

**Public-Private Partnership in Solid Waste Management: A
Case Study of Lalitpur Metropolitan City**

Submitted To:

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RECOMMENDATION OF THE SUPERVISOR

This is to certify that the thesis entitled "Public Private Partnership in Solid Waste Management: A case study of Lalitpur Metropolitan City" Submitted by Mr. Lok Bahadur Rai to the Central Department of public Administration, Faculty of Management, Tribhuvan University for the Master of Philosophy (M.Phil) degree was completed under my supervision and guidance. The thesis is the candidate's original work. I have carefully read this final work and am fully satisfied with the language and the substance of the thesis.

To the best of my knowledge, the candidate has also fulfilled all the requirements of the M.Phil.program of the Central Department of Public Administration, Faculty of Management, Tribhuvan University. I, therefore, recommend that this thesis be considered for the award of M.Phil. Degree.

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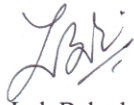
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DECLARATION

I hereby declare that this thesis entitled "Public Private Partnership in Solid Waste Management: A case study of Lalitpur Metropolitan City" submitted to Central Department of Public Administration (CDPA), Faculty of Management, Tribhuvan University has been completed as per the prescribed format of Tribhuvan University. This is my original work done for the partial fulfillment of the requirement of the Master Degree of Philosophy in Public Administration (M.Phil) under the guidance and supervision of Pro. Dr. Purushottam Sharma, of the Central Department of Public Administration (CDPA). I also declare that all documents have been obtained and presented in accordance with academic rules and ethical conduct. I personally will have no objection for reference of this study for other research purposes.



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VIVA-VOCE SHEET











We have conducted the viva-voce examination of the thesis
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Entitled:

"PPP in SolidWaste Management :A Case Study of Lalitpur Sub- Metropolitan City.
" and found the thesis to be the original work of the students and written according
to the prescribed format. We recommended the thesis to be accepted as the partial
fulfillment of the requirements for Master of Philosophy.

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In many developing nations, for the last few decades partnership is playing more significant role in infrastructure development and providing services relating to SWM and the government ownership has declined. At present, PPP is considered as an important model for urban development. It has been found that partnership can be used as a good policy to improve economic growth. PPPs can also enhance the social infrastructure in sustainable way. Thus, solid waste has become serious problems and it has also created challenges for the developed as well as developing nations like Nepal.

The Solid Waste Management Act has provided the required power and functions to the local bodies for managing the waste but the problems is being serious. Therefore, the GoN of has felt that the management of waste should be done through the PPP model. Lalitpur PPP model shall be developed as a role model for Nepal and a long-term plan shall be prepare recommended by SWM OBA SIP Project so that PPP model can deliver effective and sustainable services. While considering these facts, I attempted to conduct a research work entitled “Public Private Partnership in Solid Waste Management: A case study of LMC” for the partial fulfillment of the requirements for the Masters of Philosophy in Public Administration.

I express my sincere gratitude to Prof. Dr. Purushottam Sharma, who provided me an opportunity to work under his supervision. His constructive and intellectual guidance and suggestions inspired me able to make thoughts and ideas for accomplished of this research more reliable and effective. Similarly, I would like to extend my warm gratitude to Prof. Dr. Tek Nath Dhakal, the Head of Department of Public Administration and Coordinator of M.Phil. program for his valuable guidance and cooperation. Furthermore, I would like to thank to Dr. Narendra Paudel for his inspiration and valuable suggestions during my M. Phil. Study.

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ABSTRACT

This studied deals with Solid Waste Management practices of LMC along with private and other stakeholder participation. It focused on dissemination of knowledge on the SWM practices, plans and strategy of LMC along with its stake with private sectors as PPP model. For some decade, it has been seen as urgent issue to address. Many cities of Nepal are now suffering from the adverse impacts of unmanaged waste. The problem is acute, particularly in the major cities of the country where improper, insufficient and unplanned management of solid waste has led to environmental pollutions, public health hazards and dirty urban view.

Civilization and modernization is measured on the basis of clean, green and healthy society. Now a day, it is felt that the management of solid waste is the responsibility of all stakeholders like central government, local government, private sector, NGOs, civil society and individuals. Rapid urbanization has made solid waste management a serious problem today. The perception of the people has always been that it is a responsibility of the local authority. Currently, many local authorities have been experimenting with several innovative and participatory methods of 3R i.e. Reduce, Reuse and Recycle of solid waste.

LMC has its office located at Pulchowk, Lalitpur and is the sole agency for providing municipal services and carrying out urban development works in the city of Lalitpur. LMC comprises of 30 wards. It has population of 254308. It has 212 educational institutions established in the district including schools and college of various faculties. It has 4 major hospitals located in the district. There are about 150 industries established here including 106 industries of Patan Industrial State. There are altogether 100 hotels and restaurants located in the city. It is historically a marketplace and have more than 6000 shops are running within LMC. This data clearly indicates the possible generation of solid waste in this city as well as emergence of effective SWM. After the enactment of LSGA in 1999, municipalities were given more power and authority to plan and implement developmental works regarding urban infrastructures and services within its jurisdiction.

The study is generally objected for acquiring and disseminating knowledge on solid waste management and public private partnership practices and approaches. For this, it has chosen the case of LMC. It is based on the secondary data in the form of Reports, survey and outcomes of seminars and workshops conducted by LMC. The study has tried to provide an insight of existing status of waste generation to waste management, approaches and practices of partnership with stakeholders, thus it contributes for making the effort of involving private and other stakeholders more effective and efficient.

In the process of solid waste management, the Public Private Partnership (PPP) program is popularized in the developed and developing countries. Public Private Partnership is cooperative institutional arrangements between public and private actors. This study is based on theoretical framework discussed in the neo- liberalism and public private partnership in solid waste management which argue that the role of state can be changed by giving some responsibility to private sectors as a step of transforming toward privatization and free market economy.

This study is based on descriptive research designs which describe SWM practices with the illustration of case of LMC. The secondary sources of data such as internal reports, survey reports and official documents of LMC environmental section has been taken as major source of data. Site observation, unstructured questionnaires with employees and other stakeholders are also practiced. The collected data have been presented sequentially and systematically according to the demand of objective of the study.

Total collected waste are categorized into different 8 types among which 91% solid waste has found composed of organic, paper and plastics categories. Households, Institutions and Commercial shops, hotels, restaurants are major generators of solid waste. Among nearly 75 tons of generated daily solid waste, 60 tons is collected by municipality and 15 tons is collected by private sectors. Bell collection system has been applied by municipality whereas door to door collection system by private collectors. There are no recycling programs of LMC but some NGOs, INGOs, and Kawadis are involved in such activities.

Under LMC, there is Environmental and Sanitation Section at Balkumari headed by an Environmental Engineer as section chief. The section chief directly report to the CEO of LMC. This section has major responsibility of SWM. Major Private Stakeholders are found from private institutions and community based organizations (CBOs) and involved in activities like awareness creation in SWM, plastic collection and composting, training on composting and establish eco-clubs. Project based, regular and occasional programs on SWM partnered with private sectors have been found conducted. Private sectors are free to collect their fee for their service of door to door collection of solid waste. It comprises of about 15 tons of solid waste generated from households.

VDCs, DDCs and Municipalities are regarded as Local bodies as LSGA 1999. According to performance indicators of local bodies, they receive less or more grants from central government. LMC has a good track record on Sanitation and SWM indicator. It is continuously trying to overcome its weaknesses in SWM through various strategic plans.

LMC has identified some key issues that are affecting SWM among which political instability, lack of awareness, unavailability of real database, lack of proper segregation, insufficiency of resources, lack of conducive participation of private sectors etc. It has made a mid-term and long term plans for effective SWM after having conducting proper projection on population and possible waste generation in such periods. It has been planning to apply international level approach for SWM of LMC. It has proposed so many approaches for effective SWM. Similarly, on the basis of a systematic study and reports, it has made proper strategies for effective SWM in LMC.

The systematic practices of SWM are new in Nepal. The initiation of SWM is late or slower than the generation of wastes. LMC is trying to manage the generated wastes in efficient, planned and strategic manner. Similarly, it has equally realized the importance of private sector and community base organization for SWM; it is working with them through many projects and programs. LMC must charges regular fees for its SWM services to public, institutions and other commercial entities. Hopefully, it will make them more responsible as well as a rational burden to make the city clean and healthy. It will also helpful to improve SWM practice and enhance its sustainability.

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ACRONYMS AND ABBRIVIATION

BOT	Build-Operate-Transfer
BOOT	Build-Own-Operate-Transfer
CBOs	Community Based Organizations
DDC	District Development Committee
EPA	Environmental Protection Act
GoN	Government of Nepal
LEE	Initial Environment Examination
ISWM	Integrated Solid Waste Management
RCA	Japan International Cooperation Agency
KMC	Kathmandu Metropolitan City
LBFC	Local Bodies Fiscal Commission
LBs	Local Bodies
LGCDP	Local Governance and Community Development Program
LSGA	Local Self Government Act
LSGR	Local Self Government Regulation
LMC	Lalitpur Metropolitan City
MSW	Municipality Waste Management
NEIA	National Environmental Impact Association

NEPCEMAC	Nepal Pollutions Control and Environment Center
NGOs	Non-Governmental Organizations
OBA	Output Based Aids
PFBOIA	Private Financing in Build and Operate of Infrastructure Act
PPP	Public Private Partnership
PSP	Private Sector Participation
3R	Reduce, Reuse and Recycle
SIP	Service Improvement Plan
SWMA	Solid Waste Management Act
SWM	Solid Waste Management
SWM-SIP	Solid Waste Management Service Implementation Plan
SWMTSC	Solid Waste Management Technical Support Center
TLO	Toll Lane Organization
TU	Tribhuvan University
UNDP	United Nations Environment Program
UNEP	United Nations Environmental Program
UN-HABITAT	United Nations —Human Settlement Program
VDCs	Village Development Committees
WEPCO	Women Environment Preservations Committee
WB	World Bank

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CHAPTER – I

INTRODUCTION

This chapter deals with the introduction aspects of the Solid Waste Management. This chapter discusses the general background of the solid waste management, its management and general meaning of public private partnership. The study states the research problem and defines the research questions. Furthermore, it highlights significance of the study, limitations of the study and explains the structure of the study.

1.1 Background of the Study

Waste is meant by such materials that are no longer needed and are thrown away. Thus, the solid wastes are concerned with those kinds of solid (not liquid) materials, which are not useful for human beings. It has been generally observed that many of the solid wastes are being produced by day to day human activity. At present, most of the developed and developing countries are facing serious problems and challenges of Solid Waste Management (SWM). If the solid wastes are not properly and effectively managed they definitely create serious and sensitive problems because it leads to land pollution if openly dumped, water would be polluted if dumped in low lands, and air would be polluted if burnt. For instance, Dhaka capital city of Bangladesh is facing a serious environmental degradation and public health risk due to uncollected disposal of waste on streets and other public areas, clogged drainage system by indiscriminately dumped wastes and by contamination of water resources near uncontrolled dumping sites (Hai & Ali, 2004).

Waste management is the collecting, transporting, processing, recycling or disposing and monitoring of waste materials. It is also carried out to recover resources from it. There is more to waste management than collecting rubbish and dumping it at landfill and seeks environmentally friendly recycling opportunities for waste resources that are recovered (Anderzen, Christina & Veronica Bless, n.d.).

Solid Waste Management system comprises of all administrative, financial, legal, planning and engineering functions for solution. There are different activities that are

associated with the solid waste management from the point of generation to disposal they are, waste generation, waste handling and separation, storage and processing at the source, collection, separation, processing and transportation of solid waste, transfer and transport, and disposal. To minimize the negative impact on human being and surrounding environment of solid waste, it can be managed sustainably through recycle and reuse. It is to be considered that the solid waste is a multi-usable resource in our daily life. Only to landfill or disposed the solid waste is not a better management of wastes (JICA, 2004).

Solid waste management has been and will continue to be a major issue facing countries worldwide. There is increasing waste generation rates due to population growth, changing lifestyles of people, development and consumption of products with materials that are less bio degradable. It has led to the diverse challenges for Solid Waste Management (SWM) in various cities of the world. This is because urbanization, rapid industrialization and rapid economic growth in these countries that has resulted in large increases in refuse output resulting in rapid depletion of landfill and poor performance of waste disposal systems that are used in these countries. Meanwhile, with limited resources, only basic technologies for treatment and disposal, and deficient enforcement of relevant regulations, serious problems remain for SWM in developing countries, especially regarding safe disposal and recycling of MSW (ISWA and UNEP, 2002). Furthermore, this has been compounded by inappropriate waste handling, storage, collection and disposal practices pose environmental and public health risks. In densely populated urban centers for example, appropriate and safe solid waste management (SWM) is of utmost importance to create a healthy environment for the population

Similarly, solid wastes are classified into various terms such as the domestic waste, industrial waste, chemical waste, medical waste or hazardous waste. This term refers to substances including solid, liquid, gas, semisolid, smoke, dust, and materials used by the electronic and information technology which are not in a position to be used forthwith, thrown or rotten, or disposed causing degradation of the environment, or other similar types of objects or posters or pamphlets posted in public places in an unauthorized manner and other objects which have been declared as waste by the Government of Nepal

through the publication of the notices in the Nepal Gazette from time to time (GoN, 2011). Nepalese urban spaces are facing problems of solid waste management.

The overall goal of urban solid waste management is to collect, treat and dispose of solid wastes generated by all urban population using the most economical means available. Local Governments in urban area are usually authorized to have responsibility for providing solid waste management services. Most local government laws have a provision of ownership over waste management. As cities grow economically, the business activities and consumption patterns increase solid wastes quantities as a result it increased traffic congestion adversely affects the productivity of the solid waste fleet. Productivity loss is exacerbated by longer hauls required of the fleet, as open lands for disposal are further and further away from urban centers. The challenge is to rationalize worker and vehicle performance, while expanding services to a growing urban population (World Bank, 2009). Thus, solid waste management is an inevitable by- product of human activities. In the past, this was not major problems in Nepalese urban centers because almost everything was reduced, reused or recycled and whatever remained was taken care of by nature. However, the introduction of new materials and changing consumption patterns and life styles, especially in the urban area, have resulted in increasing volume of waste as well as breakdown of traditional systems of waste management.

According to SWM Technical Guidelines-2010, in Nepal, like other many developing countries, these changes have taken place rapidly over the few decades, while the government and the people have failed to realize serious implications and the urgent need to address solid waste management. As a result, many cities of Nepal are now suffering from the adverse impacts of unmanaged waste. The problem is acute, particularly in the large cities such as Kathmandu, Lalitpur, Bhaktapur, Birgunj, Nepalgunj, Biratnagar, Pokhara etc. where improper management of waste has led to environmental pollutions, public health hazards and urban economy.

Waste management practices differ in developed and developing countries, in urban and rural areas and in residential and industrial producers according to the quantity and composition of generated wastes. Now a day, it is felt that the management of solid waste

is the responsibility of all stakeholders like central government, local government, private sector, NGOs, civil society and individuals. Civilization and modernization is measured on the basis of clean, green and healthy society. Single effort of Government is sufficient to cope with these serious problems of the country in efficient and effective manner. So, other stakeholders must be taken the necessary steps for sustainable and valuable management of solid waste. Furthermore rapid urbanization has made solid waste management a serious problem today. The perception of the people has always been that it is a responsibility of the local authority. Local authorities are constitutionally bound to keep their territories clean. For some time now, many local authorities have been experimenting with several innovative and participatory methods of 3R i.e. Reduce, Reuse and Recycle (MaRGG, 2005) of solid waste.

1.1.1 Socio-Economic Status of Lalitpur Metropolitan City (LMC)

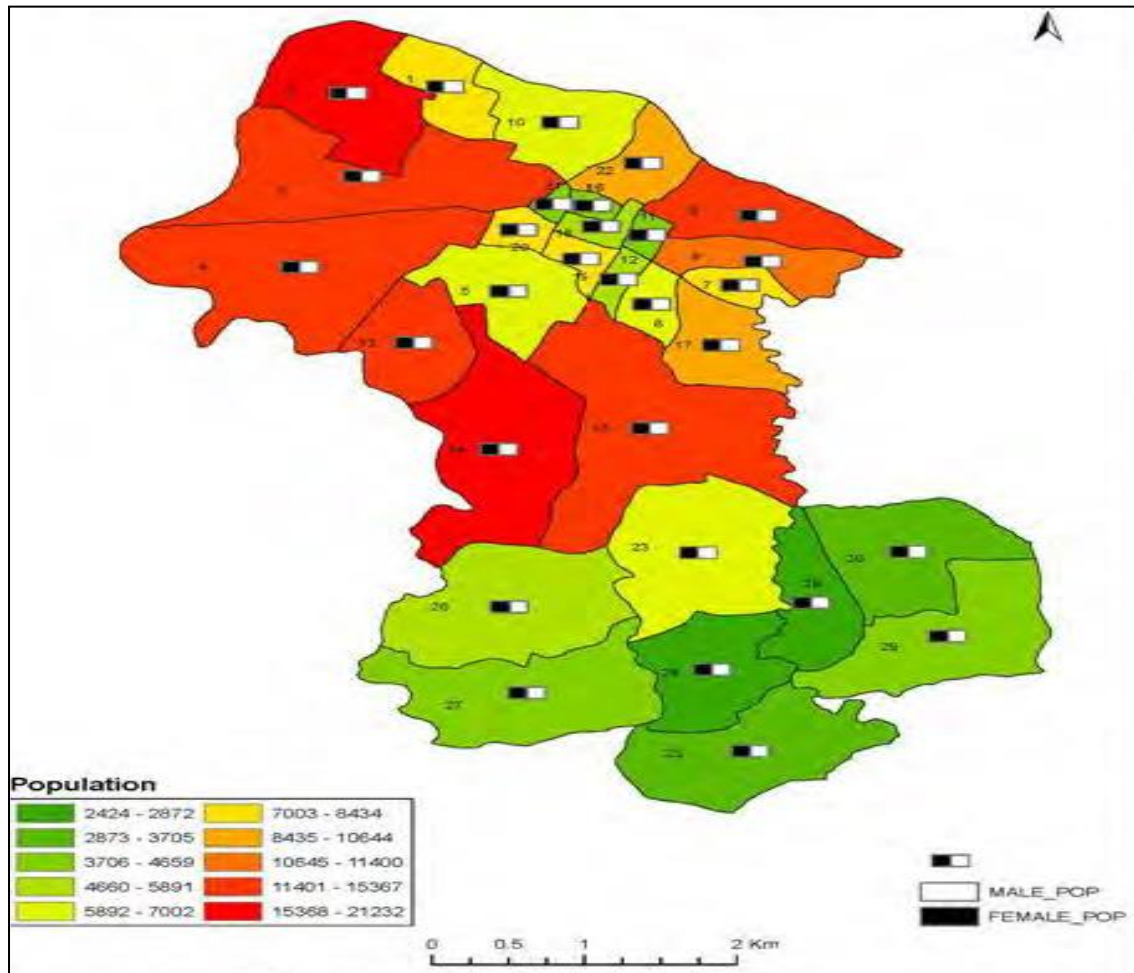
Brief Description of the LMC area

Lalitpur Metropolitan City (LMC) is located between the latitudes 27° 32' 13" and 27° 49' 10" North and longitudes 85° 11' 31" and 85° 31' 38" East, in the south-east of Kathmandu at Central Development Region of Nepal. With its urban history dating back as far as 2000 years, LMC is one of the three major cities located inside the Kathmandu valley, besides Kathmandu and Bhaktapur.

Metropolitan City (LMC) is located in the south-east of Kathmandu at Central Development Region of Nepal. With its urban history dating back as far as 2000 years, LMC is one of the three major cities located inside the Kathmandu valley, besides Kathmandu and Bhaktapur. LMC was originally established in 1918 and upgraded to Metropolitan city in 1995. Recently it has been converted into Lalitpur Metropolitan City. The municipality has a long history with its foundation in the third century. From historic times, the municipality is known with various names such as Yala after the Kirat King Yalamber; Ashok Pattan after the visit of Emperor Ashok who erected four Ashok Stupas at four corners of the municipality. From the Pattan name, it has carried the famous name "Patan" even today. Lalitpur is famous for its abundant fine historical art and culture including the World Heritage Site – Patan Durbar Square. LMC has its office located at Pulchowk, Lalitpur and is the

sole agency for providing municipal services and carrying out urban development works in the city of Lalitpur. After the enactment of LSGA in 1999, municipalities were given more power and authority to plan and implement developmental works regarding urban infrastructures and services within its jurisdiction. Following the municipal reform in 2014, the municipality jurisdiction is extended by amalgamation of 3 VDC namely Sonakothi, Dhapakhel and Harisiddhi and it has increased to 30 wards from 22 wards. The map of the extended municipality is provided in the following Figure. The Figure also provides information on the population in the ward. The population in wards varies from min 2424 to 21232 as per Census 2011.

administrative boundary map of LMC.



Source: Population Census 2011, CBS

The city spread over an area of 15.15 km² and is divided into 22 wards, and

recently extended to 30 wards with annexation of nearby VDC. The Municipal Area is now extended to 24.98 sq. km.

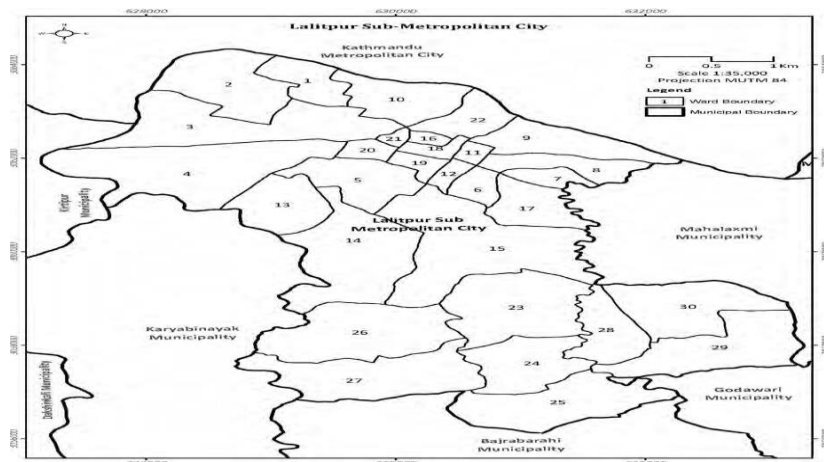
The valley lies at a mean elevation of about 1,350m above sea level. The altitude of the city varies from a minimum of 1,266m to a maximum of 1,366m above sea level, which shows the relative flatness of the ground on which the city is located. Among them, ward no 15 is the largest (2.43 sq.km) and ward no 21 is the smallest (0.93 sq.km).

Table 1.1 Extended Geographical Boundaries of Lalitpur Metropolitan City (Ward wise)

Geographical Boundaries		Rivers at the Boundaries
East	Imadol (Mahalaxmi Municipality)	Kodku River
West	Karya Binayak Municipality, Kirtipur Municipality and Kathmandu Metropolitan City (KMC)	Nakhu Khola, Bagmati River
North	Kathmandu Metropolitan City (KMC) and Imadol of Mahalaxmi Municipality	Bagmati and Manohara River
South	Thecho and Jhauwarashi in Bajrabarahi Municipality and Thaiba in Godawari Municipality	

Extended Lalitpur Metropolitan (Ward wise)

Map of City



Source: Municipality Map, 2015

Rivers form the natural territorial boundary of LMC separating the city from its neighboring cities and VDCs. It is bounded in the north and west by the holy Bagmati River, to the east by Karmanasa River and to the south by Nakhu Khola. LMC lies within the warm temperate climate zone of the Kathmandu valley, with typical monsoonal two-season year. Yearly average temperature in the city is 15-20o Celsius and receives yearly average rainfall of 2000-2400mm (DHM 2001). There's the dry season from October to

May and there's the wet season, the monsoon, from June to September

(http://www.lalitpur.org.np/e_home.php)

Lalitpur Metropolitan City has a well-developed road network of various categories, width and pavement types catering to the transportation needs of its citizens. The city has good transportation linkages with other cities and settlement areas at the rural peripheries of the valley, especially at the south and south-east. From 1985 to 1998, the total length of road under various road categories in the Lalitpur District increased from 290 to 383 kilometers (Status of SWM in municipalities of Nepal, SWMTSC, 2008).

Land use pattern

The city of Lalitpur was one of the three main cities in Kathmandu valley and it consist several other small satellite settlements like Lubhu, Khokana, Bugamati, and there existed close socio-economic and cultural linkages between. The city like other cities in the valley shows distinct urban settlement and land use pattern. The settlements were compact in nature and within them were hierarchies of spaces depending upon the social position held by the people especially during the Malla period. The royal palace or Durbar Square with series of courtyards and big open spaces with temples in it occupied the central position within the city. The immediate area surrounding the palace was allocated for the priests, noblemen and people belonging to the high castes. Next to this were people of the business community, craftsmen, farmers and workers. To the outermost boundary or the periphery of the city were the lower caste groups such as cleaners, podes, butchers etc. Agricultural

land extends beyond the city area. This is in consonance with the traditional urban settlement pattern of human history.

Considering the rapid urbanization in the city, Kathmandu Valley Urban Development Program has devised a certain land use ordinance to guide the pattern of land use within the city and this is the basic guideline that has been followed for the purpose of preparing a current land use map. The area covered by different land use zones have been presented in a tabular form below.

Table 1.2 Land Use Zone of LMC

S.N	Zone	Area in sq. m.
1	Core Area/Inner City Area	0.97
2	Residential Area	13.03
3	Institutional Zone	1.08
4	Industrial Zone	0.17
5	Conservation Zone	0.066
6	Surface Transportation Sub-Zone	0.0055
7	Sports Zone	0.096

Source: City Profile, LMC 2005

Population and households

According to the Census Report of 2011, the total population of the Lalitpur is 226,728 which comprise of 108, 936 female and 117,932 male respectively and number of households is 54,581

According to the 2001 Census, the total population was only 162,991. Thus, the population has increased by 72% within the 10 years period (www.census.gov.np).

Institutional, Industrial and Commercial Establishments

According to the City Profile (2005) of LMC, there are altogether 213 educational institutions in LMC, including government and private schools, boarding schools, colleges. Among of them are 22 pre-primary, 36 primary, 141 secondary level schools and 13 colleges. The schools are more or less evenly distributed among the 30 wards of the city. Similarly, there is only one industrial estate within LMC and is situated at Patan Industrial Estate, Lagankhel. There are about 150 industries in total in LMC including 106 in Patan Industrial state. There are also numerous cottage

industries (848), including handicraft and metallurgy factories. There are 13 big hotels with world standard services and facilities and a number of small hotels. Altogether, more than 100 hotels and restaurant are located in LMC, which generate significant amount of waste (SWM-SIP Study, 2016)

Hospitals

There are 4 major hospitals in the whole district of Lalitpur with a total bed capacity of 282. Three of these hospitals are located within LMC, Patan Hospital, Mental hospital and Kustarog. There are also two private hospitals, B & B Hospital at Gwarko and Alka and Nidan Hospital at Pulchowk (SWM-OBA Study, 2016)

Hotels and Industries

One industrial estate situated at Patan Industrial Complex. There are about 150 industries in total in LMC including 106 in Patan Industrial state. There are also numerous cottage industries (848), including handicraft and metallurgy factories, which are spread at different places of the municipality. Lalitpur, with its rich art and architecture, breath taking historic monuments and unique living culture and tradition, has much to offer to the tourist. There are 13 big hotels apart from number of small ones established here in the city, with world standard services and facilities. Altogether, more than 100 hotels and restaurant are located in LMC, which generate significant amount of waste (SWM-OBA Study, 2016).

Market and shops

The major market centers in LMC are at Kupondol, Pulchowk, Kumaripati, Lagankhel, Sanepa and Mangal-Bazaar area. There is vegetable market at Lagankhel and Dhougal Bazaar at ward no. 18 of LMC. The daily-consumed market commodities are available in these market areas. Mangal Bazaar being a center of the old city, have, since historic times been a major market center. The area also being close to the Patan Durbar Square the hot spot of tourists, several shops selling tourist goods, like handicrafts and souvenirs are located here. In total, more than 6000 shops are in LMC however very few of them are registered (SWMTSC Final Report,2014).

In LMC, the commercial establishments (Hotel, restaurants, Shops), industries, institutional establishments (schools/colleges, offices etc.), health institutions and commercial activities in streets generates huge amount of municipal waste along with households.

1.2 Statement of the problem

Collection and dumping as well as recycling, reusing and safe disposal of urban waste has become a major challenge, causing adverse impact on the environment, public health and deteriorated the living standard of people. Thus, the solid waste management is key responsibility of every municipality in effective and efficient way. If it is not effectively managed; it creates serious and sensitive environmental problems which affect human health and national economy as well as environment.

For the effective management of solid waste, the Waste Management Act, 2011 has expanded the authority of waste management for the local bodies. Accordingly, the Nepalese local government institutions have greater responsibility for waste management by involving private sector, communities, individuals and other institutions. Similarly, the Lalitpur Sub Metropolitan City (LMC), Department of Environment and Solid Waste Management, has invited to private sector and community organizations for managing the solid waste in effective and efficient way. Private sectors, NGOs, community groups are expected to actively involved in solid waste management. However, the efficiency of the solid waste management is still not improved. So, this study attempts to explore the following fundamental questions:

- What is the status of current waste generation and their composition in LMC?
- How the LMC is currently managing solid waste generated in the city?
- How LMC has been bringing other actors in the process of SWM?

1.3 Objective of the Study

The general objective of this study is to assess policy, strategies and operating plans for solid waste management of Lalitpur Sub Metropolitan City. The specific objectives of this study are as follows:

- To assess policies and strategies of PPP model for managing solid waste in LMC.
- To reveal the existing SWM system of LMC.
- To explore the roles played by different actors for managing solid waste in LMC.

1.4 Significance of the Study

The study aims to provide information on recent institutional structures and the attempts to an effective SWM of LMC. Researcher believes that the data and information of this study would be equally beneficial to be applied by other municipalities in Nepal. It also would be a significant document for the practitioners, academicians and those who have the keen interest in solid waste management.

Likewise, this study is useful for the government and the private sector institutions that are involving into the waste management activities and policy and plan formulation process regarding the solid waste. In addition to this, it is beneficial to those agencies that are providing the funds for the waste management to LMC.

The study has tried to provide an insight of existing status of waste generation to waste management of LMC, partnership in solid waste management with private sectors and other stakeholders. So, it contributes for making the effort of involving private and other stakeholders more effective and efficient.

1.5 Limitations of the Study

This study is limited to provide knowledge on current solid waste management process, organizational structure, private and other stakeholders' participation and future strategies of LMC for effective solid waste management.

The limitations of this study are:

- It provides glimpses of SWM of LMC and does not compare it with other LMC and SWM practices.
- It is not an analytical study, since it just aimed to provide various information required for SWM which is still can be regarded as a new practices in Nepal.
- Basically, this research is concentrated only on the municipal solid waste.

1.6 Structure of the thesis

The research has been discussed within the different five chapters. The first chapter deals with the introductory aspects of the solid waste management and LMC. Similarly, it discusses the research problems, objectives, significance and the limitations of the study.

The second chapter explains the theoretical and conceptual foundation of Public Private Partnership (PPP) in SWM. It is divided into two major parts; first part dealing with the concept of SWM and second part with the theories of PPP in solid waste management. This part is contained with major policies and Acts and institutions of Nepal for effective SWM.

The third chapter explains the methodology adopted for the study. It deals with the research process, nature and type of data, sampling, data collection and data analysis plan. The fourth chapter deals with the data presentation and analysis. It tabulates and describes the collected data.

The final chapter provides summary and conclusions based on the findings of the study.

CHAPTER-II

REVIEW OF LITERATURE

This chapter reviews the existing literature thereby examines the theoretical and conceptual foundation of PPP in the perspective of solid waste management. It is divided into major two parts; the first part deals with the meaning and concept of solid waste management, proceeds towards the Nepalese policies and laws and policies and guiding principles of SWM. In the second part, the study focuses on theoretical aspects of PPP in the perspective of Solid Waste Management (SWM). Based on the theoretical description, an analytical framework has been developed; the previous research in the related field of SWM has been reviewed and ends with theoretical framework of the study.

2 Theoretical reviews

2.1 Concept of solid waste and its management

The definitions of Solid Waste Management may vary from country to country and city to city. In most countries, the local governments are responsible for municipal solid waste management; however the other two viz.; industrial and hazardous solid waste in the responsibility of the national government. In some places, the local governments with different departments, manages all kinds of wastes individually (UNEP, 2009, UN-HABITAT, 2010). Solid waste is a byproduct of human activities. It is often defined as something that is no longer useful and has to be discarded which tends to increase with rapid urbanization, improved living standards and changing consumption patterns. While it is generally understood that proper waste management helps protect human health and the environment and preserve natural resources, many do not realize that solid waste also impacts climate change. Manufacture, distribution, and use of products-as well as the disposal of the resulting waste-all result in emissions of atmospheric gases called “Greenhouse Gases” that affect the Earth’s climate. When organic waste decomposes in landfills and uncontrolled dumps, it produces methane, one of the major greenhouse gases contributing to climate change (EPA, 2011).

Municipal Solid Waste (MSW) encompasses planning, engineering, organization, administration, financial and legal aspects of activities associated with generation, growth, storage, collection, transport, processing and disposal in an environmentally compatible manner adopting principles of economy, aesthetics, energy and conservation (Tchobanoglous et al. 1993 quoted by Jha, Singh, Singh & Gupta, 2011). It also defined to include refuse from households, non-hazardous solid waste from industrial, commercial and institutional establishments (including hospitals), market waste, yard waste and street sweepings. Municipal Solid Waste Management (MSWM) encompasses the functions of collection, transfer, treatment, recycling, resource recovery and disposal of municipal solid waste (Schubeler et al, 1996). Eirin Solberg (2012) states that MSW refers to waste in a solid form, produced in the day to day life of a society such as packaging, food scrapes, grass clippings, clothing, furniture, paper, electronics and so on. It is called municipal solid waste because it is in the responsibility of the local government and comes from our homes, schools, hospitals and businesses. It does not include waste from bigger industries where the ones responsible for the industry also are responsible for the disposal of the waste they create. Municipal sewage networks and treatment are neither considered as a part of MSW (Solberg, 2012).

According to Solberg (2012) MSW can be categorized into (i) Bio-degradable Waste; Kitchen Waste, Garden Waste, Paper, Cotton (ii) Recyclable Materials, Plastic Bottles, Metal Cans, Glass, Paper (iii) Inert Matter, Porcelain, Construction and Demolition Waste (iv) Composite Waste, Tetra Pack, Textile (v) Domestic Hazardous Waste, Batteries, Spray Cans, Paint, Fertilizer, Medication, Cleaning Soap. When a product has no longer any value for the user, it is disposed of as waste. This means the product has lost its personal value for the user by different reasons (trends, design, and functionality) and is no longer attractive to keep. There are primarily two principles of waste handling; through mineralization and recycling. Because mineralization can be a very slow process, it is also important to add storing. Mineralization can be done either through a biologic process (living organisms) or through chemical reactions (heat, burning). A product has also something called material value, which refers to the price of the production and the value of the material. This value can be kept to a certain extend through recycling, but it gets often lost when a product is disposed of and mixed with other materials, and the

separation needed for recycling is no longer economically efficient. To keep the material value, we need to separate the waste in at least two groups before it is sent for disposal; bio-degradable waste would be difficult to separate them after the breakdown of bio-degradable waste have started (ibid).

Similarly, the system for collection, transportation and disposal of MSW is called Solid Waste Management (SWM). The norm has been to collect garbage and transport it to landfills where it is buried and covered. Solid waste management is a systematic control of generation, collection, storage, transport, source separation, processing, treatment, recovery and disposal of solid waste. In the past, solid waste management primarily included collection, land disposal, and incineration of household waste. Industrial waste disposal did not receive much attention. Environmental awareness by the general public increased over time because of various reasons such as advancements in environmental science and technology and interest in pollution-related health problems (ibid).

Internationally, municipalities are challenged every day with the complexity of solid waste management; the increasing generation of waste, the limited resources available for its management and the lack of responsibility from waste generators worsen the problem. This implies that problems generated as a consequence of the improper management of Municipal Solid Waste (MSW) are complex because waste is generated in diverse sectors such as commercial (stores), education (schools), health (hospitals), recreation (parks), and touristic (hotels), among others. These establishments are heterogeneously distributed in the cities and have different performance contexts as well. This diversity of waste generators makes very difficult to implement effective and efficient waste management initiatives. (Carolina Arlmijo-de Vega, Sara Ojeda-Benitez, Quetzalli Aguilar-Virgen & Paul A. Taboada- Gonzalez, 2010: 140-145).

Attention was drawn towards the fact that Earth's material and energy resources are finite (Meadows et al., 1972). A healthy solid waste management system can be considered as a public good. It is difficult to exclude one from "Consuming" such good, whereas one's consumption generally does not affect (subtract) the utility others' consumption (Ostrom, 2005: 24). The provision of public goods usually encounters serious collective action problem (Olsen, 1965).

From the government's perspective, waste incineration would be a highly convenient and effective solution. It requires the least effort for the government to change the lifestyle and habit of the population. Improvement in technology also reduces significantly the risk of dioxin emission, a gas which is harmful if over-inhaled. Most importantly, incineration can reduce for certain tremendously the volume of waste and lengthen significantly the lifespan of existing landfills (Yes, 2008).

Information regarding the physical and chemical properties of solid waste is important in evaluating equipment needs, systems and management programs and plans, especially with respect to the implementation of disposal and resource and energy recovery options. Characterization of waste is also important to determine its possible environmental impacts. The waste components, although vary widely with the location and season of the year, include food wastes, paper, plastic, cloths, metal, glass, construction materials and others (DCC, 1999).

2.1.1 Classification of waste

According to JICA, 2005 and ADB, 2012 the solid waste can be categorized into four different categories such as Municipal Waste, Industrial Waste, Medical Waste and Other Solid Waste. These classifications have been briefly described below:

Municipal solid waste -The municipal waste can be recognized as the household waste from dwellings. It also indicates the commercial waste from the business center and commercial center which include store, business premises, restaurants, market, hotel etc. Similarly, it also focused on the institutional wastes which are collected from school, government office, community hall etc. The wastes which are collected from the municipal street or street sweeping are also recognized as a municipal waste. Municipal waste basically recognized as non-hazardous nature, recyclable nature and reusable nature.

Industrial solid waste- The industrial solid waste can be collected from the industrial works as manufacturing establishments, breweries lather, carpet, chemical industries, food processing industries etc.

Medical solid waste- Solid wastes are collected from the medical institutions such as health care institutions, research facilities and laboratories etc. are known as the medical solid waste.

Other solid waste- Solid wastes are collected from the agriculture, from livestock rearing, from forest and similar waste from the construction and demolition of building and facilities are also categorized under the category of other solid waste.

2.1.2. Features of solid waste

Solid waste can be of various types depending on their source and characteristics. Some of the main sources of solid waste are households, shops, institutions such as offices and schools, industries, agriculture, health care facilities and construction sites. The nature of waste generated from these sources can be quite different. For instance, households and agriculture generally produce more organic waste while the nature of industrial waste materials so as to minimize their adverse impacts on environment and maximize their potential for reuse. Similarly, UN-HABITAT (2010) has explained the different characteristics and the behavior influenced the increased volume of solid waste following are common features and behavior of solid waste:

- a) **Cooking and eating habits-** It is one of the common natures of the waste. In some countries the shops sell mostly food that has largely been prepared, either frozen or canned. In other countries and in smaller communities, poultry is purchased alive and vegetables are bought with considerable extra material in addition to the part that is consumed (maize can be taken as a good example). If fruit and vegetables are cheap and plentiful, and often damaged when being transported, large amounts may be discarded. Different types of fruit and vegetables generate different amounts of waste-compare bananas and watermelons for example. Where significant amounts of fish are consumed, the waste quickly acquires a very strong smell.
- b) **Social and economic factors-**Life styles of the people have made the differences for the generations of waste. This not only affects the type and amount kitchen waste that is generated, but also the amount of paper (because of higher literacy and the purchase of newspapers and magazines). More affluent citizens are more likely to discard

durable items. Some high-income houses may be equipped with garbage grinders for sending their food waste into the sewerage system. The use of domestic servants can also have an impact on the type of waste that is generated.

c) Recycle and reuse-In some towns much of the waste is fed to livestock and poultry. Food and drinks containers may be reused for household purposes. Certain items may be segregated from the waste and sold. Waste pickers may sort through wastes, taking out what they can use or sell. Such practices can have a major influence on the waste that is put out for collection.

d) Architecture- In the cities where the housing is constructed mainly of mud brick and the floors and courtyards are not paved, there are large quantities of soil and dust in the waste. Sweeping of the unpaved roads also increases the amount of soil in the waste. The lack of adequate toilets may increase the amount of excreta in the waste.

e) Climate and geography-Climate and geography have also increased the moisture content of solid waste stored in the open. In tropical climates, large amounts of vegetation can be expected in the waste, and seasonal climates may result in huge piles of leaves during certain times of the year. Similarly, some cities accumulate large quantities of fine windblown soil. The climate also influences the types and yields of crops, and therefore the food wastes generated by residents. The characteristics of municipal solid waste are also influenced by the definition of the term.

f) Service level-The availability of the service and their level also affects the wastes volume and their quantity. For instance, residents in Switzerland are prepared to carry their waste to a shared container at street level, whereas Cairo's residents are reluctant to be seen carrying their wastes. Householders in England are becoming accustomed to having their non-recyclable waste (including kitchen wastes) being collected once every two weeks.

g) Labor costs and unemployment- Because of high wages levels, industrialized countries have developed capital-intensive technologies for collecting solid waste in order to keep wage bills and total costs down to the minimum level. Low income countries at the other extreme have large pools of unemployed labors that are willing to work for very low salaries and in such cases labor –intensive methods may be appropriate. When this phenomenon is coupled with the problems some developing

countries experience in keeping sophisticated vehicles and other machines in good condition, labor-intensive methods become attractive because of their economy and reliability. Managing large teams of laborers in an effective way is quite a challenge.

h) Willingness to pay- In some cities, there is an almost universal conviction that municipal authorities should provide a waste collection service without charging directly for it. Other communities may be accustomed to making their own arrangements for waste collection and paying for this service directly. Any plan to finance a solid waste management system from user charges must take into consideration local attitudes and the existing situation.

i) Attitudes to littering- Some social groups are very careful to always put all their waste inside the appropriate container; whereas others regard the street as an appropriate place for dumping litter and domestic waste (even though they keep their houses and yards very clean). It is easy to write in a project proposal that a program of public education will change this attitude, but in practice education alone may not be effective in changing habits.

j) Environmental awareness- Since the 1960s, there has been a gradual process of extending the boundaries of environmental concern, from neighborhood to nation, and now, with the concern about climate change, to the global level. However, this process is at different stages in different countries and is proceeding at different speeds. Thus, it cannot be assumed that householders will be interested in whether their waste is dumped illegally or taken to an approved disposal site, provided that it is taken out of the immediate neighborhood. This is often referred to as the “NIMBY” factor (Not in My Back Yard). City officials may show the same lack of concern with regard to the destination of the waste, and may give solid waste management in general a low priority. A low level of environmental awareness among the public may make it difficult to implement household segregation into two or more waste streams. This lack of awareness is often accompanied by the lack of any effective enforcement mechanism to ensure correct use of waste storage facilities. All of these factors can have an influence on success or failure of a waste collection system, and so should be considered when any system is being designed.

2.1.3 Principles of effective solid waste management

Some of the basic principles for effective solid waste management are as follows (SWM-Technical Guidelines, 2010).

- Integrated and sustainable waste management system should be adopted.
- The 3-R principle (reduce, reuse and recycle) should be promoted at all levels.
- Waste should be segregated at source to maximize recycling.
- The practice of dumping waste on streets or open areas for collecting should be stopped and more effective forms of waste collection that minimizes waste should be land filled.
- Environmental impacts of waste should be minimized.
- Polluters pay principle should be applied to minimize waste production, recover cost and make the SWM system as a whole sustainable.
- Participation of local communities and private sector in SWM should be encouraged.

The above principles need to be adopted by all municipalities in planning and implementing their waste management systems.

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 egocentrism. 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 egocentrism 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, egocentrism is disagree with the anthropocentrism belief which puts an absolute dividing line between

nature and human beings (Lundmark, 2003). Thus, this thesis is based on egocentrism idea, because I strongly believe that all living things have the same right to live in this planet. In my view, 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 was began in the United States in the 1980s, which was the result of growing frustration of the African- Americas in the US with the placement of toxic landfills and garbage incinerators in the neighborhoods or communities of minority population. Thus, the concept of environmental equity was presented as a fight against the environmental racism (Hannigan, 2008). The environmental equity argues that all people have the equal right to natural resources like clean air, land, water and food and right to live and work in a clean and safe environment, regardless of their race, color, national origin and wealth.

2.4 Review of existing Nepalese policies and institutional framework on SWM and PPP

Management of increasing amounts of solid waste has become a major challenge in many cities in developing countries like Nepal. If solid waste is properly used, it can be a valuable resource but if it is not effectively managed, it can result in serious and adverse impacts on environment and public health. Solid waste management is therefore a critical component within urban sanitation and it is also one of the most important and resource intensive services provided by the municipalities. With the pace of development, managing municipal solid waste has been one of the major problems of the state. The country lacks appropriate disposing tools and methods and adequate disposal place as well. This often raises conflict between people and the government and concerned authorities. To solve these problems to manage the generated waste in proper way, there are several legislations which directly or indirectly address about the solid waste management. In addition, different plans and policies have also been initiated so far to address the issue which shows that safe disposal of solid waste too lies in the priority issue of the government (Pokhrel, 2011).

Laws and policies related to the solid waste management and the public private partnership are another considered variable in this study. Policy is purposive course of action followed by an actor or set of actors in dealing with a problem or matter of concern (Anderson, 1980). Similarly, law may be defined as a body rules, created by the state, binding within its jurisdiction and enforced with the authority of the state through the use of sanctions (Adams,1996).It is ordinarily used in connections with a statute enacted by a state legislation (Anderson et al., 1980). Therefore, laws and policies are necessary and important tools for enhancing activities in legitimate way. It also provides the required power and authority to all stakeholders. For obtaining the desired result of this study, it is necessary for analyzed the different laws and policies which provides formal power, authority and guidelines for the public private partnership in solid waste management. So, this study aspires for analyzed of laws and policies related with the solid waste management and public private partnership. For the analysis of these laws and policies, study has concentrated on analysis of its provision regarding the solid waste management and the public private partnership. In this context, the following laws and policies have been reviewed.

2.4.1 National policy on solid wastes management, 2053

Nepal Government has made the SWM National Policy, 2053. It recognized waste and its problem and as its principle. Policy focused on the problem of the waste has been found in most of municipal cooperation, municipalities and town oriented village in Nepal. The policy also has accepted on its preamble the waste and its problem should provide the responsibilities to the local government through the cooperation of private sector, NGOs, Community organizations and other local people for the minimization of its adverse effects. Hence in this context, a national policy is formulated relating to the management of solid wastes. This policy has made the five different objectives regarding the SWM such as to make SWM more effective and simple, to minimize environmental pollution caused by the solid wastes and adverse effect thereof to the public health, to mobilize the solid wastes as resources, to privatize the management work of the solid wastes and to obtain public support by increasing public awareness in the sanitation works.

On the basis of these objective of major policy were made on this national policy as local bodies should be made more competitive for the management of SWM, to make the arrangement for mobilization of non-governmental organization for sustainable and effective management of solid waste, to develop sanitation concept on the basis of the appropriate technology which would be suitable to the local, social and economic environment, to manage final disposal of solid wastes in accordance with their volume and nature, to mobilized the solid wastes as a source by its recycling and processing, to make the management works of the solid wastes economically self-reliant, to privatize the management works of the solid wastes in the various phases.

The National Policy has also made the strategy for effective management of waste in all over Nepal. This policy basically focuses on the strategy of public participation, Technology, Mobilization of sources and privatization.

Policy also focused on the institutional arrangement for effective waste management at the national as well as local level with proper authority for manages the waste management activities in effective and efficient way.

On the basis of adopted policies by the National Policies on Solid Waste Management the Solid Waste Management Act has been enacted. Similarly, the local bodies have been enhanced the activities on SWM through the involvement of the private sector, NGOs and CBOs. However, the LBs have not been successes to arrange the formal procedure of Public Private Partnership in SWM activities. Most of the private cooperation and NGOs are enhanced their functions regarding the solid waste management in informal way.

2.4.2 Solid Waste Management Act, 2011

Solid Waste Management Act has enacted by the GoN for the management of waste in consolidate way in 2011. It fulfills the demand of the umbrella act to govern the problem and management of waste for entire country. This act has provided sole authority of waste management into the Local Bodies (LB). Similarly, it also clearly states that the other LBs should be enhanced their duties and responsibilities through the participation of the private sector, NGOs, Community Organizations and Club. According to this preamble, the act feel that necessary for consolidate laws relating to the most urgently

needed service like solid waste management to make arrangement for the systematic and effective management of solid waste by minimizing the solid waste at source, re-using, processing or disposing of the solid waste, and to maintain the clean and healthy environment by minimizing the adverse effects of the solid waste in the public health and environment. This act has also made definition about the waste such as this act defined the solid waste means the domestic waste, industrial waste, chemical waste, medical waste or hazardous waste. This term shall also include substances including solid, liquid, gas, semisolid, smoke, dust and materials used by the electronic and information technology, which are not in a position to be used forthwith, thrown or rotten, or disposed causing degradation of the environment; or other similar types of objects or posters or pamphlets posted in public places in an unauthorized manner. Similarly, this act also defined the organizations or institutions for managing the waste such as the community organizations and local bodies.

Likewise, the SWMA, 2011 has made the whole responsibility for the Solid Waste Management rest on the LBs in their different sections of this Act (Section 4). However, the waste of health institutions, chemical and industrial waste management is the responsibility of concerned institutions that generated the waste. Similarly, this act has focused on the waste reduction and recycling concept (Section 5). On the section 6 also said that local body shall have to prescribe for segregation of solid waste at source by dividing the solid waste into different categories including at least organic and inorganic. Furthermore section 7, 8, 9, 10 and 11 of this act has also made the different provision of waste management and its procedure. It clearly focused on the responsibility to construct and operate the infrastructure or structure required for the collection, final disposal and processing of solid waste, including construction of any transfer station, landfill site, processing plant, compost plant, and bio gas plant for the management of solid waste. Likewise, the act gave the more concern about the reduction in production of waste, segregation of the solid waste, discharge of solid waste designation of solid waste collection center, transportation of solid waste and reduction, reuse land recycling of solid waste.

On the other hand SWMA, 2011 has made the significant provision in about the involvement of the private sector and community (in section 13, 14, 15, 16, 17 and 18). According to this act nobody shall do or cause to do the work relating to the solid waste management without obtaining license from the local body pursuant to this act. An act makes clear provision for the SWM can be done through the private sector who has obtained license. According to this act any private and non-governmental institutions may carry out the different functions like raise awareness for minimization of solid waste, collection of solid waste, transportation of solid waste, use, reuse, recycling or processing of solid waste, disposal of solid waste, and post closure management (of a sanitary landfill site).

In addition with, this act also mentioned that make competition among the private sector and other community organizations while carrying out the solid waste management activities through the private and community institutions. Likewise, an act also focused on methods on PPP in solid waste management by the local bodies. The Local Body may impose and collect service fee from the concerned person, institution or body for the management of solid waste and private sector may impose and service charges from the service users by the consent of concern authority.

However, this act had success to make any particular definition about the private sector institutions. Similarly, it cannot be succeed to provide the effective model for PPP in solid waste management. In addition with, it did not envisage any provision about the motivation for private sector for management the waste.

2.4.3 Act on Private Financing in Build and Operate of Infrastructure (PFBOIA), 2006

The act on private financing in build and operate of infrastructure act has enacted in 2006 for attracting the private investment in different project. Similarly, it has made different mode and methods of private financing in build and operate infrastructure.

First of all PFBOIA has principally agreed to make necessary provisions on making the services and facilities available to the general public in a reliable, cost-effective and easily available manner by getting the private sector involved in the build operation and

transfer of the infrastructures in consistent with the liberal economic policy pursued by the country.

Similarly, the act made the definition about the “Infrastructure”, Sewage disposal, solid waste processing and management Plant, Energy production and distribution, Stadium, Public conference hall; Multi residential building falls under the definition of infrastructure.

It has mentioned different provisions regarding the private financing in build and operates of infrastructure Act 2063(2006) governing PPP in the country. The Act has indicated the following modalities for PPP (section 3):

- Build and Transfer(BT)
- Build, Operate and Transfer(BOT)
- Build, Own, Operate and Transfer(BOOT)
- Build, Transfer and Operate(BTO)
- Lease, Operate and Transfer(LOT)
- Lease, Build, Operate and Transfer(LBOT)
- Develop, Operate and Transfer(DOT)
- By other methods of similar kind.

Conducting the detail feasibility study by negotiations, implementing a project by negotiations, memorandum of understanding is made between private sector investor making provisions in Section 8, 9, and 10 respectively. In addition to this, the license may be issued to the private financing institutions to the implement the project in Section 16. Likewise, Section 22 made another provision relating to the license; the license shall transfer the project to Government of Nepal as mentioned in the agreement and project may be implemented in joint financing of GoN and the private sector (GoN, 2006).

The act raised the issues of investment of the private sector in the infrastructure project but this act does not cover the waste management issues of the country. Waste Management is the special issue in-terms of private sector involvement but it is not successfully connected to manage the common forms of PPP model.

2.4.4 Private Sector Involvement Modality

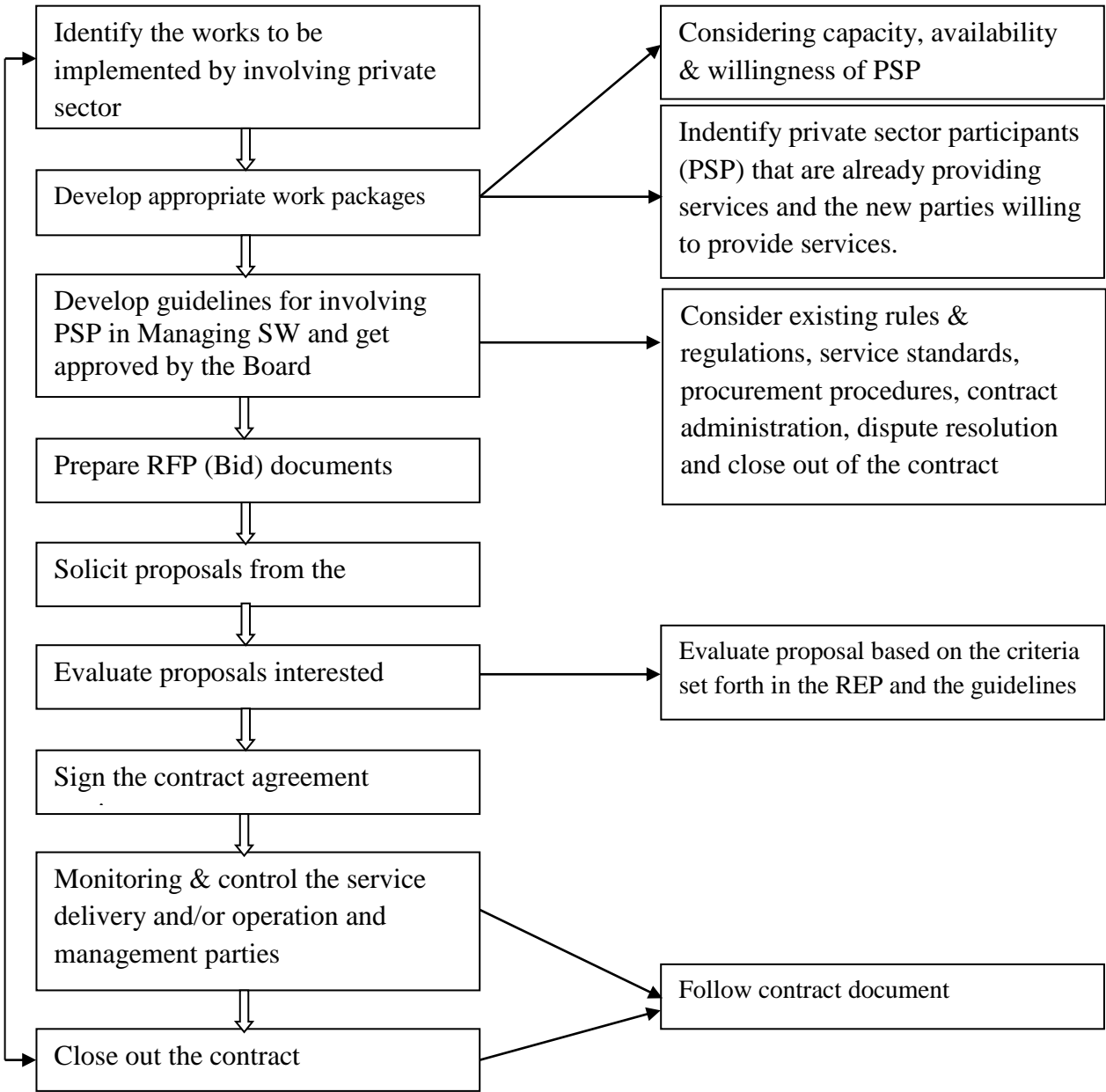
Section 157 of LBFAR 2064 permits local body to involve private sector under Public Private Partnership for management of solid waste. Considering the legal environment and other relevant conditions, following modalities are considered as more suitable for private sector involvement however, management contract is the preferred one:

- a. Service contract
- b. Management contract
- c. Lease contract
- d. Concession

2.4.5 Procurement Process

Procurement procedure to be followed for private sector involvement in management (or PPP) guideline considering the existing legal framework is presented which is presented below:

Figure 1 Private sector involvement process



2.4.6 Local Self Government Act (LSGA), 1999

The LSGA, 1999 enacted for the purpose of enhancing the local governance system in effective and efficient way in Nepal. In the preamble of the act it has been mentioned to make provisions conducive to the enjoyment of the fruits of democracy through the utmost participation of the sovereign people in the process of governance via decentralization. Similarly, it focused on the institutionalize process of development by enhancing the participation of all the people including the ethnic communities, indigenous people and down-trodden. Likewise, it includes the socially and economically backward groups for social equality in mobilizing and allocating means for the development of their own region. It employs the balanced and equal distribution of the fruits of development, have institutional development of local bodies capable of bearing responsibility. It also provides such responsibility and power at the local level as it is necessary to formulate and carry out plans, and constitute local bodies for the development of the local self-governance system. Thus, they are able to make decisions on the matters affecting the day-to-day needs and lives of the people, by developing local leadership. On the other hand this act also makes six separate principles and policies for the local self- governance system more effective.

The major policies and principles of the LSGA are:

- Devolution of powers, responsibilities, and means and resources as are required to make the Local Bodies capable and efficient in local self-governance.
- Building and development of institutional mechanism and functional structure in Local Bodies.
- Devolution of powers to collect and mobilize such means and resources as are required to discharge the functions, duties, responsibility and accountability of Local Bodies.
- To make the Local Bodies oriented towards establishing the civil society based on democratic process, transparent practice, public accountability, and people's participation.

- For the purpose of developing local leadership, arrangement of effective mechanism to make the Local Body accountable to the people in its own areas.
- Encouraging the private sector to participate in local self-governance in the task of providing basic services for sustainable development.

It is, thus, clear that waste management is the key responsibility of the LBs and their organs. Similarly, it also makes the principles for private sector participation in every activity of LBs. However, this act does not focus on the waste problems and its management in efficient way. Lack of the separate provisions and modality of PPP on solid waste management is another issue of this act.

2.4.7 The Town Development Act, 1988

This Act is enacted for the development of Nepalese and town and city in effective and efficient way. It imagined one of the major institutional arrangements as a Town Development Committee for regulate, control or prohibits any act or active an adverse effect on public health or the aesthetics of the town, or in any way pollutes the environment. It has also provision of punishment for the violation of the prescribed provision of this act.

The act lacks the proper provision of waste management in urban and cities LBs. of Nepal. Similarly, it does not have any framework or modality of the waste management from the private or public sectors. Thus, there is no such provision of management of waste and PPP model of managing the waste for an entire country. It leads the clear conclusion the towns and cities couldn't be clean and beautiful when the waste or municipal wastes are not effectively managed by the

2.4.8 Environment Protection Act, 1997

Environment Protection Act (EPA) is recognized as the integrated laws for the area of environment sector. It contains the most of the widespread aspects of the environment. It has made the general principal about the environment and its protection. Hence, it does not have clear and separate requirement to manage solid waste. It focused on the regulatory mechanism that is necessary for all kinds of waste which have adverse impacts on environment and human health.

The EPA, 2053 had provided for the general understanding for the concept of environment and its protection. It also explains the environmental sensitivity and the environment that must be protected and preserved. The main intention of this act is to make the city more clean and healthy by minimizing the adverse impacts to be caused from environmental degradation.

As such, the act has in its first part defined several terms regarding the environment and its relation like waste, disposal, environment and pollution. It defined the term waste as the liquid, gas, slurry, smoke materials. Similarly, definition disposal as given by this act- as the act of omission, storage or disposal of sound, heat or wastes. Likewise, it has made the environmental interaction and its interrelationship among the different components of natural, cultural and social systems, economic and human activities and their components and pollution that significantly degrade, damage the environment and national heritage.

This act is important for the area of environment and waste management because of the fact that it has made clear the standpoint of waste management which is significantly related with the concept of environment and the protection of process of environment. EPA has made the provision of prevention and control of pollution. It stated that on its provision no one shall success to create pollution; made to significant adverse impacts on the environment, negatively affected to public life and health, or dispose or cause to be disposed sound, heat radioactive rays and wastes from any mechanical devices, industrial enterprises, or other places contrary to the prescribed standards. In the topics of Protection of National Heritage- it said that it is the responsibility of the concerned agency to protect National Heritage. For getting this purpose, it has made the provision as the concerned agency or authority must be prepared and maintain an inventory and such an inventory may also include the objects or places listed in the World Heritage list available within Nepal.

EPA is one of the institutions of Environment Protection Council (EPC) for providing policy guidance and suggestion to Government of Nepal in the area of environment and environment protection. This institution is also required for making coordination among different agencies, constitute and environment Protection Council comprises of environment experts and representation of the persons from recognized political parties at

national level as well. According to this provision, the Environment Ministry may form the committee in order to achieve the objectives of this act. The Ministry may form different committees consisting also of experts in the relevant subject. It has generated the concept for compensation may be given.

The person and organizations have had any loss or damage in case of any consequence of the creation or disposal or pollution, sound, heat or wastes by anybody contrary to this Act or Rules or guidelines have the authority to claim the compensation. Similarly, the Environment Protection rules are also made for supplementary legal mechanism for the EPA. It makes the procedural provision for the implementation of EPA. It makes different provision for getting prescribed legal rights and made the guidelines for concern authority or the agencies for accomplishment of given legal objectives like promotion and protection of the environment. It has ensured that no activities could be allowed to operate which generate excessive amount of solid waste and has encouraged emitting less amount of solid waste to the possible extent (Pokhrel, 2011).

The Environment Protection Act has described the different provisions about waste through the eye of environment protection. It cannot directly deal with the problems of the waste and its management. Similarly, the act has not been pointing out the private participation in environment protection and the solid waste management activities. In addition to this, it did not focus on the role of the LBs in managing the waste and environment.

2.4.9 Solid Waste (Management and Resource Mobilization) Act, 1987

The Solid Waste Management and Resource Mobilization Act had been promulgated since 1987, but it had not been practiced or it dismissed. More specifically, this act came for the effective management of waste and the waste should be mobilized as a resource. It enacted for regulating and controlling of human health problems caused by waste and pollution. It defined various terms related with solid waste management such as solid waste, hazardous waste, site, pollution, and container, recycle and transfer station, waste management equipment, production area.

Solid Waste Management Resource Mobilization Center (SWMRMC) is one of the important institutional arrangements of this act and authorizes it to take action to control haphazard waste disposal and to collect service fees. The act has given authority for taking various punitive actions against activities detrimental to the intentions of the Act. However, this SWMRMC already discontinued and the Solid Waste Management Act, 2011 had also renamed this center as Solid Waste Technical Support Center.

2.4.10 Solid Waste (Management and Resource Mobilization) Regulation, 2046

The rule has expected that the center could produce compost fertilizer and sell it, operate public toilet, bath room and slaughter house. The center may provide sanitation service to any individuals.

It has also the provision of collection and management of solid wastes. This regulation also provides the necessary criteria to get permission to manage and collect any reusable or other kinds of solid wastes. It had also made various provisions about the procedure regarding the collection and management of solid waste. Regarding the removal of harmful solid waste, this regulation provisioned that any case any industrial or commercial enterprise or agency or institutions or individual request the center to remove harmful or polluted solid wastes or those that are likely to spread communicable diseases, emitted in the course of routine business, the center should do so by collecting service charges.

2.4.11 Tenth Five Year Plan (2002-2007)

In the context of the protection of environment of Nepal, there have been policy level efforts since the Sixth Plan. It was realized that for implementing the programs by the sectoral institutions and environment protection activities also be advanced side by side. In this process there have been some laws and policies came into effect namely the Environmental Protection Policy in 1987, the National Environment Protection Action Plan were prepared and implemented. In 1993, the Nepal Environment Policy and Action Plan (NEPAP) came into effect. GoN have been conducted different activities and formulate the programs in the context of ratifying the international convention on Environment and Development held on Rio De Generio of Brazil and other treaties approved in various international forums. In the process, the Environmental Protection

Act, 1996 and Regulations 1997 are in enacted. For the achievement of these objectives, it is necessary to take the concept of environmental management from central to the local level development activities through decentralized programs. Similarly, it is also necessary to promote the involvement of governmental, non-governmental, local level authorities and the private sectors. Therefore, the Tenth Plan had been directed towards the proper management and utilization of natural resources and the achievement of sustainability in its use by involving all concerned stakeholders in the management of environment and the natural resources (NPC, 2002:421).

Involvement of the private sector in the development activities have been recognized by the tenth plan. It clearly states that the role of Government of Nepal as policy –maker, monitor and facilitator through development of private sector as the center point of overall economic activity. It has imagined the effective, responsible, and private sector. So, it has taken necessary strategy to manage policy and laws for creating capable and effective private sector and to develop systematized corporate culture in private sector (NPC, 2002:129).

Similarly, this plan made the different objectives regarding the involvement of the private sector. The private sector plays a vital role in the movement of poverty alleviation by maintaining wide, stable and high economic growth through best mobilization of available resources and means making the economic sector of the country strong, healthy, accelerated, competitive and more tied up with external economy, the objective of the Tenth Plan would be to develop private sector friendly financial structure (ibid).

On the other hand, the tenth plan has developed the same policy programs and strategies regarding the urban development. According to the plan intense housing pressure in urban areas has entailed the construction of safe, comfortable and cost-effective housing, and it has become necessary to develop necessary infrastructure to put the already settled unmanaged dwellings in order. Equally necessary is to protect and promote various historical, cultural and touristic heritages found in the urban areas. It is necessary that resources, means and capabilities of local elected bodies along with that of private sector be optimally utilized for the construction, operation and management of urban infrastructures (NPC, 2002: 396).

The environment management should make more effective on the basis of the concept of environmental governance and controlling pollution, and to attain sustainable development through wise/ judicious utilization of the natural resources helps to make the clean healthy environment.

The plan has been developed with two fold objectives. They are: protection of natural environment, restoration, and sensible use of resources because of the fact that there is correlation between the environment protection and the economic development, control the pollution in the urban areas and to keep the rural areas clean, healthy and beautiful, voluntary participation of people will be encouraged and the sustainable development will be promoted (NPC, 2002:423).

2.4.12 The 11th Interim Plan 2007

The interim plan is regarded as the eleventh three years plan. It also agreed the principles of environment protection and environment protection should be done the involvement of private, NGOs and community organizations. Implementation of international agreements to minimize the environmental problem and to manage economic development provision which government has made and implemented was the main objectives of it.

It emphasizes on the environment protection and the economic development that can lead to sustainable development, protection and sustainable use of natural resources, environmental awareness, the non-governmental and private sector participation. It has taken the policy for institutionalization the environmental monitoring and auditing system, public awareness, participation of local agencies, communities and NGOs in the environment, treaties and conventions ratified by GoN must be recognized and implemented, Carbon Trade will be promoted to achieve benefit from clean development mechanism under the Kyoto Protocol, existing by laws on water and air quantity will be implemented effectively. Additional bylaws will be formulated and implemented to measure the expected standard of water, soil and noise and takes the policy and principles of “Polluters Pay” and “Pollution Prevention Pays” (NPC, 2007).

2.4.13 13th Three Year Plan (2013-2017)

The 13th Three Year Plan (2013-2017) has newly come into practice. It is unable to give the detail, specific and effective objectives of solid waste management and the involvement of the private sector into the field of solid waste management. However, it makes the scattered provision for waste and the waste and its management. This plan (2013: 86) has made objectives towards the urban city more secure, healthy and economically sound with the more and adequate infrastructure. Through its tactical policy, the program of public private partnership should be made on the development and expansion of basic urban services (NPC, 2913:87). It states that the human activity and process of development is interrelated. Thus, the human activity and the development process should be in environmental friendly with the concept of green development (NPC, 1013:96). It focused on the climate change and its effects. This plan makes their concern about the waste management towards the environment protection. It clearly said that management of environment should be internalized into the development efforts. Similarly, it has to take the action plan, policies and laws for the management of environment in sustainable way. So, it takes the action plan for making aware regarding issues of environment. It recognizes the waste as the serious and complex problem and it creates challenge for the concerned authority for effective management of waste. Thus, the plan also keeps the principle of “Polluters Pay” and “Pollution Prevention Pays” already mentioned in 11th Interim Plan (2007-2010). It further focuses on partnership that should be strengthened among private sectors, LB, NGOs, Community Organizations for the climate change and environmental activities.

The tenth five year plan, eleventh three years interim plan, twelve interim plan and thirteen interim plans only can make their concentration about the environment problem rather than focusing on the waste management. During the analysis of different provisions of these plans documents have not successfully identity the consolidate stipulation especially in solid waste management through the participation of the private sector.

2.5 Review of related literature on SWM

At International level there are various organizations including private and government which are working in the field of environment and are engaged in research and development in the field of waste management. The International agencies such as World Health Organization (WHO), Environmental Protection Agency (EPA) and United Nations Environment Program (UNEP) are engaged in developing new technologies for waste management and its disposal including its characterization.

Areas of significant interest for this study were for example; the effectiveness of public private partnerships for service delivery and shed light on how such partnerships contribute to the meaningful urban governance in Bangladesh(Bhuiyan, 2010); background of SWM privatization in Dares Salaam (Mbuligwe, 2004);evaluation of the post-privatization of solid waste collection contractors in Dar es Salaam city(Kaseva & Mbuligwe,2005); constraints to promoting people centered approaches in recycling(Bolaane, 2006); performance assessment of service providers involved in SWM in developing countries (Oduro- Kwarteng & Dijk, 2008);analyzing the possibilities for public/private partnerships using the example of SWM (Shafiuil & Mansoor, 2004); analysis of the current state as well as new opportunities and challenges regarding MSWM in China (Xudong et al.,2010). Others are; a comparative analysis of municipal solid waste management (MSWM) in Singapore and Berlin (Dongqing, 2010); comparison of the cost between the service of private and public collection of residual household waste in Flemish(Jacobsen et al., 2013); a review of the integrated waste management system operating in the city of London, Ontario-Canada and Kumasi, Ghana(Asase et al., 2009); exploration of the households 'perspective on solid waste collection services provided by the private sector in Dar-es-Salaam(Salha & Ali, 2006); and a comparison of two models for dealing with urban solid waste: Management by contract and management by public–private partnership (Aauto & Derval dos Santos, 2013).

Past research has identified the stakeholders that may have an interest in adequate waste management. The stakeholders reported are: national and local government (Shekdar, 2009); municipal authorities; city corporations; non-government organizations (NGO's;

households (Sujauddin et al., 2008); private contractors; Ministries of Health; Environment, Economy and Finance (Geng et al., 2009) and recycling companies (Tai *et al.*, 2011).

In this regards, some scholars have identified factors influencing the elements of the elements of the waste management systems. The generation of waste is influenced by family size, their education level and the monthly income (Sujauddin et al., 2008). Households attitudes related to separation of waste are affected by the active support and investment of a real estate company, community residential committees' involvement for public participation (Zhuang et al.,2008) and fee for collection service based on the waste volume or weight (Scheilber, 2011). Similarly, the Gender, peer influence, land size, location of household and membership of environmental organization explain household waste utilization and separation behavior (Ekere at el., 2009).

Likewise, it has been reported that collection, transfer and transport practices are affected by improper bin collection systems, poor route planning, and lack of information about collection schedule (Hazra & Goel, 2009. Insufficient infrastructure (Moghadam et al., 2009), poor roads and number of vehicles for waste collection (Henry et al., 2006) are the elements of the waste management system.

Tadesse et al., (2008) analyzed and factors that influence household waste disposal decision making. The results showed that the supply of waste facilities significantly affects waste disposal choice. Insufficient financial resources limiting the safe disposal of waste well equipped and engineered landfills and absence of legislation are mentioned by Pokhrel & Viraraghavan (2005). Minghua et al., (2009) stated that in order to increase recycling rates, the government should encourage markets for recycled materials and increasing professionalism in recycling companies. Similarly, other scholars have also mentioned others factors such as financial support for recycling projects and infrastructure (Nissim et al., 2005), recycling companies in the country (Henry et al., 2006, drop-off and buy back center (Matete & Trois, 2008) and organization of the informal sector (Sharholy et al., 2008).

Waste management is also affected by the aspects or enabling factors that facilitate the performance of the system. Those factors are: technical, environmental, financial, socio-culture, institutional and legal.

Technical factors

Literature found that technical factors the system that are related to the lack of technical skills among personnel within municipalities and government authorities (Hazra & Goel, 2009), deficient infrastructure (Moghadam et al., 2009), poor roads and vehicles (Henry et al., 2006), insufficient technologies and reliable data (Mrayyan & Hamdi, 2006) are also the technical factors.

Environmental factors

Metete & Trois (2008) and Asase et al., (2009) have suggested that the factors affecting the environmental aspect of solid waste management in developing countries are the lack of environmental control systems and evaluation of the real impacts. Ekere et al., (2009) proposed that the involvement of the population in active environmental organizations is necessary to have better systems.

Financial factors

Financial factors also influenced in managing municipal solid waste. The huge expenditure is required to provide the service (Sharholy et al., 2007), in absence of financial support, limited resources, the unwillingness of the user to pay for the service (Sujauddin et. al., 2008) and the lack of proper use of economic instruments have hampered the delivery of proper waste management services. As Sharholy et al., (2008) indicated that the involvement of the private sector is also a factor that could improve the efficiency of the waste management system.

Social factors

The waste workers are associated to low social status (Vindannrachchi et al., 2006) situation that gives as a result of low motivation among the solid waste employees. Politicians give low priority to solid waste management compared to other municipal

activities (Moghadam et al., 2009) with the end result of limited and skilled personnel in the municipalities (Sharholy, et al., 2008) and strategic plans for solid waste management that allows monitoring and evaluating annually the system (Asase et al., 2009).

Institutional factors

Management inefficiencies are often observed in the municipalities. Some researchers have investigated that the institutional factors that affect the system and concluded that local waste management authorities have a lack of organizational capacities (leadership) and professional knowhow. Besides this, they concluded that information available is very scanty from the public domain (Chung & Lo, 2008). The extremely limited information is not complete or is scattered around various agencies concerned, therefore, it is extremely difficult to gain an insight into the complex problem of municipal solid waste management (Seng et al., 2010).

Legal factor

Legal factors also influence the solid waste management system. Researchers have documented that an adequate legal framework contributes positively to the development of the integrated waste management system (Asase et al., 2009) while the absence of satisfactory policies (Mrayyan & Hamdi, 2006) and weak regulations (Seng et al., 2010) are detrimental to it.

2.6 Review of all previous SWM studies

Previously, many studies have been carried out regarding the SWM, among of them main studies are as follows:

A diagnostic study was conducted on solid waste management status of 58 municipalities of Nepal in 2005 by SWMTSC (then SWMRMC) in which LMC was also included. This report was updated in 2008 and it has also focused on SWM status and municipalities' provisions and capacities.

JICA also conducted detailed studies on SWM in 2005 in Kathmandu Valley which included LMC. The study has focused mainly on collection/transportation system and composting practice and was on some pilot projects.

Similarly, in 2011, a study titled ‘Integrated SWM of Kathmandu Valley’ was conducted which covered overall aspects of solid waste management in the valley with focus on existing gaps and technology options that can be promoted for better solid waste management of the valley.

Likewise, in 2013, a study was conducted by Solid Waste Management Technical Support Center (SWMTSC) in support of ADB. A study titled ‘Solid Waste Management in Nepal, Current Status and Policy Recommendations’ it has focused on existing status, gaps and recommendations for policy interventions.

However, all the above studies lacked implementation support and monitoring of the progress. In this connection, the OBA was also conducted a study which was based on identification of gap, municipality’s contribution to meet the gap, support needed to increase the performance efficiency and monitoring of the same based on specific indicators within a time schedule and expressed confident that municipality and the PS will be able to clean Lalitpur at the end of the OBA project in next 4 years.

2.7 Theoretical framework

For the effective management of solid waste the involvement of private sector participation is inevitable. Currently, the functions of solid waste management are the jurisdiction of Local Government (LG) or Local Bodies (LBs). Similarly, the LG and LBs are not able to enhance the task of waste management alone. In Nepalese perspective, the newly enacted law Solid Waste Management Act (SWMA), 2011, Local Self Governance Act (LSGA), 1999, Solid Waste National Policy, 1996 and Solid Waste Management Technical Guidelines make the different provision for creating the atmosphere of PSP in solid waste management. Therefore, the ultimate authority of solid waste management is vested on the local bodies.

Solid Waste Management has traditionally been a distinctly municipal responsibility in Nepal. The in-effective governance of the authorities responsible for solid waste management has led to the presence of significant amounts of unmanaged waste in cities around the country. Rapid and unplanned urban growth has exerted tremendous pressure on the urban environment and solid waste is visibly and worst environmental problem in many urban areas in the country (World Bank, 2007). In the process of solid waste management, the Public Private Partnership (PPP) program is popularized in the developed and developing countries. Public Private Partnership is cooperative institutional arrangements between public and private actors (Grave & Hodge, 2007). Public Private Partnership as more or less sustainable cooperation between public and private actors in which joint products or services are developed and in which risks, costs, and profits are shared (Klijn & Teisman, 2005). Likewise, the Neo- Liberal and free market proponents influence the role of the state that can be changed and some responsibilities need to be given to private sector, which resulted in transforming of states role and prioritization of free market rules and policies (Saei, 2012). Thus, the study discussed the *neo- liberalism and public private partnership in solid waste management*.

2.7.1 Neo-Liberalism and Public Private Partnership

The study uses the neo-liberal theory as the theoretical framework. The theory perceives the private sector to be superior to the public sector in the delivery of services. According to this theory, limited government intervention in the economy and the superior economic performance of the private sector lead to competition and efficiency (Nellis & Kikeri, 1989 cited in Ayee, 1998).

During the last century government 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 to 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 economic 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 need 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 was replaced by neo-liberalism as a dominant economical system (Callinicos, 2003, Leys, 2001).

Under the neo-liberal system during the 1980s and 1990s government 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 economic system in different degrees (Brenner & 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).

Neo-liberal theory is apposite for this study. It stresses on and explains the impacts of the private sector involvement in the delivery of services. Privatizing service delivery is expected to result in higher productivity gains, efficiency and effectiveness. Private institutions engage in competition. Ideally, engaging private waste management institutions will lead to improved sanitation. Therefore, governments privatize sanitation services because of the notions of efficiency, effectiveness and other qualities postulated by neo-liberal theory which characterize the private sector.

Policy makers and the academicians 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 Economic 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).

2.7.2 Public Private Partnership involvement in 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 land in particular public private partnership is seen as 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 play an active role in accountability improvement and service quality of both public and private sector. These kinds of arrangement turn the people's role from passive service receivers to service partners that in return lead to high quality and efficiency of work (Ahmad et

al., 2006, UNESCAP, 2011). Similarly, Public Private Partnership implies a common understanding of shared goals, a willingness to repartition responsibilities for their achievements, a counting public private dialogue on what needs to be done to promote their realization and a supportive policy and institutional framework (Shrestha, 2008). Partnership goes beyond business concerns and extends into all policy areas, including education, health, human rights, immigration and citizenship, science and technology, foreign relations, arts and culture. There is widespread trend to broaden participation in governance by strengthening the interface between the state and non-state actors (ibid). Public Private Partnership focused on the participation one of the private stakeholders in every journey of the government. PPP re-defines the role of the state in infrastructure provisioning, transforming its status from a 'provider' to that of an 'enabler' and 'regulator', which fit into the neo-liberal ideology of market economy (Adekunle, 2010). PPP differ in their allocation of responsibilities and risk between the state and the private sector, and their complexity as well as in their duration. PPP continue that policy adding more redefined dimensions to how private sectors organizations can be used in Public service delivery. PPP are simply seen as a softer option for governments to draw on private sector expertise than the more direct strategy of privatizing or shifting responsibility for service production to the private sector (Grave& Hodge, 2007). In addition to this, Crosby and Bryson add the more clear concept about the public private partnership, according to him, the concept of PPP emphasizes that no one organization can solve problems alone and that to find solutions to complex public policy tasks, public and private sector actors must form new institutional arrangements that allow for participation from both sectors (Crosby& Bryson, 2005).

2.7.3 Reason for adopting the PPP

Interest in PPPs and other forms of government-private sector cooperation has emerged in countries around the world for a variety of reasons. Neither national nor local governments in most countries have sufficient budgetary resources to extend services and infrastructure or to subsidize inefficient state enterprise or agencies (Rondinelli, 2003). The UNDP points out that in developing countries "the current and projected revenue base of most municipalities is inadequate to finance capital improvements and associated operating costs of Lalitpur Metropolitan City and other many municipalities have large

debt obligations, leaving little room for major new loans” (UNDP, 2000:8). Public dissatisfaction with the quality and coverage of government provided services the slowness with which national and local government extend infrastructure often pressure them to seek more private sector participation (Rondinelli, 2003). Most of the experiences suggest that many goods and services for which people can pay- transportation, telecommunications, electric power, piped water, or housing-can be delivered more efficiently by involving the private sector (Roth, 1987). Involving the private sector often brings stronger managerial capacity, access to new technology and specialized skills that government cannot afford to develop on their own (Rondinelli, 2003). Economic globalization is also creating pressures on private firms to responds more flexible to rapidly changing world markets and to gain access to modern transportation and telecommunications systems that facilitate international trade and investment. They can fill a void in countries where governments are slow to respond to demands for technologically sophisticated infrastructure and services on which improvements in economic competitiveness depend (Rondinelli, et.al., 1998). Moreover, international organization like World Bank, UNDP, International Finance Cooperation often require, as a precondition for infrastructure loans to developing countries, that government mobilize private investment and improve public service delivery. Similarly, Asian Development Bank (ADB) also has been recognized the following three reasons for motivate governments to enter into PPPs for infrastructures are (ADB, 2010):

Mobilization of Private Capital

Governments face an ever-increasing need to find sufficient financing to develop and maintain infrastructure required to support growing populations. Governments are challenged by the demands of increasing urbanization, the rehabilitation requirements of aging infrastructure, the need to expand networks to new populations, and the goal of reaching previously unserved or underserved areas. Furthermore, infrastructure services are often provided at an operating deficit, which is covered only through subsidies, thus constituting an additional drain on public resources. Combined with most governments’ limited financing capacity, these pressures drive a desire to mobilize private sector capital for infrastructure investment. Structured correctly, a PPP may be able to mobilize previously untapped resources from the local, regional, or international private sector

which is seeking investment opportunities. The goal of the private sector is entering into a PPP is to profit from its capacity and experience in managing businesses (Utilities in particular). The private sector seeks compensation for its services through fees for services rendered, resulting in an appropriate return on capital invested.

PPP as a Tool for Greater Efficiency

The efficient use of scarce public resources is a critical challenge for governments-and one in which many governments fall far short of goals. The reason is that the public sector typically has few or no incentives for efficiency structured into its organization and processes and is thus poorly positioned to efficiently build and operate infrastructure. Injecting such incentives into an entrenched public sector is difficult, though not impossible, as Singapore has demonstrated by developing a government-wide dedication to efficiency while maintaining many critical services within the public domain. Private sector operators, however, enter into an investment or contracting opportunity with the clear goal of maximizing profits, which are generated, in large part, by increased efficiency in investment and operations. If the PPP is structured to let the operator pursue this goal, the efficiency of the infrastructure services will likely be enhanced. Improving the efficiency of services and operations also increases the chances that those services are economically sustainable and provided at affordable rates-even after satisfying the profit requirements of the private operators. PPP allows the government to pass operational roles to efficient private sector operators while retaining and improving focus on core public sector responsibilities, such as regulation and supervision. Properly implemented, this approach should result in a lower aggregate cash outlay for the government and better and cheaper service to the consumer. This should hold true even if the government continues to bear part of the investment or operational cost since government's cost obligation is likely to be targeted, limited, and structured within a rational overall financing strategy. In 2005, investment commitments to private infrastructure projects in low –and middle-income countries grew by over 30% against 2004 to almost \$96 billion. The World Bank estimates that about 70% of infrastructure investment currently comes from the public sector, 8% from official development assistance, and 22% from the private sector (World Bank, 2006).

PPP as a Catalyst for Broader Sector Reform

Governments sometimes see PPP as a catalyst to provoke the large discussion of and commitment to a sector reform agenda, of which PPPs are only one component. A key issue is always the restructuring and clarifying of roles within a sector. Specifically, there is a requirement to reexamine and reallocate the roles of policy maker, regulator, and service provider, particularly to mobilize capital and achieve efficiency, as outlined above. A reform program that includes PPP provides an opportunity to reconsider the assignment of sector roles to remove any potential conflicts and to consider a private entity as a possible sector participant. Implementation a specific PPP transaction often forces concrete reform steps to support the new allocation of sector role such as the passage of laws and establishment of separate regulatory bodies. In essence, re-examination on the regulatory and policy arrangements is critical to the success of a PPP project.

Public-Private Partnership Approach

According to Walter & Van De Walle (1989), PPP can contribute to the following:

1. Improved performance of the public sector by employing innovative operation and maintenance methods,
2. Reduced and stabilized costs of providing services by ensuring that work activities are performed by the most productive and cost effective means,
3. Improved environmental protection by dedicating highly skilled personnel to insure efficient operation and compliance with environmental requirements and ,
4. Access to private capital for infrastructure investment by broadening the supply of domestic and international capital.

As the municipalities are generally responsible for solid waste services, the private sector has been involved in the municipal solid waste sector through outsourcing arrangements and informally through waste picking. According to KCCA (2012), the recent trends in involvement of the private sector in the urban solid waste sector in developing countries, partly driven by more stringent environmental standards. The private sector can play a

significant role in improving environmental hygiene issues, around solid waste collection and disposal through the regularizing of waste picker initiatives as part of the PPPs solution. The introduction and promotion of more output focused contracts for street cleaning and solid waste collection, the involvement of the private sector in treatment and disposal projects to introduce technical innovation into through sanitary landfill technology, recycling and in waste to energy projects and the involvement of the private sector in financing capital investment.

The concept “Partnership Approach” which has come with Neo-liberalism is still a new concept in the developing world. Knowledge on partnership approach is project planning and development conception is still limited. The functioning and shortcoming of partnership have only been partially investigated (Westholm *et al*, 1999). It still relies on unproven assumptions and therefore, there is need for more critical, systematic, empirical and comparative investigations. On this basis, this study used the partnership approach to explore more about partnership related to CBOs in municipal solid waste service provision. Specifically, to identity different stakeholders and the types of partnership framed with CBOs in Municipality Solid Waste Management in Lalitpur Metropolitan City.

2.7.4 Types of PPP

The seven types are Build, Own and Operate (BOO), which entails the government authorizing private forms to build, own and operate an assets; Build, Operate and Transfer (BOT), which is similar to BOO, but differs from it to the extent that the asset is transferred to the government after an agreed period of time, reasonably enough for the private investor to have recouped its investment; Contracting Out, which involves contracting out the provisioning of specific technical services by public sector agencies to an external private company; Franchising Concessioning, involving a private firm assuming responsibility for operating a service and collecting charges for a specified period of time; Afterimage in which public sector controls the construction and owns the fixed assets but contracts out to private sectors organizations the operation, maintenance and collection of service charges; Leasing, which involves one of the partners (Public or private sector) making use of equipment or assets belonging to either of them without

purchasing the equipment/assets but by paying a lease to the other partner; and Management Contract, where by the private sector organization takes over responsibility for the operation and management of a specific infrastructure using staff and equipment of the public sector (Akekunle, 2010). So, the private sector initiatives are to be strongly considered for making solid waste management in proficient and sustainable manner. Similarly, the Local Self Government Act, 2055 has focused on the participation of the private sector of each and every activity of local government. The effective management of solid waste is the crucial functions of the each and every local government. Likewise, UNECE (2008, pp.2-3) states that the following terms are used to explain partnership agreements:

Buy- Build-Operate (BBO): Transfer of a public asset to a private or quasi- public entity usually under contract that the assets are to be upgraded and operated for a specified period of time. Public control is exercised through the contract at the time of transfer.

Build-Own-Operate (BOO): The private sector finance, builds, owns and operates a facility or service in perpetuity. The public constraints are stated in the original agreement and through ongoing regulator authority.

Build-Own-Operate-Transfer (BOOT): A private receives a franchise to finance, design, build and operate a facility (and to charge user fees) for a specified period, after which ownership is transferred back to the public sector.

Build- Operate-Transfer (BOT): The private sector designs, finances and constructs a new facility under a long-term concession contract, and operates the facility during the term of the concession after which ownership is transferred back to the public sector if not already transferred upon completion of the facility. In fact, such a form covers BOOT and BLOT with the sole difference being the ownership of the facility.

Build-Lease-Operate-Transfer (BLOT): A private entity receives a franchise to finance, design, build and operate a leased facility (and to charge user fees) for the lease period, against payment of a rent.

Design-Build-Finance-Operate (DBFO): The private sector design, finance and construct a new facility under a long-term lease, and operates the facility during the term of the lease. The private partner transfers the new facility to the public sector at the end of the lease term.

Finance Only: A private entity, usually a financial services company, funds a project directly or uses various mechanisms such as long-term lease or bond issue.

Operation and Maintenance Contract (O & M): A private operator, under contract, operates a publicly owned asset for a specified term. Ownership of the asset remains with the public entity. (Many do not consider O&M's to be within the spectrum of PPPs and consider such contracts as service contracts).

Design-Build (DB): The private sector designs and builds infrastructure to meet public sector performance specification, often for a fixed price, turnkey basis, so the risk of cost overruns is 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 labor where appropriate. Partnering with the private sector gives local governments the ability to take advantage of economies of scale. By contracting competitively for services, they can determine the true cost of production and thereby eliminate waste (Gerrard, 2001 as quoted by Sei, 2012).

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 (ibid).

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.

The private sector is playing crucial role in producing goods and providing services that were recognized as the responsibility of governments (Rondinelli, 2002). PPPs are frequently used around the world like develop and expand energy and utility networks and services, telecommunication and transportation system, construct and water, sewer and waste treatment facilities and providing health education and services. Similarly, many of the developing countries, governments are also PPPs to finance and manage toll expressways, airports, shipping ports and railroads and to reduce environmental pollution, build low cost housing and develop ecotourism (Rondinelli, 1996). However, ADB (2010) found that the PPPs have been completed worldwide following area such as power generation and distribution, Water and Sanitation, Refuse disposal, Pipelines, Hospitals, School buildings and teaching facilities, Stadiums, Air traffic control, Prisons, Railways, Roads, Billing and other information technology systems and Housing.

2.7.5 Weakness of Public Private Partnership

Public private partnerships could have significant limitations if so many important aspects such an economically, social, political, legal and administrative which need to be studied carefully before approval of the contract, are not properly taken into account. The limitations of PPP are as follows;

- All projects are not feasible for different reasons such as political, legal, commercial viability, etc.
- 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 of successful implementation of that, these barriers are;

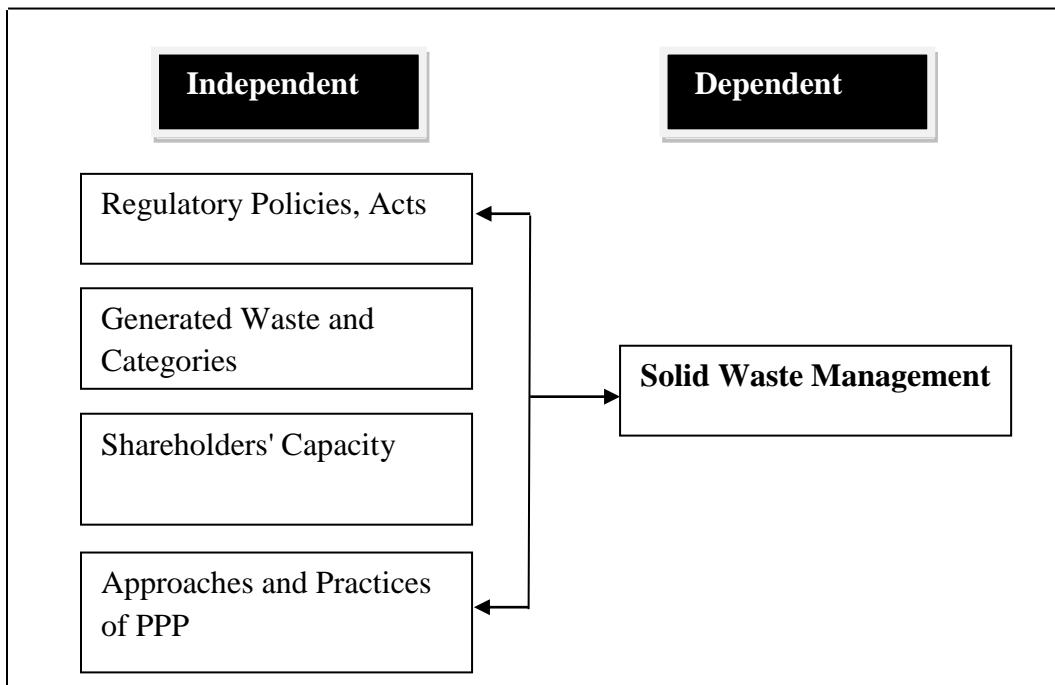
- Lack of capacity to conceptualize and implement innovative approaches by municipalities. Public sector is facing a huge lacking of skills and incentives to change the traditional method of service provision and establish a collaborative partnership with people.
- Most of municipalities do not see it 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 Organization (CBOs) due to lack of access, skills and in most cases funds (Ahmad et al., 2006).

The local self-governance Act (LSGA), 99 makes the municipalities totally responsible for solid waste management. Even in Kathmandu, where the SWMRMC was previously involved in waste management, the municipalities have now taken over all responsibilities. Although this is the move in the right direction, most municipalities do not have adequate resources and technical expertise to manage their waste effectively. The LSGA has increased the responsibilities of municipalities but abolished the tax levied on goods and vehicles entering into or passing through municipal areas which has the main source for income of the municipalities. As a result, most municipalities are now

struggling to mobilize resources just to meet their regular expenses. The Municipalities of Nepal are therefore unable to spend enough on waste management, especially on capital investment for the purchase of equipment and the construction of infrastructure. Most municipalities are only involved in sweeping streets and dumping the waste along a nearby river or in a public place.

2.8 Conceptual framework

The theory of governance and the theory of Neo-liberalism have been taken in this study to build the theoretical framework. In the perspective to measure effectiveness of public-private partnership in solid waste management, the theory of governance and theory of neo-liberalism helps to in depth analysis. Therefore, on the basis of this theoretical framework the effectiveness of solid waste management is taken as a dependent variable and affecting factors of dependent variable are to be taken as independent variables. Socio-demographic factors, institutional performance of the private sector as well as LMC, Policy and Laws, resources and working modality are the factors which affected the effectiveness of partnership in solid waste management. The following simple schematic diagram presents analytical framework that has been used during this research:



Brief descriptions of the above variables are as follows:

Policies and Laws:

Policies and laws were also considered as other independent variables to identifying the major provisions regarding the solid waste management and the public private partnership.

Approaches and Practices of PPP

Knowledge about the waste, generation trend, waste management practices, expenditure on waste management, training and its effectiveness on solid waste management and people's satisfaction regarding the solid waste management are major independent factor to be taken in measuring the effectiveness of solid waste management. Similarly, the role of the private sector institutions, their capacity, functions, resources, willingness and attitude of peoples towards the private sector in managing the solid waste also recognized as the independents variables which affects the solid waste management.

Institutional Structure, Performance and Capacity

Institutional performance denotes to the performance in service delivery through the institutional resources, systems and behavioral aspect of the service provider as the part of institutions. Therefore, in this study the institutional performance on solid waste management were measured for the performance evaluation of Lalitpur Metropolitan City and institutions of the private sectors.

Monitoring and Evaluation System of SWM

Here, for the effective SWM, the institutional monitoring, supervision and evaluation have a strong role. Thus, the process and role of concerned institutions are very important.

2.9 Conclusions

Solid waste is a byproduct of human activities. It is defined as things which are not useful and have to be discarded. Rapid urbanization, changing living patterns and improving living standards, expansions of trade and business, industrialization are major factors which contribute to increase the waste. Improper management of solid waste affects the human health's, environment and climate change as well. So, the waste management is recognized as issue among the developed and developing countries like Nepal. However, they have not succeeded to manage this issue ineffective and efficient ways.

The waste is classified as municipal waste, industrial waste, medical waste and other waste.

Similarly, the municipal waste is concerned with the planning, engineering, organization, administration, financial and legal aspects of activities associated with generation, growth, storage, collection, transport, processing and disposal in an environmentally compatible manner adopting the principles of economy, aesthetics, energy and conservation. The municipal waste classified in different ways like i) biodegradable waste, ii) recyclable materials, inert matter, porcelain, construction and demolition waste, iii) composite waste, tetra pack, textile, iv) domestic hazardous waste. So, if the product is no longer any use it is disposed in effective way. Mineralization and recycling are the two principles of waste handling. The system for collection, transportation and disposal of MSW is called solid waste management. It is a systematic control of generation, collection, storage, transport, source separation, processing, treatment, recovery and disposal of solid waste. Through the making goals of eradicate extreme poverty and hunger, reduced child mortality ensure environment sustainability the Millennium Development Goals has contributed on solid waste management. On the other hand, the Nepalese policies and literature have also addressed the issue of solid waste management. The SWMA, 2011 is the mother act for governing the solid waste management activities in Nepal. It provides the waste management authority into the LBs. This act also addressed the provision of the waste should be managed through the participation of private sector and the other voluntary organizations. Similarly, the GoN has been made

National Policy on Solid Waste Management in 2053. This policy realized the higher quantity of waste being generated in urban areas as a result of population growth, urbanization and industrialization. So it can be managed in integrated way. Furthermore, the LSGA, EPA and Town Development Act also have been mentioned different provisions of solid waste management. Likewise, different five years have been mentioned for the provision of solid waste management and the environment protection.

Solid waste management is recognized as the responsibility of the municipality. In-effective governance is one of the reasons for presence of significant amount of unmanaged waste in the countries. In the process of solid waste management, the PPP program is popularized in developed and developing countries. It is cooperative institutional arrangements between public and private actors. PPP is sustainable cooperation between public and private actors in which joint products or services are developed and risks, costs and profits are shared. Similarly, the neo-liberal and free market proponents took the opportunity to argue that the role of state should change and some responsibilities need to be given to private sector which resulted in transformation of state's role and prioritization of free market rules and policies.

CHAPTER-III

RESEARCH METHODOLOGY

3.1 Introduction to research methodology

In simple word, research means a search for facts- answer to questions and solution to problems. It is a purposive investigation (Krishnaswami & Rangnatham, 1983).

Research is the process of a systematic and in-depth study or search of any particular topic, subject or area of investigation backed by the collection, compilation, presentation and interpretation of relevant details or data. Similarly, the research methodology is used to develop the scientific knowledge on different methods such as quantitative, qualitative and mixed methods that help to study a particular field of research work. The analysis is done on the combination of theoretical assumptions through the process of verification, falsification, explanations and interpretation. The process generates the scientific knowledge. It includes series of strategies and techniques of data collection and their interpretation to conduct a scientific inquiry. In this research work, it was explained by developing research design. The research designs are the plans and procedure of data collection and analysis (Creswell, 2009). The plan and procedure consists of the technique of data collection such as questionnaires, interviews, observations, review of published documents as well as field study notes. On this research following research methodology were used for obtained the stated objectives of the study.

3.2 Research design

Research designs are plans and the procedure for the research that span the decisions from broad assumptions to detailed methods of data collection and analysis (Creswell, 2011). Similarly, decisions regarding what, where, when, how much, by what means concerning an inquiry or a research study constitute a research design. It is the conceptual structure within which research is conducted; it constitutes the blueprint for the collection, measurement and analysis of the data (Kothari, 2008). Therefore, it serves as a framework that guides the collection and analysis of the data, the research instruments to be followed to answer the proposed research questions (Pant, 2009). Research design can be classified in different ways. Creswell (2011) have classified them into three different

categories viz. qualitative, quantitative and mixed methods research design. Hence, for the purpose of this study, the mixed method was used to make the reliable findings and conclusions.

On the basis of the objectives and research questions of this research; the descriptive and analytical research design was used for getting information, analyzing this information and making findings more reliable and scientific way.

3.3 Nature and sources of data

The search for answer to research questions is called collection of data. Data as the values collected through record-keeping or polling, observing, or measuring (Pant, 2009).

Generally, the data can be collected from the primary and secondary sources. Therefore, for the purpose of getting reliable data and information on this study used primary as well as secondary information.

3.3.1 Primary sources of data

For primary sources of data, unstructured interview was conducted with the respective persons of Environment Section, LMC Balkumari, World Bank LMC- OBA Project, LMC-EU Project and other experts(See appendix I).

3.3.2 Secondary sources and methods

In this study, the secondary information has been collected from the following methods and sources:

Published documents

In this study, the published documents have been used for the secondary information for analysis of getting the prescribed objectives of the study. Similarly, it has also been used for making literature review, construct the theoretical framework and the conceptual framework. Various academic writing relating to SWM and PPP has been used.

Similarly, different published books such as research methods, Solid Waste Management from the different scholars and publishers and international organizations like UNDP, UN-HABITAT, JICA, Athena Infonomics India Pvt.Ltd., Ratna Pustak Bhandar,

Kathmandu, Heritage Publication Lalitpur, Sterling Publisher Pvt. Ltd. In India, McRGG and Oxford University Press and so on.

Unpublished documents

The documents which have not been published anywhere yet the time has been used for the analysis of the data. Therefore, in this study different unpublished source like Master's thesis and PhD dissertation of different Universities related on PPP and SWM have been used.

Laws and policies

Basically, the published report from the National and International Institutions regarding the Solid Waste Management and Public Private Partnership has been used for discussions. In this study, the major data have been used which have been received from the report SWM strategic plan and action plan of Lalitpur Metropolitan City submitted to SWMTSC on 2014. Similarly, the other different report published by Solid Waste Management Technical Support Center, Lalitpur Metropolitan City and Ministry of Local Development has been adopted for getting the required information from the secondary sources.

Internet and website

In this study, it's tried to get related information in the internet and related website used several key words. Among those words or phrases mostly used search words or phrases were: *'solid waste management'*, *'developing countries'*, *'waste management'*, *'public private management'*, *'public private partnership and waste management'*, *'waste problem'*, *'collection and transport methods'*, *'solid waste management in Nepal'*, *'waste management and LMC'*, *'Private Institutions involving in solid waste management in Nepal'*, *'waste management and cities in developing countries'*, *'waste management and peoples attitude'*, *'waste collectors'*, *'municipalities and waste management'*, *'roles and responsibilities'*, *'householders and waste management'*, and *'waste management and private sectors'*.

3.4 Sampling methods and sample size

In order to achieve the objective of the study, 10 persons were selected for interview on the basis of purposive sample.

3.5 The study approach

The study is focused on the mixed methods of research design used both qualitative and quantitative data. The data are a basically collected from secondary sources.

3.6 The research strategy

The research strategy for this study is concentrated on the mixed methods as both quantitative and qualitative are collected from the primary and secondary sources. Present research strategy of this study primary method that helps to enhance the study project and secondary information guides the supporting role in the procedures thereby playing complimentary role with each other.

3.7 Validity and reliability

During the conducting the research and obtaining the required information from the primary and secondary sources were given concentration to manage the tools and instruments accurately for the purpose they are designed. In the process of managing the validity and reliability of the data the related on the topics of this study and conformation data were only be used. Similarly, in the process of selecting the questions; so the questionnaire and the interview were seriously formulated and checked/rechecked from the research supervisor and the expert. Furthermore, the list of expert was selected and interviewed to them after the extensively study of the relevant subject matter of this study. Similarly, they were requested to provide only accurate and conformed data and information. For ensuring the acquisition of valid information from the respondents, the questionnaire was translated into Nepali language as well. In addition to this, the purpose of this study, required information and proper guidelines were clearly provided to the target respondents. Dependability and the conformability were achieved by maintaining an audit trial consisting of research notes, memos and reflections on how categories were derived and how decisions were made throughout the inquiry.

3.8 Ethical consideration

In the course of conducting this study various aspect of ethical consideration has been adopted into the consideration and maintained as much as possible. Proper citation has been done whether the secondary information has been used from various sources and has also been mentioned in the bibliography. The information and opinion collected from the respondents have kept confidential. Opinions and views of respondents and experts have been used with the permission from them. The results and the findings of the study also had been provided with all of the respondents and expert of this study and their suggestions were also incorporated in this regard.

CHAPTER- IV

DATA PRESENTATION AND ANALYSIS

This chapter deals with the existing status of waste generation in Lalitpur Metropolitan City. The existing status consists of waste categories such as household waste, institutional waste and commercial waste. It outlines the existing solid waste management system of Lalitpur Metropolitan City. The system comprises of waste segregation, collection and transportation system of Lalitpur Metropolitan City. Similarly, it analyses the organizational structure of Lalitpur Metropolitan City. Likewise, this chapter deals with the approaches and practices of Public Private Partnership applied by Lalitpur Metropolitan City in solid waste management and the planning and strategy of solid waste management of Lalitpur Metropolitan City. On the other hand, this chapter also draws major findings of the study considering the research questions and the objectives laid down in the study.

4.1 Existing status of waste generation in LMC

4.1.1 Waste categories

According to the LMC Environmental Section, the potential waste generators in the municipality are households, commercial establishments, institutions, industries, health institutions, etc. The wastes generated by health institutions like Hospitals and Industries contain hazardous and infectious waste materials. They should be treated or managed separately. So, in this study, it has covered waste generated from households, commercial and institutional establishments. Therefore, in general municipalities have categorized the waste obtained from the household, commercial and institutional into seven different types which are:

1. Organic waste
2. Plastics
3. Paper and paper products
4. Textile
5. Rubber and Leather

6. Metals
7. Glass
8. Others (inert materials etc.)

4.1.2 Waste generation and categorical composition in LMC

A base line assessment of municipalities of Nepal was conducted in April to May 2012 by SWMTSC in collaboration with Asian Development Bank (ADB). The study was carried out by environmental officers (surveyors) with sufficient knowledge in the subject matter and with research experience under direct supervision of supervisors, team leader of baseline survey and staff of concerned municipality. A pre-coded structured questionnaire was formulated for this survey purposes. Surveyors spent a minimum of 10 days to complete their field study in their assigned municipality. For this study, a household was defined as a number of people using one kitchen. During the survey, the surveyor has provided waste collection bags to each household, institutional and commercial establishment to collect their wastes generated in a 24-hour period. The measured categories of generated daily waste have been separately presented here:

4.1.2.1 Domestic/ household waste

From the field survey, the average per capita household waste generation rate in Lalitpur was found to be 0.186 kg per person per day. The total amount of waste generation was found to be almost 42 tons per day from the household level of Lalitpur whereas nearly same amount of waste was generated from the institutional and commercial sector of Lalitpur. Based on the analysis and findings, it is estimated that waste from households in general contributes more than 50% of the total MSW generation. Thus, the average MSW generation was found to be 0.372 g/capita/day. With these per-capita waste generation rates and population for the year 2011, the total MSW generation from Lalitpur Metropolitan City was estimated at about 79 tons/day (SWM-SIP OBA Study, 2016)

Table 1.3: Daily generation of domestic/household waste

Categories of Waste	Composition in Percentage
Organic Waste	78.84%
Paper	5.24%
Plastic	9.66%
Metal	0.66%
Glass	2.22%
Rubber and leather	1.0%
Textile and Other	2.38%

Source: LMC/ADB: Survey Status of SWM in 58 Municipalities of Nepal

The domestic/household waste consist of 78.84% organic, 9.66% plastic, 5.24% paper, 9.66% plastic, metal, 0.66% rubber and leather 1%, glass,2.22% and, textile and other 2.38% respectively.

4.1.2.2 Generation of institutional waste

For obtaining waste composition generated from the different institutional sectors, one school and one Government or Non-Government office were selected from each ward.

The institutional waste per institution was found to be 3.15 kg.

Table 1.4: Daily generation of institutional waste

Categories of Waste	Composition in Percentage
Organic Waste	13.0%
Paper	43.0%
Plastic	23.0%
Metal	1.43%
Glass	0.57%
Rubber and leather	1.0%
Textile and Other	18.0%

Source: LMC/ADB: Survey Status of SWM in 58 Municipalities of Nepal

The institutional waste comprises of 13% organic, 43% paper, 23% plastic, 1.43% metal, 0.57% glass, 1% rubber and leather and, 18% textile and others.

4.1.2.3 Category of commercial waste generation

One shop and one hotel or restaurant was selected from each ward for the analysis of the commercial waste. The commercial waste per establishment was found to be 3.38kg. The overall composition of commercial waste of LMC is shown below in the table.

Table 1.5: Daily generation of commercial waste

Categories of Waste	Composition in Percentage
Organic Waste	38.0%
Paper and paper products	30.0%
Plastic	23.0%
Metal	0.15%
Glass	0.84%
Rubber and leather	0.01%
Textile and Other	8.0%

Source: LMC/ADB: Survey Status of SWM in 58 Municipalities of Nepal

The commercial waste comprises of 38% organic, 30% paper and paper products, 23% plastic, 0.15% metal, 0.84% glass, 0.01% rubber and leather and, 8% textile and others respectively.

4.1.2.4 Composition of aggregate municipal solid waste

The composition of waste has been averaged using weighted average method of household, institutional and commercial waste and presented as composition of municipal waste in the table below:

Table 1.6: Daily generation of municipal waste

Categories of Waste	Composition in Percentage
Organic Waste	57.07%
Paper	18.38%
Plastic	15.55%
Metal	0.53%
Glass	1.44%
Rubber and leather	0.46%
Textile	0.40%
Other	6.17%

Source: LMC/ADB: Survey Status of SWM in 58 Municipalities of Nepal

The municipal waste consists of 57.07% organic, 18.38% paper, 15.55% plastic, 0.53% metal, 1.44% glass, 0.46% rubber and leather, 0.40% textile and, 6.17% others respectively.

4.2 Existing SWM System of LMC

4.2.1 Waste segregation, collection and transportation system

According to Environment and Sanitation section of LMC, nearly 75 tons of solid waste is generated daily in LMC only. With its limited resources and capabilities, LMC at present has been able to collect nearly 60 tons/day, while the remaining 15 tons are somehow managed by private sectors, three largest private operators such as NEPCEMAC, Sirjansil and WEPCO. This doesn't include the unknown but relatively limited waste volume which is collected by small private operators. There are various activities which have been carried out for the collection of daily waste. For this, LMC has widely introduced a curb-side and on-ground collection system. In such a collection methods, most of the waste that is brought by the waste generators is piled up at the collection points and picked up manually and places in collection trucks with shovels. LMC has introduced a bell collection system so that residents can throw their garbage into the collection truck directly by them. Recently, the collection services are provided in all 30 wards by the LMC (11 wards) and by private service providers (11 wards). They, however, charge a collection fee to the participating waste generators. Almost all waste collected is combined together, but in some wards such as ward no. 9, 22 and 13 source-segregation collection can be seen in practice. Most of the street sweeping is carried out by the municipalities. There are 165 sweepers employed to sweep the core areas of the city twice a day and most other areas once a day. This includes 66 sweepers working for different wards, 26 helpers for loading waste on transport vehicles and remaining for street cleaning. Waste collection equipment of various capacities is currently used in LMC which are as follows:

Table 1.7 Type and number of equipment used to collect SW by municipality

Type of Equipment	Quantity (m ³)	No. of Equipment Operating
Power Tiller	2.3	2
Tipper/Dump Trucks	3.5	12
Secondary Vehicles	15	4

Source: LMC, Environmental and Sanitation Section, LMC, 2015

According to LMC, in some areas the waste are collected in daily, in some areas weekly and in some areas it is twice a week. It is estimated that 18% of the collected waste is separated by the operators for recycling prior to transport of the residues to the landfill (SIP Survey, OBA Study, 2016).

4.2.2 Resource recovery and recycling from solid waste

There are no recycling programs in LMC but few NGOs, Kawadi and women's group involved in waste management are practicing recycling. Waste pickers also collect their recyclable material from the Balkumari transfer station and sell them to Kawadi. Based on survey conducted by SWMTSC on recovery of recyclable waste in Kathmandu Valley, average 30 tons per day of total recyclable and reusable fractions are recovered from municipal waste in LMC. Similarly, according to municipality, 3000 kg/day recyclable waste is collected by private sector/scrap dealers. 4000 kg/ day is segregated by 26 scrap collectors who are helping the municipality in its transfer station in Balkumari. According to LMC, municipality, private sector/scrap dealers, Jagaruk Mahila Samuha, WEPCO and many others are collecting recyclable waste in LMC. WEPCO has been conducting paper recycling plant in LMC.

There is no community's level composting of municipality levels composting plant operated by LMC. It was found that some people have been using organic wastes for the organic manure by composting or decomposing them at the field. Private sectors such as NEPSEMAC and WEPCO are encouraging and giving training to people for household level composting. Municipality has been planning to build and operate at least 3 municipality level composting plant having capacity of 3 to 5tons/day within this planning period that is 2014 – 2018.

4.2.3 Final disposal system of solid waste

The waste collected by the municipality is finally disposed of in Okharpauwa landfill site which is 33km away from the main city. Disposal of waste in Okharpauwa landfill site has been started since 2005. The waste collected by other private sectors is disposed in Bagmati river bank and at Balkumari and some are disposed to the container allocated by the municipalities.

4.2.4 Special waste management system of LMC

Patan Hospital and B&B Hospitals have their own incineration to manage their hazardous medical waste. Other than that, there are no provisions for the management of special waste such as medical waste, industrial effluents, dead animals etc. Such hazardous waste were found mixed with the household waste and being collected together by the municipality and taken to the Balkumari transfer station and finally to the Okharpauwa landfill site. Similarly, other waste such as industrial waste, dead animal bodies, construction debris, bulk and electronic waste are increasing day by day, so addressing of such type of waste need to be planned by the municipality.

4.2.5 Structural framework and human resources of SWM

4.2.5.1 Organizational structure

In 2004, LMC approved a new organizational structure where it designated the Environment Section to be responsible for SWM activities. The Environment Section is comprised of two sub-sections, the Sanitation Sub-section and Mechanical Sub-section. It is located at Balkumari separately from the central LMC office with its own garage and workshop building. The Public Works Division is responsible for identification, planning, development, and monitoring of municipal infrastructure projects. Regarding the SWM facilities planning, this Section should be closely involved and CDS also has been implementing waste minimization training as a component of their community mobilization program for the last ten years. LMC should tap into the experience of this section, and jointly formulate and implement the effective community level SWM programs as well.

The post of the Environment Engineer is heading the Environment & Sanitation Section was established in 2004, who has been working as the Section Chief. In terms of reporting, the Environment Section Chief reports directly to the CEO of the municipality. Close coordination with the Public Works Division is maintained on various SWM issues. LMC established the Solid Waste Management Committee, composed of four Ward Chairpersons with relevant municipality staff as observers, which is usually convened on a monthly basis. This platform is used to settle daily waste management problems and make recommendations of some principles about SWM.

4.2.5.2 Human resources

Total number of staff under the Environment Section is 213 persons or about 40% of all LMC staff has been allocated in Environment Section. Over 80% of 206 persons are field level staff. Only one engineer is posted in the Environmental Section.

Table 1.8: LMC environmental section staff

Staff Category	Number of Person
Sweepers	165
Drivers	20
Engineers/Officers	1
Environmental Officer	1
Mechanics	9
Supervisors	2
Administrative	7
Technician	3
Sweeper Captain	5
Total	213

Source: LMC Environmental Section

According to the LMC Environmental Section, the senior officer and mid-level staffs are highly educated with relevant technical expertise. Regarding senior level officers of Environment Section, they needed strengthening their managerial skills and capacity, especially in view of their responsibility to manage a sizable field staff whereas mid-level staffs are in need of supporting skills in management and communication.

According to the Environment Section, an assistant officer (Nayab Subba), with the support of four supervisors and field level supervisors called Jachakis and Naikes, are managing all field level staff. Among the sweepers, 76 are assigned at the ward level and conduct various cleaning jobs in addition to regular street sweeping. The rest of the sweepers is assigned under the central LMC office and separated into the following groups:

- Sweepers concentrating on tourist areas

- Sweepers cleaning the major streets and highways
- Waste loaders going around with the collection trucks
- Drainage cleaners

The sweepers usually work in two shifts, (6:00 a.m. to 09:00 a.m., 5:00 p.m. to 7:00 p.m. only at Mangal Bazar) but some like the drainage cleaners work only in one eight-hour shift.

4.2.5.3 SWM service arrangement in LMC

Lalitpur Metropolitan City provides the services such as street sweeping, collection, transportation as well as processing for the solid waste management. Street sweeping practice is performed daily with own manpower from municipality, private contractor and women's group, and the waste collected from the street sweeping is disposed of through open piles. The LMC is conducting waste segregation campaign which covers 2500 HHs in ward 22 and 600 HHs in ward 13. Similarly, waste management activities are being conducted in ward 2,3,4,5,15,16,18 and 22 of LMC through the support of EU project (SIP Survey, OBA Study, 2015).

4.3 Approaches and practices of public private partnership by LMC in SWM

4.3.1 Bringing together of other actors in SWM of LMC

Different private actors, CBOs and the local groups are involved in solid waste management of the municipality as a public private partnership approach. They are involved in collecting, transporting and composting of the wastes as well as organizing different cleanup campaigns and awareness programs. They are as follows:

Private actors:

- Nepal Pollution Control and Environment Management Center (NEPCEMAC)
- WEPCO
- CEP
- Fulbari
- Jupital Tole Sudhar Samiti

- Macha Raja Nepali
- Multipurpose Research and Namuna
- NGO
- Nepal Bikas Aviyan
- Creative Environment Kendra
- Tole Committee
- Janachetana Fohar Byawasthapan Samuha
- NEPCO

CBOs and Local Groups

- Jagaruk Mahila Samuha
- Kusunti Tol Sudhar Samiti
- Sirjansil Batabaran Samrachan Kendra
- Women Environmental Group etc. Who charge a collection fee to the participating waste generators.

4.3.2 Information and awareness activities in SWM

For the effective SWM, the planned and ongoing activities of LMC by involving private sectors through public awareness and community mobilization are as follows:

- Awareness raising and clean-up campaign program
- Plastic collection and composting activities
- Training on composting, vermin-composting and paper recycling.
- Establishment of eco-clubs in schools

Different programs have been conducted by the municipalities and other private sectors. Some of the programs are listed below:

Table 1.9: Program conducted by municipalities and other actors

Organizer	Program	Frequency of Occurrence
Municipality	PRISM (Poverty reduction of informal workers in SWM)	-
Municipality	Distribution of composting bin	During the Projects
Municipality	Waste segregation campaign	During special Occasions
Sirjansil Batabaran Samrachan Kendra	Cleanup campaign	Sometimes
WEPCO	Training on household composting	Occasionally
Jagaruk Mahila Samuha	Women empowerment and awareness Programs	Occasionally

Source: Environmental Section, LMC

These types of awareness programs and trainings were found to be successful in bringing behavioral change among the people of municipality.

4.3.3 Revenue generation from SWM service charges

The LMC is not collecting SWM tax formally from its beneficiaries. People from the most of the wards do not pay any fee for SWM to the municipality except in the Dashain and Tihar for the welfare of the society. But, the private organization working on the fields are charging fees on monthly basis. The prices range from NRs 100- NRs 350 per month per household.

According to the 21st Municipal Council of Lalitpur Sub- Metropolitan City (LMC) has proposed annual SWM charge NRs. 182/- per household for the area up to 2000sq. ft., NRs.360 for the area from 2001sq.ft. to 4000sq.ft, NRs.720 for the area from 4001sq.ft. to 6000sq.ft, NRs.1500 for above area of 6000sq.ft and NRs.15000 for colony/apartment. Similarly, LMC has proposed different annual SWM charges to different business such as NRs. 500 for Retailer and Tea/Coffee shops, NRs. 1000 for Wholesaler, Medical shops, NRs.2000 for Small Dept. Store, Mart and Schools/Colleges, NRs. 3000 per trip for Large

Dept. Stores (Bhatbhateni, Namaste etc.)

4.3.4 Monitoring and evaluation of municipal performance on SWM

The Government of Nepal (GoN) has implemented the system of allocation minimum grants and additional grants to Local Bodies (LBs) in order to carry out assigned duties according to clause 236 of the Local Self Governance Act (LSGA), 1999, since 2007/08 based on the result of MCPMs of DDCs. The system has replicated in VDCs and municipalities from 2009/10. As per the mandate and spirit of the LSGA, District Development Committees (DDCs), Village Development Committees (VDCs), and Municipalities are recognized as Local Bodies and are responsible in delivering services to the people at local level.

The LSGA also mentions providing an additional grant based on population, level of development, possibility and capability of mobilizing revenues, degree of the resource gap, adequacy and quality of financial transactions, audit reports, and so on. Similarly, rule 273 “Gha” of the Local Self-Governance Regulation (LSGR), 1999 provides for a performance based grant system to Local Bodies (LBs). According to these provisions the Ministry of Local Development and Federal Affairs (MLDFA), on recommendation of the Local Bodies Fiscal Commission (LBFC) can develop minimum conditions and performance indicators for LBs and link the size of the capital development grant to the performance of the LBs. Under this system, the grants for LBs can be disbursed on the basis of the LBs performance. The grant under this system is based on the performance of the LBs. The Local Governance and Community Development Program (LGCDP) have implemented performance based grant system to provide additional grant to DDCs from the fiscal year 2008/2009 and for VDCs and municipalities from the FY 2009/10. The Minimum conditions include four working areas (**Local Self- Governance, Financial Management, Formation and Function of Committees**) with such 15 indicators, which the municipalities to fulfill.

For the measurement of the performance, five working areas consisting 40 indicators have been fixed. The total weighting score allocated is 100. Out of 100 score, the Basic Urban Services Management is allocated only 18 score which seems too little and vague compared to the vast scope of activities related to this indicator. In year 2011/12, Lalitpur Metropolitan City has fulfilled the minimum conditions and acquired 82 score for its Performance Measures. Similarly, in FY 2010/11, it had also fulfilled the minimum conditions with 66 score for its Performance Measures and obtained 16 out of 18 in Urban Basic Service Management. LMC became successful to get 4 out of 4 in Sanitation and SWM indicator and 2 out of 2 in Park, Greenery and Environmental Management, while got only 1 out of 2 in Slaughters house Management.

4.3.5 Policies and issues for effective SWM

Although LMC has initiated several attempts for effective solid waste management, the current practice of SWM in LMC is not at satisfactory level due to the lack of practicing Integrated Solid Waste Management (ISWM) approach, resource recovery and cost recovery approach. The closure of open dumping and rehabilitation plan for the Bagmati river dumping sites have yet to be fully implemented. Prior to fully implementation of ISWM project, the transfer station along with bailer system and waste recovery collection center has to be established for smooth operation of final disposal. During the planning workshops with various stakeholders and other consultation meetings with concerned municipal officials, several issues related to solid waste management were identified. The SWM strategy strikes a balance between the existing SWM status, constraints and capacity limitations on the one hand, and the urgency to transform the sector and provide a basic level of service on the otherhand. The major issues are:

- In absence of elected political leadership it is becoming difficult to mobilize community to effectively participate in SWM and take decisions which affect masses such as introducing improved systems of waste management, levy of

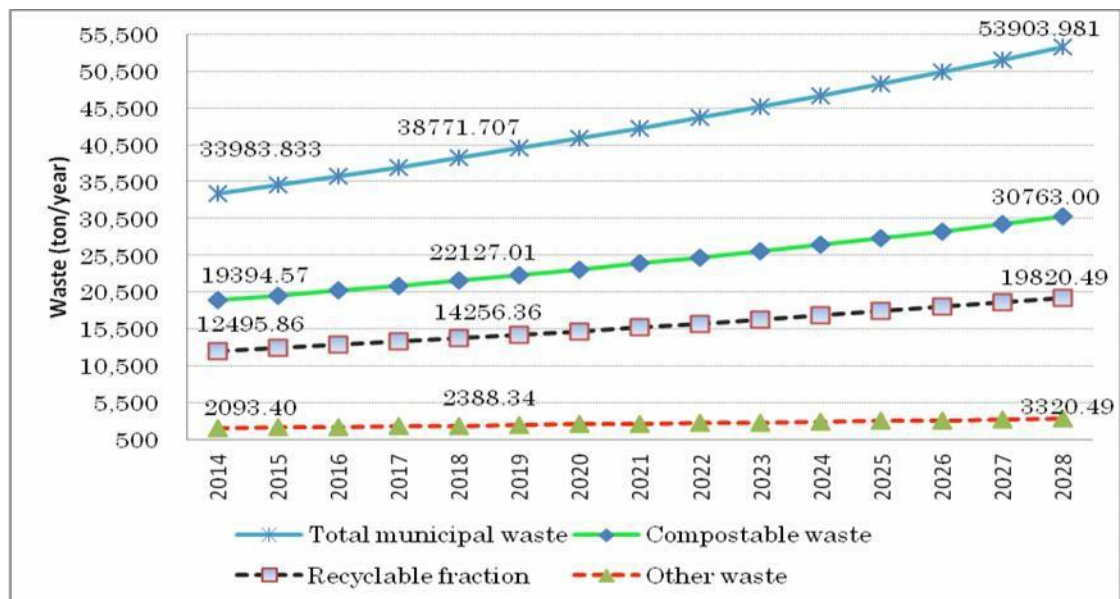
- user charges, identifying land for waste treatment and final disposal facilities.
- Lack of data collection, record keeping and lack of periodic updates of basic data, key performance indicators.
 - Lack of dissemination of data among public and other stakeholders.
 - Segregation of waste at sources are initiated to practice but not effectively implemented though there is mandatory provision of segregation of waste at sources, transport, and treat them separately in the SWM Act 2011.
 - Practice of collection and transportation of source segregated waste limited and given less priority in SWM related programs and plans of municipality.
 - Although large proportion of compostable and recyclable materials in the municipal waste of Lalitpur Metropolitan City provides a great opportunity for composting and recycling, only part of recyclable fractions have been recovered through informal sector. However, resources recovery from solid waste and 3R principles (reduce, reuse and composting/recycling) has not streamlined in waste management system of municipality. This approach not only generate resources but also significantly reduce the amount of waste to be disposed of at final disposal sites, thereby saving costs for final disposal and reducing public health and environmental risks. Currently, municipality spends more than NRs. 2200 per day for a ton of waste just for collection and its final disposal.
 - While the enactment of the new Solid Waste Management Act in 2011 is a major step in improving SWM practices in Lalitpur Metropolitan City, this has not been fully and effectively translated into specific actions and results on the ground. In addition, appropriate by-laws, guidelines and code of practices has not formulated and enforced
 - Lack of public awareness and their behaviors on SWM have created problems for effective implementation of good SWM practices. Therefore, the both education on SWM practices and enforcement of SWM acts should be implemented together which seems lacking in current system in LMC.
 - Lack of active participation of stakeholders, particularly local communities and Private Sector and no clearly define role and responsibilities for SWM.

- Lack of proper planning and implementation strategy for SWM.
- Inadequate operational and management capacity of municipality, lack of coordination among various sections and no M&E system and mechanism reveals.
- Less financial capabilities and no cost recovery and resource recovery mechanism practiced.
- Less pay attention to management of special waste and hazardous waste in safe manner.

Based on these key strategic issues identified during the assessment of existing SWM system, the SWM strategic objectives for Lalitpur Metropolitan City are designed to transform the existing SWM system into a fully integrated, transparent and efficient system; which meets internationally recognized standards and practices. Different key activities have been determined under each objective statement that describes the way of achieving results. Objectives are specific, measurable and result oriented that supports to narrow down the gaps identified in the strategic issue.

Similarly, the assessed waste composition based LMC/ADB survey data, 15 years projection of each component of municipal waste has been presented below:

Figure 2 Components of municipal waste



Source: LMC/ADB Survey 2012

The above figure shows that recovery of organic waste is increasing gradually from 2% in 2014 to 40% in 2018 and 90% in 2028 at the end of planning period of the municipality. The recovery of recyclable fraction also is in increasing trend which increased from 10% in 2014, 40% will be in 2018 and 100% will be in 2028.

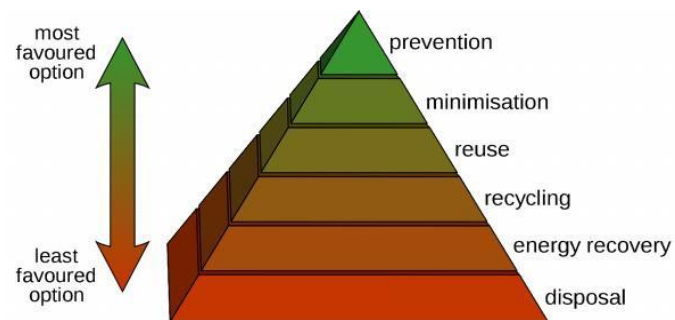
Similarly, the recovery of compostable waste is also in increasing trend.

4.4 Basic approaches and guiding principles of SWM

The guiding principles of SWM strategy of LMC is in line with SWM act 2011, Local- self Government Act, 1999 and other relevant environmental related act. The following guiding principles for SWM strategy has been found for consideration. The strategy has put first priority to ensure that the focus will be given on waste prevention (preventing the generation and minimizing the waste that is being generated). If the first option is neither insufficient nor practical or technically or sociologically feasible, then other solutions have to be considered. The strategic approach applied for the development of strategy is based on the internationally recognized waste hierarchy including:

- Prevention;
- Minimization;
- Reuse;
- Recycling;
- Energy recovery;
- Disposal

Figure 3 Strategy for SWM hierarchical structure



https://en.wikipedia.org/wiki/waste_hierarchy

- Zero waste targets: It shall be the ultimate targets to be achieved through practicing the concept of reduce, reuse and recycle and extended producers' liability in a concerted manner. Not more than 20% of waste shall be landfilled at the end of 2025.
- Provisions of Solid Waste Management Act 2011 (2068), which has fundamentally incorporated the basic principles above mentioned in both of the approaches.
- Ensuring people participation - Municipality alone cannot meet the challenge of keeping the LMC clean. People participation shall be ensured to change their attitude and behavior on solid waste through massive information, education and communication (IEC) programs throughout the municipality to change peoples' attitude on solid waste and to minimize the waste including plastic waste and facilitate sustainable waste management.
- Participation of communities, TLOs, private sector enterprises and other stakeholders,
- SWM services to be made self-sustaining - SWM service shall be made self-sustaining within a period of 5 years by resource recovery and cost recovery approach such as levy of user fee charges and revenue from reusable and recyclable products.
- Maintaining strong communication and dissemination of information

4.5 Proposed SWM Policies

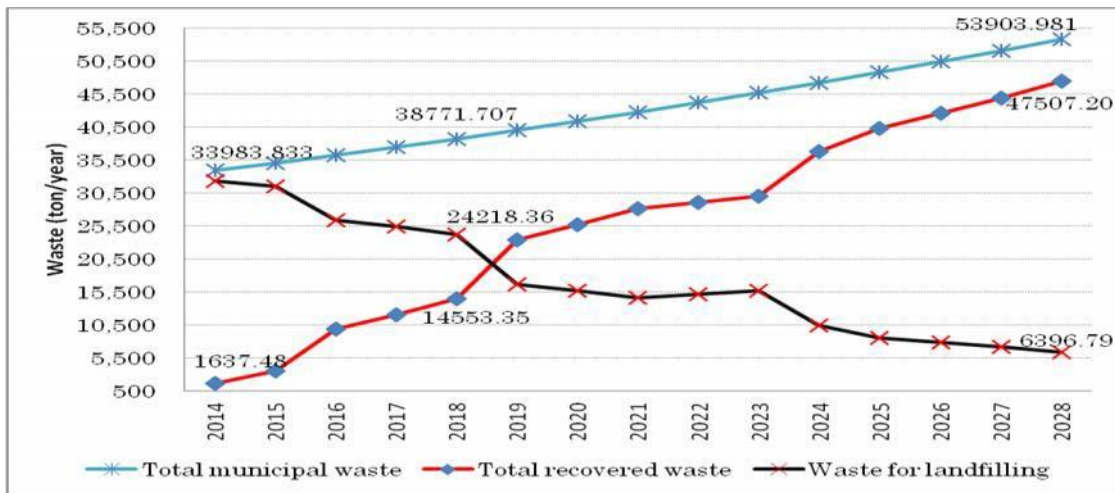
The proposed SWM policies and targets are given below:

4.5.1 Strategic objectives and targets

The vision and mission statements broadly cover all aspects regarding the approach to address the solid waste problems at the municipal level. Following strategic objectives are identified and based on the aforementioned strategic issues and consultation with the municipal officials, SWMTSC, development partners and other concerned stakeholders, the following Strategic Objectives set for SWM of LMC.

- To establish Municipal Solid Waste Management Information System (MSWMIS)
- To improve collection and transportation system of source segregated sources..
- To promote 3R approach for waste minimization
- To improve waste treatment and final disposal system
- To promote public participation and behavior change of different stakeholders in SWM
- To enhance organizational, institutional and legal arrangements for effective SWM service
- To develop financially sustainable SWM system
- To facilitate special and hazardous waste management

Figure 2 Projection of total SWM, total possible recovery of waste with proposed target over planning period



Source: LMC, Environmental Section

The above figure depicts that the recovery of municipal waste and recovery of recyclable waste is increasing throughout the planning period of Lalitpur Metropolitan City. On the other hand, the waste for landfill site is decreasing from 95% in 2014 to 62% in the planning period of 2018. Similarly, it will decrease to 12% in 2028 at the end of the planning period.

4.6 Major findings of the study

The major findings of this study are as follows:

4.6.1 Findings on existing status of waste generation

- Total collected waste is categorized into 8 different types. Among such categories, 91% solid waste has found composed of organic, paper and plastics.
- Households, Institutions and Commercial sectors are major generators of solid waste.
- Among nearly 75 tons of generated daily solid waste, 60 tons is collected by municipality and 15 tons is collected by private sectors.
- Bell collection system has been applied by municipality.
- Door to door collection system has been found in practice by private sectors.
- Power tillers, Tippers, Dump Trucks and secondary vehicles are found to carry collected waste to collection canter Balkumari and to dumping site.
- There are no recycling programs of LMC but some NGOs, INGOs, and Kawadis are involved in such activities.
- There is no any municipal level as well as private level composting plant operated for recycling and revenue generation from collected waste.
- Okharpauwa is the destination for final disposal of waste by municipality whereas private sectors dispose it at Bagmati River Bank at Balkhu and the containers allocated by municipality.
- There are no any provisions with municipality for managing special wastes such as hazardous wastes generated from hospitals etc. The generated of such wastes themselves managing such wastes.

4.6.2 Findings on approaches and practices of PPP in SWM of LMC

- Under LMC, there are 17 private actors active in waste collection. The private actors all have NGO background, but all of them are effectively dual registration with one company for business activities and one company for NGO activities.
- None of the private actors or operators have formal written agreements with the LMC and the actors have number of challenges related to the present system.

4.6.3 Findings on the role played by actors in managing SWM in LMC

- Major private actors are found from private institutions and community based organizations.
- Private actors partnership activities are for awareness generation of SWM, plastic collection and composting, training on composting and establishment of eco-clubs in schools.
- Project based, regular and occasional programs on SWM partnered with private actors have been found conducted.
- Private actors are free to collect their fee for their service of door to door collection of solid waste. It comprises of about 15 tons of solid waste generated from households.
- The role of Private actors need to be enhanced by extending the service level and coverage from street sweeping to practicing domestic composting, qualitative improvement checking NPK (Nitrogen, phosphorus and potassium) components.
- LMC has proposed Build Operate and Transfer (BOT) or Build Operate Owned and Transfer (BOOT) model in solid waste management.

4.6.4 Findings on monitoring, regulatory policies and evaluation systems of LMC on SWM

- VDCs, DDCs and Municipalities are regarded as Local bodies as LSGA 1999.
- According to performance indicators of local bodies, they receive less or more grants from central government for every Fiscal Year.
- The Local Governance and Community Development Program (LGCDP) have implemented performance based grant system to provide additional grant to DDCs from the fiscal year 2008/2009 and for VDCs and municipalities from the FY 2009/10
- LMC has been found successful to get 4 out of 4 in Sanitation and SWM indicator and 2 out of 2 in Park, Greenery and Environmental Management. It is continuously trying to overcome its weaknesses in SWM through various strategic plans.

4.6.5 Findings on planning and policies for effective SWM

- LMC has identified some key issues that are affecting SWM among which political instability, lack of awareness, unavailability of real database, lack of proper segregation, insufficiency of resources, lack of active participation of private sectors etc.
- It has made a mid-term 5 year and long term 15 year plan for effective SWM after having conducting proper projection on population and possible waste generation in such periods.
- It has been planning to apply international level approach for SWM of LMC. It has proposed so many approaches for effective SWM.
- Similarly, on the basis of a systematic study and reports, it has made proper strategies for effective SWM in LMC.

CHAPTER -V

SUMMARY AND CONCLUSIONS

5.1 Summary

This thesis has identified the Management of Solid Waste as a major issue and generally objected for dissemination of knowledge on the SWM practices, plans and strategy of LMC along with its stake with private sectors as PPP model. The whole study can be summarized in the following manner:

In Nepal, the government and people have failed to realize serious implications and the urgent need to address solid waste management for some decade. As a result, many cities of Nepal are now suffering from the adverse impacts of unmanaged waste. The problem is acute, particularly in the large cities such as Kathmandu, Lalitpur, Bhaktapur, Birgunj, Nepalgunj, Biratnagar, Pokhara etc. where improper management of waste has led to environmental pollutions, public health hazards and dirty city.

Waste management practices differ in developed and developing countries, in urban and rural areas and in residential and industrial producers according to the quantity and composition of generated wastes. Now a day, it is felt that the management of solid waste is the responsibility of all stakeholders like central government, local government, private sector, NGOs, civil society and individuals. Civilization and modernization is measured on the basis of clean, green and healthy society. Single effort of Government is insufficient to cope with these serious problems of the country in efficient and effective manner. So, other stakeholders must be taken the necessary steps for sustainable and valuable management of solid waste. Rapid urbanization has made solid waste management a serious problem today. The perception of the people has always been that it is a responsibility of the local authority. Local authorities are constitutionally bound to keep their territories clean. For some time now, many local authorities have been experimenting with several innovative and participatory methods of 3R i.e. Reduce, Reuse and Recycle (MaRGG, 2005) of solid waste.

LMC was originally established in 1918 and finally upgraded to sub- Metropolitan

city in 1995 and recently it has been converted into Metropolitan City. However, Lalitpur Metropolitan City (LMC) has been used throughout the study. The municipality has a long history with its foundation in the third century, and is famous for “Patan” as old name. LMC has its office located at Pulchowk, Lalitpur and is the sole agency for providing municipal services and carrying out urban development works in the city of Lalitpur.

LMC comprises of 22 wards. It has population around 22 million. It has 212 educational institutions established in the district including schools and college of various faculties. It has 5 major hospitals located in the district. There are about 150 industries established here including 106 industries of Patan Industrial State. There are altogether 100 hotels and restaurants located in the city. It is historically a marketplace and have more than 6000 shops are running within LMC. After the enactment of LSGA in 1999, municipalities were given more power and authority to plan and implement developmental works regarding urban infrastructures and services within its jurisdiction.

The study is generally objected for acquiring and disseminating knowledge on solid waste management and public private partnership practices. For this, it has chosen the case of LMC. For this general purpose, it has specifically gathered, analyzed and presented data on current waste generation and categorization, SWM practice and Institutional structure of LMC, It has collected and presented data of approaches and practices of public private partnership on SWM of LMC as well as its plan and strategies for effective SWM.

The study has tried to provide an insight of existing status of waste generation to waste management, partnership with stakeholders, thus it contributes for making the effort of involving private and other stakeholders more effective and efficient.

In the process of solid waste management, the Public Private Partnership (PPP) program is popularized in the developed and developing countries. Public Private Partnership is cooperative institutional arrangements between public and private actors. Public Private Partnership has more or less sustainable cooperation between public and private actors in which joint products or services are developed and in which risks, costs, and profits are

shared. Likewise, the Neo- Liberal and free market proponents influence the role of the state that can be changed and some responsibilities need to be given to private sector, which resulted in transforming of states role and prioritization of free market rules and policies. Thus, the study is based on theoretical framework discussed in the *neo-liberalism and public private partnership in solid waste management*.

This study is based on descriptive research design. It is a case study of LMC. The secondary sources of data such as internal reports, survey reports and official documents of LMC environmental section has been taken as major source of data. Site observation, unstructured questionnaires with employees and other stakeholders are also practiced. The collected data have been presented sequentially and systematically according to the demand of objective of the study.

Total collected waste are categorized into different 8 types among which 91% solid waste has found composed of organic, paper and plastics categories. Households, Institutions and Commercial shops, hotels, restaurants are major generators of solid waste. Among nearly 75 tons of generated daily solid waste, 60 tons is collected by municipality and 15 tons is collected by private sectors.

Bell collection system has been applied by municipality whereas door to door collection system by private collectors. Power tillers, Tippers, Dump Trucks and secondary vehicles are found to carry collected waste to collection centre, Balkumari and to dumping site of Okharpauwa. There are no recycling programs of LMC but some NGOs, INGOs, and Kawadis are involved in such activities. Private sectors dispose waste at Bagmati River Bank at Balkhu and the containers allocated by municipality. There are no any provisions with municipality for managing special wastes such as hazardous wastes generated from hospitals etc. The generated of such wastes themselves managing.

Under LMC, there is Environmental and Sanitation Section at Balkumari headed by an Environmental Engineer as section chief. The section chief directly report to the CEO of LMC. This section has major responsibility of SWM. Environmental section comprise of about 40% staffs of LMC in number. Among them, 80% staffs of this section are field level staffs such as sweepers, waste loaders and drainage cleaners.

Major Private Stakeholders are found from private institutions and Community Based Organizations (CBOs) and involved in activities like awareness creation in SWM, plastic collection and composting, training on composting and establish eco-clubs. Project based, regular and occasional programs on SWM partnered with private sectors have been found conducted. Private sectors are free to collect their fee for their service of door to door collection of solid waste. It comprises of about 15 tons of solid waste generated from households.

VDCs, DDCs and Municipalities are regarded as Local bodies as LSGA 1999. According to performance indicators of local bodies, they receive less or more grants from central government. LMC has a good track record on Sanitation and SWM indicator. It is continuously trying to overcome its weaknesses in SWM through various strategic plans.

LMC has identified some key issues that are affecting SWM among which political instability, lack of awareness, unavailability of real database, lack of proper segregation, insufficiency of resources, lack of active participation of private sectors etc. It has made a mid-term and long term plans for effective SWM after having conducting proper projection on population and possible waste generation in such periods. It has been planning to apply international level approach for SWM of LMC. It has proposed so many approaches for effective SWM. Similarly, on the basis of a systematic study and reports, it has made proper strategies for effective SWM in LMC.

5.2 Conclusions

The practice of SWM is still found new in Nepal. As a city grows overpopulated, it increases generation of wastes. The initiation of SWM is late or slower than the generation of wastes. It means there is now prior plan for SWM in Nepal.

In this scenario, LMC has structured a separate environmental section for SWM. Beyond its limitation of resources and effective models of SWM, it is trying to manage the generated wastes in efficient, planned and strategic manner. Similarly, it has equally realized the importance of private sector and community base organization for SWM; it is working with them through many projects and programs.

In this study, LMC has not practiced to take regular charges for its SWM services to public, institutions and other commercial entities. This is not a good practice. It is making the generators of waste more careless day by day. Similarly, this is making the LMC management poor day by day to handle the challenges of SWM effectively.

In this respect, the study concludes that either LMC must start to raise the proposed fees as proposed or worked out by KMC or ADB or it should apply a suitable public private model of SWM and handover all SWM practices to private sector as soon as possible. Thus, without any delay, LMC should go with any one alternative and go with that.

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APPENDIX -I

Tribhuvan University

Central Department of Public Administration

Interview Schedule

(Used for thesis work to the degree of M.Phil. in Public Administration)

1. Have you categorized the daily wastes in the LMC? If yes, please list out them.

.....
.....

2. Please provide the data on daily generated household waste in the LMC categorically.

.....
.....

3. Please provide the data on daily generated institutional waste in the LMC categorically.

.....
.....

4. Please provide the data on daily generated commercial waste in the LMC categorically.

.....
.....

5. Please specify the composition of aggregate municipal solid waste.

.....
.....

6. How is the recycled and composted waste utilized?

.....
.....

7. Do the landfill operations conform to acceptable environmental standards?
.....
.....
8. Do you have special hospitals and laboratory waste management system?
.....
.....
9. Please provide the data on organizational structure of LMC for SWM.
 - a. Organizational structure
 - b. Human resources
 - c. Major stakeholders and actors in SWM of LMC
10. Other activities for SWM in an association with stakeholders
.....
.....
11. Do you have charge system in waste collection with households, industries and other participants?
.....
.....
12. How are the bylaws, ordinances and regulations in municipal solid waste management designed? Are they transparent, unambiguous and fair?
.....
.....
13. Do the policies and laws recognize the informal waste collectors as important stakeholders in solid waste management?
.....
.....
14. Are there any functional links between the community based waste management organizations, the private sector and the public sector?
.....
.....

- 15. What portion of the LMC budget does solid waste management account for?
.....
.....
- 16. Are the disposal grounds/landfills carefully sited, correctly designed and well operated?
.....
.....
- 17. Have you set monitoring and evaluation program of SWM performances?
.....
.....
- 18. What are the key strategic issues or challenges for effective SWM of LMC?
.....
.....

APPENDIX – II

List of person selected for interview

1. Pradeep Amatya - Environment Engineer, Environment Section, LMC, Balkumari
2. Surendra Raj Awale – Solid Waste Management Center, Chief, LMC
3. Puskar Bhattarai – Mechanical Engineer, LMC
4. Jayashree Rajbhandari – Project Coordinator, World Bank LMC – OBA Project
5. Nimesh Dhakal – Project Manager, EU Project, LMC
6. Santa Lal Maharjan – Staff (Kharidar) LMC
7. Hari Krishna Maharjan, Head Driver, LMC
8. Rosy Maharjan – Social Mobilizer, LMC – OBA Project
9. Manoj Pangeni – GIS Officer, EU Project – LMC
- 10.** Anish Raj Shakya – Environment Associate, LMC – OBA Project

11. APPENDIX – II

APPENDIX – III



Office of the Environment Section, LMC, Balkumari



Pradeep Amatya, Environment Engineer at his office



Waste segregation at source at LMS, Balkumari



Ready to transport to the landfill site, Sisdole



Waste collection center at LMC, Balkumari



Segregation of waste



Waste dumping in Sisdol Landfill Site



Compost Plant operated by WEPCO



Paper recycling plant operated by WEPCO



Waste separation process