the management of solid waste.
Based on the above mentioned arguments and reasons, this thesis project is going to study the public private partnership as an alternative to public sector controlled waste management and as a possible solution for the increasing problem of municipal solid waste in the cities of developing countries. Therefore the research question and sub questions of this study has been formulated as following:

To what extend can public private partnership improves the solid waste management situation in the cities of developing countries?

- **What are the current solid waste management practices and associated problems of it in Delhi and Manila cities?**
- **How public private partnership can help in provision of better waste services and reduction of the health and environmental risks?**
- **What are the possible prospects and constrains of public private partnership?**

1.2 Scope of the Study

This project tries to study the effectiveness of private sector participation in solid waste management sector and intends to focus on the public private partnership in solid waste management as a possible alternative and solution for the waste management problems in two cities of developing countries (Delhi the capital city of India and Manila the capital city of Philippines). The main purpose of this study is to focus on the possible solutions to either improve or make more efficient waste management practices in the above mentioned cities. Waste is an issue of both health and environmental concern to municipal authorities, governments and particularly people, therefore establishment of functional, efficient and adequate waste management systems are absolutely essential towards more sustainable solutions and governmental authorities have a great range of roles and responsibilities in this respect, including policy-making and taking other necessary steps in order to pave the way for more efficient and sustainable waste management systems.

II. Theoretical Framework

Mainly social justice and environmental justice concepts have been employed in this thesis, but some other concepts that are in a way related to the research topic have also been shortly discussed such as sustainable development. Social and environmental justice concepts will be discussed in order to study the solid waste management problems in Delhi, the capital city of India and Manila, the capital city of Philippines and to study the social and environmental injustice in municipal services distribution. However, there are many other theories and concepts that could be applied for such a study such as institutional theory, capacity building theory, good governance, political ecology. Political ecology for instance, could be used to study how social, economical and political factors affect the management and organization of solid waste systems (Bryman, A. 2008, Blaikie, N. 2000), while the concept of good governance could be used to study waste management aspects such as financial resources management for waste management and the rules and regulatory framework for private service providers involvement the waste management sector.

Improper solid waste management in the cities of developing countries has social and environmental cost, therefore I tried in this thesis to study solid waste problems in Delhi and Manila cities from a different perspective, thus, social/environmental justice have been applied in this study.

2.1 Waste Management, Sustainable Development and Millennium Development Goals

Sustainable development refers to "*development that meets the need of the present without compromising the ability of future generations to meet their own needs*" (Brundtland Commission, 1987). In order to achieve sustainable development, having an appropriate approach and strategy for solid waste management is essential. OECD environmental outlook 2020 listed municipal waste generation among the "red light" pressures on the environment and one of the problems that need to be addressed urgently. A waste management policy towards waste minimization and changing patterns of consumption was recognized among the solution to the environmental problems by OECD (OECD 2001).

As mentioned earlier in the first chapter, rapid and uncontrolled urbanization and population growth has significantly increased the amount of solid waste produced daily in the cities of developing countries. When improperly managed, waste has

very serious impacts on people's well-being and implicitly on the achievement of the MDGs (Millennium development goals) (Coad and Gozenbach 2007). Proper solid waste management can contribute to achieve the following Millennium Development Goals.

2.1.1 Goal 1: Eradicate Extreme Poverty and Hunger.

Although indirect, the impact of improper waste management on poverty is even more insidious and long lasting. It has been proven that healthier people are more likely to escape poverty. Thus well management of municipal solid waste and removing the effects of waste on health would have positive implications on poverty reduction, which is the first of the eight MDGs. Furthermore, waste management provides employment opportunities for cities` poor in activities such as sweeping, collection and recycling (Coad and Gonzenbach 2007). By improving their working conditions, waste management can contribute to reducing poverty and improving the quality of life of the people. For instance, in India about one million people find livelihood opportunities by collecting and recycling of waste. Though informal in nature but still is a source of income for them.

2.1.2 Goal 4: Reduce Child Mortality.

One of the initial reason for better management of solid waste is to protect people`s health. Improperly managed solid waste makes a good breeding place for houseflies and other insects, which are a major vector for different diseases such as diarrhoea and outbreaks of plague, which are deadly infectious disease and particularly affect children, so proper waste management can reduce child mortality (Coad and Gonzenbach 2007). Furthermore, drains blocked by dumped waste cause flooding and are favourable breeding places for mosquitoes spreading Malaria, dengue, and other diseases and burnt waste causes respiratory illnesses, especially affecting waste workers and those living in vicinity of dumps. (Coad and Gonzenbach 2007) Additionally, waste causes surface and ground water pollution, which is one of the major sources of health problems in the developing countries.

2.1.3 Goal 7: Ensure Environmental Sustainability.

Proper and sound solid waste management can also contribute to the achievement of the environmental sustainability, for instance, recycling reduces the demand for raw materials and saves energy. Forests can be protected by using recycled pulp

and use of biogas produced by anaerobic digestion process of biodegradable waste instead of using wood for cooking. Proper disposal and treatment avoids surface and ground waters pollution, created through dumping waste into rivers and lakes, and leachate from landfills (also a source of methane emissions) (Awomeso 2010, Narayana 2008). Uncollected waste which is carried away to rivers, lakes and sea affects the ecosystems. Composting is also one of possible options which reduces the need for chemical fertilizers, has positive spill-over effects on health, as the use of good quality compost in agriculture and food production process improves nutrition.

2.2 Environmental Ethics

Environmental ethics refers to "*the moral relationship between human beings and nature*" (Lundmark 2003). Environmental ethic discourse mainly focuses on two systems of belief, anthropocentrism and ecocentrism.

The anthropocentrism belief considers human beings separate from the nature and more important and worth than the other organisms. In this belief the nature is seen as a source of providing the resources which can be used for human purposes. Anthropocentrism judges our acts towards nature on the basis of how they affect us, not on how our acts affect other beings (Lundmark 2003).

But in contrast, an ecocentrism belief sees the environment consisting of "complex system of ecological interdependence" (Lundmark 2003). In this belief each organism and environment are given intrinsic value and it says that pollution and other forms of human interventions can have multiple ecological effects, therefore ecocentrism is disagree with the anthropocentrism belief which puts and absolute dividing line between nature and human beings (Lundmark 2003). This thesis is based on ecocentrism idea, because I strongly believe that all living beings have the same right to live in this planet. In my opinion, it is our moral duty to help those in need, especially those who are weaker than us.

2.3 Environmental justice theory

The interest for environmental and social justice begun in the United States in the 1980s, which was the result of growing frustration of the African-Americans in the US with the placement of toxic landfills and garbage incinerators in the neighbourhoods or communities of minority population. Therefore, the concept of

environmental equity was presented as a fight against environmental racism (Hannigan 2008). Environmental equity argues that all people have the equal right to natural resources such as clean air, land, water and food, and the right to live and work in a clean and safe environment, regardless of their race, colour, national origin and wealth.

2.4 Background

As mentioned earlier, the rising interest in low-income communities and communities of colour in the United States in 1980s, which unfairly bore the burdens of environmental hazards, was the spark that lit the fire for environmental and social justice (Low and Gleeson 1998). Different definitions of environmental justice have been given by variety of organizations interested in the topic.

The United States Environmental Protection Agency defines the environmental justice as:

"The fair treatment and meaningful involvement of all people regardless of race, colour, national origin, or income with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies. Fair treatment means that no group of people, including racial, ethnic, or socioeconomic group should bear a disproportionate share of the negative environmental consequences resulting from industrial, municipal, and commercial operations or the execution of

Above mentioned definition clearly emphasizes on basic value which is the right to a clean and healthy environment for everyone; the need to ensure that the poor communities do not suffer disproportionately from negative environmental impacts and the poor and marginalized have a fair share to the earth's resources (Adebowale 2009).

In its first decade, studies of social and environmental justice concentrated on a small set of problems, defining environmental justice as reducing inequalities in distributing environmental harms and exposures to risks across a population (Alastair 2004). Later on, environmental justice analyses have started to develop from several different angles. From the perspective of the meanings of "justice", the contradiction between environmental justice and social justice has been highlighted by arguing that economically poor communities may be politically willing to accept a waste site nearby if employment and local government income is promised (Dobson 2003; Alastair 2004).

According to Clapp, "*waste often takes advantage of economic inequalities making their ways to disadvantaged communities*" (Clapp 2002). As the powerful and rich communities externalise their environmental impacts, wastes usually ends up in remote rural areas and in the least developed and fashionable urban neighbourhoods (Ackerman and Mirza 2001). This is exactly the case in most of cities in the developing world among them Delhi and Manila, where waste is generally dumped where poor people live, poor communities suffer most from inadequate waste collection services, and the workers involved in the waste recycling, come from the most poor and marginalised social groups, which shows a picture of deeply social inequality (Agarwal 2005).

2.5 Social Justice and Municipal Solid Waste Management

At least from an egalitarian point of view, it may be desirable for most of the people in a society that the collective benefits (such as natural resources) and the collective burdens (such as pollution) are equally distributed between the members. But in the real world, the poor and most vulnerable groups of society are discriminated against as they receive fewer benefits and bear more burdens in their societies (Tilly 2004). This discrimination against a poor and vulnerable group of people in a society, who are not able to protest or defend themselves, has been conceptualized as social injustice (Miller 1999, Syme and Nancarrow 2001). According to Miller social injustice refers to "*Perceived unfairness or injustice of a society in its distributions of benefits and burdens*" (Miller 1999), while Syme and Nancarrow defines social injustice as "When not all people within a society have equal access to facilities, services or systems within that society" (Syme and Nancarrow 2001). And it is exactly what is happening in the developing countries, a great portion of the people who are the poor and most vulnerable groups of society have not access to solid waste service (Cointreau 2007, UN-HABITAT 2003, Khatib, 2010, Zurbrugg 2003). For instance in Mumbai, one of the mega cities in India, there are highly-serviced areas, medium-serviced areas and very low-serviced areas. It is worth to mention that the low served areas are mostly slums. According to Mukherjee, slums are not seen as the rightful recipients of the formal systems of solid waste management. It means that a huge area of the city and a significant number of the population do not receive municipal solid waste services, since slums form 60% of Mumbai`s population (Mukherjee, 2005). Therefore, advocacy and mentioning of social injustice is a way of protesting against it and in my opinion in should be a duty especially for the governments to correct injustice in society and pave the way for fairly distribution of rewards and burdens among their population.

III. Research Methodology

The aim of this chapter is to present the structure of the report, provide a description about the research methods used in order to answer the project's research questions as well as clarify the reasoning behind choosing each of these methods.

Two methods have been used in order to answer the research question of this project. First municipal solid waste management practices and public private partnership in solid waste management as a case study in the two cities of developing countries (Delhi the capital city of India and Manila the capital city of Philippines) has been studied. Secondly interviews with three experts of solid waste management field have been conducted. Two interviews give specific information regarding the both cities while the third interview gives a general overview of the solid waste management practices and the role of public private partnership as a possible solution for solid waste management problems in the cities of developing countries.

3.1 Report Structure

Chapter one provides an introduction, highlighting the main problems and issues regarding the municipal solid waste management in developing countries mainly caused by urbanization and population growth. A problem formulation and research question also form part of this chapter.

Chapter two presents the theoretical framework of the project which is beside some other relevant concepts, based on environmental justice and social justice theories. The theories are used to identify current set up of solid waste management from a social and environmental justice perspective in developing countries.

Chapter three presents the methodology of the research which will be based on both qualitative data collection and quantitative data collection.

Chapter four will proceed with the case study of the project. In this part current solid waste management practices in Delhi and Manila will be studied. The purpose of this literature review and case study is to bring to light the nature of current solid waste management practices and their inadequacies in these cities while chapter five turns attention to public private partnership and its role as an alternative model for current public sector controlled system in Delhi and Manila cities.

Chapter six will give an analysis of the results of the research findings and interviews, while chapter six will finally draw together a conclusion of the project.

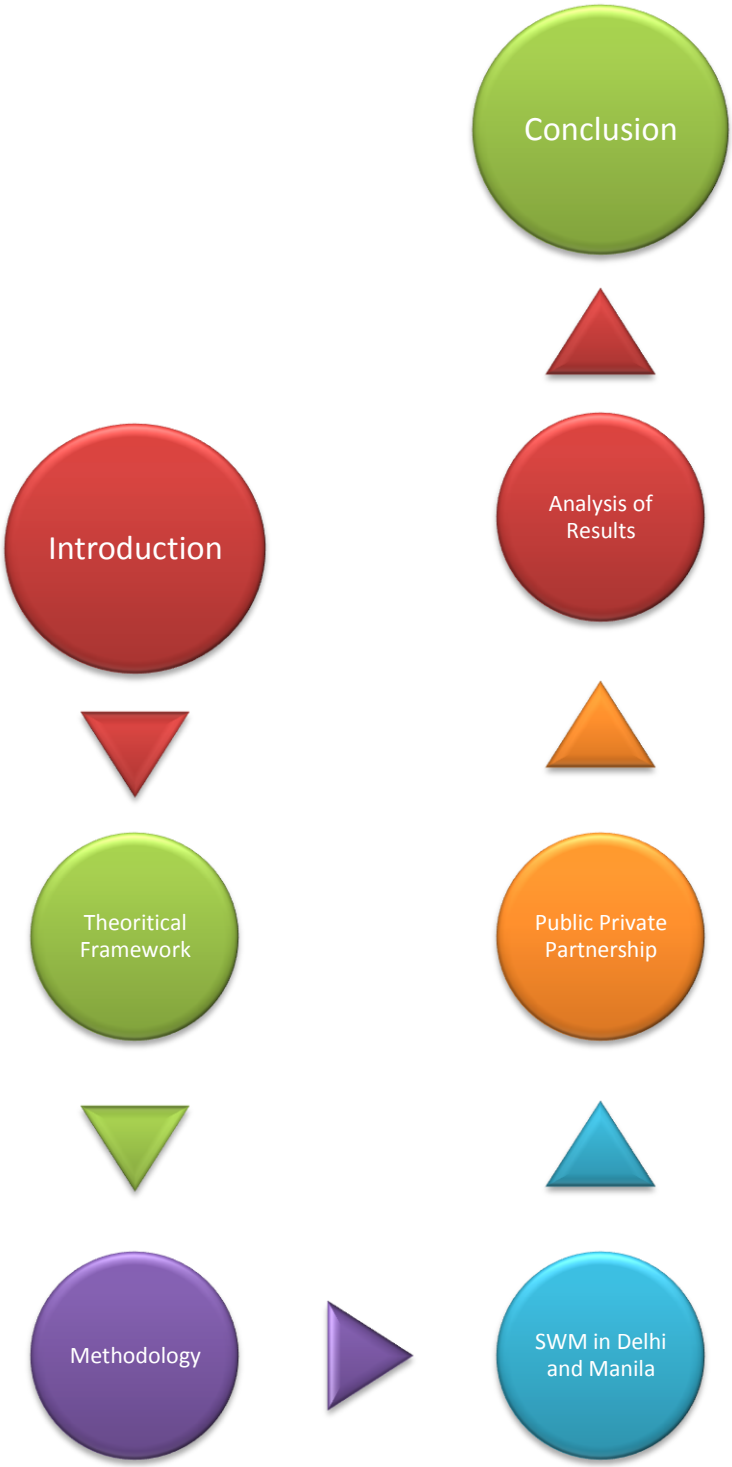

Fig. 3.1: *Workflow illustration of the project.*

3.2 Methods

Two types of data are available to a researcher in order to help him reach his research goals (Primary and secondary ones). Primary data are those that are produced by the researcher or his/her team. These can be obtained via a wide array of methods and techniques. Some of them are observation, interviews, field studies, etc. Secondary are the ones that were produced by other research teams and were available to the researcher mainly in the form of literature.

For the needs of this thesis project, both types of data were utilized. Primary data sources in the form of interviews and secondary data sources in the form of literature studies. More details about both are following.

3.3 Literature review

An extensive literature analysis was conducted in order to gain the initial and fundamental knowledge about the solid waste situation that was essential for setting the context and specifying the focus points of the project. Additionally, this obtained knowledge was the basis of the interviews' design and the main driver behind the formation of the research questions. The literature sources that were used for the duration of this thesis project were:

- Research Reports
- Scientific articles
- Books
- NGOs' reports and publishing
- Relevant World Wide Web pages

It should be pointed out that whenever possible, the use of academic sources of information were preferred. Also, data from International Organizations and information from national authorities were considered as valid and reliable. That been said, even though the validity of the literature sources can be considered as high (since they are the work of professionals and high esteemed organizations) the different purposes and motivations behind each of them should be taken into account.

Lastly, the use of World Wide Web sites was limited and restricted only to official pages of International Organizations or national and international authorities.

3.4 Interviews

Since the purpose of this research was the deeper understanding of solid waste management problem phenomena and public private partnership as an alternative model, the nature of it had to be qualitative. Subsequently, of such type were the methods that had to be employed. As a result, interviews were identified as the appropriate tool for this specific thesis project.

A set of interviews were conducted for the purposes of this thesis project, which was based on the structured interview in the form of telephone interviews with the heads of national solid waste association of India and Philippines and with an international organization. The interviews were conducted in order to shed some light on the problems regarding solid waste management in Delhi and Manila and other cities of developing countries and get the experts' opinions on current problems, the causes of problems and possible solutions. The second purpose of interviews was to obtain fresh and first hand information regarding solid waste management in Delhi and Manila.

3.4.1 Sampling Method

The sampling method used for interview set was the purposive sampling. Purposive sampling occurs when the researcher picks a specific group to study because it is known to be of the type that is wanted (McNeill and Chapman 2005).

For the interviews the interviewees were selected because they had published a major research in the relevant field or directly involved in the solid waste management area. Either way it is assumed that they have an interest in the subject and the required expertise to answer the questions.

For an overview of all experts (and the organizations they represent) who took part in both the interviews sets, please see Table 3.1.

3.4.2 Data collection

As mentioned before the technique was used during the conduction of the interviews was semi structured telephonic interviews. The list of questions was sent to the identified interviewees by electronic mail a few days before the interview.

Semi-Structured Questionnaire

Phone interviews which is also called semi-structured interviews was conducted with the identified expert and the conversation was recorded with the use of mobile phone. The interview were guided by the interview schedule and not dictated by it and was flexible in nature. The ordering of the questions was not that important and the interviewer had the opportunity to follow the flow of the conversation and even come up with new questions on the spot if anything of interest came up while keeping in mind that they must not lose the control. The interviewee was allowed maximum freedom to express his/her opinions. The main weakness of the telephone interview is that facial expressions and body language cannot be observed (McNeill and Chapman 2005). The received data are rich and are more difficult to analyze.

Table 3.1: *List of interviewees*

Organization	About organization	Name	Position	Interview Method
National Solid Waste Association of India	A highly professional body in solid waste management sector. The main responsibility of Association is to make policies and play a role of advisor for the government of India. They also organize workshops, seminars, training programs, educational programs, public awareness programs regarding the urban policies and solid waste management.	Dr Kumar Sahu	Executive Director	Telephonic Interview
National Solis Waste Association of Philippines	It is a professional organization in solid waste management composed of waste practitioners from national governmental agencies, local governments units, NGOs and the academe. Policy making is the main responsibility of the association. The aim of the association is to empower local governments, communities, and private sector towards a clean, safe and sustainable environment.	Lizette Cardenas	Executive Director	Telephonic Interview
(Eawag) Swiss Federal	SANDEC is the department of water and sanitation in	Christian	Head of the	Telephonic

Institute of Aquatic Science and Technology. Department of water and sanitation in developing countries (sandec)	developing countries at the Swiss federal research institute of Aquatic science and technology (Eawag). The main goals of the department are to: 1) develop, provide and facilitate the implementation of new concepts and technologies in water supply and environmental sanitation in developing countries. 2) Increase research capacity and professional expertise in low and middle-income countries in the field of water supply and environmental sanitation. 3) Raise awareness and enhance professional expertise in high-income countries for water supply and environmental sanitation issues in low and middle-income countries.	Zurbrügg	department	Interview

3.4.3 Data Processing

After the collection of responses and the transcription of the interviews, the interviews were analyzed separately in order to distil the key points of relevance by their answers. Finally, after the examination of whether any emergent coinciding take on things exists, a combined analysis took place on key themes as a step towards providing answers to the research question.

3.4.4 Validity and Concerns

The validity of the conducted interviews is nearly impossible to be assessed. Since interviews in general are an artificial situation and there is no guaranty that the respondents' replies correspond with what they actually do or believe (whether they lie intentionally or they actually believe what they are saying) (McNeill and Chapman 2005). Nevertheless, some concerns for interviews have been identified and are presented below.

***a. Interviewees*:** The fact that the interviewees were working for an organization that is involved in some way in the solid waste management arena, does not automatically make them experts in this field. In order to find the most suitable person, an inquiry has been made at the beginning of the communication with the organization.

b. *Interpretation*: There is always the concern that the researcher do not interpret the interviewee's opinion in the intended way and as a result the analysis may not be completely accurate and its final conclusions may have deviated from the original interviewees' point of view, in order to correctly understand the sentences which are said by the interviewees, the researcher has listened three times to the recorded version of interviews in order to make sure that interview is correctly transcribed.

3.5 Limitations

The greatest limitation of this thesis project was the inability of its author to conduct a field study in the cities that have been studied in this project in order to determine firsthand information and conditions in the country and collect empirical data, which would have helped him, make more informative and critical proposals. Another limitation was the problem of finding expert interviewees, some experts in the desired organizations was not interested to be interviewed.

IV. Case Study

This chapter presents brief introduction of both Delhi and Manila cities and also the municipal solid waste management practices in these cities. In order to study the efficiency of PPP model for solid waste management in these cities, a few examples of public private partnership projects that have already been implemented in these cities will also be presented in this chapter.

4.1 Delhi, India

Delhi as the capital city of India is the main gateway to the country. The United Nations Population Division places three of the world`s 10 largest metropolises by population in India. Mumbai, Delhi, and Kolkata (PRB, 2012). From administrative point of view, Delhi is divided into three parts governed by different municipalities, these are: the Municipal Corporation of Delhi (MCD), the New Delhi Municipal Committee (NDMC) and the Delhi Cantonment Board and about 97% of Delhi`s estimated 17.7 million population live in Municipal Corporation of Delhi (UN-HABITAT 2010). With an urban area of 1483 square kilometres, Delhi is not a state, but rather the National Capital Territory (NCT).

Delhi locates in the northern part of the country and is a major commercial and political centre of the country and attracts about 600,000 commuters every day. It is the second largest city and the most densely populated and urbanized city of India (Talyan et al., 2008). According to the India`s national statistics in the decade of (1991-2001) annual growth rate of the population was 3.85%, which is about double the national average.

Fig. 4.1: *Map of Delhi* (Khandelwal 2007).

Urbanization level in India has gradually increased from 17.6% to 28% in the last 50 years and according to statistics is expected to rise to 36% by the year 2026, so this increase in the level of urbanization has created several mega cities and the number of metropolises in India has increased from 23 to 35 in the last decade (Talyan et al., 2008).
As a second most populous country and second fastest growing economy in the world, India has 1240 million populations (UNFPA 2011) and Delhi the capital city of India has about 17.7 million inhabitants (UN-HABITAT 2010). According to 2001 statistic population density in Delhi are 9340 persons per square kilometre while population growth rate according to 2009 estimation is 1.548%, while population growth rate for slum areas in Delhi is four and half times higher than the non slum areas (Government of Delhi 2002).

Such a huge population and rapid urbanization obviously generates a significant amount of waste of many kinds the management of which is a massive task for the local administration and puts a huge burden on the infrastructure of the city (Sharholy et al., 2007, Talyan et al., 2008).

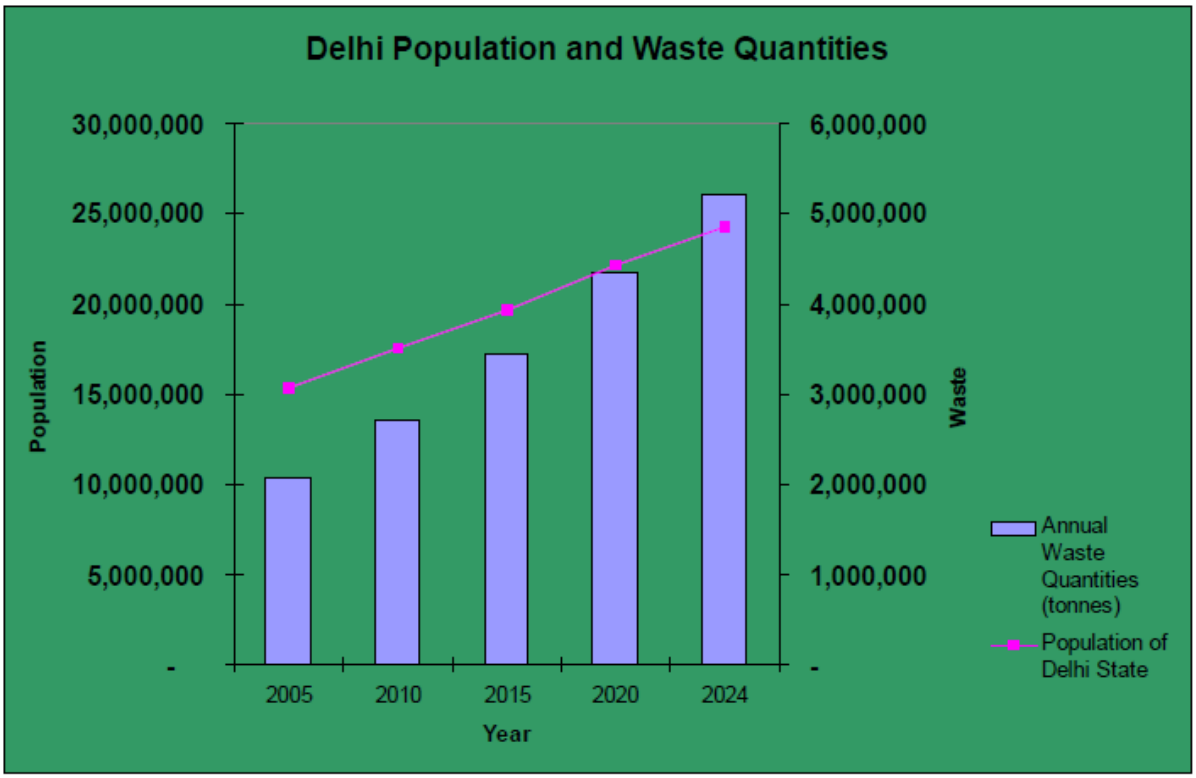

Fig. 4.2: *Population growth and waste generation in Delhi* (Khandelwal 2007).

4.1.1 Municipal Solid Waste Management in Delhi

Waste is the by product of human activities. Adequate solid waste management in a city is crucial for both the human health and the environment. Solid waste management is the most neglected areas in urban management system in Indian cities (Joseph et al., 2006), therefore management of municipal solid waste has become a major challenge for the municipal authorities in all Indian metropolises as well as the (NCT) Nation Capital Territory of Delhi (Joseph 2002, Talyan et al., 2008).

4.1.2 Waste Generation and Composition

As one of the most densely populated and urbanized city, Delhi generates about 7000 tons of municipal solid waste every day and according to the projections this number is expected to rise to 17000 to 25000 tons/day by the year 2021 (Talyan et al., 2008). This 7000 tons waste generated per day is for non slum areas of Delhi, while 50% of Delhi´s pollution live in slum areas and often do not receive municipal services (UN-HABITAT 2010). Due to multiple activities different types of solid waste are generated in Delhi such as:

- Municipal solid waste (from the domestic and commercial sectors and common areas such as, parks, gardens, street sweepings and drain silt)
- Construction and demolition debris
- Bio-medical waste (waste generated by health-care and veterinary establishments)
- Slaughterhouse waste (organized as well, as un-organized activities)
- E-Waste
- Special waste (small quantities of toxic and hazardous waste generated by the household and trade sectors)
- Industrial waste generated within the city area (DUD 2008).

Table 4.1: *An overview of municipal solid waste composition in Delhi* (Talyan et al., 2008).

Physical composition (as wt.%) of MSW in Delhi

Parameters	2002	1995	1982
Biodegradable	38.6	38.0	57.7
Paper	5.6	5.6	5.9
Plastic	6.0	6.0	1.5
Metal	0.2	0.3	0.6
Glass and Crockery	1.0	1.0	0.3
Non-biodegradable (leather, rubber, bones, and synthetic material)	13.9	14.0	5.1
Inert (stones, bricks, ashes, etc.)	34.7	34.8	28.9

Table 4.1 gives an overview of source wise generation of waste in Delhi. The figures quoted in the tables only indicate the amount of municipal solid waste that is collected and disposed by Municipal Corporation of Delhi and does not take into account the significant amount of waste removed prior to disposal by the informal sector involved in recycling.

The quantity or amount of solid waste generated depends on different number of factors such as, standard of living, food habits, degree and kinds of commercial activities. Availability of data on quantity variation and generation of municipal solid waste is vital in planning for collection and disposal systems. With increasing rate of urbanization and changing life styles, Delhi and other cities in Indian now generate eight times more municipal solid waste than they did five decades before (Sharholy et al., 2008).

Characterizing the solid waste by its source, type, generation rate and composition is very important in order to monitor and control existing waste management systems and to make regulatory, financial, and institutional decisions (Sharholy et al., 2008). Table 4.2 presents the physical composition of solid waste generated in Delhi.

Table 4.2: *Source wise solid waste generation in Delhi* (Talyan et al., 2008).

Source wise generation of the MSW (tonnes/day) in Delhi					
Residential waste	Main shopping centres	Vegetable and fruit markets	Construction waste	Hospital waste	Industrial waste
3010	1017	538	382	107	502

Presently, about 90 million tons of solid waste is generated annually as by products of industrial, mining, municipal, agricultural and other processes. According to different studies conducted by several agencies in Delhi, the composition of solid waste in the last decade has not changed. Composition of municipal solid waste is different based on the cultural habits, economic status of residents and density of population (Sharholy et al., 2008). Biodegradable fraction constitutes the major component of solid waste in Delhi followed by non biodegradable such as (leather, rubber, bones and some other materials), paper, plastic, metal and glass. Amount of construction waste has increased in Delhi which indicates the high pace of construction activities. As the country grows economically and the population become more urbanized the increase in the amount of paper, paper packaging and plastic is the most obvious change which is an indication of improved in living standards and consumerist attitudes of population (Talyan et al., 2008).

The amount of municipal solid waste generated per capita is estimated to increase at a rate of 1–1.33% annually in the country.

4.1.3 Legal and Institutional Framework

Three municipal bodies - the Municipal Corporation of Delhi (MCD), the New Delhi Municipal Council (NDMC) and the Delhi Cantonment Board (DCB) are responsible for solid waste management in Delhi (DUD 2008, Sarkar 2003). Municipal Corporation of Delhi alone manages almost 95 % of the total area of the city. The above mentioned authorities are being supported by other agencies. For instance the Delhi Development Authority is providing land to Municipal Corporation of Delhi for sanitary land filling and also the Department of Flood Control of Delhi Administration supplies soil to cover the sanitary landfills.

4.1.4 Waste Collection, Transportation and Disposal

There are two kinds of municipal solid waste collection systems in Delhi. The old system according to Municipal Corporation of Delhi act 1957 and the new system according to new municipal solid waste rules enforced in 2000 (Talyan et al., 2008). The old system required people to take their waste to the already provided municipal bin, but implementation of the new system reassigned the responsibility to municipalities. Now municipal authorities are responsible to provide door to door collection of segregated waste. Municipal Corporation of Delhi has not been able to implement the new rules completely because providing door to door waste collection requires more staff and resources. Some private groups and NGOs also participate in door to door collection of solid waste. The collected waste by private groups, NGOs, municipal authorities and households are transported by handcarts to the municipal bins already provided by municipality. All the areas are not served, it means there is a low and high served areas and areas that totally do not receive any service such as slums (Sarkar 2003). Regarding waste segregation, practically no segregation of waste is practiced but some mass awareness programmes have been launched for motivating citizens to take part in undertaking segregation of waste.

Storage facilities are poor, age-old practices the metal containers which is also called (Dhalaos) are used for storage of waste which are posing serious problems and not acceptable in the present situation and in most cases these bins leads to creation of unauthorized open dumps. The same bins are used for decomposable and non decomposable waste. However, in some selected zones private contractors are engaged for waste storage and transportation (Sharholy et al., 2008, Sarkar 2003). Trucks, tricycles, mini dumpers, loaders and tractor trailers are used for transporting of garbage to the disposal points. Most of these vehicles are open and

not compatible with storage facilities. Entire lifting is manual and at a few places front-end-loaders are used. Private contractors are also used waste transportation in some selected zones of Municipal Corporation of Delhi.

Two leading mechanisms of waste treatment are practiced in Delhi and other Indian cities, composting and waste to energy (incineration). These projects are relatively new in India and due to lack of financial resources both mechanisms are yet far from success (Agarwal et al., 2005, Pappu et al., 2007)

About 90% of collected waste in Delhi is disposed of in landfills, as Open, uncontrolled and poorly managed dumping is commonly practiced in many metropolitan cities of India (Kumar et al., 2003, Sharholy et al., 2008). In Delhi and other urban areas of India municipal solid waste is directly disposed of in the nearest low laying lands causing a huge human health and environmental problems (Ray et al., 2005). Landfill gas treatment and leachate treatment is not practiced in these dumpsites making them a source of problem rather than a solution for the municipal solid waste.

There are three official landfills in Delhi namely Gazipur located in the east of Delhi, Bhalswa located in the north of Delhi and Okhla located in the south of Delhi spreading over the area of about 66 hectares (Khandelwal 2007). All types of solid waste from households, industry, medical waste, hazardous waste and slaughterhouse waste from 12 zones of Municipal Corporation of Delhi and 2 zones of New Delhi Municipal Corporation are disposed of in these three landfills (Talyan et al., 2008). At the end of every day the landfills are covered with the construction and demolition waste. All three landfills are not provided with a base liner or with a leachate collection, treatment, and disposal system, therefore the produced leachate percolates into ground waters. It has been estimated that these landfills produces 81.5 million litters of leachate every year. The landfills are located very close to Yamuna River (5-6 km) which is the source of 70% of Delhi water supply.

Fig. 4.3: *Gazipur landfill* (Khandelwal 2007).

Fig. 4.4: *Bhalswa landfill* (Khandelwal 2007).

Fig. 4.5: *Okhla landfill* (Khandelwal 2007).

4.2 Manila, Philippines

Metro Manila is located in Southern Luzon, the largest of the more than 7,000 islands that make up the country known as the Philippines (Einsiedel 2009). Metro Manila serves not only as the country's political centre, but also as its financial, educational, cultural, social and commercial centre. It is the heart of the country because the national government and the major administrative offices located here. The

national language is Tagalog, but most of the citizens are also fluent in English, which is the language of instruction in the public schools. Geographically, Metro Manila is formed by fifteen cities and two municipalities namely: The cities of Manila, Quezon, Caloocan, Makati, Marikina, Mandaluyong, Las Piñas, Pasig, Navotas, Muntinlupa, Malabon, Valenzuela and Pasay, Taguig and Parañaque and the municipalities of, Pateros and San Juan (UN-HABITAT, 2010, Tseng 2008).

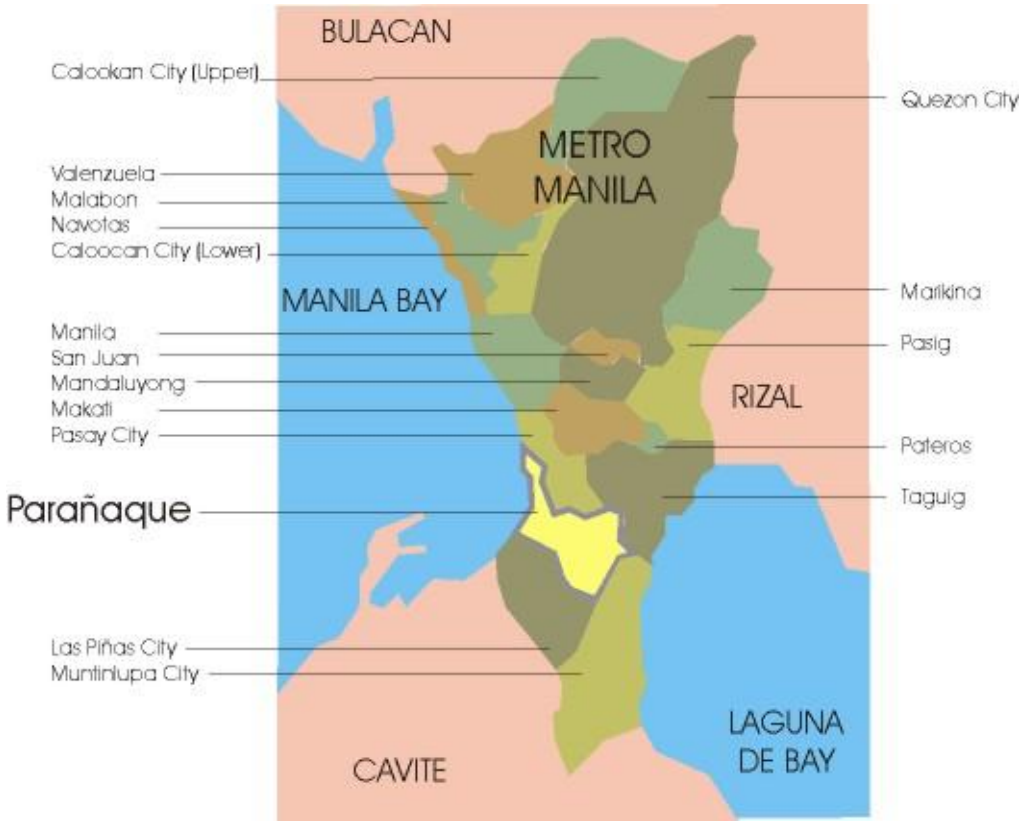

Fig. 4.6: *Map of Metro Manila* (http://bahay.ph/philippines.php).

Metro Manila is the most populous metropolis in Philippines and the 11th most populous metropolis in the world. As of 2010 census it had an estimated population of 12 million which is equal to 13% of national population. The total area of metro manila is 636 square kilometres. It is the densest region in the country with a population density of 18700 persons per square kilometre (Einsiedel 2009, ADB 2006). About 63 percent of Philippines total population live in urban areas of which over one-fifth are in Metro Manila. Despite its overcrowded condition, metro Manila continues to attract a large number of migrants from other regions of the country who come in search of employment and better income opportunities. This rapid urbanization and population growth has significantly increased the demand for urban services such as provision of municipal solid waste services and sanitation and

puts a huge burden on the shoulders of municipal authorities already unable to provide proper municipal services for their citizens (ADB 2003, ADB 2006).

4.2.1 Municipal Solid Waste Management in Metro Manila

One of the major factors that could worsen the environmental problems is the generation of municipal solid waste in the cities of developing countries which is the result of rapid urbanization, population growth and economic growth that metro Manila is no exception (Narayana 2009, Ballados 2010, Salam 2010). Municipal solid waste management in metro Manila has been a perennial problem beyond the capacity of municipal authorities that has resulted in many environmental problems (Roy et al., 2009, Tseng 2008, Hara et al., 2011). Mismanagement of generated solid waste in Metro Manila has also resulted to different health problems for the people living in the surrounding areas due to contaminated soil, surface and ground waters. As other cities in developing countries, open dumping and burning of waste by the people is major problem in metro Manila. The waste is indiscriminately dumped in the open areas in the nook and corners of the city creating huge problems for the citizens and becoming a breathing ground for the rodents (Lapid et al., 2001, NRC 2007).

4.2.2 Solid Waste Generation, Composition and Characteristics

Metro Manila generates about 7000 tons of municipal solid waste per day (ADB 2006). 80% to 90% of the total generated waste is collected and disposed of in the nine dumpsites in the metropolis. The main sources of waste are shown in figure 4.7.

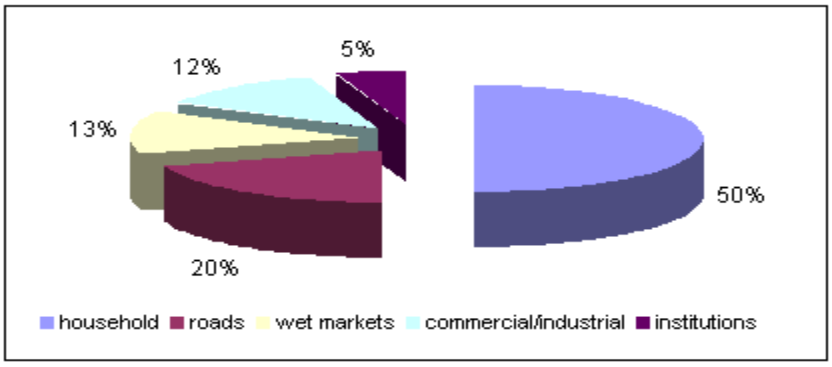

Fig. 4.7: *Main sources of solid waste in metro Manila* (Garcia 2006).

Studies shows that an average Pilipino generate between 0.3 and 0.7 kilograms of municipal solid waste every day in rural and urban areas respectively.

Residential areas generate about 50% of waste, while commercial and industrial firms contribute about 12%. According to the National Solid Waste Management Commission, the bulk of household waste is made up of food and kitchen wastes (NRC, 2007, ADB 2006, Chiu 2006). Figure 4.8 shows the composition of households waste in metro Manila.

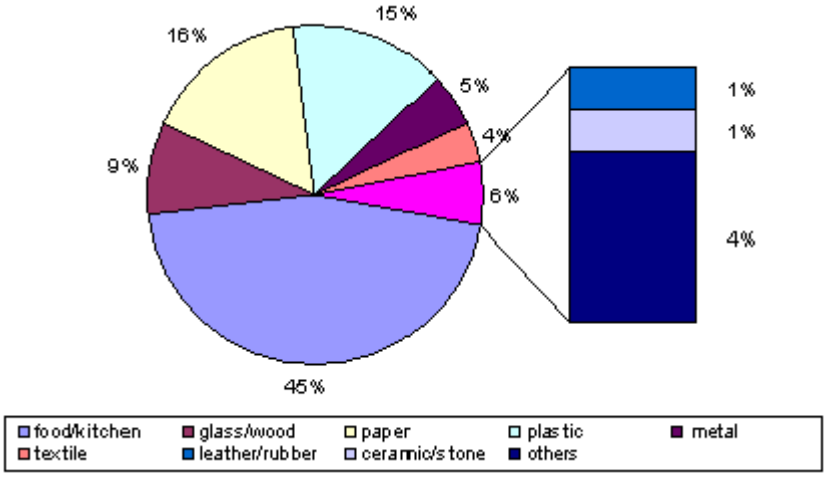

Fig. 4.8: *Household waste composition in metro Manila* (ADB 2006).

In terms of solid waste composition, a survey conducted in ten metro Manila cities by the Philippine Environmental Governance Program supported by the United States Agency for International Development (USAID) reveals that about 60% of the solid waste generated in these cities is biodegradable materials. The survey also identified that about 20% of waste are considered as recyclables, while 2% are considered as hazardous or special wastes (Garcia 2006).

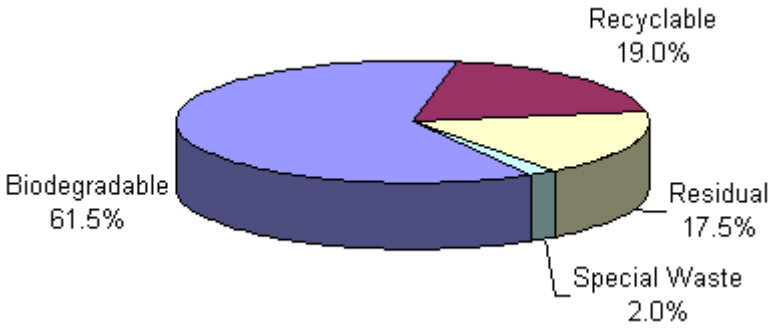

Fig. 4.9: *Average composition of solid waste in metro Manila cities* (Garcia 2006).

4.2.3 Solid waste collection, transportation and disposal

Waste collection is conducted at the Barangay level (a barangay is the smallest administrative division in the Philippines and is the native Filipino term for a village, district or ward) (Ballados 2010) for biodegradable, compostable and

reusable wastes while the municipalities are responsible of collecting the non-recyclable material and some special wastes. The most common method of waste collection in metro Manila, involves collection by handcarts, tricycles, tractors and other common vehicles (ADB 2006, Garcia 2006). Waste from the generation points are collected by both municipal and private sector collectors and taken to the municipal bins already put in different points by municipalities also called primary collection areas. Afterwards garbage trucks transport the collected waste from primary collection areas to the disposal sites or landfills (Tseng 2008). A survey conducted by Environment Unit of the League of Cities of the Philippines (LCP) in 1999 reported that 30 percent of households at the barangay level had access to solid waste collection at different frequencies, ranging from twice a week to once every two weeks (Garcia 2006).

With regard to waste segregation, it is not properly practiced in metro manila (The Garbage Book, 2004). Proper solid waste segregation includes using separate waste bins for biodegradable, non-biodegradable, domestic hazardous and bulky wastes with clear markings to distinguish the type of wastes inside, and segregating for re-use, recycling and composting (Eugenia 2002, Lapid 1996). Barangays with the help of metro Manila Development Authority (MMDA) and some NGOs are making public awareness campaigns to persuade the people to segregate their waste at source.

After collection the wastes are disposed of in dumpsites. The three common disposal facilities in metro Manila are open dumpsites, controlled dumpsites and landfills. According to the section 59 of Republic Act number 9003, also known as the "Philippine Ecological Solid Waste Management Act of 2000, there should no more be open dumpsites by year 2004 and also by year 2006 all controlled dumpsites should be closed in Philippines (NCR, 2007). Although achieving this target is yet far from the reality.

Environmental laws and regulations were already available in Philippines, but after the collapse of pyatasa disposal site in 2000 in metro Manila which caused the death of 300 waste collectors, the government of Philippines accelerated the modernization of solid waste systems (UN-HABITAT 2010). One of the steps that were taken by the government was enforcement of the section 59 of Republic Act number 9003 also known as the "Philippine Ecological Solid Waste Management Act of 2000.

Availability of solid waste disposal sites continues to be a pressing problem in Metro Manila. With the closure of two disposal sites in Carmona and San Mateo in 1998 and 2000 respectively, Local Government Units in Metro Manila are searching for available disposal sites for their garbage. Presently, all collected wastes in Metro

Manila are disposed in controlled dumpsites, open dumpsites and a small amount of waste goes to proper landfills (Hara et al ., 2008).

Fig. 4.10: *One of the sanitary landfills in Philippines* (Garcia 2006).

4.2.4 Legal institutional framework

In year 2000 after the passing of RA 9003 a significant transformation occurred in the Philippine`s solid waste management systems. Based on the new regulations a central body for national solid waste management called the National Solid Waste Management Commission (NSWMC) was created (ADB 2003). The responsibility of this new body was to monitor and oversee the implementation of solid waste management framework. Under this body are provincial solid waste management boards that are chaired by their respective governors. The provincial boards will be composed of the city and municipal mayors, as well as, NGOs and representatives of the recycling, and packaging industries. In Metro Manila, the Metro Manila Development Authority (MMDA) is given the responsibility to chair its solid waste management board (RA No. 9003). The Local Governmental Units (LGUs) are working under the Metro Manila Development Authority and directly with residential and commercial generators through providing waste collection and municipal services while the NGOs focus on community-based projects such as environmental education and public awareness campaigns regarding waste segregation and recycling at source. Figure 4.11 provides an overview of solid waste management institutional set up in metro Manila.

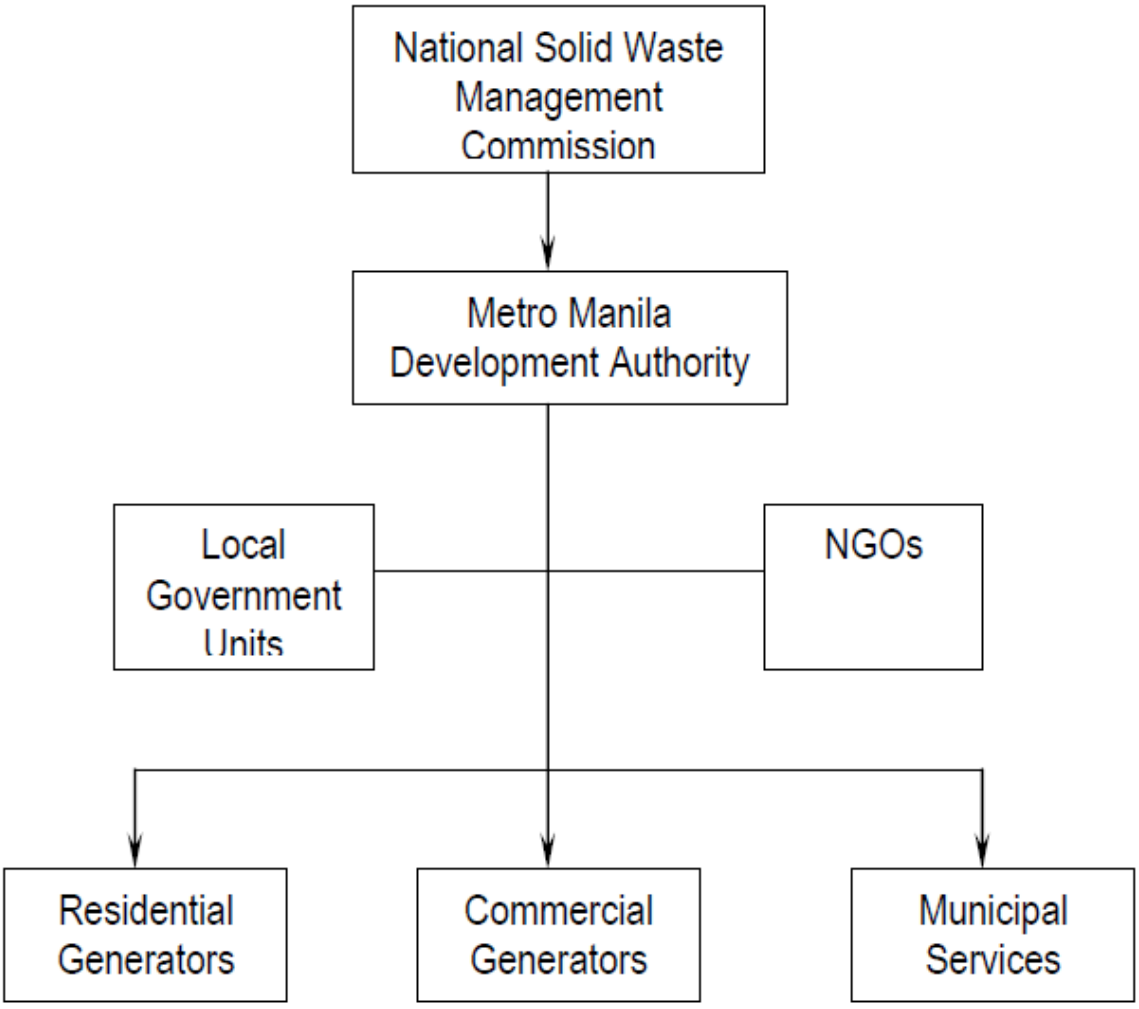

Fig. 4.11: Institutional framework of solid waste management in Metro Manila (Einsiedel 2009).

V. Public Private Partnership

5.1 Neo-Liberalism and public private partnership

During the last century governments had a significant role in provision of social services and infrastructure in most of countries all over the world but in the last three decades the role of the state has considerably changed (Harvey, 2005, Pacione 1990). The western world between 1940s and 1970s experienced a high point of state intervention in both nationalization and provision of social services which is also called Keynesian period. The decline of this period started with the economical crises in mid 1970s when the state was no longer capable of providing social services. The neo-liberal and free market proponents took the opportunity to argue that the role of the state should change and some responsibilities needs to be given to private sector, which resulted in transformation of state`s role and prioritization of free market rules and policies. Neo-liberal and free market solution was involved the greater participation of the private sector and promotion of market competition in order to tackle the economic crises and as a means of modernization and in this process the Keynesianism re wash placed by neo-liberalism as a dominant economical system (Callinicos 2003, Leys 2001).

Under the neo-liberal system during the 1980s and 1990s governments concentrated on promoting the private sector resulting in privatization of many public services and enterprises across the world (George, 2004). In the last two decades developing countries have also started to adopt the neo-liberal policies and the free market economical system in different degrees (Brenner and Theodore, 2002). Private sector participation in provision of social services and public private partnerships can also be studied under this context as a result of privatizations and neo-liberalism (World Bank, 2000, Harvey, 2005).

Policy makers and the academics who are studying the role of the states in 21st century and those who try to bring about the efficiency, development and provision of high quality public services are very interested in public private partnerships. International organizations such as the European Union, the OECD (Organization for Economical Co-operation and Development) and the World Bank have strongly advocated and promoted public private partnerships. According to them public private partnerships can bring about improved efficiency and quality in public services (Osborne, 2000).

5.2 Public Private Partnership and Solid Waste Management

Public private partnership is a long or medium term arrangement between the public and private sectors whereby public sector transfers part of its responsibilities to the private sector (World Bank 2011). These arrangements are typically formed with clear goals and agreements for delivery of public services or delivery of public infrastructure.

Due to increasing problem of municipal solid waste management in most cities in the developing countries, private sector participation in providing solid waste services started as a response to major failures of service delivery by the public sector (UNESCAP, 2011). It is often believed and proposed that private sector participation in providing municipal services could be the best possible way to solve the current waste problems in developing countries and in particular public private partnership is seen as a potential alternative to the traditional service delivery system fully controlled by the public sector, more importantly public private partnership is believed to provide the services that the public sector neither have the resources nor the expertise to supply alone (Forsyth 2005). According to UNESCAP public private partnership itself is not a solution option for the service delivery problems but rather a viable project implementation mechanism for a desired solution option (UNESCAP, 2011).

Public private partnership arrangements pave the way to both the public and private sectors to share the responsibilities in providing the services (Cointreau 1995). Public private arrangements can have many forms, but the common distinguishing characteristic is a shared governance structure and decision-making process. Such a partnership, combines the private sector's dynamism with the public sector`s responsibility of public interest which makes it work better (Ahmad et al., 2006).

Furthermore, a third party—the people—can also play a considerable role in public private partnership. Citizens can contribute significantly to service delivery for instance they can support private sector participation with payment of service charges and also they can play an active role in accountability improvement and service quality of both public and private sector. These kinds of arrangements turn the people `s role from passive service receivers to active service partners that in return lead to high quality and efficiency of work (Ahmad et al., 2006, UNESCAP, 2011).

5.3 Types of Public Private Partnerships

According to the European Union there are four main types of public private partnerships each types having its own strengths and weaknesses. They are as follows:

- *Contracting*
- *Build–Own-Operate (BOT)*
- *Design-Build-Finance-Operate (DBFO) Concession*
- *Concession (European Commission, 2003).*

Table 5.1: *Strengths and Weaknesses of PPP arrangements* (European Commission, 2003).

PPP Type	Main features	Application	Strength	Weaknesses
Contracting	*Contract with Private party to design & build public facility* *Facility is financed & owned by public sector* *Key driver is the transfer of design and construction risk.*	*Suited to capital projects with small operating requirement.* *Suited to capital projects where the public sector wishes to retain operating responsibility.*	*Transfer of design and construction risk* *Potential to accelerate construction program*	*Possible conflict between planning and environmental considerations.* *May increase operational risk.* *Commissioning stage is critical.* *Limited incentive for whole life costing approach to design.* *Does not attract private finance*
BOT	*Contract with a private sector contractor to design, build and operate a public facility for a defined period, after which the facility is handed back to the public sector. The facility is financed by the public sector and remains in public ownership throughout the contract. Key driver is the*	*Suited to projects that involve a significant operating content.* *Particularly suited to water and waste projects.*	*Transfer of design, construction and operating risk* *Potential to accelerate construction* *Risk transfer provides incentive for adoption of whole life costing approach* *Promotes private sector innovation and improved value for money.* *Improved quality of operation and maintenance.* *Contracts can be holistic* *Government able to focus on core public sector*	*Possible conflict between planning and environmental considerations.* *Contracts are more complex and tendering process can take longer* *Contract management and performance monitoring systems required.* *Cost of re-entering the business if operator proves unsatisfactory*

	transfer of operating risk in addition to design and construction risk.		*responsibilities.*	
DBFO	*Contract with a private party to design, build, operate and finance a facility for defined period, after which the facility reverts to the public sector.* *The facility is owned by the private sector for the contract period and it recovers costs through public subvention.* *Key driver is the utilization of finance and transfer of Design, construction & operating risk.* *Variant forms involve different combinations of the principle responsibilities.*	*Suited to projects that involve significant operating content.* *Particularly suited to roads, water and waste projects.*	*As for BOT plus:* *Attracts private sector finance;* *Attracts debt finance discipline;* *Delivers more predictable and consistent cost profile;* *Greater potential for accelerated construction program; and* *Increased risk transfer provides greater incentive for private sector contractor to adopt a whole life costing approach to design*	*Possible conflict between planning and environmental considerations.* *Contracts can be more complex and tendering process can take longer than for BOT.* *Contract management and Performance monitoring systems required.* *Cost of re-entering the business if operator proves unsatisfactory.* *Funding guarantees may be required.* *Change management system required.*
Concession	*As for DBFO except private party recovers costs from user charges.* *Key driver is the Polluter Pays Principle and utilizing private finance and transferring design, construction and operating risk.*	*Suited to projects that provide an opportunity for the introduction of user charging.* *Particularly suited to roads, water (nondomestic) and waste projects.*	*As for DBFO plus:* *Facilitates implementation of the Polluter Pays Principle; and* *Increases level of demand risk transfer and encourages generation of third party revenue.*	*As for DBFO plus:* *May not be politically acceptable* *Requires effective management of alternatives / substitutes, e.g. alternative transport routes; alternative waste disposal options)*

Each model in the abovementioned table has its own benefits and constraints and can be appropriate for achieving the major objectives of public-private partnership

to a varying degree. No single public private partnership model that can satisfy all conditions concerning a project's location and its technical and financial features. Before selecting the most suitable and appropriate model the country's political, legal and socio-cultural situation, maturity of the country's PPP market should be taken into account (UNDP, 2005).

5.4 Potential advantages of public private partnership

The interest for involving the private sector in service delivery and urban service provision is increasing worldwide. Many reasons are mentioned for the collaboration between private and public sector in provision and developing infrastructure services. These are:

- Increased efficiency and flexibility in service delivery
- Cost efficiency in operation and management
- Resources availability for growing needs of investment in the sector
- Access to advanced technology
- Availability of expertise (World Bank 2011, UNESCAP, 2011).

Organizing of public-private partnerships to assume functions that were formerly public sector responsibilities has potential benefits for both citizens and governments. PPPs can increase competition and efficiency in service provision, expand coverage, and reduce delivery costs. As Gabriel Roth points out, PPPs allow optimal overall risk allocation between the public and private sectors, facilitating the distribution of risk to the organizations that can most effectively manage it (Roth 1987).
Participation of the private sector ensures that projects and programs are subject to commercial discipline and sound financial due diligence. Furthermore, the private sector can often manage more efficiently the entire supply chain needed to provide and distribute goods and services more effectively than can government agencies. Public-private partnerships can bring new ideas for designing programs and projects, and greater synergy between design and operation of facilities (UNDP 2000).

By working in partnership with the private sector, governments can benefit from the strong incentives for private firms to keep costs down. Often, private firms can avoid the bureaucratic problems that plague national and municipal governments, and they can experiment with new technology and procedures. PPPs allow government

to extend services without increasing the number of public employees and without making large capital investments in facilities and equipment. Private sector can often obtain a higher level of productivity from their work forces than can civil service systems, for instance they can use part-time labour where appropriate. Partnering with the private sector gives local governments the ability to take advantage of economies of scale. By contracting with several suppliers, the governments can assure continuity of services. By contracting competitively for services, they can determine the true costs of production and thereby eliminate waste (Gerrard 2001).

Meanwhile public private partnership can usually respond more flexibly to market signals and demands more easily acquire modern technology, and develop stronger capacity to maintain infrastructure than can public agencies. Public-private sector cooperation can also generate jobs and income while meeting demand for public goods and services. Moreover, forming partnerships are the most effective way for governments in the cities of developing countries to mobilize private and foreign investment capital for infrastructure and municipal service improvement. By achieving their objectives the public private partnerships can contribute to increasing national productivity and economic growth, assuring a more efficient allocation of limited capital resources, accelerating the transition to a market economy, and developing and improving the private sector (Gerrard 2001).

Lack of above mentioned advantages and capacities in the public sector are the main reasons of government's failure in providing municipal services for their population, and the attraction towards public private partnerships.

5.5 Possible Limitations of Public Private Partnership

Public private partnerships could have significant limitations if so many important aspects such as economical, social, political, legal, and administrative which need to be studied carefully before approval of the contract, are not properly taken into account. Possible limitation includes:

- All projects are not feasible for different reasons such as political, legal, commercial viability, etc.).
- The private sector may not take interest in a project due to possible high risks or due to lack of technical, financial capacity to implement the project.

- A PPP project in some cases may be more costly unless additional costs (for instance due to higher transaction and financing costs) can be off-set through efficiency gains (UNESCAP, 2011).

Although it is strongly believed and proposed by the most influential organizations such as European Commission and World Bank that public private partnership is a better alternative for solving the municipal solid waste management problems in developing countries, but there are still significant barriers to successful implementation of that. These barriers are:

- Lack of capacity to conceptualise and implement innovative approaches by municipalities. Public sector is facing a huge lacking of skills and incentives to change the traditional method of service provision and establish a collaborative partnership with people.
- Most of municipalities do not see it necessary to work with private sector, NGOs and people.
- Encouragement of municipalities for making public private partnership is hardly possible by private sector, NGOs or community based organizations (CBOs) due to lack of access, skills and in most cases funds (Ahmad et al., 2006).

5.6 An Example of PPP in Delhi (Service Contract Model)

In 2004, among the other factors that forced the Municipal Corporation of Delhi to accelerate privatisation of solid waste management was the Commonwealth Games which was planned to be held in Delhi in 2009. As a result, the Supreme Court put pressure on municipalities to improve their waste management systems in Delhi, the obsession with becoming a 'world class city', the desire to ensure that the city had a functioning waste management system when it hosted the Commonwealth Games and the hope for not losing the confidence in the municipality's ability to provide essential services (ICRA, 2008).
In January 2005, the municipal corporation of Delhi contracted the collection, transportation and disposal of municipal solid waste in different zones of Delhi with private sector. Among the contractors Metro Waste Handling (p) Ltd. (MWH) received the contract for the west zone of Delhi.

The waste zone, that has an approximately area of 80 square kilometres and about 1.5 million population, produces about 500 tonnes of solid waste per day.

Total staff working for the MWH in the west zone is 697 persons. They are divided into different categories such as 45 supervisors, 42 office and technical workers, 50 drivers, 60 helpers and 500 collection and segregation workers (Garg et al., 2007). The whole task of collection, segregation and transportation is done by this team in the west zone area of Delhi. The west zone is divided into 16 wards and each ward is under the governance of a team leader. Under each team leader there is a group of field supervisors and each supervisor is responsible for a group of collectors, segregators and drivers.
The supervisors are responsible for the following activities:

- Keeping a track of daily waste collection
- Visiting the waste storage depots at least twice a day
- Optimizing the number of waste storage depots workers and maximizing their productivity by assigning them adequate responsibilities
- Maintaining vehicle time and route plan
- Making sure the waste storage depots are thoroughly disinfected
- Ensuring that their staff (helpers, drivers and waste storage depot workers) are punctual and are following adequate safety and hygiene norms
- Keeping a very close contact with local residents, community based organizations, councillors and Municipal Corporation of Delhi to make sure that proper coordination is maintained with them (Khandelwal 2007).

5.6.1 Collection and storage system

With privatization, the collection and storage of waste has undergone a significant change (SERD, 2010). Prior to the privatization, waste from the waste storage depots was collected in open trucks. The problems such as waste spillage and odour were common. Moreover the staffs carrying out the collection of the waste without the provision of any safety equipment such as the masks, gloves, boots etc. was highly vulnerable to potential health hazards.

Before the partnership, the system was inefficient and poorly managed for instance the waste in the waste storage depots used to rot for several days and there was no proper scheduling or tracking of the waste collection vehicles (SERD 2010). Furthermore, the waste was collected without any discrimination between the wet and dry portion and was picked in the mixed form, therefore minimization of the waste going to the landfill was totally neglected.

Currently the waste is brought to the street corner bins by households themselves or in most cases the waste pickers hired by the people, so the responsibility of the waste conveying from generation point to the bins is up to the people ((Garg et al., 2007). There are also separate bins for biodegradable and non biodegradable waste. Then the compactor loaders collect the waste from the bins and transport them to the waste storage depots (WSD) also known as Dhalaos. Collecting waste with compactor loaders is a containerized mechanical loading and unloading which reduces spillage, ensures hygienic environment around the waste storage depots, thus reduces environmental and health risks (ICRA, 2008). Separate trucks are being used for biodegradable (Green trucks) and non biodegradable (blue trucks) and the biodegradable waste is transported to the composting facility which has also been established by the private sector. After arriving to the waste storage depots, the waste is being segregated by workers and the rest is taken to the disposal sites by the trucks. An appreciable amount of wet waste is being separated by workers at the waste storage depots and taken to the centralized compost plant at Bhalaswa, which in the mean time reduces the amount of waste goes to Bhalaswa landfills.

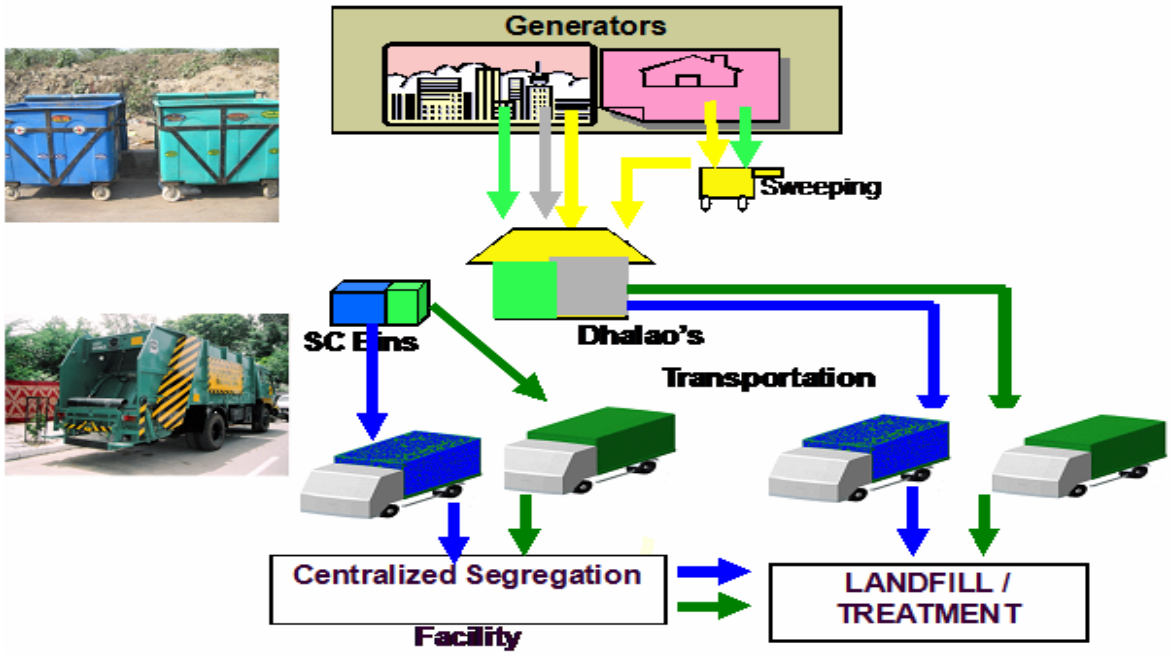

Fig. 5.2: *Waste management system in west zone of Delhi* (Garg et al., 2007).

Coordination between the supervisors, team leaders, drivers and other staff is very strong. The movement of the vehicles takes place according to the proper schedule and the communication between the staff takes place through Command and control communication devices comprise of wireless sets on vehicles and wireless

handsets with operational and technical staff and also cellular phones. The trucks are equipped with the GPS system which makes them easier to be tracked.

Fig. 5.3: *WSD before and after* (Khandelwal 2007).

The waste storage depots have been reconstructed and repaired as shown in figure 5.3. The waste is not thrown on the floor of the waste storage depot as was the practice earlier but is stored in bins. There are separate bins for wet and dry waste. Water, electricity and drainage connections have also been provided in the WSDs. All the waste is collected daily from the WSDs and are taken to the landfills or composting facility. Proper hygiene and cleanliness is also maintained.

One of the most important tasks in waste management is waste segregation which without people cooperation cannot be achieved, thus waste awareness campaigns for rising the people`s information to segregate their waste properly at source is extremely important (ICRA, 2008). With keeping these facts in mind Metro Waste Handling private limited has been conducting Slum programs, Street play's, School assembly sessions student rallies, Posters & banner displays, awareness programs for household segregation at source level, training of operational staff etc and these campaigns have been proven very useful.

Fig. 5.4: *waste awareness campaigns for the people and waste pickers* (Garg et al., 2007).

In general we can conclude the followings regarding the solid waste management in the west zone of Delhi since the partnership with the private sector:

- Management of solid waste, which was one of the most poorly managed public activity, has improved and transformed into the most well managed activity.
- Relevant technical equipments, such as GPS based traction system for the vehicles, use of wireless sets and cell phones has resulted in better co-ordination, improved community participation and operation.
- Waste segregation, which used to be a totally neglected affair, has witnessed improvement.
- Partial formalization of the informal sector involved in waste segregation – beginning of a new era.
- Awareness is increasing among the people about the benefits of segregation at source (Khandelwal 2007).

VI. Analysis and Summary of Findings

This chapter summarizes the findings of the study. I relate the findings to the theory that I used and the extent to which the results address the research questions that the study aimed to answer. The main goal of this study was to find out whether and how public private partnership leads to improvement of solid waste management in Delhi and Manila metropolises. As an alternative model for fully public sector, public private partnership has been studied in this study. In such partnerships responsibility of providing some of the municipal services are passed to the private sector. The reason for establishing such partnerships in the waste management sector is to improve operation and maintenance of the municipal services.
In this thesis the role of public sector has been studied in the existing legal and institutional frameworks. Furthermore, the challenges that the public sector is currently facing in provision of municipal services for their residents, has been discussed. An example of public private sectors partnership for the management of solid waste in west zone of Delhi has also been presented. Public awareness and community involvement in the solid waste management process were also of critical importance.

6.1 Analysis of Current Waste Situation and Practices in Delhi and Manila Cities

Analysis of this part is based on the following research question:

- ***What are the current solid waste management practices and its associated problems in Delhi and Manila cities?***

From the case study and the interviews conducted with the waste sector experts in both Delhi and Manila metropolises it has been observed that the general solid waste management situation is highly unsatisfactory in both cities.
The issues surrounding solid waste management in Delhi and Manila cities can be categorized as political, technical, organizational, institutional, socioeconomic and managerial.

Due to rapid urbanization and population growth in the recent years the amount of waste being generated has significantly increased while the capacity of municipal authorities in delivering waste services for their residences remains undesirably low.

This inability in delivering the services is caused by different factors such as lack of institutional capacities in the public sector, technical capacitates and lack of proper knowledge among the municipal officers and workers, corruption issues in the public sector, lack of law enforcement and in some cases lack of financial resources. On the other hand lack of public awareness about adverse consequence of inadequate waste management, lack of community participation and people cooperation has further worsened the situation.

Lack of long term vision and goals has had its toll on urban waste management sector. The hazards created today in Delhi and Manila is the direct result of such a deficiency. Lack of ability to understand that long-term vision should start from today is a strong failure in itself. It is highly recognized that the Governments and Municipalities had always given attention on short-term solutions only and have not considered the waste management issues as a priority. In other words solid waste management is a highly political neglected issue.

Cardenas (2012, Appendix A) mentions more issues such as inadequate financial resources and capacities in the municipalities by stating: "*....There is lack of political will to enforce the key provisions of the law by local governments since solid waste is not a priority program.....The local governments usually have limited budget or no specific budget for their solid waste management. There is also lack of capacity building and institutional capacities and resources in the municipalities to provide consulting, information, trainings and networking services for the implementation of regulations" (Cardenas 2012, P, 3).*

It is worth mentioning that some experts disagree with financial constraints in the municipalities, instead they point to inefficiently using of resources which is due to lack of proper management. On the other hand solid waste itself can become a source of income and can support the municipalities financially.

Sahu (2012, Appendix B) gives an example from India by stating: *"...I don`t think there is any financial problems in the municipalities. I think the waste itself has a value and is the source of income for the municipalities. For instance, the ITC (Indian Tobacco Company) which is a tobacco production company have decided to collect and buy the waste paper. This company also has a paper plant in Chennai for recycling of waste paper and they have been very successful in this mission.....financial issues are not a problem, man power is not a problem, private sector availability is not a problem our problem is the management" (Sahu 2012, P, 2).*

Waste management in Delhi and Manila cities is being pursed following old and outdated 'end of pipe' strategies. Lack of law enforcement by municipalities is also a barrier towards improved solid waste management. The main activity regarding the solid waste is collection, transportation and disposal of the generated waste. Despite the regulations that call for proper recycling and treatment of waste, a clear and specific activity by municipalities aimed at promoting waste reduction, reuse and recycling (3 Rs) within households is highly lacking. High urban population which competes for the limited space even more worsen the situation. Because of this land scarcity, the people who are engaged in the 3 Rs strategy such as organic compositing are finding it extremely hard to locate land from where they can practice. Moreover, such activities are not given priority by both those in authority and land owners who mainly focus on the profitable business of urban housing.

indiscriminately dumping of solid waste in the open areas of the city and in water bodies and lack of community and households cooperation and participation in the waste management process for instance proper segregation of solid waste at source, have also significantly contributed to the creation of huge waste problems in both cities. Segregation of waste at source is very important and can accelerate better recycling of waste. For instance, since a considerable amount of municipal waste generated in Delhi and Manila is biodegradable waste and does not necessarily need to be sent to landfills, proper segregation of waste can significantly reduce the transportation costs as well as the increasing demand for new landfills.

Public health and aesthetics are compromised when the wastes from transfer stations are not collected according to schedule because they are located along main streets which are used by many people. Also waste spillage from the uncovered waste trucks while in transit makes previously cleaned localities dirty. There are also some managerial problems in regard to the health protection of the collection staff. The municipalities are reluctant to enforce measures aimed at protecting the health of collection staff.

Therefore, lack of institutional capacities, efficiency and proper management in the municipalities is a major barrier towards better resource management.
Zurbrugg (2012, Appendix C) in this regard says "*I am not totally agree with this argument that there is little budget for them, if you look at how inefficiently they use the money and this is the issue I have mentioned several times before that they could probably halve their cost if we take it as an rough suggestion. If they streamline their operations and make sure that all people are working as they are expected to work and the trucks are really working not doing something else on the*

working hours..... so by increasing efficiency we can avoid extra expenses" (Zurbrugg 2012, P,9).

The availability of corruption, lack of proper plan for solid waste programs in the municipalities and inter organizational complications which is due to structural problems has been observed the most important issues. Lack of cooperation and coordination between the departments involved in the management of solid waste creates huge managerial problems. Different departments blame each other for not performing well when issues such as public awareness, community mobilization, and training and education programs for people are mentioned. In this regards Zurbrugg (2012) says: "*even on the local level there is various institutions and organizations, governmental authorities which are all having parts of responsibilities in solid waste management and that of course makes it very difficult because often they do not talk with each other and they are doing things independent from each other which means that there is very little coordination between them and this is a major challenge*" (Zurbrugg 2012, P, 2). Cardena (2012) agreeing with this issue by stating: "*Vague and fragmented organizational structure is also a source of problem. Most of the waste management activities are implemented by many departments within the local governments" (Cardenas 2012, P,2).*

Political interferences and corruption is another major issue in the public sector which affects the proper management of solid waste in both cities. For instance while contracting the delivery of some of the municipal services with private sector, corruption and bribery issues play an important role. Or politicians use their power in favour of a specific company. When a company get the contract through a corrupt process they would do whatever they want because they are sure that not performing well have no consequences because they have already paid for getting the job and no one will come and monitor their work, thus monopoly of services by a few specific people and private companies leads to reduction of service quality.

Sahu (2012) in this regard says "*Corruption is a very big problem in our municipalities. When the private sector wants to take the contract they need to pay an amount first to municipal authorities as bribe in order to get the contract" (Sahu 2012, P,3)*.

One of the main reasons behind corruption could be lack of transparency while making contracts. If the decision making process is more participatory and other stakeholders are involved in the process the chance of corruption would be reduced. On the other hand media can play a positive role in this regard. Since India and Philippines are both democratic countries therefore free media is very

active. If the bedding process is open to all specially to media and journalists then it would prove very useful and can extremely reduce the possibility of corruption.

Choice of appropriate technologies for solid waste management programs is also an issue of concern. Often the authorities with desire of modernization of waste sector and wishes for looking modern and well equipped adopt the same technologies which have been very successful in other places such as European countries. In most cases they are being offered by local and international suppliers to buy modern and expensive technologies and they do so without thinking that is this modern technology suitable for my city or not. For instance the incineration technology which has a huge waste reduction potential, almost about 80% to 95% (Rand et al 2000) tends to be extremely attractive technology. But with occasional exceptions, it has not been an appropriate technology for low and middle income countries. High financial start-up and operational capital and high content of wet waste in the waste stream are the main barriers to implementation of incinerator facility and it's a successful adoption of it in developing countries (Rand et al 2000).

With regard to choice of technology Cardenas (2012) says: "*Choice of technology and equipment is also very important to be taken into account. Local governments are generally offered the latest technologies and equipments from local and foreign suppliers without taking into account that these technologies are suitable for our city or not". (Cardenas 2012, P,3).*

Making the people cooperate socially and economically is the socioeconomic dimension of solid waste management. Lack of adequate information regarding the adverse consequence of waste is a major barrier among the people. In order get the people`s cooperation and support, there is a need to increase their knowledge regarding the issues surrounding the waste. It is a matter behaviour change in people. According to a study people willingness for reduction, reusing and recycling of waste depends on their level of knowledge. The people who were more likely to recycle waste were those who fully understood the proper way and the reasons to do it as opposed to a person simply desiring to recycle (Troschinetz et. al., 2009). Therefore conducting public awareness and educational campaigns looks extremely necessary and useful. For instance people can contribute to a successful waste management by reduction, reusing, recycling and proper segregation of waste at source (Troschinetz et. al., 2009). Also households can play a significant role in cooperating with waste collection staff by putting placing their waste on the right place and right time outside the house.

Despite doing a significant job, informal waste collectors including scavengers working at the landfills and those who collect the recyclable waste around the city are not recognised by any existing policies and in most cases they are harassed by people in the society. Scavengers are mainly from minority groups of society who are socially and economically most vulnerable people. It is estimated that there is about 100,000 waste pickers in Delhi mostly women and children (WIEGO 2012). Integration of this huge work potential can extremely contribute to improvement of solid waste management.

6.2 Public private partnership analysis

Analysis of this part is based on the following research questions:

- ***How can public private partnership help in provision of better waste services and reduction of the health and environmental risks?***
- **What are the possible prospects and constraints of public private partnership?**

In general from the example of public private partnership in west zone of Delhi, I can point out that partnership between the Municipal Corporation of Delhi and the Metro Waste Handling (p) Ltd. (MWH) has greatly improved the solid waste management situation. This is justified by the followings:

West zone of Delhi with 1.5 million populations generates of 500 tonnes of solid waste per day which needs proper management. Before the partnership the solid waste system was inefficient and poorly managed. Partnership has significantly increased the efficiency of the waste collection, segregation and disposal and also has positively contributed to proper recycling of some materials. All the waste management activities are conducted according to a schedule made by the team leaders and supervisors. The west zone has been divided into different wards which are governed by different team leaders. The working team such as drivers, collectors and segregators have a supervisor in each ward and the supervisor is responsible for monitoring the working team and report to the team leader.

This proper division of areas and responsible teams has greatly improved the management of waste. Furthermore, with the partnership collection, segregation and storage of waste has undergone a huge change. No more open trucks are used for transportation of waste and the problems such as waste spillage and odour are no more common. Different colour waste bins are used for biodegradable and non biodegradable waste collection which was not practiced prior to partnership. Collection of waste in different bins has increased the amount of recyclable waste and the waste which goes to composting facilities, while reducing the amount of

waste goes to landfills. Collection bins are located in different parts of the each ward where needed, doing so has prevented littering of waste on the streets and creation of small open dumps everywhere in the city.

Collection and transportation of waste with compactor loaders has also contributed to improvement in the system. For instance collecting waste with compactor loaders has considerably reduces waste spillage, ensures hygienic environment around the waste storage depots, thus reduces environmental and health risks.

Partnership has also improved waste segregation both at source and in waste storage depots. After arriving of waste to the waste storage depots a team of workers are responsible to segregate the waste and separate them into compostable and non compostable wastes.

A considerable amount of wet waste is being separated by workers at the waste storage depots and taken to the compost plant at Bhalaswa. Separation of wet and biodegradable waste from the waste stream significantly reduces the amount of leachate, carbon dioxide and methane gases produced in the landfills and dumpsites and in return preventing the contamination of soil, underground waters and air pollution which leads to reduction of health and environmental hazards (Philippe and Culot 2009, Bobeck 2010). Degradation of organic matter in the landfills and dumpsites results in formation of carbon dioxide and methane, where anaerobic decomposition results in extensive production of methane which can accelerate the global warming process (Manahan 2005, Chakraborty et al., 2011).

Regarding the efficiency of public private partnership Cardenas says: "..... *For instance in Quezon City garbage collection and management of disposal facility has been contracted with the private sector. According to the Quezon City Government, they were able to save about 3 x the amount for having a public private partnership. There is also an increase in collection efficiency of 99% in this city.....better management, providing better services, flexibility and cost efficiency are some of the benefits of this model, therefore public private partnership is being encouraged by the governments and the international organizations such as World Bank" (Cardenas 2012, P,6).*

The most important driver behind the success of private sector is profit oriented management. They are making money and doing business. The more efficient service they deliver the more credit and reputation they gain. The more cost efficiently they operate the more benefit they get. Sahu (2012) is also convinced that public private partnership is a good model for waste management, he says: "..... *It is a good model because private sector wants to do business and work hard for that. I think the municipalities should just retain the monitoring and contracting*

role and the other responsibilities of service providing should be given to private sector (Sahu 2012, P,4).

Some main benefits of Public private partnership are summarized below:

- Speedy, efficient and cost effective delivery of projects
- Creation of added value through synergies between public authorities and private sector companies, in particular, through the integration and cross transfer of public and private sector skills, knowledge and expertise
- Competition and greater construction capacity
- Innovation and diversity in the provision of public services
- Effective utilisation of state assets to the benefit of all users of public services
- Alleviation of capacity constraints and bottlenecks in the economy through higher productivity of labour and capital resources in the delivery of projects
- Accountability for the provision and delivery of quality public services through performance of incentive management (UNDP, 2005)

One more important thing is the issue of rewards and consequences in public private partnerships. When a person is not performing well during the work he/she can get fired by private sector employer which is the consequence of not working properly. But in public sector it is not often the case. For instance in India the availability of strong labour union makes it very difficult for public sector to fire a worker (Zurbrugg 2012).

Lack of proper performance has consequences even for private sector itself. Zurbrugg (2012) says in this regard: ..... *If the private sector does not perform well then it has consequences and you can of course cancel the contract (Zurbrugg 2012, P,5)*.

There are besides benefits also risks associated with public private partnerships. Some possible implications or constraints of public private partnership are:

Political Risks:

Some governments may have less experience with public private partnership. The combination of inexperience by government and stakeholder unfamiliarity with public private partnerships may result in higher political risks.

Loss of control by public sector:

Public private partnership is about sharing of risks, benefits and decision making between the partners. Public private partnerships where private sector does big

investments often provide for greater involvement of the private partner in decision making. This often leads to concerns about who controls the delivery of services.

Inability to benefit from competition:

Competition between the private companies to get the contract is an important benefit for the public sector. Competition the key for innovation, efficiency and cost efficiency, So if there are only a limited number of private partners with the required expertise or ability to do the job, then the public sector may not benefit from this partnership.

Bias in the selection process:

There is always the possibility for the public sector to be accused of being bias in the selection of partners (UNDP, 2005, UNESCAP, 2011).

6.3 Social/Environmental Justice, Millennium Development Goals and PPP

In the discourse of development theory much attention is paid to social capital. According to the Rio Declaration and Agenda 21, any strategy for sustainable development has to include all dimensions of economic, social and ecological development (Warner 1999). Sustainable social development means continuous progress towards creation of a human society that treats equally all the people regardless of their economical, cultural, racial and language differences. This is exactly in tune with social and environmental justice theory which also emphasises on the same values.
Social capital development within communities involves a process in which community's increase participation in their own governance (Evans 1996). Increased participation has the possibility to create better management and opportunities.

Building social capital is a process in which governing bodies work with communities to provide better services as coproduction (Ostrom 1996). The main goal is to increase community participation in the process by providing opportunities, trainings and educational programs for them. Public private partnership can work as a tool to build social capital in the communities and increase their participation in the solid waste management process by conducting public awareness campaigns, education and training workshops for the communities and help to achieve the MDGs.

Goal number 8 of the MDGs is about establishing partnership. It means that making partnership is one of the possible ways of achieving sustainable development (Coad and Gozenbach 2007). This partnership should be based on trust and loyalty. The main goals and objectives of the partnership in solid waste management can be summarized as follows:

- Identify and recognize the stakeholders and partners
- Explore the potential new partners and define forms of partnership models to create synergy
- Explore capability and strength of the stakeholders involved in waste management and to utilize their strength in an optimum manner
- Define and consolidate the roles of each stakeholder partners in UWM,
- Explore the ways of economic and commercial sustainability of methodologies of waste management that protects human health and nature,
- Explore the methods of waste management that prevent waste disposal in public place and nature
- Motivate and mobilize the waste generators, polluters and communities in general to work for waste management at source.
- Reduce the cost of UWM to the consumers (UNDP, 2005, Coad and Gozenbach 2007)

From the example of public private partnership in the west zone of Delhi it has been observed that Metro Waste Handling private limited has been conducting Slum programs, Street play's, School assembly sessions student rallies, Posters & banner displays, awareness programs for household segregation at source level and training of operational staff. These activities are improving the level of people`s knowledge and information regarding the solid waste and help them to get involved in their waste management process. On the other hand these activities build social capital in the communities and enable the people to solve most of their solid waste management problems within their communities and keep their environment clean, thus reduce the health and environmental risks. Because based on the definition of environmental just theory given by the United States Environmental Protection Agency, access to clean living environment and not to be exposed to risks or ecological and health impacts is the basic rights of every person in a country.

VII. Conclusion

The goal of this thesis was to study the solid waste management practices and its associated problems in Delhi and Manila metropolises. Public private partnership for solid waste management has been studied with the aim of exploring its efficiency as a possible better alternative model for the public sector controlled system.

Solid waste management is not only the responsibility of public sector because everybody who generates waste is a stakeholder and needs to bear some responsibility. On the other hand it has repeatedly been pointed out by most influential organizations such as World Bank and European Commission that there is a need for a change and different approach in order to overcome the increasing problem of solid waste management in most of developing countries. From social point of view they emphasize on community and private sector participation in the form of partnerships. This participation and partnership stems for the following situation: Firstly, the growing deterioration in the environment due to population growth, uncontrolled rapid urbanization and economical growth has challenged the capacity of public sector to work up to the expectation of the people.

Secondly, private sector is believed to have the resources, technologies, capacities, efficiency and expertise needed for more effective management of solid waste, while public sector can play a significant role in make the regulations and retain the authority of monitoring over the private sector contractors. Such distribution of responsibilities can be arranged in the form of public private partnership.

Public Private Partnerships are arrangements between public and the private sectors for the purpose of providing public services. Such partnerships are characterized by the sharing of risks, responsibilities and reward between the partners. The reason for making such partnerships in Delhi and Manila cities in the solid waste management involves the provision of better municipal services and sustainability of the solid waste services.

Since public private partnership combines the skills of both public and private sectors it improves the solid waste management situation, thus is a better alternative model for solid waste management. This argument has been proven in practice in the public private partnership project in Delhi. The partnership between Municipal Corporation of Delhi and Metro Waste Handling (p) Ltd. has greatly improved the solid waste management situation in west zone of Delhi city. After partnership collection, transportation, segregation and recycling practices have been

significantly improved and have resulted in huge reduction in the amount of waste going to landfills. The segregated organic waste transports to the composting facility for production of sustainable compost products. Since the organic waste fraction is responsible for leachate and methane gas generation, removal of biodegradable waste from the waste stream to be disposed of reduces the methane emissions at the landfills which is one of the responsible gases for global warming. By conducting public awareness campaigns, training and educational programs, Metro Waste Handling (p) Ltd has greatly increased the level of people`s information and knowledge regarding solid waste management.

In general it is concluded that until all stakeholders Such as public and private sectors (both formal and informal), NGOs and communities are involved in the solid waste management process, a durable and sustainable solid waste management system is not possible. Public private partnership is a good alternative model for solid waste management in Delhi and Manila cities, but at the same time one important issue worth mentioning that capacity building in the public sector is also very important for having a successful partnership with private sector. Without institutional capacities public sector cannot be a strong partner to properly manage the contract and monitor the quality of services provided by the private sector.

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Appendix A

Interview with Lizette Cardenas

The purpose of this Interview is purely for academic purpose for a master thesis project in Municipal Solid Waste Management at Aalborg University in Denmark. The results of this interview are not for publication.

Please explain a little bit about yourself and your organization activities?

My name is Lizette Cardenas. I am the executive director of Solid Waste Management Association of the Philippines (SWAPP). I have a Master degree of Science in Communications and a Master degree of Arts in Public Administration.

SWAPP is a non-profit organization which was formed in May 2000. It is composed of solid waste practitioners from local governments, national government, NGOs and the academe. Its objectives are to: enhance the knowledge and skills of solid waste management practitioners to plan and implement integrated solid waste management programs; disseminate information and promote exchanges and partnership among solid waste management practitioners; advocate for policy reforms to strengthen Local Government's capacity to implement their solid waste management; and conduct solid waste management researches in aid of policy, advocacy and program development.

SWAPP activities include: conducting of trainings, seminars and conferences on solid waste and related topics like sanitation, e-wastes; conducts researches on solid waste and related topics; facilitates study tours to solid waste management sites and sharing of best practices; maintains a Resource Centre which contains materials on solid waste management and related topics; maintains on-line assistance to members and non members through information sharing and dissemination; networking and linkage establishments with other waste sectors; promotes advocacy on solid waste management issues; provides technical assistances to local governments and other waste sectors; coordinates activities and events; documents best practices on solid waste management and prepare proceedings of events/conferences.

What are the current problems with municipal solid waste management in your city?

The current problems of municipal solid waste management in the metro Manila are:

- Indiscriminate dumping of wastes in rivers and bodies of water which contaminates surface and ground water supplies. It also clogs waste drainage, creating stagnant waste for insect breeding and floods during rainy seasons.
- Uncontrolled gas emissions from decomposition of organic wastes in open dumps and untreated pollutes surrounding soil and water bodies
- Waste workers are seldom protected from direct contact and injury and are exposed to hazardous and medical wastes which are co-disposed with municipal wastes.
- Low recovery rate and waste diversion from landfills because of low implementation of segregation at source, recycling and composting.
- Lack of appropriate disposal sites because of costs, social acceptability and waste generation rates.
- Lack or absence of skilled technical waste personnel in an local governments
- Solid waste is not a priority of local government, hence, not given proper budget and staff.

What do you think are the cause of these problems?

- Lack of sustainability of the solid waste management program – the term of office of the solid waste management board and committee is dependent on the term of local chief executive or Mayor. The institutional mechanism (SWM Boards/Committees) for the implementation of the law at the local level is not functioning well.
- Vague and fragmented organizational structure is also a source of problem. Most of the waste management activities are implemented by many departments within the local governments. Hence, the coordination and communication between and among the different departments in carrying out the solid waste management services are poor and inefficient. Lack of coordination and proper management.
- Lack of planning activities including implementation of the strategic waste management plan- Majority of the local government lack comprehensive plans as required by RA 9003. In these local governments, there are usually no clear goals for solid waste management; the operation is reactive rather than predicted demands; equipments are purchased only when needs arises and funds available. This lack of planning can be traced to inadequate information system or data base which would be useful in indentifying the priority areas requiring immediate improvement.

- Choice of technology and equipment is also very important to be taken into account. Local governments are generally offered the latest technologies and equipments from local and foreign suppliers without taking into account that these technologies are suitable for our city or not. These creates problems for the local governments because they are rushed into buying technologies and equipments without any thinking of its warranty on the parts, maintenance and viability, technical skills in the operation and maintenance, the material requirements for the technology, the marketing aspects of the products produced, among others.
- Creation, monitoring and enforcement of waste management ordinance – Policy formulation and enforcement are the major undertakings for successful waste management program. There is lack of political will to enforce the key provisions of the law by local governments since solid waste is not a priority program. The incorporation of waste management concerns in the administration of the municipality or city, like business permitting, building construction, procurement criteria and procedures, needs a closer look.
- Not-in-my Backyard Syndrome - This NIMBY syndrome is a major barrier to the sitting of waste disposal facilities and establishment and operations of materials recovery facilities. There is inadequate appreciation of the real essence and intent of RA 9003 which is getting people to take responsibility for their wastes and creating a waste-free lifestyle.
- Limited or inadequate budget for solid waste management programs is one of the major issues. The local governments usually have limited budget or no specific budget for their solid waste management. There is also lack of capacity building and institutional capacities and resources in the municipalities to provide consulting, information, trainings and networking services for the implementation of regulations.

What is your opinion about community or households participation in waste management issues and how can their participation help to improve the waste management efficiency?

The community participation in waste management has been encouraged by NGOs and the private sector and some local governments who shown their innovativeness in creating models of solid waste management programs. Community participation helps the implementation of the solid waste management programs because it creates partnerships among the different stakeholders. It also helps identify champions from among the different stakeholders who can assist and encourage/influence the rest of the community in adopting the solid waste management plans and programs of the local governments.

What are the main barriers to successful and fairly solid waste management in your country?

The solid waste management Boards and solid waste management Barangay Committees are generally created or reorganized after every election of new sets of local officials; hence, there is no continuity in the solid waste management plans and programs. Solid waste management is also not often considered a priority of the local government and are also considered cost-centres. In terms of the personnel and offices, there are often overlapping in functions and no single office is in charge because the Office of the Environment and Natural Resources at the local level is not mandated positions.

What is your opinion about Public Private Partnership (PPP) in solid waste management?

The public private partnership is a good alternative in solid waste management. Since the private sector has the resources (knowledge, technical resources, manpower and financial resources) to undertake and deliver the solid waste management services. On the other hand, the public sector has the mandate and policies to facilitate the delivery of these services. So making partnership with private sector is a good idea and proves useful.

Do you think involvement of private sector in solid waste services is useful?

Yes because of the reasons that I mentioned above. Mostly because of the expertise and flexibility that the private sector has, their involvement is very useful.

How do you evaluate their activities and work efficiency?

I think the work quality of private sector is very good. The public sector or local governments should work hand-in hand with the private sector on any solid waste management activities so that it would be a learning process for the public sector. This is to ensure that when the time comes that the private sector will end the partnership, the public sector is already capable of managing the solid waste management activities.

Why involvement of private sector in solid waste management has become so attractive?

Since the public sector is facing corruption and lack of capacities, so the private sector seems to be a favourable alternative for solving the increasing solid waste

problems. Because they are more flexible, they have resources, they have capacities and expertise and so on that makes them capable to tackle the problem more effectively.

What are the main drivers behind the attraction towards privatization of some of solid waste services in your city?

- Cost of building an solid waste management facility such as a sanitary landfill
- Cost of collection and disposal
- Lack of technical personnel and equipment in the public sector
- Lack of expertise and institutional capacities

Do you think the public private partnership model is a suitable model for your city and will the people accept it?

Yes it is a good model. I think people will accept whatever that can improve the situation of municipal solid waste in their city.

What are the benefits and constraints of Public Private Partnership?

Better management, providing better services, flexibility and cost efficiency are some of the benefits of this model, therefore public private partnership is being encouraged by the governments and the international organizations such as World Bank. But the constraint would be the long process of undertaking a PPP and the terms of office of the local officials which is only 3 years.

How do you see the role of Municipalities in creating PPP models?

Public private partnership models are created because of private sector's interest to invest in certain projects like establishment of sanitary landfills. However, the constraint will be the social acceptability of the project and the willingness of the local government units to cooperate with the counterparts. Municipalities and the governments can play a significant role here; they can make the regulations and ease the situation for making such a partnership.

How do you evaluate the role of private sector in delivering solid waste services?

Usually, the local governments establish terms of reference which they bid out to private sector. Hence, the deliverables indicated in the terms of reference would be the basis of evaluation and payments. There is also a project manager or a

designated officer in the local governments that monitors the work of the private sector, but again the capacities of the municipalities for the monitoring of the projects and their work efficiency is important.

Do you think that municipalities in your city have the capacities and are capable enough to monitor the activities of private contractors?

It would depend on the projects and municipalities; for solid waste management, a city or municipality would have different technical knowledge for monitoring projects. Maybe for local governments which have been assisted or being assisted by donor agencies, they would be more capable because they are given capacity building opportunities like trainings, field visits, etc.

What should be done in order to make sure that private contractors do their job properly and what should be the standard or evaluation criteria of their activities?

The contracts and terms of reference should be the basis for evaluating the work of the private sector; hence, if the terms of reference are not specific enough for the work required, then the deliverables would be questionable.

What is your opinion about corruption issues when municipalities or local government making contract with private service providers?

There is always the possibility of corruption in any government contracts especially if there is no transparency and accountability. I think lack of strong institutions and capacities in public sector pave the way for corruption.

Are communities in favour of Public private partnership and has this model improved the solid waste services in any community that you know?

It would depend on the community, if they are open to public private partnership arrangements. We have had several examples of public private partnership in the Philippines. For instance in Quezon City garbage collection and management of disposal facility has been contracted with the private sector. According to the Quezon City Government, they were able to save about 3 x the amount for having a public private partnership. There is also an increase in collection efficiency of 99% in this city.

Appendix B

Interview with Dr Amiya Kumar Sahu

The purpose of this Interview is purely for academic purposes for a master thesis project in Municipal Solid Waste Management at Aalborg University Denmark. The results of this interview are not for publication.

Please explain a little bit about yourself and your organization activities regarding solid waste management?

My name is Amiya Kumar Sahu, I have done my PhD in urban planning and management in the United States. I started my work as a head of the association in 1996. I am also member of the ISWA (Integrated Solid Waste Association). Our association is a highly professional body in solid waste management area and we have a significant number of professional engineers and scientists working here. The name of association is national solid waste association of India but also have international members from Japan, USA, Africa and some other places working here for the association. Currently we have 300 hundred professional staff and our biggest supporter is the government of India. Our main activities are to make policies and play a role of adviser for the government. We also cooperate with private sector and industries. We also organize workshops, seminars, training programs, educational programs, public awareness programs regarding the urban policies and solid waste management. We have also for the first time in the country started a special training course on solid waste management issues with cooperation with some universities.

What are the main solid waste management problems in your city and your country in general and how do you evaluate the capacities of municipalities in dealing with solid waste management?

Well India generates about 58 million tons of solid waste per year. Per capita waste generation varies from 0.1kg/capita/day to 0.7kg/capita/day depending on the economic standards of the people. Rich people generate more waste comparing to poor people. About 50% of the waste in Delhi and other Indian cities is organic waste while the rest is dry waste. No city in Indian including Delhi is good in management of solid waste, we have a lot of solid waste problems in our cities. The main problems are the lack of public awareness, lack of information about adverse consequences of bad waste management. Even the waste department managers

in the municipalities do not have proper knowledge about the waste management. In most cases they just give the job to private companies which in most cases are not well qualified. Another problem is political interferences in the municipalities when giving the contract to private sector, so in most cases the companies responsible for solid waste is belong to politicians and rich people and they just want to do their business rather than taking care of the properly waste management. Most of the private sector on the field do not perform well and just pass their time. I can say that our problem is mainly because of lack of education and awareness, and also lack of professional capacities in the municipalities.

What about the financial issues, is lack of financial resources a problem in the municipalities in your city?

No I am not agree with that, I don`t think there is any financial problems in the municipalities. I think the waste itself has a value and is the source of income for the municipalities. For instance, the ITC (Indian Tobacco Company) which is a tobacco production company have decided to collect and buy the waste paper. This company also has a paper plant in Chennai for recycling of waste paper and they have been very successful in this mission and now they want to collect all dray waste in Chennai and want to pay for it, so it is a good income source for the municipalities in such cities. In such a situation you will not see any peace of dry waste on the streets because even a small boy or waste picker take it and sell it on the company. Similarly we can see the organic wet waste which can also be sold on the companies involved in producing gas from waste, producing compost, generate power out of it and so on. What I mean is that, we should give a value to this waste and turns it to a source of income and it is not difficult, lots of companies are willing to buy the waste, financial issues are not a problem, man power is not a problem, private sector availability is not a problem, our problem is the management.

What is your opinion about Public Private Partnership in solid waste management and do you think it would be a good model for your city?

Public private partnership in solid waste management is very good. It is a useful model, but the problem is that when the private sector wants to take the contract the municipalities expect so much from them to do and in return do not pay good. So in this because of high expectations the quality of work goes down. So it is again the issue of good management and capacities in the municipalities to manage the situation well and pave the way for better cooperation with private sector in order to increase the quality of work.

You mentioned the issue of political interferences in the municipalities from politicians side, what is your opinion about corruption issues when municipalities or local government making contract with private sector?

Corruption is a very big problem in our municipalities. When the private sector wants to take the contract they need to pay an amount first to municipal authorities as bribe in order to get the contract. Then the private sector takes the contract and does whatever they want because they have paid for receiving the contract, there is no clear and transparent bidding process. So afterwards the bribed municipal authorities do not monitor the work quality of private sector and this is the reason that the work quality is down the city is unclean and money is gone, which is again the issue of mismanagement and corruption in the municipalities.

What do you think is the reason of attraction towards privatization of municipal services in India?

Better service, cost efficiency and flexibility. Private sector provides better service than the municipalities do.

Household are the major solid waste producers and solid waste service receivers in a city, how do you evaluate the role of people`s culture with regard to efficient solid waste management and what they can do to improve the situation of waste management?

Household can play a very significant role in solid waste management, because waste generation starts from households and they are the biggest waste producers in the country. For instance they can separate the waste at source i mean segregation of waste at source, it will make it very easy when recycling the waste, they can also play a positive role in keeping their city clean, if we all manage our waste properly there will be waste on the streets.

Do you think involvement of private sector in solid waste services is useful and how do you evaluate their work efficiency?

In general yes. But there are some points. First of all the problems that i mentioned before, inside the municipalities, should be solved. On the other hand a good and proper study of the real statistic should be done by the municipalities before they give the contracts to private sector. Data is vital for estimation of cost. When there is no correct information about the amount of waste characteristic of waste how a private sector can estimate the cost of the project, so it is the biggest problem and is one of the main reasons of project failure in most cases. I can generally say that

involvement private sector is very good; it increases the quality of work in general if we have good municipalities to be good partners.

Do you think public private partnership is a better alternative for management of solid waste in your city? If yes what should be done in order to make sure that private contractors do their job properly?

Yes definitely. It is a good model because private sector wants to do business and work hard for that. I think the municipalities should just retain the monitoring and contracting role and the other responsibilities of service providing should be given to private sector. If the bidding process is transparent and the monitoring by the municipalities is done properly, I am sure that most of the solid waste problems will be solved because in that case private sector work very hard to get the contract and give a good image from themselves to the people which can lead to high quality of work. One more thing I want to add here is that public private partnership as an alternative and efficient model have been presented by World Bank and have been accepted by the government of India. The only thing which makes the situation difficult is low capacities and corruption in the governmental offices.

Do you think that municipalities in the cities of developing countries (in your city) have the capacities and are capable enough to monitor the activities of private contractors?

Not at all, they are corrupt and have not the capacity of supervising and monitoring as i mentioned before even the municipal officers do not have knowledge about waste management. How an unqualified person can monitor the work quality of a private company.

Do you think the public private partnership model is an interesting model for the people, will they accept it?

Why not, people want good service; if they can get through PPP they will be very happy. They just want to see the city clean and in most places people are willing to pay for it if they get better service.

Do you have any suggestion at the end as an expert what should be done to improve the waste management in Delhi?

I am strongly recommending PPP, but beside that I have to say that without capacities, proper knowledge, expertise and good institutional arrangements in the

municipalities any management model including PPP cannot solve the problem of solid waste. In the current situation that we have in our city such as political interferences from the politician's side corruption in the governmental authorities, lack of capacities, lack of expertise, how can we establish efficient solid waste management systems.

Appendix C

Interview with Christian Zurbrügg

The purpose of this Interview is purely for academic purposes for a master thesis project in Municipal Solid Waste Management at Aalborg University Denmark. The results of this interview are not for publication.

Please explain a little bit about yourself and your organization activities regarding solid waste management?

I am head of the department. The department is called SANDEC, *which stands for* Department of Water and Sanitation in Developing Countries. It is one of the departments in the Swiss Federal Institute of Aquatic Science and Technology (Eawag). The name «Eawag» was originally a German acronym, standing for «Eidgenössische Anstalt für Wasserversorgung, Abwasserreinigung und Gewässerschutz» (Federal Institute of Water Supply, Wastewater Treatment and Water Pollution Control). This designation is still used in legal documents. It is a federal research institute in Switzerland but our department is focusing on developing countries issues that include water supply, sanitation and solid waste management in developing countries. I am the head of the department but also the group leader for solid waste management research.

Most of the cities in developing countries are facing serious municipal solid waste management problems, what do you think are the cause of these problems?

I think it is a long and important question. I think there are funding problems, priority of management and political priorities, financial problems but also management skills, technical skills on how to solve the problem, on how to tackle the problems. I think these are the main causes of the problem.

What are the main institutional barriers to successful and fairly solid waste management in the cities of Developing countries? Well I think institutions are mainly municipalities responsible for solid waste management in most of developing countries and of course on the national level there is a ministry, ministry of environment, ministry of public health and on the local level there is usually municipality and inside that there can be a solid waste management department. But often there is a conflict; there are many departments involving in the same topic, so typically there is not only solid waste department but also a public health department in the city which is responsible for other issues and solid waste and in

most cases there is also a department called public works department which is then maybe responsible for the equipments like the trucks. So very often what you are facing in developing countries is that, even on the local level there is various institutions and organizations, governmental authorities which are all having parts of responsibilities in solid waste management and that of course makes it very difficult because often they do not talk with each other and they are doing things independent from each other which means that there is very little coordination between them and this is a major challenge. I think the issue of behaviour is also very important, behaviour change and participation in solid waste management by public themselves is very important. There is often not a perceived need for household participation so that there is lots of littering; people do not pay attention to the regulations on how solid waste should be disposed, people often do not see it necessary to pay for solid waste management and they feel it is a governmental responsibility and it should be free of charge. So I think there are also social issues which are also the cause of the problems. How to overcome the problem is a different issue, the cause is that the people do not behave correctly and why they do not behave correctly is a question that needs to be looked at, if they are not aware, if they are not educated, are not aware of the impacts, those can also be reasons.

Why most of the municipalities in developing countries have been unable to deliver proper solid waste management services, how do you evaluate the capacities of municipalities in developing countries?

Municipalities in developing countries have lots of problems; they are under pressure and are not able to provide adequate services for the population. The total amount of waste being generated every day has been increased significantly which needs proper management according to current situation. Most of the municipalities are still using the management systems which have been used during the last two three decades. That management principles and manners are not working now because population growth, urbanization, industrialization and globalization have changed the situation. Lack of management skills, financial resources, institutional skills, coordination between the responsible authorities is also the reason that lowers the capacity of municipalities in dealing with the problem.

Household are the major solid waste producers and service receivers in a city, how do you evaluate the role of people`s culture with regard to efficient solid waste management and what can household do to improve the situation?

I think it is more the social aspect how to create public awareness on how they can contribute to waste management by recycling, waste reduction, waste segregation

at source, and also cooperating with the collection staff by putting the bin on the right place and right time outside the house. I think the role of households is very big and important and they can really make a big difference in the recycling process by doing source segregation and cooperating with keeping their environment clean. Public awareness of negative consequences of waste is an important element in solid waste management because they can help with not littering their city and environment and as a result the cities look clean. Since waste is the cause of many diseases, by persuading the people to keeping their environment clean we can avoid lots of unexpected diseases.

Which management model do you think would be a better alternative for current solid waste management systems which in most cases is fully controlled by public sector?

I think public private partnership is a very better model and solution for solid waste problems in developing countries. As I understand the public private partnership is collaboration between the private sector and the public sector which in most cases are municipalities which has the overview and role of monitoring. And another model which is full privatisation is that the public sector gives everything to private sector and says ok we give away the responsibilities to private sector and do not care and do not do anything and just let the private sector to develop itself. This model cannot be the proper one because solid waste services are not a private good but rather a public good. Because if one of the households does not care about the waste they generate or do not care about the littering of the public space, the impacts of that would be for all community and all community would be affected. Then it shows that the impacts of waste from one individual household is affecting the others, so it means that the service is a public good and should have a close link to a public authority like a municipality which is responsible for such as public good, which is responsible for making sure that there is no air pollution, there is no water pollution and there is not any negative impacts on the citizens. And all of these things are the responsibility of a governmental agency and cannot be just delegated to a private sector because private sector is not concerned about the public interest; they are concerned about their profit. Since the impact is a public interest, so a public institution has to be involved in the partnership.

What is your opinion about the efficiency of Public Private Partnership in solid waste management?

The official opinion is that it is usually more efficient than the public sector services. Which can make sense of course that a private company can be often more flexible in acquisition of resources and knowledge, in hiring, in firing, and of course because their goal is to make profit so they want to be more cost efficient. The risk of

course is that they try to be more cost efficient and they limit the quality of service, so they might do the job as well as they should because it would need too much time and would cost too much. So what it means that public private partnership can really be very efficient and that needs a strong local government authority which controls and has a very good contractual agreement with the private sector. So making the contract and monitoring in very important and often unfortunately not sufficient in some cases. It is not sufficient if the local government is a weak partner and of course the private sector is in a way strong and can misuse this strength for their own purposes.

Do you think private sector participation in the management of solid waste is a good option in developing countries?

Yes definitely I am convinced. This does not mean necessarily large private sector. It can also mean small private sector. So small business that for instance does some primarily collection in neighbourhoods and then transfer the waste into the disposal points or even the recycling sector which is often private sector of course in some case informal private sector but it is still private sector and they are doing really a great job and a very useful job and I think including this private sector can be very useful.

What are the main steps to be taken in order to create a good public private partnership model?

First of all the legislations are important to allow creating such model because in many place that is not even allowed. The legislation should allow that the private sector can be included in the municipal service delivery. I think as a second step the municipality is the one who open the service for tender. The other step is that the municipality needs to know what needs to be managed, they need to know what the waste amounts are, what the area is, what the service requirements are, what needs to be done with the collected waste, which elements of the service are included. It should be clear that is it just collection or collection and treatment and management of a treatment station or a disposal site and so on. All these needs to be developed by the municipality or any other public agency and doing all these thing there is need for capacity of people to prepare the documents. Data is also needed because you need to know what the amounts of waste are and what services are you requiring because if you are asking for the tender document by the private, then they need to make suggestion based on available data. They also need to make a cost estimate based on data and if they do not have the data of course the cost estimate will be very weak and during the service then suddenly new information will appear and the contract will be very weak as well. So first of all i think the public sector needs to know what the situation is and what are they

dealing with. Then they can develop a plan of what service they are requiring and then they can open for tender and then. The other step which is very important is to avoid the situation of monopoly. If you have only one bidder that is of course very difficult and dangerous because you will not have a choice or alternative and you cannot select the cheaper one, so in this situation the issue of competition does not play. One more important thing is that the municipality should divide the areas in different parts and give it to different contractors. The benefit is if one of the contractors does not perform well and the municipality cancels its contract the other contractor who is already working can take over the area. If you have only one contractor for the whole city and they go bankrupt, then what do you do and in that case you are lost because you do not have service and you do not have alternative. So the best is to have several contractors in different places.

For preparing the primary data that can be needed by private sector when making the contract, the municipalities should prepare that themselves or they can hire a research institution or consultancy agency to do it for them. The consultants can usually do the solid waste generation and characterization for the city and that is not a problem.

Why involvement of private sector in solid waste management has become so attractive and what are the main drivers behind this attraction in the cities of developing countries?

I think it is because of the reason that municipalities think that they can get better service with a lower cost, but that might not always be the case. I think the better service you can achieve because you can set up your contract to define what performance level you want. The lower cost is not always so obvious; I think generally the cost is lower because the private sector has to bid because there is the situation of competition and sometimes there is very hard competition. But nevertheless I think the performance and work efficiency of private sector is much better.

I think the main drivers for attraction of private sector is better service, flexibility of service and cost of service.

What is the consequence of private sector involvement in solid waste management in general?

I think it depends how the contract is regulated between the private sector and municipality. Obviously there is small private sector which can be independent from the municipality and yes there will be some cost for the community. But on the other hand the experience shows that most of the communities are willing to pay some thing if the service is good. When they see that they have the alternative of paying nothing and getting very bad service and paying some thing and getting a good

service then I am sure they pay some thing and want the good service. And of course the only one who cannot pay at all is the poorest because they do not have the funds. I think it is possible to find a solution for those who cannot afford the private sector service. That can be other subsidies, that can be donations from NGOs and so on and that depends on the municipality to find the best possible way.

What are the benefits and constraints of Public Private Partnership?

I think I mentioned the benefits, which are the flexibility of service if the private sector does not perform well then it has consequences and you can of course cancel the contract, cost efficiency, work efficiency and better performance. But at the same time you need to make sure that this contractual arrangement is good. The contract between the public and private sectors has to be well defined and well established and the public side has to have the capacity to oversee and monitor the contractor. Otherwise the municipality will have difficulties and problem in overseeing and monitoring the private sector. If the public sector does not have enough capacity they cannot enforce some measures when the job is not done properly by the contractor and this from my point of view is a constraint.

Do you think that municipalities in the cities of developing countries have the capacities to monitor the activities of private contractors?

I think that depends on the municipality but what is important that when you think about the public private partnership it develops the capacities in the municipality and the municipalities themselves also need to build their capacity and that is a process that has started early and have to be developed. I think the work of the World Bank which has is pushed very much towards public private partnership. At the beginning they had focused only on the private sector but later they realized that they have to actually strengthen the capacity of municipalities to be able to a good partner in this partnership, so I think it needs a lot of capacity buildings which is different from capacity to provide service and the capacity to supervise service. So before going to public private partnership, municipalities need to build some capacities in order to be able to go for the contracts and monitoring of the contractors.

Municipalities are facing low capacity problems in most of the cities in developing world and if they do not perform well the private sector which is seeking their own profit will misuse the contracts. There are also some legal difficulties in some countries. For instance in India the local government and local public sector for example municipalities cannot fire any one if they do not perform well in their job. Because there is a very strong labour union and legislation that they have very difficulties in firing people if they are not doing their job well. So what they have is a large amount of staff who is not working well and the municipal authorities cannot

do much because they are restricted by the laws and by their very inflexible system. I can say that it is not a performance oriented system it is more like business as usual and there is no accountability for the public either. So there is no motivation to perform well, because there are no consequences if they do not perform well. If they perform well or bad there is no difference, they still get paid and the budget is still there and maybe in the long term it has some political consequences but even the political consequences will not be directed to the staff in the municipality but rather to the political leaders, so the staff of the municipality are in a way safe from the precaution. But in the private sector it is totally different, if you do not perform well and do not do your job in a private company you get fired.

What should be done in order to make sure that private contractors do their job properly and what should be the evaluation criteria of their activities?

The contracts between the parties should be very clear and well arranged and the public part should have the capacity to monitor the contractors. The consequence of not performing according to the contract should be very clear in the contract. People and communities could be a good source of help they can inform the municipal authorities if they see that the contractor is not performing well.

What is your opinion about corruption issues when municipalities or local governments making contract with private sector and how corruption can be avoided?

Of course corruption is not good, but we are facing corruption issues in most of developing countries and that is obvious. Now the question is what to do against it. I think one of the ways one can work against it is total transparency; I mean the process should be open to everybody especially to media and journalists. For instance what the situation is, what the regulations are, what the bid is, what is tendered, what the expectations are of this partnership and also the process should be very transparent on what are the criteria of how and which private contractor is hired. All these process should be very clear, open and should be looked by the public. So in this there will also be a public evaluation of the criteria. I think if the decision making is more participatory and other stakeholders are involved in the process then I think there will be less possibility of corruption. But it is clear that there is always risk of course but that is the only way and I think specially in India and Philippines that both countries are democratic countries and the media, public and in general civil society is very strong, there are a lots of out spoken journalist and there is freedom of speech and all these factors can play a very significant role in this area if the whole procedure is shown in a very transparent way and as a result most of the corrupt situations can be hindered.

Do you have any example of successful public private partnership in solid waste management in any city in the developing world? Do you think it improves the situation?

Yes it improves the situation. I do not have many examples but the few that I know are working much better. One thing is important and that is when there happen a change for instance the municipal services are free of charge and suddenly the communities have to pay for it because privatization of parts of the service and it depends from one community or city to another. For example it should be explained to the people that it is not only private services that charges some amounts but also even public service needs to be paid for. It depends which financial arrangement is in that city, you can have the public private partnership where the private sector gets the money through the municipality not through the households or communities. I think it is a way that does not affect the communities directly to say oh now i have to pay for it. In this case the municipalities can collect solid waste service charges from the household together with the other taxes. One difficulty is probably the community's social activities. They would tend to be overlooked because what you do is you can have put a kind of overall blanket on the top of the whole city especially with a large skill public private partnership. It means that you use one solution for the whole city because every community in developing countries is very different in its form and in the way it acts and maybe there is a local solution which is early available and works quit well. So there will be a risk by putting this overall blanket on the top and you would lose that momentum by the communities. For instance the recycling activities, if you already have community recycling programs or informal recycling programs and now suddenly the private sector come and says that all these waste is my property because they want to collect it and the more they collect the more money they get which is on one hand good but on the other hand not good for the informal sector recycling and for those people who have a livelihood from these recycling activities. This is the risk that needs to be taken account.

Informal sector in solid waste management is doing a great job every day what can be done to integrate them into the formal sector and strengthen the collaboration between them and the formal sector, what role can municipalities play?

I think now they are being more and more recognized that they are doing a significant job but now the question is how to best integrate them. I think there are different models of how to integrate them of course you have to talk with them and work together with them. If you have one hundred thousand individual members of recycling sector it is very difficult to talk with each of them, i mean coordination is very difficult and it might need a kind of organization or association on the informal

side that does not necessarily mean formalization but a kind of cooperative or a kind of professional association of the recyclers and someone who represents that group of people to be a discussion partner with the municipality. That would help a lot to be a good discussion partner with the municipality and try to find a solution on how to best collaborate with municipality and even the private sector that is of course valid for both situation. I know some cases where the private sector has included them or integrated them as their staff and giving them certain responsibilities and providing them some health insurance and they are part of the company and working in coordination with private sector and municipality.

What is your suggestion as an expert on improvement of solid waste management systems in developing countries, what should be done in general?

I think a lot of factors are involved here, for instance including all the stakeholders in the decision and discussion process, building local and social capacities, using appropriate technologies, having a very transparent and clear institutional set up to make sure that there is not several different agencies which are doing the same thing, clear distribution of responsibilities, technical issues, financial issues to make sure how to fund and how the costs are recovered, make sure that the costs not only covers the collection but also the treatment and disposal, to include the stakeholders and that is more the social aspect how to create public awareness on how they can contribute to waste management by recycling, waste reduction, waste segregation at source, and also cooperating with the collection staff by putting the bin on the right place and on the right time outside the house. I think all these elements are very important and needs to be looked at and then of course to make sure that even the poorest are covered, because this is a very important issue it is the issue of equity that all people should get service not only the one that can afford service. This is more a policy issue i think, because you might not be able to get any fees from the poorest, but you can get fees from the rich residential areas and the industries that can pay more and then you can subsidize service to make sure that the poorest get service and their fees are paid.

You mentioned the issue of funds, often the municipal authorities are complaining that the central government do not allocate enough budgets for solid waste services what do you think in this regard?

I am not totally agree with this argument that there is little budget for them, if you look at how inefficiently they use the money and this is the issue i have mentioned several times before that they could probably half their cost if we take it as an rough suggestion. If they streamline their operations and make sure that all people are

working as they are expected to work and the trucks are really working not doing something else on the working hours. On the other hand maintenance of the equipments is important in order to make sure that the trucks are serviced on time to keep them always active. So in general i can say that the efficiency problem is very big in most municipalities, so by increasing efficiency we can avoid extra expenses. Why private sector is gaining reputation and more people are interested in private sector? Because they think and they are convinced now that private sector is more easily efficient than a municipal service. I think the municipal service can also be more efficient and it needs the structure and it needs performance measurements, accountability, if all these things are in place and the municipal authority really want and work to be more efficient then I think they can reduce their costs significantly. Once you have improved efficiency then you can make a new calculations and see how much budget do you need, I think that extra amount that they will need will be zero or very little amount. So in general we should try to find the causes of the high cost then we should argue that our budget is enough or not, it is also related to the lack of capacities because proper calculation of the total expenses is directly related to financial management capacities which are also an area of concern in most of the municipalities.