TOWARDS A POLICY FOR BETTER PRIVATE SECTOR PARTICIPATION IN SOLID WASTE MANAGEMENT IN NAIROBI CITY- KENYA.

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A THESIS SUBMITTED IN PARTIAL FULFILMENT FOR THE REQUIREMENTS OF THE DEGREE OF MASTER OF ARTS IN URBAN AND REGIONAL PLANNING IN THE UNIVERSITY OF NAIROBI.

JULY 2006.

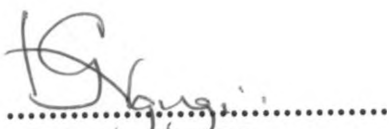
DECLARATION

This is my original work and has not been presented for a degree in any other university.

Signed.....

JOHNSON K. MUTHOKA.
(Candidate)

This work has been submitted for examination with the approval of the university supervisor.



Signed .....

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DEDICATION

To my wife Caroline Mwende for your support and encouragement and to my children Oscar, Vicky and Eric for your perseverance.

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Last and indeed most important, I thank GOD almighty for His eternal Grace.

ABSTRACT

This study is an attempt to come up with comprehensive policy proposals aimed at improving private sector participation in solid waste management in the city of Nairobi. It was felt that by reconciling findings from the three main sectors that may influence how the private sector performs in SWM in Nairobi (i. e. the households, the local authority and the private sector) it would be possible to come up with workable policy proposals aimed at better involvement of the private sector in SWM in the city. It involved carrying out an investigation into the key domestic solid waste generation parameters that may affect performance of the private sector in SWM in the city, documentation of the efforts the City Council of Nairobi; especially the environment department, is making towards better involvement of the private sector in SWM in the city, and an evaluative study on the operational capacity of the private sector in providing SWM services in the city.

The study established that contracting which is currently being tried by the city council is riddled with corruption and nepotism within the city council. On the other hand low returns and difficulties in collecting user charges hampers smooth penetration of the private sector into the very poor zones of the city through open competition. Open competition is also ruled out in such zones mainly due to lack of proper monitoring and controls, which leads to illegal dumping of waste. As a result a three tier

process is recommended whereby contracting combined with normal city council operations, use of Community Based Organizations (CBOs) and awareness creation is carried out in the very poor areas, franchising is used in the middle-income areas and open competition in the wealthy zones. Franchising in the middle-income zones will ensure self regulation among the franchised firms out of fear of losing their franchises hence they are likely to be more cautious in their operations. Open competition would work more efficiently in the wealthy areas where the willingness and the ability to pay are well grounded. It is also likely to translate into lower charges. There is also need to support the private sector through funding, lower taxes on equipment and training.

It is believed that the above proposals, if properly implemented, can lead to improved performance of the private sector in SWM in Nairobi.

List of Acronyms

BOO:	Built -Own - Operate
BOOT:	Built - Own- Operate - Transfer.
BOT:	Built-Operate - Transfer
CBD:	Central Business District.
CBOs:	Community Based Organizations.
DRDSL:	Domestic Refuse Disposal Services Ltd.
FADD:	Faculty of Architecture, Design and Development.
GDP:	Gross Domestic Product
GNP:	Gross National Product
GTZ:	Gessellschaft Fur Technische Zusammenarbeit – The Germany Agency for Technical Co-operation.
JICA:	Japan International Cooperation Agency.
KACC:	Kenya Anti-Corruption Commission
MSWM:	Municipal Solid Waste Management.
NCBDA:	Nairobi Central Business District Association
NCC	Nairobi City Council.
NDP:	National Development Plan.
NEMA:	National Environment Management Authority.
NGOs:	Non Governmental Organizations.
NHC:	National Housing Corporation
NIMBY:	Not In My Back Yard.
PSVs:	Public Service Vehicles.
SW:	Solid Waste

SWM:	Solid Waste Management.
UNCHS:	United Nations Centre for Human Settlements (Habita).
UNDP:	United Nations Population Division
UNEP:	United Nations Environment Programme.
WB:	The World Bank.

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CHAPTER ONE: INTRODUCTION.

1:1: General Introduction

Sustainable development has since the Reo Summit in 1992 emerged as a dominant paradigm that is likely to continue playing a vital role in the design of urban policy especially in the arena of provision of basic infrastructure services. Provision of these services, to the urban poor and ensuring their right to livelihood and access to resources is central to the concept of urban sustainability and poverty reduction in developing countries (Kaseva et al., 2005).

According to the United Nations Center for Human Settlements (Habitat 1996), one way of estimating the scale of non-income poverty in urban centres is to base it on the number of people who live in poor quality houses or neighbourhoods that lack the basic infrastructure services.

Most developing cities have failed in providing equal access to basic services to their inhabitants. Some writers on urban governance have provided the following checklist of the core responsibilities of local authorities: -

- Land use planning
- Waste management

- Water supply and sewerage services
- Disaster relief and rehabilitation
- Health and social services
- Park development and maintenance
- Implementation and licensing to maintain compliance with national standards
- Public transport management, housing provision and
- Environmental monitoring and impact assessment (Gilbert et al, 1996).

If a city government is able to successfully provide the aforementioned services to the satisfaction of the majority of the inhabitants, then it can be considered as having a responsive and efficient urban management (Ayenew M, 1999).

A majority of local city governments in developing countries have failed in most of the above listed fields. It has now become a foregone conclusion that municipal bureaucracies are neither the sole nor the most efficient instruments of services delivery. They have often been criticized as being cumbersome, not service-oriented, corrupt and unable to cope with the increasing challenges of modern urban government (ibid). As a result, there has been a concerted effort aimed at searching for alternative means of service delivery.

One of the fields in which municipal governments in developing countries have grossly failed is solid waste management (SWM).

Proper management of solid waste is critical to the health and general well-being of urban residents. Municipal solid waste management is an essential public service, which benefits all urban residents. It is not feasible to exclude from service those who do not pay, because public cleanliness and safe disposal of wastes are essential to public health and environmental protection (World Bank, 1994).

Within local governments of developing countries, expenditure for municipal solid waste service is usually 20 per cent to 50 per cent of total municipal expenditure (ibid). However, even with such a high level of expenditure, the level of solid waste service is low, and only 50 per cent to 70 per cent of solid waste is collected (ibid).

Despite significant efforts in the last decades, a majority of municipalities in the developing world can not manage the growing volume of waste generated in their rapidly growing cities. An estimated 35 – 40 per cent of the solid waste generated in Addis Ababa City (Ethiopia) is left uncollected and dumped on any available waste ground (Ayenew M., 1999). Only 25 per cent of the estimated 1,500 tonnes of solid waste generated in Nairobi gets collected (JICA, 1998). Yet, in the mid 1970s,

the Nairobi City Council singly collected over 90 per cent of the waste (ibid).

One of the SWM approaches that have been gaining popularity in the city of Nairobi since 1980s is private sector involvement.

A review of literature reveals that engaging private sector in solid waste management in developing cities can greatly contribute towards solving the problem of solid waste menace.

According to Klundert & Lardinois (1995), in Sao Paulo, Brazil, where the private sector provides services, the cost of providing these services is approximately half of that in Rio De Janeiro, vehicle efficiency is 71 per cent higher in Sao Paulo than in Rio, and labour efficiency 13 per cent higher. They also say that in Buenos Airos, public collectors (which serve about 13 per cent of the city) used 7.5 times more workers per 1,000 population served and 4.5 times as many workers per vehicle, than the private collectors. Another example of higher private sector efficiency over public sector given by the two is that of Malaysia where the cost of contractor services averages 23 per cent less (after taxes) than the cost of services provided by the municipalities.

Likewise, a study carried out by Habitat International in 2005 titled *Appraisal of Solid Waste Collection Following Private sector Involvement in Dar es Salaam City, Tanzania,* indicates that as a result of privatization of solid waste collection activities in Dar es Salaam city, solid waste collection improved from 10% in 1994 to 40% of the total waste generated in the city daily in 2001. The report cites similar successes in Calcutta, India, and Kumasi, Ghana, where private operators are handling more than 40% of the waste. The report attributes such success in private sector involvement in SWM on a number of factors. First private sector is free from bureaucratic hurdles and the upkeep of their equipment is excellent. Other factors it cites are the fact that the good condition of vehicles and equipment used by the private sector ensures not only trouble-free operation but also results in higher output and profitability. On top of this it has also been observed that private sector is endowed with qualities such as political independence, economic rationality, efficiency, dynamism and innovation, qualities which make it measure up favourably to public sector enterprise (Kaseva & Mbulingwe, 2005).

Since the failure of the City Council of Nairobi (NCC) to provide basic services, especially SWM, to its residents in 1980s coupled with increased demand for services, there has been a rapid growth of the private sector participation in SWM in the city. According to Kantai

(2000) there are, by city hall's count, 70 garbage collection companies in Nairobi, many of which have greatly assisted the city in its efforts to become dirtier. All the council requires setting yourself up as a licensed garbage collector is Kshs 7,000 ($87) and a scrap-heap on wheels.

The Nairobi City Council (NCC) has no official policy towards the privatization of waste collection, nor do they provide any assistance to private companies to enable them to operate in informal settlements (Kim P, 1998). Currently only the high income and parts of the middle income areas of the city are covered with over 50% of residents in the city going without this basic service. This negates the principles of sustainable urban livelihood which demands not only inter- generational but also intra-generational equity.

It is with the above in mind that this research seeks to evaluate the role played by the private sector in SWM in Nairobi. It will seek to establish the current domestic SW generation parameters that may affect performance of the private sector in Nairobi, document the efforts the City Council of Nairobi; especially the environment department, is making towards better involvement of the private sector in SWM in the city, carry out an evaluative study on the operational capacity of the private sector in SWM in the city, and finally make policy proposals aimed at improving performance of the private sector in SWM in the city.

It is hopped that this will make a great contribution to the continuing search for better municipal service delivery alternatives especially in developing cities.

1.2: The Current situation of SWM in Nairobi

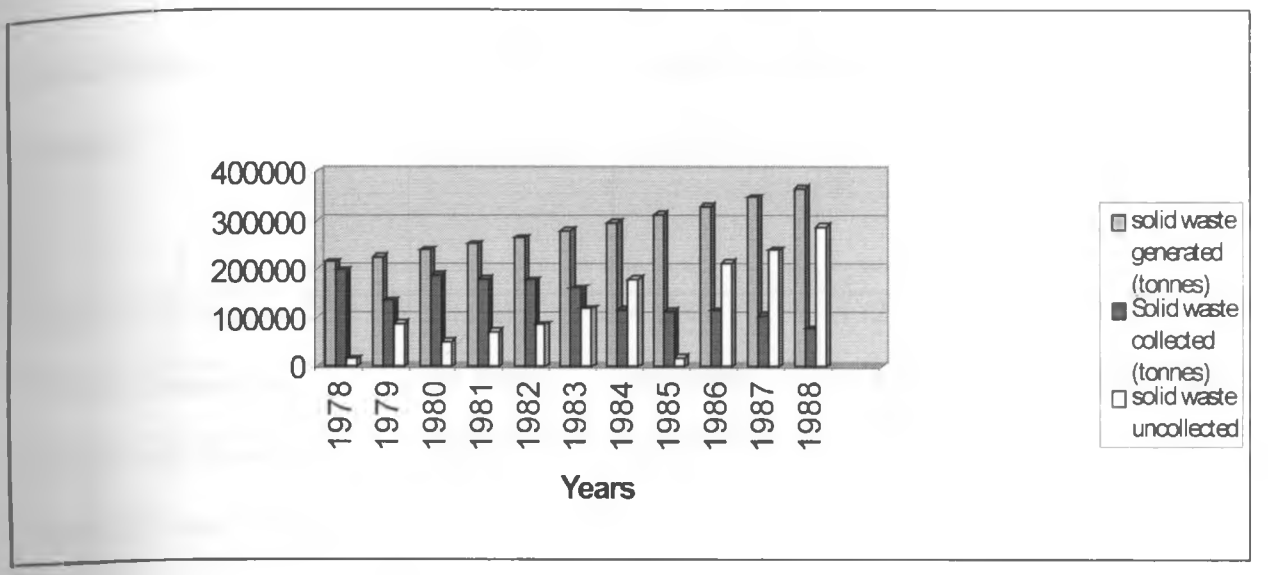
Population growth and the rapid pace of urbanization pose a wide range of environmental challenges for large cities. One of these challenges is that of Solid Waste Management (SWM). Since the early 1970s, SWM in developing countries has received increasing attention from researchers and policy makers concerned to establish a sustainable management system (Gerlagh et al 1999). In Kenya just like in most other developing economies, the responsibility for SWM rests largely with municipal authorities.

According to Miller (1979: E114), as the gross national product of an affluent nation grows, so does one of its major gross national by-products – garbage or solid waste. Miller (1979: E114) defines solid waste as any useless, unwanted or discarded material that is not a liquid or gas. It could be yesterday's newspaper and junk mail, today's dinner table scraps, raked leaves and grass clippings, non returnable bottles and cans, worn out appliances, shoes or clothes, furniture or abandoned cars, animal manure, street sweepings, yard waste, market waste, crop

residues, food processing waste, sewage sludge from waste treatment plants, mining and industrial waste, and an array of other cast-off materials. Some of the industrial and institutional waste consists of hazardous materials that are toxic, flammable or explosive.

In Nairobi, SWM efficiency has been falling since 1980s as shown in Chart 1 below. In 1988, this attracted organized commercial private sector companies such as Bins (Nairobi) Service Limited and Domestic Refuse Disposal Services Limited (DRDSL) that registered to manage, collect and dispose solid waste (at the Dandora Land-fill site) from industries, institutions, commercial establishment and high-income residential areas, at a time when the Nairobi City Council's (NCC's) performance was only 21.54% leaving about 2,870 tonnes uncollected daily (UNCHS (Habitat),1998).

Chart 1: How Efficiency in SWM in Nairobi Deteriorated 1978-1888.



Source : Compiled from UNCHS (Habitat) data (1998).

Surveys show that over the years private companies have become very important participants in the city's waste collection sector (see table 1 below). Indeed by 1996, the combined daily collection capacity of the two private companies (Bins & DRDSL) was 400 tonnes while NCC's was 100 tonnes only (ibid). According to Kantai (2000) there are, by city hall's count, 70 garbage collection companies in Nairobi.

Currently, the private sector in Nairobi serves the largest number of clients compared to all other SWM agencies including the city council (see table 1 below).

Table 1: Relative Importance of SW Collection Agencies in Nairobi.

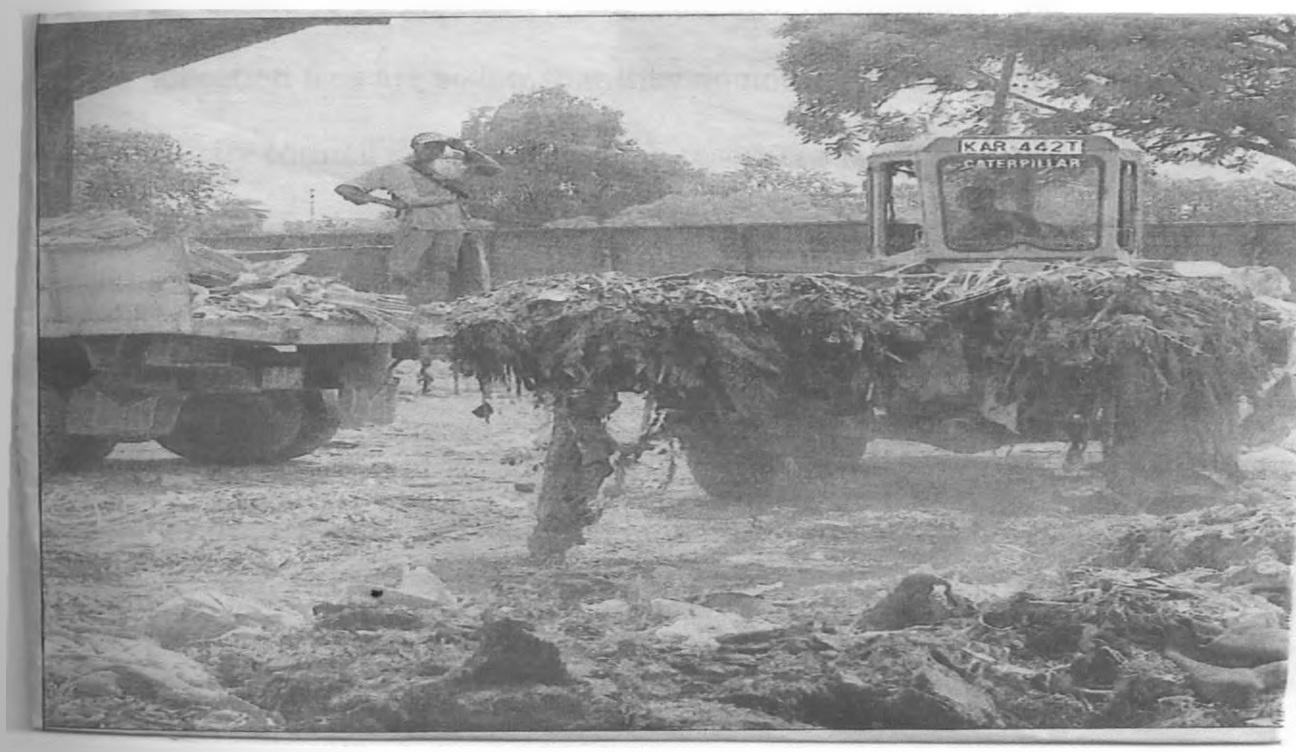
Solid Waste Collection Agency	Activity area (Clients served)			
	Residential	Institutions	Industrial	Commercial
Nairobi City Council	1 (1%)	4 (3%)	4 (21%)	3 (16.7%)
Private Companies	57 (73%)	58 (45%)	6 (32%)	3 (16.7%)
Community Based Organizations (CBOs)	5 (6%)	5 (4%)	-	-
Personal Initiative	15 (19%)	61 (48%)	9 (47%)	12 (66%)
Total	**78 (100%)**	**128 (100%)**	**19 (100%)**	**18 (100%)**

Source: Ikiara et al. (2004).

However with the continued growth and dominance of the private sector in SWM in Nairobi, SWM service coverage and efficiency still remains too low. This is clearly manifested in the many undesignated unsightly dumpsites all over the city. Indeed even the Central Business District (CBD) has not been spared if the huge dumpsite off Kijabe Street and the sporadic rot next to the City Market as well as at the famous Wakulima market is anything to go by (see plate 1 below). The same can be said about most other neighbouhoods in the city especially in the eastern part. Only 25 per cent of the estimated 1,500 tons of solid waste

generated daily in Nairobi gets collected (JICA ,1998). Yet, in the mid 1970s, the Nairobi City Council singly collected over 90 per cent of the waste (ibid).

Plate 1: A City Council Tractor Clearing Garbage at Wakulima Market- The City's Main Wholesale Market for Farm Produce Which Had Been Shut-down for a Two-day Cleaning.



Source: Daily Nation (5th June 2006 P 5)

The collection of garbage in Nairobi has become a thorny issue at City Hall. The council lacks the right equipment, especially trucks, as a result

of which mountains of garbage remain uncollected for months sometimes years, posing a great health risk to city residents (Gerlagh et al 1999).

Currently the Nairobi City Council (NCC) is responsible for collection of garbage and disposal fees. These charges are included in the consumers' monthly water bills and include a one – time charge for supplying a dustbin and a fixed monthly fee for refuse collection. However not many residents know the shape or colour of the so called City Council dustbins since these ceased to be provided a long time ago. Additionally, the garbage collection fees are so low that they do not cover actual costs. As at now, the city council with its dwindling resources is simply not capable of meeting the demand for these services.

The problems plaguing the management of Nairobi's urban services can be traced to both local and central levels of government. Staff at both levels suffer from a lack of decision-making authority, a lack of experience, a lack of accountability and heavy volumes of work due to under-staffing (Smoke, 1994: 128). There is also a lack of inter-local government cooperation in projects where a coordination in planning and construction of infrastructure projects would result in significant cost savings (Ibid., 124). Smoke (ibid), also identifies several financial problems that plague local authorities among them being out-dated land rates, neglect in the collection of taxes, dishonesty of revenue collectors,

inadequate enforcement authority, political pressure on officers to be less aggressive in revenue collection, and payment delinquency on the part of many government agencies and parastatals. Furthermore, user fees for some urban services may be heavily subsidized to the point that the service is operated at a net loss (Bubba and Lamba, 1991: 41).

These problems are exacerbated by political difficulties at the city level. Councilors are more concerned with the private accumulation of wealth than with the efficient management of urban services (Bubba and Lamba, 1991: 42). There are also poor relations between the politicians and chief officers. The Nairobi City Council (NCC) has been at the centre of these controversies. In 1983, the City Council was dismissed because of gross mismanagement and failure to provide urban services. In its place, a commission was set up to run the city. Between 1983 and 1991, there were five different chairpersons and three different commissions: each was dissolved because of its inability to serve City Hall or to provide residents with services (Ibid, 46-47).

These organizational, fiscal and political problems faced by central and local governments in Kenya have resulted in an inability to cope with the staggering rates of population growth and rural to urban migration which have been taking place in the country's major cities especially Nairobi. There is excessive strain on existing facilities and under-investment in

new ones. Education, health facilities, and urban services (including waste management) are especially affected (Gerlagh et al 1999).

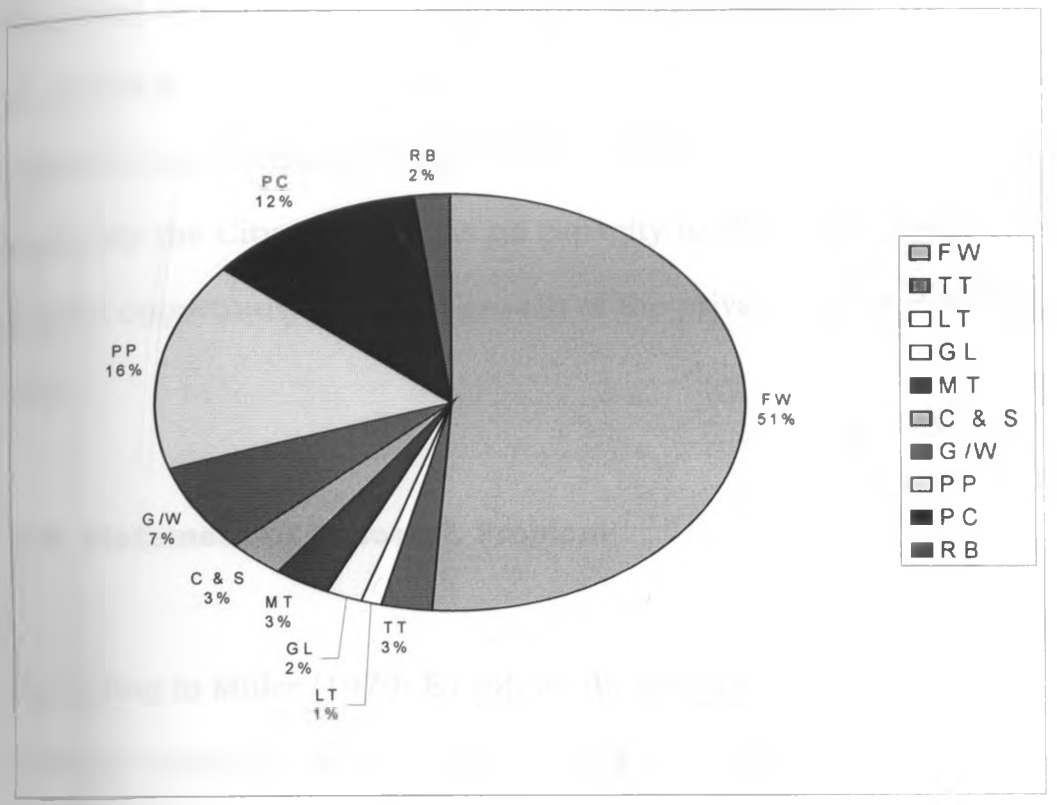
Uncollected solid waste is one of Nairobi's most visible environmental problems: The municipal service, which seems to fail most strikingly is garbage collection and disposal because it causes littering and untidiness, which has an immediate adverse psychological impact. The lack of adequate garbage disposal in an area often results in negative attitudes that contribute to a general deterioration of community development and cohesion (Mwaura, 1991: 35). In Nairobi, the most neglected are the poor who live in areas which are inaccessible, generate waste whose value is not high enough to attract informal garbage collectors, have no political power to force the authorities to serve them better and their main concern tends to be that of shelter above their heads and daily survival.

Solid wastes in Nairobi come from a broad spectrum of industrial, service as well as manufacturing processes. The main high-volume generators of industrial solid wastes include the chemical, petroleum, metals, wood, paper, leather, textile and transportation industries. Smaller generators include auto and equipment repair shops, electroplates, construction companies, dry cleaners and pesticide applicators.

[Chart 2 below shows the relative proportions of solid wastes generated by various human activities in Nairobi]. From this it can be seen that food waste contributes the largest share of solid waste in the city at 51 per cent followed by paper at 16 per cent and plastic materials at 12 per cent.

The high organic content of solid waste in the city offers a great opportunity for composting as one of the most suitable alternative to improving SWM in Nairobi. However composting has been known to have its own limitations including lack of market for the compost, low prices, lack of storage facilities leading to fast deterioration of the compost in harsh sunlight, the high costs which the poor people engaged in composting can not afford as well as the stigma associated with composting which tends to be equated with scavenging among others (see Kim P, 1998).

Chart 2: Types of Solid Wastes Generated in Nairobi.



Key

(FW)- Food waste

(TT) – Textile

(LT)- Leather

(GL)- Glass (containers and others)

(C&S)- Ceramic and soil

(PP)- Paper (recyclable and other)

(PC)- Plastic (container and others)

(RB)- Rubber.

(MT)- Metal (containers and others)

(G/W) – Grass/wood

Source: JICA (1998).

Again most informal waste pickers tend to concentrate within the major dumpsite in Dandora and other major illegal dumpsites. The implication of all this is that SWM in Nairobi will continue to involve mainly collection and haulage of solid waste to designated dump sites; but currently the City Council has no capacity to effectively do so. This offers a great opportunity for rapid growth of the private sector in SWM in the city.

1.3: Statement of Research Problem

According to Miller (1979: E114), as the gross national product of an affluent nation grows, so does one of its major gross national by-products – garbage or solid waste. Miller (1979: E114) defines solid waste as any useless, unwanted or discarded material that is not a liquid or gas. It could be yesterday's newspaper and junk mail, today's dinner table scraps, raked leaves and grass clippings, non returnable bottles and cans, worn out appliances, shoes or clothes, furniture or abandoned cars, animal manure, street sweepings, yard waste, market waste, crop residues, food processing waste, sewage sludge from waste treatment plants, mining and industrial waste, and an array of other cast-off materials. Some of the industrial and institutional waste consists of hazardous materials that are toxic, flammable or explosive.

Solid wastes in Nairobi come from a broad spectrum of industrial, service as well as manufacturing processes. The main high-volume generators of industrial solid wastes include the chemical, petroleum, metals, wood, paper, leather, textile and transportation industries. Smaller generators include auto and equipment repair shops, electroplates, construction companies, dry cleaners and pesticide applicators.

Proper management of solid waste is critical to the health and general well-being of urban residents.

Dumped solid waste attracts rodents and other disease vectors, which can be harmful to human health. Rats and malaria transmitting mosquitoes are easily attracted to solid waste dumps. House flies from solid waste dumped near homes can easily contaminate food with great adverse effects on human health and more so small children who are yet to learn the basic hygienic practices. The foul smell emitted by most biodegradable solid waste is highly irritating. The very common habit of burning solid waste within residential areas can be harmful to human health. Most of the gases emitted by such burning can also contribute to either the green house effect or in the depletion of the Ozone layer with adverse effects on human life. Leachate from dumped solid waste can easily contaminate soil and ground water resources. Consumption of dumped plastic materials by domestic animals can cause their death.

Sometimes hazardous solid waste from hospitals gets mixed with other solid waste materials and these can be harmful to small children who may go playing around where they are dumped. Such waste can also be harmful to waste pickers/scavengers.

With the diminishing ability of the Nairobi City Council (NCC) to handle SWM in the1980s due to structural adjustment reforms, decreased funding from the central government, outdated property tax system plus increased demand for SWM service, private SWM companies have continued to increase thus dominating the market. According to Kantai (2000) there are, by city hall's count, 70 garbage collection companies in Nairobi, many of which have greatly assisted the city in its efforts to become dirtier. All the council requires setting yourself up as a licensed garbage collector is Kshs 7,000 ($87) and a scrap-heap on wheels.

Ikiara et al (2004), say that private companies in Nairobi serve 45-73 per cent of the households, 32 per cent of the institutions, 50 per cent of the industries and 16.7 per cent of the commercial enterprises. However about 81 per cent of the households served by private companies live in the high and middle –income areas (largely the Western part) of the city. This means that solid waste in the low-income areas where 50-60 per cent of the city's population lives is not given the attention it deserves. Normally, communities from middle and high-income areas are capable

of organizing themselves into strong Community Based Organizations (CBOs) aimed at improving SWM situation in their neighbourhoods: they may hire informal or formal waste collectors, they may make arrangements with local politicians for waste transfer points, or even start waste separation experiments. Again Middle and high income communities tend to produce more valuable waste and hence are attractive to low-income waste pickers, where they are often assisted by watchmen and domestic servants (Klundert et al, 1995). As such extending solid waste management to the poor areas of a city is more likely to require intervention since the materials generated there are less valuable.

It has already been observed that other alternative means of SWM in the city including re-use, recycling and composting among others have not had much impact on the sector. In 1992 Syagga P; noted that despite the proliferation of informal waste pickers in Nairobi, scavengers collected a mere 20 tonnes of the 800 to 1,000 tonnes of solid waste generated daily in Nairobi. JICA (1998) found that food waste contributed the highest component of solid waste in Nairobi at 51 per cent followed by paper at 16 per cent and plastics at 1 per cent. This means there is an opportunity for composting. However Kim P (1998) noted a lot of huddles lying on the path of this alternative including lack of market for the compost, low prices, lack of storage facilities leading to fast deterioration

of the compost in harsh sunlight, the high costs which the poor people engaged in composting can not afford as well as the stigma associated with composting which tends to be equated with scavenging among others. Again most informal waste pickers tend to concentrate within the major dump site in Dandora and other major illegal dump sites. The implication of all this is that SWM in Nairobi will continue to involve mainly collection and haulage of solid waste to designated dump sites; but currently the City Council has no capacity to effectively do so.

The potential for involving the private sector in SWM in Nairobi is there but its performance still remains too poor. This calls for the need to re-evaluate the role played by the private sector in SWM in Nairobi with a view to coming up with appropriate measures aimed at improving the sector's participation in SWM in the city.

Key questions to be addressed in this research include:-

- What are the key domestic SW generation parameters that may affect performance of the private sector in SWM in Nairobi?
- What efforts (if any) is the City Council of Nairobi; especially the environment department, making towards better involvement of the private sector in SWM in the city

- What is the role of the private sector in providing SWM services in the city?
- What policy and institutional changes may bring about better performance of the private sector in domestic SWM in the city?

1.4: Research Objectives

The main objectives of this research will be:

- To examine the key domestic solid waste generation parameters that may affect performance of the private sector in Nairobi.
- To document the efforts the City Council of Nairobi; especially the environment department, is making towards better involvement of the private sector in SWM in the city
- To carry out an evaluative study on the operational capacity of the private sector in providing SWM services in the city
- To make policy proposals aimed at improving performance of the private sector in SWM in Nairobi.

1.5: Study assumptions

This research was carried out under the following assumptions:

- There is a role for the private sector in SWM in Nairobi.

- Population in the city of Nairobi will continue to rise, leading to increasingly higher volumes of solid waste generation.
- Poor policy and institutional framework is the main hindrance towards better performance of the private sector in SWM in Nairobi.

1.6: Justification of the study

Proper management of solid waste is critical to the health and general well being of urban residents.

Dumped solid waste attracts rodents and other disease vectors, which can be harmful to human health. Rats and malaria transmitting mosquitoes are easily attracted to solid waste dumps. House flies from solid waste dumped near homes can easily contaminate food with great adverse effects on human health and more so small children who are yet to learn the basic hygienic practices. The foul smell emitted by most biodegradable solid waste is highly irritating. The very common habit of burning solid waste within residential areas can be harmful to human health. Most of the gases emitted by such burning can also contribute to either the green house effect or in the depletion of the Ozone layer with adverse effects on human life. Leachate from dumped solid waste can easily contaminate soil and ground water resources. Consumption of dumped plastic materials by domestic animals can cause their death.

Sometimes hazardous solid waste from hospitals get mixed with other solid waste materials and these can be harmful to small children who may go playing around where they are dumped. Such waste can also be harmful to waste pickers/scavengers.

As a result of the failure by the city council to properly manage solid waste in the city, private sector has over the years become a key participant in urban solid waste management. According to Kantai (2000) there are, by city hall's count, 70 garbage collection companies in Nairobi. However with the growth and gradual dominance of the private firms in SWM in the city, still the SWM situation in the city continues to be pathetic.

The above scenario is well captured in a report prepared by the United Nations Environment Programme (UNEP) titled; "*Selection, Design and Implementation of Economic Instruments in the Solid Waste Management Sector in Kenya - The case of plastic bags*" (2005), that only 25 per cent of the estimated 1,500 tones of solid waste generated daily in Nairobi gets collected. Yet, until the mid 1970s the Nairobi city council singly collected over 90 per cent of the waste generated in Nairobi each day.

Secondly there is marked inequality in the geographical service distribution. According the above report, broadly the Western part of the

city is well served by private firms and the NCC while the Eastern part is hardly serviced. High- income and some middle-income residential areas together with commercial areas are well serviced by private companies and even the NCC. Small private firms are increasingly servicing some of the relatively better-off low-income areas. The core low-income areas (slums and other unplanned settlements) where 55-60 per cent of Nairobi residents live, however, receive no waste collection service, save for localized interventions by community-based organizations (CBOs). The 1998 JICA study found 26 per cent of households in the high-income areas, 16 per cent of those in middle-income areas, 75 per cent of those in low-income areas, and 74 per cent of the surrounding area do not receive any service.

Third, there is widespread indiscriminate dumping in illegal dumpsites and waste pickers litter the city with unusable waste materials without control. It is should be noted that most of these illegal dump sites are found within the low income areas yet most of the waste dumped there is generated far away in the segregated middle and high-income areas. This is true given that waste generation tends to increase with a rise in the level of income especially waste rich in paper and plastic packaging materials (see National Center for Resource Recovery, Inc, 1973: 14).

Fourth, there is only one official dumpsite (NCC-owned and operated), which is full and located in a densely populated part of the city. According to the above report, waste pickers and dealers "control" this dumpsite, through gangster-like waste dealership cartels, forcing the NCC and private companies to "bribe" to access the dump.

Fifth and related to fourth above, the city has no transfer facilities.

As a result of all these disposal problems, the generators and private waste collection firms, again to avoid costs, dump in illegal places since an effective monitoring system lacks. This has led to proliferation of undesignated dumpsites all over the city most of which are used at night. There are even claims that some private garbage collectors are using handcarts to collect garbage at night, which they dump in rivers. Again even when private firms commit themselves to transport the waste to the designated dump site and pay the dumping fee, the manner in which they transport the waste leaves a lot to be desired. Most a time the open tippers scatter the smelly waste all over on their way to the dump site.

It has been observed that other alternative means of SWM in the city including re-use, recycling and composting among others have not had much impact on the sector. In 1992 Syagga P, noted that despite the proliferation of informal waste pickers in Nairobi, scavengers collected a

mere 20 tonnes of the 800 to 1,000 tonnes of solid waste generated daily in Nairobi. JICA (1998) found that food waste contributed the highest component of solid waste in Nairobi at 51 per cent followed by paper at 16 per cent and plastics at 1 per cent. This means there is an opportunity for composting. However Kim P (1998) noted a lot of huddles lying on the path of this alternative including lack of market for the compost, low prices, lack of storage facilities leading to fast deterioration of the compost in harsh sunlight, the high costs which the poor people engaged in composting can not afford as well as the stigma associated with composting which tends to be equated with scavenging among others. Again most informal waste pickers tend to concentrate within the major dump site in Dandora and other major illegal dump sites. The implication of all this is that SWM in Nairobi will continue to involve mainly collection and haulage of solid waste to designated dump sites; but currently the City Council has no capacity to effectively do so.

It is worthy noting that after the introduction of Special Adjustment Programms (SAPS) in Kenya in the 1980s, public toilet facilities maintained by NCC in the Central Business District (CBD) of Nairobi just collapsed. However salvation came in the form of a new group of private business entrepreneurs, in the name of Nairobi Central Business District Association (NCBDA), who took over the rehabilitation of the existing public toilets and construction of new ones. If it were not for NCBDA, the

CBD would probably be without a single public toilet. NCBDA has also been aggressively involved in security campaigns in the city. This is a good example of how the private sector can contribute to service delivery in a rapidly expanding city whose administration's capacity is constrained.

The potential for involving the private sector in SWM in Nairobi is there but its performance still remains too poor. This calls for the need to re-evaluate the role played by the private sector in SWM in Nairobi with a view to coming up with appropriate measures aimed at improving the sector's participation in SWM in the city.

It is the above scenario, which prompted the need to carry out this research to find out ways of improving private sector involvement in SWM in the city of Nairobi.

1.7: What the Government Policy Says.

The government of Kenya seems to have noticed the vital role that the private sector can play in municipal service delivery. The Kenya's 2002-2008 National Development Plan (NDP) (p, 97) notes that, the expansion of local authorities, coupled with urban population increases and budgetary constrains, has resulted in local authorities being unable to maintain and effectively manage existing services. Consequently the

government has shifted towards privatization, commercialization and stakeholder participation in traditional local service delivery. The government's plan is to prepare a comprehensive policy on service delivery by local authorities, which will aim at encouraging councils to privatize and commercialize their non-core functions. The government seeks to encourage more viable private sector initiatives to supplement efforts in improving service delivery. For some services such as infrastructure development (roads, markets, stadia, recreational parks, SWM facilities etc), councils will be encouraged to enter into agreements with private developers for "Built, Operate, and Transfer" (BOT) arrangements.

According to the same NDP (p, 121), to minimize environmental pollution and further improve waste management, the government seeks to develop a waste management policy within the plan period. It is thus hoped that this research will go a long way in contributing towards the formulation of such a policy.

1.8: Scope of the study

This research work is limited to investigating key parameters of only three main sectors, which may determine how the private sector performs in managing solid waste in Nairobi. These include the households, the local government and the private sector firms involved in solid waste management in the city. It however gives a highlight of the

other key agencies involved in SWM in developing cities. The idea was to reconcile findings from the three key sectors leading to workable recommendations towards better performance of the private sector in SWM in the city.

1.9: Limitations of the study

This research work was carried out under the following limiting factors:

- Foremost there was lack of funds, as the researcher, being a parallel programme student, had to finance the entire exercise on his own.
- Time allocated for the research was limited given that the research was carried out while the researcher was still engaged in normal office duties as he was among the very first group to undertake the course as a part time student in the university.
- The large size of the study area combined with the above factors forced the researcher to work with a minimal number of the sample household population.
- The private solid waste management firms were highly suspicious of the interview process due to fears of being exposed to further competition. As a result, the return rate of questionnaires was not as high as was initially anticipated.

1.10: Organization of the Report

This study report is organized into 6 chapters. Chapter 1 gives an introduction to the study with the background information, which leads to statement of the research problem, objectives, assumptions, justification of the study, its scope as well as limitations. Chapter 2 covers the literature review and the conceptual framework. Chapter 3 documents the key aspects of the study area. This is followed by chapter 4, which deals with the research methodology covering the target population, the sampling techniques and data collection methods/tools used as well as data analysis and presentation. Chapter 5 presents key research findings from the three sectors whose reconciliation helped in formulating the policy proposals aimed at improved private sector involvement in Solid Waste Management in Nairobi. Finally chapter 6 contains the conclusions, policy recommendations and further research opportunities.

CHAPTER TWO: LITERATURE REVIEW

2.1: Introduction

This section begins with definitions of the various key terms used in this study followed by a review of the existing literature on urbanization trends in developing countries narrowing down to Nairobi whereby an attempt is made to bring out the core source of the problem. This covers the city's spatial and demographic growth over the years as well as its demographic dynamics and the implication of these on the problem of SWM. Further the role of the various agencies involved in municipal solid waste management is reviewed and examples of success stories of involving the private sector in SWM in developing cities given. Finally it gives a conceptual framework within which the data needs of the study were identified.

2.2: Some Definitions

In this research, the following terms shall be used within the conceptual definitions attached to them as follows:

Solid waste (SW): According to Nazih, E.J (2000), the Swiss law on environmental protection defines waste as "all movable property which the owner wishes to dispose of or whose reclamation, neutralization or disposal is necessary in the public interest". Majani (1991) defines waste

as unwanted discarded materials. When these materials are not liquid or gaseous in nature, they are referred to as solid waste (Muthoni, A.M, 1999).

Solid Waste Management (SWM): This refers to the development and operation of refuse handling in a healthy, economic and environmentally friendly manner (Majani, 1991). Mbui (1995) referred to solid waste management as the purposeful, systematic control of the generation, storage, collection, transportation, separation and disposal of municipal waste. Effective solid waste management involves collection, processing, utilization and disposal of SW in the most economical way consistent with environmental and public health protection (Nazih, E.J, 2000). It further involves control of waste generation through waste minimization programms implemented through public awareness programms (ibid).

The private sector: This refers to the formal private sector corporations, institutions, firms and individuals, operating registered and/or incorporated businesses with official business licenses, an organized labour force governed by labour laws, some degree of capital investment, and generally modern technology.

Household: this refers to the totality of persons living together in a residence and includes the household head, spouse, children, any dependants living with them and servant(s).

The Local government: this refers to the City Council of Nairobi incorporated by Royal Charter dated the 20th March, 1950 and established under section 12 (1) of the Local Government Act Cap 265 of the laws of Kenya.

Primacy: a primate city occurs in a situation where the largest city is several times the population of the one second in rank (Alden and Morgan, 1974, p 68).

Sustainable urban development: This is urban development that takes into consideration not just economic growth but also social equity and environmental conservation for the sake of ensuring that as the city develops to meet the needs of the present generation, care is also taken to avoid compromising the ability of future generations to meet their needs. Efforts should also be made to avoid marginalizing some sections of the city's population for the sake of social equity.

2.3: An Urbanizing World.

With just under half of its population living in cities, the world is already urbanized (UNCHS (Habitat), 2001). Three billion people- nearly every

other person on earth- already live in cities. Today, the planet hosts 19 cities with 10 million or more people; 22 cities with 5-10 million people ; 370 cities with 1-5 million people; and 433 cities with 0.5-1 million people. By 2030, over 60 per cent of the world's population (4.9 billion out of 8.1 billion people) will live in cities (ibid).

According to the United Nations Centre for Human Settlement (Habitat) (ibid), Africa's population of 851 million (2003) is growing at an annual rate of 2.3 per cent, almost twice the world average of 1.2 per cent (UNPD, 2004). It is estimated that, sub-Saharan Africa's urban population will approach 440 million or 46 per cent of its projected total of 952 million by 2020. Today, Africa's urban areas account for 34 per cent of the total population of 661 million and are credited with 60 per cent of the region's Gross Domestic Product (GDP). This can be contrasted to the fact that two decades ago the population of developing countries was predominantly rural with less than 29 per cent living in urban areas (UNCHS (Habitat), 1999).

African cities like Nairobi tend to exhibit high rates of growth yet they are in the middle of poverty with most national economies growing at below 5 per cent per annum (see table 2 below). From this table, it can be seen that over the years under consideration, most of the countries experienced negative growth rates yet their urban growth rates continued

to be extremely high. Indeed three years ago Kenya's economy experienced a negative growth. This is a great challenge to planners and urban management policy makers because such cities' growth is not accompanied by commensurate expansion in resources to fund their proper management. Resource constraints in most African cities have over the years led to neglect of most municipal services. One of the municipal services that has suffered greatly over the years in Nairobi is SWM.

Table 2: Urbanization in a select African Countries and GNP Growth Rates, 1980-1990/91

Country	Average Annual Growth Rate (%)		
	Urban Population		GNP per capita
	1965-1980	1980-1990	1980-1990
Mozambique	10.2	10.4	-1.1
Tanzania	11.3	10.5	-0.8
Ethiopia	4.9	5.3	-1.6
Malawi	7.4	6.2	0.1
Uganda	4.8	4.4	-
Sierra Leon	5.2	5.3	-1.6
Nigeria	5.7	6.0	-2.3
Kenya	8.1	7.9	0.3
Ghana	3.2	4.2	-0.3
Zimbabwe	6.0	5.9	-0.2
Botswana	12.6	9.9	5.6
Namibia	4.6	5.3	-1.2
South Africa	3.2	3.7	0.7
Gabon	7.3	6.2	-4.2
Burundi	6.9	5.5	1.3
Madagascar	5.2	6.4	-2.5

Sources: World Bank (1992, 1993).

High national population growth rates combined with rapid rural-urban migration by people in search of jobs, educational opportunities, health

care and other urban benefits, result in very high urban population growth rates. Environmental disasters and armed conflicts also contribute to rural-urban migration.

2.4: The Problem of Primacy – Failed Regional Development Planning.

A primate city occurs in a situation where the largest city is several times the population of the one second in rank (Alden and Morgan, 1974, p 68). Nairobi's primacy in Kenya's urban settlement distribution has increased rapidly since independence. According to Obudho, (1997), the city's population as a percentage of the population of the four largest centres increased from 98 per cent in 1948 to 142 in 1989 (see also table 3 below).

Table 3: Population of Six Largest Urban Centres in Kenya, 1979, 1989 & 1999.

Urban centre	1979	1989	Growth rate %	1999	Growth rate %	2025*
Nairobi	827,775	1,324,570	4.71	2,143,254	4.82	7,288,223
Mombasa	341,148	461,753	3.03	665,018	3.65	1,689,022
Kisumu	152,643	192,733	2.33	322,734	5.17	1,196,832
Nakuru	92,851	163,927	5.70	231,262	3.45	558,595
Eldoret	50,503	111,882	7.95	197,449	6.70	1,065,933
Machakos	84,320	116,293	3.21	143,274	2.10	245,944

*Projected

Source: Compiled from Kenya's Population Census data, 1979, 1989 & 1999.

From the above it can be seen that as at 1999, Nairobi was 3.22 times larger than the second largest city of Mombasa, 6.64 times larger than the third largest city of Kisumu and growing at a steady rate of 4.82% per annum.

Apart from Mombasa and Kisumu, growth rates of all the other centres seem to have gone down over the years further denoting the high tendency of the city to grow towards primacy.

Nairobi's primacy has been sustained by the economies of agglomeration offered to enterprises by locating in the city (Obudho and Aduwo, 1992), despite the various attempts by the government of Kenya (GOK) to deconcentrate urbanization and facilitate more balanced spatial development. Some programmes have aimed at reducing migration to Nairobi through such instruments as tax incentives, limitations on investment, and demolition of slum and squatter settlements (Obudho, 1997). The Government of Kenya (GOK) has also promoted regional centres by extending support services to them, improving infrastructure, and strengthening the linkages between these centres and Nairobi. Integrated rural development programmes were implemented to provide agricultural inputs and social services, increase infrastructure investments, and improve agricultural productivity and incomes (ibid). All these policy strategies and programmes have failed to affect

population distribution significantly and so Nairobi has continued to grow and is expanding rapidly both in terms of densities and horizontally. The African planner seems to be in a dilemma – not sure whether to strengthen the failed de-concentration models or to concentrate his/her efforts in the management of the emerging mega-cities.

Nairobi can be considered to be a core development region in Kenya. Core regions are the engines of economic growth. They usually offer the largest national market, are usually the areas where the bulk of non-primary sectors employment opportunities are concentrated, and usually have the largest pool of tartiary and quaternary services in the Nation (Maleche, 2004). They are also the most active centres of innovation. However, Friedman (1966, p 68) noted that core regions may not grow as efficiently as planned due to what he calls "Points of Strangulation". Such points of strangulation include poor and inadequate infrastructure services, lack of or poor housing which discourages investors from investing in such regions as well as poor delivery of services and poor management (Maleche, 2004).

Today Nairobi can be said to be experiencing the exact symptoms of the so called points of strangulation. Traffic congestion is so high that during rush hours one can sometimes take over two hours to travel a distance of

less than 15 Kilometres in the city. Lack of adequate housing has led to a phenomenal growth in slums and other unplanned settlements. Water supply is never enough as witnessed recently whereby many neighbourhoods have gone without water for weeks. Crime has reached alarming levels and only 25 per cent of the estimated 1,500 tones of garbage generated every day is collected leaving the rest lying all over especially in the low-income, high-density areas.

2.5: Systems Overload

Inevitably, rapid expansion of cities brings with it major pressures on service and utility systems. It not only calls for quantitative supplies but, beyond a certain city size, may also call for a change in the type, organization, and nature of the systems themselves. In often times, this requires capital and technologies beyond the capacities of local governments. This is particularly true in the areas of mass transit, communications, and other utilities including water and solid waste management.

Economic and social problems in Africa's mega-cities also result in serious environmental damage and degradation. According to Ayeni (1981, p 137), this is one of the most alarming and uncomfortable problems of metropolitan Lagos, because it can be seen almost

everywhere. The efforts of the Waste Disposal Board, created in 1978, quickly ran into the twin obstacles of inadequate equipment, which is costly to maintain, and the relative inaccessibility of almost 60 per cent of the inhabitants of the metropolis to such refuse collection equipment. Most mega-cities also have an adverse impact on their rivers, seriously threatening water supplies; for example, the Tjiliwung in Jakarta, the Han in Seoul, the Psig in Manila, and the Hooghly in Culcuta, among others, all receive large amounts of industrial and human waste (Kasarda and Rondinelli, 1990). Nairobi River and Ngong River among others in Nairobi are facing a similar if not worse threat.

2.6: Financial Constraints and Service Delivery- Nairobi City Council.

The Kenya's Local Government Act (Cap 265) defines the duties, functions and responsibilities of local governments. It also stipulates the various sources of their finances. Revenue finances are raised for the purpose of meeting the local authorities' recurrent expenditures while capital finances are raised to carry out capital works, such as roads, water and sewerage expansion, housing and street lighting among others.

The main sources of revenue finances open to local authorities are:

- Rates – mainly land rates on property owned by individuals, companies or the government, including parastatals.
- Fees and Charges, the main ones being:
- Premises licenses;
- Occupational licenses;
- Services or facilities- ambulances, survey fees etc;
- Goods or documents supplied- water, sewerage. Building approvals, transfer fees.
- Commercial activities, such as returns from own investments and rental income;
- Cess and royalties;
- Return on investments-investments in companies over which the local authorities do not have explicit control;
- Service charge-of employees and companies resident in their areas of jurisdiction;
- Grants from the central government, donations and also transfers from other arms of the government;

To finance capital expenditure, local authorities can rely on:

- Internal sources-money set aside from the budget to pay for projects, commonly known as revenue contribution to capital;

- Short term borrowing through bank drafts to meet immediate needs and long-term borrowing to undertake investments and /or undertake capital works (of course with the approval of the minister);
- Capital grants -from donor agencies and specialized agencies for specific purposes;
- Domestic banks- for short-term finances (mostly bridging) to finance projects;
- Stock issues- local authorities are empowered to issue stocks and bonds to raise revenue for financing their operations;
- Domestic housing finance institutions- here we have the National Housing Corporation (NHC) which is a government parastatal which has been providing housing funds in loan form.
- External loans- local authorities do borrow from international agencies, such as the World Bank, to undertake big capital projects, such as water and sanitation, road works, housing etc.

The most important form of tax collected by local authorities in Kenya is the rates, which are levied on land and buildings. The Valuation for Rating Act (Cap 266) and the Rating Act (Cap 267) are the basic rating statutes. The Kenya's 1984-1988 National Development Plan observed that, for 10 years prior to 1984, rates, licenses and cess contributed on average 43.2 per cent to the total revenue of the local authorities. Over the same period, fees and charges contributed about 17 per cent of the

total revenue, while grants accounted for 37.4 per cent. In the case of Mombasa rates contributed about 66 per cent to the total revenue collection over this period.

Rates are collected on the basis of valuation rolls prepared, or revised after every ten years. The law provides for a valuation court, in case of objections to the level of rates levied or to any change introduced to either the existing valuation roll or any supplementary rolls. Some institutions like cemeteries, hospitals, public religious worship places, museums, and national parks among others, are by law exempted from payment of rates. These institutions are specified in the Rating Act, or may be gazetted on approval by the minister.

The Nairobi City Council still uses the 1982,valuation roll which was initially to be reviewed every ten years. This was however later changed to five years and again to every ten years due to political pressure by interested parties. In the meantime, prices of land have gone up drastically over the years. This rapid increase in land prices has made re-valuation unpopular and a politically difficult issue, thus causing a slow growth of revenue from property tax (UN-Habitat, 1998).

In Nairobi, rates form 60 per cent of the revenue of the city council (ibid). However the main challenge is the high amounts owed by defaulters. The

national level of default rate is estimated at between 30 and 35 per cent (ibid). Records show that rates payment default rates in Nairobi have been rising from 10 per cent (1991/2), to 21 per cent (1992/3), to 50 per cent (1993/94), to 27 per cent (1994/95), to 35 per cent (1995/96), the main culprit being the central government (NCC, Abstract of Accounts 1991/92-1995/96). This can be blamed on a number of factors. The procedure for collection and recovery of late payments/arrears is generally poor. Enforcement is both time-consuming and cumbersome, as follow-up measures are not clearly defined. In some cases lawyers hired to collect outstanding arrears have been known to hold monies collected before remitting the same to the councils. The use of hired lawyers also makes recovery of rate arrears expensive, and hence raises the administrative costs of the rate revenue collection (ibid).

Rates revenue is highly stable and a valuable component of urban government financing in Kenya. However its elasticity in Kenyan local authorities is generally poor. They do not respond quickly to price, population and income changes. There are also long delays in revising valuation rolls. The new 2005 valuation roll for Nairobi is yet to be implemented as there are still unresolved issues lodged in court by some key stakeholders and so we continue to use a roll which is almost two and half decades old. The revision of the valuation roll is also hampered by lack of qualified personnel. In addition the law provides for collection

of arrears in rates as a civil debt which can only be collected through the civil procedure code. This procedure is long and costly hence defaulters are not dealt with speedily enough. In the case of Nairobi the main defaulter is the central government which in the recent years has failed to pay any grants in lieu of rates.

Rates collection is generally accepted by a majority of the city's property owners. However the tax still remains highly sensitive due to the fact that individual rates payers also constitute constituencies for councilors. Hence councilors are scared of taking actions which may lead to their being voted out.

At the same time, urban local governments in Kenya lack knowledge on the timing of land allocations and changes in ownership. This makes their records incomplete and outdated and the main cause is the fact that the commissioner of lands, a central government official, is responsible for land allocation and can allocate municipal land without reference to the local authority.

With such problems affecting the only major source of local government finances, combined with the rapid increase in population, and so rapid rise in demand for services, it is clear that the city council is not about to regain the capacity to cope. One of the services that has been greatly

affected is Solid Waste Management and more so in the low-income, high density neighbourhoods where an estimated 60 per cent of the city's population resides.

2.7: The Legal Framework for SWM in Kenya

There are various statutes dealing with SWM in Kenya. The following is a review of some of the key ones:

The Local Government Act (Cap 265)

It is this Act that provides for establishment of local authorities and mandates them to provide certain services to their residents including solid waste management in the country.

Under section 160, every municipal council shall have powers to establish and maintain sanitary services or the removal and destruction of, or otherwise dealing with, all kinds of refuse and effluent and, where any such service is established, to compel the use of such service by persons to whom the service is available.

The Act also gives the minister powers to dissolve any local authority which is not capable of providing services to its residents and replace it with a chairman heading a commission to run the affairs of the local

authority (see section 252). This has happened several times in the city of Nairobi. Section 264 of the Act gives local authorities powers to recover charges for sanitary and refuse removal from those being served.

The Public Health Act (Cap 242)

Section 116 of the Act outlines the duty of every local authority to take all lawful and reasonably practical measures for maintaining its districts at all times in clean and sanitary condition; to prevent the occurrence of nuisance or condition likely to be injurious or dangerous to health.it also mandates local authorities to take proceedings to law against any person causing or responsible for the continuance of any such nuisance or condition.

Section 118 (1) outlines nuisances liable to be dealt with, for instance the accumulation or deposit of refuse, offal, manure or any other which is offensive or injurious or dangerous to health and accumulation of stone, timber or other material likely to harbor rats or other vermins.

The Environmental Management and Coordination Act (EMCA) of 1999

Section 3 of the Act states that "every person in Kenya is entitled to a clean and healthy environment and has the duty to safeguard and enhance the environment.

Under the Act, a pollutant is defined to include any substance whether liquid, solid or gaseous, which may directly or indirectly alter the quality of any element of the receiving environment. Here the concern is only with solid waste which is a potential pollutant especially in overcrowded urban environments.

The Act also defines waste broadly to include any matter prescribed to be waste and any matter whether liquid, solid, gaseous or radioactive, which is discharged, emitted or deposited in the environment in such volume, composition or manner likely to cause an alteration of the environment. It should however be noted once again that the concern here is only with solid waste.

Under section 86, the Act states that "the standards and enforcement review committee shall, in consultation with the relevant lead agencies, recommend to the Authority measures necessary to inter alia, prescribe

standards for waste and then classification and analysis and formulate and advise on standards of disposal methods and means for such waste or issue regulations for the handling, storage, transportation, segregation and destruction of any waste.

Under section 87 the Act states that:-

(1) No person shall discharge or dispose of any waste, in such a manner as to cause pollution to the environment or ill health to any person;

(2) No person shall transport any waste other than (a) in accordance with a valid license to transport waste issued by the Authority and (b) to a waste disposal site established in accordance with a license issued by the Authority.

(3) No person shall operate a waste disposal site or plant without a license issued by the Authority.

(4) Every person whose activities generate wastes shall employ measures essential to minimize wastes through treatment, reclamation and recycling.

(5) Any person who contravenes any provisions of this section shall be liable to imprisonment for a term of not more than 2 years of to a fine not exceeding One Million Kenya Shillings or both.

Under the second schedule, among the projects required to undergo a mandatory environmental Impact Assessment includes waste disposal including among others sites for solid waste disposal.

Section 88 enumerates the requirements for applying for a waste licence.

Finally under section 148, the Act takes precedence over all other laws in the country existing before the time it came into being.

The Physical Planning Act (Cap 286 of 1996)

Under section 30 of the Act it is stated that:

(1) No person shall carry out development within the area of a local authority without a development permission granted by the local authority and that;

(2) Any person who contravenes the provisions of subsection (1) above shall be guilty of an offence and shall be liable to imprisonment for a term not exceeding 5 years or to a fine not exceeding one hundred thousand Kenya Shillings or both.

Relating closely to the above is section 3 which says that, for avoidance of doubt, it is hereby declared that, for the purposes of this Act, the deposit of refuse, scrap or waste materials on land involves a change of use there of and so it is development.

Under section 51, it is clearly stated that except where otherwise exempted or in respect of development by or on behalf of the armed forces of the Republic, the Government shall be bound by the provisions of this Act. This means that whatever the Act requires everybody else to do or not to do applies equally to the government including local authorities. There can thus be no excuse if a local authority is sued for failure to adhere to the provisions of the Act including on matters to do with proper and environmentally friendly SWM.

The Water Act of 2002

Section 94 (1) (b) says "No person shall without authority under this Act throw or convey or cause or permit to be thrown or conveyed, any rubbish, dirt, refuse, effluent, trade waste or other offensive, or unwholesome matter or thing into or near any water resource in such a manner as to cause or to be likely to cause pollution of the water resource".

The Local Government (Adoptive By-laws) (Building) Order 1968

In addition to Kenyan laws, the above By-laws which any municipal or county council may adopt and which have been in use in Nairobi also play a major role in regulating the manner in which solid waste is handled in the city.

According to By-law 139 (1), every domestic and public building and building of the warehouse class shall be provided with approved means of refuse disposal. If a refuse collection service is available, the following requirements of this by-law or by-law 140 of these by-laws shall apply; (2) within the cartilage of each premises a container plinth of permanent construction with adequate falls shall be provided of not less height than 3 inches above the surrounding ground level and in area not less than 6 sq. ft. for each container and (3) the container plinth to be provided in accordance with paragraph (2) of this by-law shall be so cited that (a) the amenity of any premises or highway is not impaired and (b) it is readily accessible for removal of the container.

Under By-law 140 (1), unless alternative means of refuse disposal satisfactory to the council are provided, refuse chutes shall be installed in:-

(a) a block of dwellings exceeding three storeys in height and (b) other building where an upper floor which requires refuse disposal service is 20 ft. above the adjoining ground level.

Under By-law 142 (1) before a certificate of completion is issued in respect of any building, by the council, the means of refuse disposal shall be completed and the receptacles or containers provided and (2) if partial occupation of premises is allowed by the council, means of refuse disposal shall be provided for the portion so occupied.

Under By-law 221 (1) a concrete paved area constructed of *in situ* concrete 3 inches thick or of approved concrete slabs or of other approved material and thickness, not less than 2 ft. wide shall be provided for every refuse bin, (2) the paved area, shall be surrounded on 3 sides by an approved kerb to contain the refuse spillage and (3), not less than one refuse bin shall be provided for each family unit or for every six persons accommodated.

2.8: The Impact of Laws and Regulations on SWM in Kenya.

Laws and regulations, also generally known as "command and control" instruments (CACs), have over the years remained the most prevalent mode of solid waste management. These CACs normally prescribe the

standards to be complied with on what, how, when, where and how much to produce, consume, emit and clean up. Their design is such that the motivation for agents to comply comes from fear of fines and penalties. For this disincentive to work, however, vigilance and enforcement capacity must be adequate. Most developing countries lack such capacity and, generally, tend to have the following problems with their CACs approaches: inadequate detail in law, lack of inspection staff, lack of transport, inadequate empowerment of inspectors to ticket offenders, political intervention to quash tickets, disinterest by the courts for these minor offenses and lack of courts for them, inadequate police coverage to enable arrests and follow-up through the court system, and insignificant and therefore non-deterring fines and penalties (IDB, 2003)

It can be said that the necessary legal framework for proper management of solid waste in the country is somehow impressing and that fines and penalties prescribed, especially in the most recent statute, the EMCA (1999), are fairly stiff. However there is little evidence on the ground to show the seriousness of the government (both central and local) in implementing the law as far as solid waste management is concerned. The worst situation is in Nairobi especially in the low-income, high-density residential areas where heaps of uncollected garbage continue to accumulate every day. Only 25 per cent of the estimated 1,500 tones of solid waste generated daily in Nairobi gets collected (UNEP, 2005). Rivers

passing through the city such as Nairobi, Gitathuru, Mathare and Ngong are increasingly suffering from pollution caused mainly by rampant dumping of solid waste along their banks. Illegal solid waste dumping sites can be traced all over the city even within the CBD area - like the one off Kijabe street to the northern part of the city centre. Recently, a water borne disease claimed the lives of five children in Eastleigh, a high-density suburb within the Nairobi's Eastlands, due to poor solid waste disposal methods. The only approved solid waste dumping site in Dandora is expanding towards peoples' homesteads. All this has been happening yet the law is quite clear on how solid waste in the city and elsewhere should be handled.

2.9: Factors Affecting SW Generation Characteristics in Cities

According to Nazih, E.J, (2000) two main factors; urbanization and industrialization affect Municipal Solid Waste quantities generated in a community. Urbanization (i.e. the influx of people to metropolitan areas) affects the way people live - that denotes the waste characteristics. Industrialization on the other hand has created a "throwaway" society where it is cheaper to get rid of packaging materials, appliances, and other items instead of reclaiming them. "Throwaway" has resulted in the direct increase of MSW quantities and variety along with the main contributors of this increase- the packaged – and – processed food industry (ibid).

Other factors have also contributed to the increase in quantity and variety of MSW. Nazih, E.J, (2000) gives the following factors:

- Per capita income – it has been noticed that the lower income category tend to produce less waste but with a higher food content.
- Trends in lifestyles: increased household incomes, eating habits and food preparation have changes resulting in an increase of food packaging material.
- Degree of urbanization: residents of large cities tend to generate more waste than residents of smaller cities on a per capita basis although the families tend to be smaller in size.
- Prevalence of built-in garbage grinders – grinders reduce the amounts of organic waste in MSW through the process of liquefaction and disposal in the sewage system.
- Seasonal variation: these have been shown to directly affect the waste generation rates by affecting the waste composition. For instance in the temperate North, organic waste from fruits and vegetables tend to increase in summer.
- Frequency of collection: with more frequent collection, there is a tendency to generate more waste at the household level.

2.10: The Role of the Various Agents in SWM in Developing Countries.

This sub-section section attempts to give a brief view of the roles of the various actors in SWM in developing countries but at the same time try to clarify and define their varied roles. It can be said that, the various actors enumerated here form part of every SWM system, be it in the developed or the developing countries.

It has also been noted that in most situations, few clear boundaries can be drawn between the formal and informal sector, both of which are involved in collecting and recycling of waste materials (Klundert & Lardinois, 1995). Many enterprises operate in a kind of "gray zone", where characteristics of both "formal" and the "informal" sector apply (ibid). Even the boundaries between the municipal government and the informal private sector may be blurred. For instance, it is common to find informal waste pickers working along with the municipal crew on collection vehicles. In other situations, we have informal waste pickers or recyclers who have organized themselves in such a way that they receive exclusive rights to recover resources from municipal waste.

Municipal Governments

Local municipal governments have not only the legal obligation to provide municipal services to their residents but also have the legal powers to do so. These powers and obligations are normally conferred to the local governments by the central government which allocates them the powers and responsibilities to protect the rights of the citizens, to provide services, and to serve the general public interest. One of the duties of the local governments is to implement laws and regulations so as to fulfil their statutory role. They are also mandated and obligated to provide public services failure to which can result in those in power risking the wrath of their constituents, the ridicule of the international community, and (at least in the case of a democratically elected officials, ultimately their ability to get elected and enjoy the privileges of public office (Klundert & Lardinois, 1995).

Local governments the world over are charged with the responsibility of controlling living conditions and public health. Within this framework, urban authorities around the world traditionally interpret their mandate to include the delivery of services, including sanitation, waste removal, and disposal, within their political and geographic jurisdiction (ibid). This gives them formal responsibility for solid waste management and this

responsibility is in most cases assigned to the health or sanitation departments.

- Motivated by legal and political concerns, and sometimes by international prestige.
- Performing activities because of its mandate and obligation, or because of the power and patronage they confer on the government, or its representatives.
- Using public tax-generated resources and/or fees for services rendered
- Regulating or contracting with the private sector.

The Formal Private Sector

The "formal private sector" has been defined as the private sector corporations, institutions, firms and individuals, operating registered and/or incorporated businesses with official business licenses, an organized labour force governed by labour laws, some degree of capital investment, and generally modern technology (Furedy, 1990). Generally, the main objective of the formal private sector is to maximize returns on investments.

Formal private companies participate in a wide range of activities in SWM systems, including waste collection, transportation, disposal, resource recovery, landfill operation and recycling among others.
The various ways through which they participate in municipal SWM system are:

Contracts- under this system, the private firms provide collection and disposal service under contract with and paid for by the local government.

Competition- this involves competition between the private sector and the local government in providing SWM services. According to Cointtreau-Levine (1995), in cities where there is not a public monopoly, but where the public sector competes with the private, there is no evidence that contracting costs less than public service. In fact, data from several cities suggest that competition encourages the public sector to significantly improve its efficiency and lower costs.

Leasing- contracting to lease equipment, rather than to obtain service, is one way of obtaining equipment when opportunity to borrow money for capital investment is limited. For instance, in Santa Cruz, Bolivia, 70 per cent of the solid waste collection fleet is leased from private firms who provide the vehicles, as well as the drivers, fuel, and maintenance (Wunsch, 1991).

Franchise – by national law in most countries, local governments own all waste within their boundaries, once it has been discharged for collection and disposal. A local government has the authority to give exclusive franchise to a qualified private firm for the right and responsibility to provide service to customers within a zone. In return for such an exclusive franchise, the private firm pays a license fee to the government. The firm subsequently levies appropriate fees on their customers to cover the cost of service. The fees charged however may be regulated by ceilings fixed by the local authority who also retains the responsibility to monitor the performance of the private firm. It also retains the right to renew or revoke the licenses in accordance with pre-established criteria. By this method the private firms collect user charges from each household or establishment served, hence the private firms must bear the cost of billing and collection of user charges. The cost of billing (including costs of nonpayment and late payment) is estimated to amount to 10 per cent of the total cost to the consumer of service and so it is one of the reasons why franchise does not usually result in the same low cost as contracting (Dillinger, 1988, Sicular, 1991).

Concession- under concession arrangements, the private sector finances and owns (for a period of time sufficient to depreciate investments and to provide a reasonable return to the equity of investors) solid waste management facilities. In return the local government typically grants and enables access to a specified quantity and quality of solid waste and

provides some form of tipping fee. Such arrangements can take the form of Built-Operate-Transfer (BOT), Build-Own-Operate-Transfer (BOOT) or Build-Own-Operate (BOO). The first form of concession (BOT) usually refers to totally new project whereby a private party (or consortium) agrees to finance, construct, operate and maintain a facility for a specified period and then transfer the facility to a government or other public authority. On the other hand BOOT involves a private party participating in building, owning and operating a facility then after a pre-specified number of years, the transferring of the facility to a government or other public authority. BOO involves the private sector participating in building, owning and operating a facility indefinitely without transferring it to the public sector.

Open competition/private subscription- in this method, each household and establishment hires a private collection firm and pays the solid waste removal fee that the firm charges. According to Cointtreau-Levine (1995), generally this form of privatizing of solid waste collection a) leads to substantially higher costs than those incurred by the government contracting with private firms and b) is often more costly than public service. When a number of competing firms operate in the same area, along the same streets, each loses the "economies of contiguity" that would be received if one firm served the area and in turn picked up the waste from each establishment (Dillinger, 1988). It also

encourages collusion and price setting especially in developing countries where true competition does not exist.

The main characteristics of the formal private sector in its participation in SWM systems are:

- Motivated by the need to maximize profits.
- Undertake only those activities with potential to generate income.
- Make use of private resources
- They are regulated and/or contracted by municipal government.

The Informal Private sector

The sector's activities are often driven by poverty, and are initiated personally and spontaneously (and sometimes haphazardly) in the struggle for survival (although some enterprises, especially the ones engaged in recycling activities, manage to make considerable profits) (Klundert & Lardinois, 1995). As such the choice of the material to collect is mainly determined by the value of the waste material and to some extend by the their ease of extraction, handling, and transport. It is due to this reason that paper, metals and plastics, which are normally generated in more wealthy residential or industrial areas tend to attract more attention than the filthy organic or biodegradable materials, even

though these materials could be present in lesser percentages than the organic waste.

In general waste work is done by religious or ethnic minorities, low castes or rural immigrants, who are looking for a way to generate subsistence income in an urban context. However, the importance of the role played by the informal private sector in SWM systems in general, and as crucial partners for municipalities in particular, is slowly achieving international recognition (ibid).

There can also be some generalization about gender roles in the activities of the informal private sector as participants in SWM systems. The least sophisticated forms of labour, including collection of material fall to the women and children, most of whom work from home and do any handling or sorting in their homes or yards while men are more likely to be involved in the processing or manufacturing of items, together with the selling of recovered items and materials (ibid).

The main problem facing scavengers is that industries often demand minimum quantities from suppliers, so scavengers have to sell through middlemen. The middlemen can often take most of the profits as there are few of them and many scavengers. By forming cooperatives, scavengers can bypass the middlemen and increase their earnings.

Through such programmes, waste collection can be expanded at relatively low cost, creating jobs and benefiting low-income communities.

The typical characteristics of the informal private sector in its participation in SWM systems are:

- They are motivated by the need to meet their subsistence needs and survival
- Perform activities mainly due to their potential to generate income or produce some needed goods.
- Use resources which are too marginal to attract competition from the formal private sector.
- They fall beneath the recognition of most public policy makers in the municipal government and so are in many cases looked at as an eye sore.

Community Based Organizations (CBOs)

Communities in low-income areas generally receive little or no municipal services. It is communities in such areas who are fond of coming together into CBOs, with their primary goal being that of self-help and improving their living conditions. Sometimes such CBOs receive external assistance

in the form of technical and even financial aid from different donor agencies.

Communities including those in the middle and high-income areas sometimes start CBOs with the aim of improving the living conditions in their neighbourhoods. To this end, they may hire the private sector players (either formal or informal) to handle their waste management, they may start waste separation and other similar SWM activities.

It has been noted that organized communities have a stronger voice than individuals and bring about improvements more easily (ibid).

CBOs usually spring up to fill the gaps left by the national and local governments in the development process (Muthoni A. M, 1999). Their strength lies in their ability to tackle local problems and seek their solutions (ibid). These groups relate closely with members and are best placed to articulate their aspirations and interests (Ngayu, 1997). They sometimes act as the only link between the national and local governments and Non Governmental Organizations (NGOs). Their main weaknesses are inadequate finances, low technical skills and low levels of education. All the same they possess valuable information and experience regarding the best solutions to environmental problems facing their neighbourhoods.

Non-Governmental Organizations (NGOs).

NGOs are intermediate organizations which are not directly and continuously involved in community projects. They not only advocate but can also be involved in awareness creation, advocacy, as well as decision making. They can also act as intermediaries between CBOs at the grassroots level and municipal governments. Sometimes they even serve the ideological, political or altruistic interests of international organizations. In SWM systems, NGOs can act as the umbrella organization under which CBOs operate, provide a channel of donor funding and as partners, confer some credibility on the informal sector especially where the latter is dealing with the municipal government.

The activities of both the CBOs and NGOs are typically motivated by:

- An altruistic wish to improve circumstances or a combination of personal and altruistic motivation to improve the community.
- Furtherance of issues that are aimed at serving some public interest.
- Bringing outside resources to bear on the situation.
- They operate outside of the formal decision making structures of the municipal administration, and at the same time do not function as a private-sector enterprise.

2.11: The Rationale for Private Sector Participation in SWM.

Private sector participation in any SWM system is a means to achieve the general improvement of waste management systems operating or being planned in developing countries. Its participation in SWM should occur when it has the potential to make those systems more responsive, more efficient, more economical, more equitable, or more environmentally responsible. The realization of potential gains of involving the private sector in SWM systems to a large extend depends on the quality of the private sector actors in place as well as on the degree of oversight, regulation and control retained by the municipal authority within whose area of jurisdiction the participating private sector operates.

Some of the potential benefits of involving the private sector in SWM systems include:

- Greater efficiency and enhanced performance- mainly because of leaner private-sector organization and increased flexibility of employee remuneration procedures as well as due to the introduction of productive competition into the waste management works.
- Better management and accountability - private enterprises are scared of losing business so they will always strive to be the best.

- Faster response- due to their ability to raise capital, as opposed to the relatively bureaucratic systems common in the public sector.
- Higher service ethics- aimed at building the image of the enterprise and attracting more clients.
- Greater access to experience and modern technology- due to the potential to attract and create partnership with experienced private businesses in other countries or regions.
- Risk reduction - by transferring unpredictable costs or unreliable revenues onto the private operator.
- Creation of more robust commercial sector in the country
- Generation of sustainable employment in the private sector
- Recovery of valuable materials from recycling activities, which can be locally used without loss of foreign exchange through expensive imports of similar materials.
- Conservation of resources when materials are recovered for either recycling or re-use.
- Reduction in environmental degradation likely to come from exploitation of primary resources such as mining and deforestation (see Klundert & Lardinois, 1995).

2.12: Some Case Studies of Successful Private Sector Participation in MSWM

According to Sinha (cited in Bartone et al (1991), in Sao Paulo, Brazil, where the private sector provides services, the cost of providing these services is approximately half of that in Rio de Janeiro. For comparable service areas, vehicle efficiency is 71 per cent higher in Sao Paulo than in Rio, and labour efficiency 13 per cent higher. In Buenos Aires, public collectors (which serve about 13 per cent of the city) used 7.5 times more workers per 1,000 population served and 4.5 times more workers per vehicle, than the private collectors. In Malaysia, the cost of contractor services averages 23 per cent less (after taxes) than the cost of services provided by the municipalities. Most local authorities contract out between 10 to 80 per cent of solid waste collection services, giving contracts to between one and nine contractors through a well-defined competitive tender process.

Oepen (1993) gives a very good account of the successes of involving the informal private sector in Jakarta, Indonesia. For instance in 1888, Jakarta had a daily waste production of more than 21,000 cubic metres, 25 per cent of which was recovered by an estimated 37,000 scavengers. These activities save the city $ 270,000-300,000 per month. Today, at least 78 factories use materials that have been recovered from waste in

their plastic, paper, glass and metal production processes. The recycling rates for glass and paper are as high as 60-80 per cent. The waste paper collected by scavengers comprises 90 per cent of the secondary raw material in this sector. In delivering 378,000 tonnes of waste paper per year to paper factories for recycling purposes, the scavengers save 6 million trees from being cut down. Some $48.5 million per year are made with solid waste recycling only, compared with the $0.5 million paid in garbage collection fees.

In 1989, the municipality of La Paz, Bolivia, established the EMA enterprise (Empresa Municipal de Aseo) which took over most of the tasks of the DSU (Direccion de Saneamiento Urbano). This was motivated by a wish to trim municipal budgets and advance private-sector participation. In 1991, EMA commenced its function as an intermediary, charged with subcontracting its tasks to private enterprises. EMA organizes, coordinates and controls these private sector efforts. By November 1992, EMA had subcontracted all waste collecting activities to the Chilean company Starco for a period of five years. Starco, a typical representative of the formal waste management private sector, is contractually obliged to transport all collected waste materials to the Mallasa dump. EMA retains ownership of the waste. Scavenging by collection personnel is prohibited, although much of the recoverable material is in fact removed by informal sector scavengers who search the

containers for recoverable material. Starco contracts with 'micro empresas' that have been contracted by Starco to collect the garbage from the less accessible poorer suburbs (located on a hill). In these suburbs, some ten small enterprises operate collecting the garbage on foot or with carts and delivering it at Starco against payment. Each of these 'micro empresas' consist of 8 to 10 persons who are paid by Starco per day and per collected kilo. These small enterprises received brooms, carts, gloves etc. as a one-time donation from GTZ for a total amount of $1,500 per company. DSU estimates that approximately 400 families in La Paz earn their daily income from garbage; 100 of them are organized in an 'asociacion', especially those that collect plastics (Cornelissen et al, 1993 cited in Klundert & Lardinois, 1995).

In Bamako, Mali, the municipal department (DSUVA) which has the responsibility to collect and dispose of the urban waste of the whole city, consistently fails to perform its function. In 1991, Cofesfa, a NGO consisting of young unemployed university women, got a contract from the Governate of the district to handle the collection of garbage in the area called Medina-Coura, and also provides a health education service. The pilot project was a success (GERAD, cited in Klundert & Lardinois, 1995).

Meanwhile the government of Mali (with assistance of the World Bank) established an intermediate agency, Agency de'Execution de Travaux d'Interet Public pour I'Emploi (AGETIPE), which can bypass bureaucratic government procedures. It is able to pay competitive salaries to a relatively small number of well-motivated staff to control private sector operations. Through this agency, Cofesfa received a second contract for the area of Djikoroni-Para. The waste removal service was reported to have improved considerably. But the somewhat ad hoc character of AGITIPE is a cause for concern, since financial difficulties could halt its ability to contract with Cofesfa (Miles, 1994, cited in Klundert & Lardinois, 1995).

On the other hand, the institutional arrangement of GIE (Group de Interet Economique) Beseya, a private enterprise that began collecting waste in the Humdallaye area of Bamako in 1992, with the approval of the local authorities, avoids the above risk by collecting fees directly from the residents of the service area. GIE started with sensitizing the community, making clear what their task was and the fee they expected from each household. A respected, senior person from each group of the households collects the fees and hands the money over to the collection crew. Additional income is generated by selling the compost made from the biodegradable fraction, and by selling seedlings from the tree nursery (Klundert & Lardinois, 1995). However it has been observed that

although by 1992, at least ten units were active (including Cofesfa and GIE) in several neighbourhoods of Bamako, there are still problems at the municipal level; the municipality is not able to adequately monitor and control the activities of contractors, nor to provide secondary waste collection and adequate disposal services. This is a good example of how privatization can not compensate for the lack of the overall municipal waste management strategy or for the failure to have a complete overview and to retain accountability (ibid).

2.13: The Conceptual Framework.

HOUSEHOLDS	**LOCAL GOVERNMENT**	**PRIVATE SECTOR**
• Pay taxes and so expect to be served by the city government • What domestic solid waste generation parameters may affect performance of the private sector in SWM?	• Mandated by law and required to provide services to its residents • Lacks capacity • What efforts have they made towards involvement of the private sector in SWM?	• Came in to fill the gap left by the failing city government but are motivated by the need to make a profit. • A lot of hope is placed on the sector for providing better SWM service • Do they have the capacity?
Feedback	Conflicts and breakdown of SWM systems.	Feedback
The way forward: policy proposal for better private sector participation in SWM in Nairobi city.		

Description of the Conceptual framework

The model aims at looking at the main issues touching on the three key sectors as follows:

Households: looked at here are the main domestic solid waste generation parameters that may affect performance of the private sector in SWM in the city.

Local Government: after failing to cope with the increasing garbage generation rates, what efforts have they made towards involving the private sector in SWM?

The private sector: with the much hope placed on the sector towards riding the city of her accumulating garbage heaps, do they have the capacity to deliver reliable SWM services to the city residents?

It can be said that the city government, the private sector and the city residents all have a role to play in the formulation of any SWM policies in the city. It is hoped that by reconciling the main issues touching on each of the three sectors, a clear roadmap towards better participation of the private sector in SWM in the city can be arrived at. Implementing such policy proposals will in turn require seeking feedback from each of the three sectors so as to gain a better understanding of the possible challenges, conflicts and opportunities if such policies are to be

sustained. Ignoring any of the sectors could lead to a further breakdown of the systems.

CHAPTER THREE: THE STUDY AREA

3.1: A Brief history of Nairobi.

The city of Nairobi owes its birth and subsequent growth to the Kenya-Uganda Railway (KUR). The railhead reached Nairobi in May 1899 "enroute" to the present day Kisumu City. The moving of the railway headquarters from Mombasa to Nairobi by its chief engineer, Sir George Whitehouse resulted in the subsequent growth of Nairobi as the commercial and business hub of the then British East Africa protectorate (Situma 1992, p 167). By 1900, Nairobi had already a large and flourishing centre with the settlement consisting of mainly the railway buildings and separate areas for Europeans and Indians, the latter being mainly the labourers employed on the construction of the railway line. There was practically no African settlement at that time. In the same year (1900), Nairobi assumed the function it has since performed as the capital of Kenya, with the boundary of the urban centre being clearly defined.

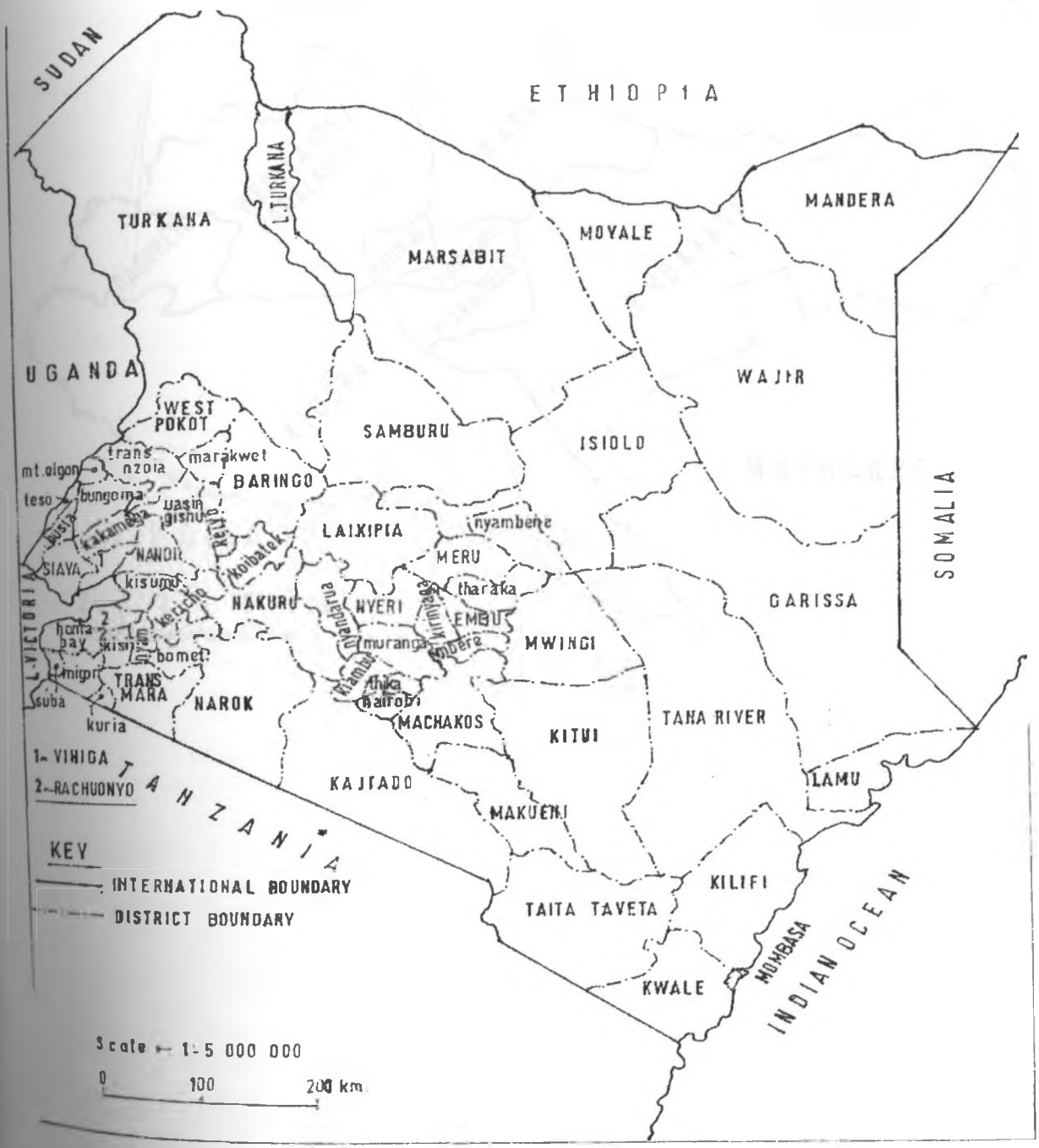
In 1907, Nairobi became the capital of Kenya and in 1950, it assumed the status of the capital city.

3.2: The Physical City

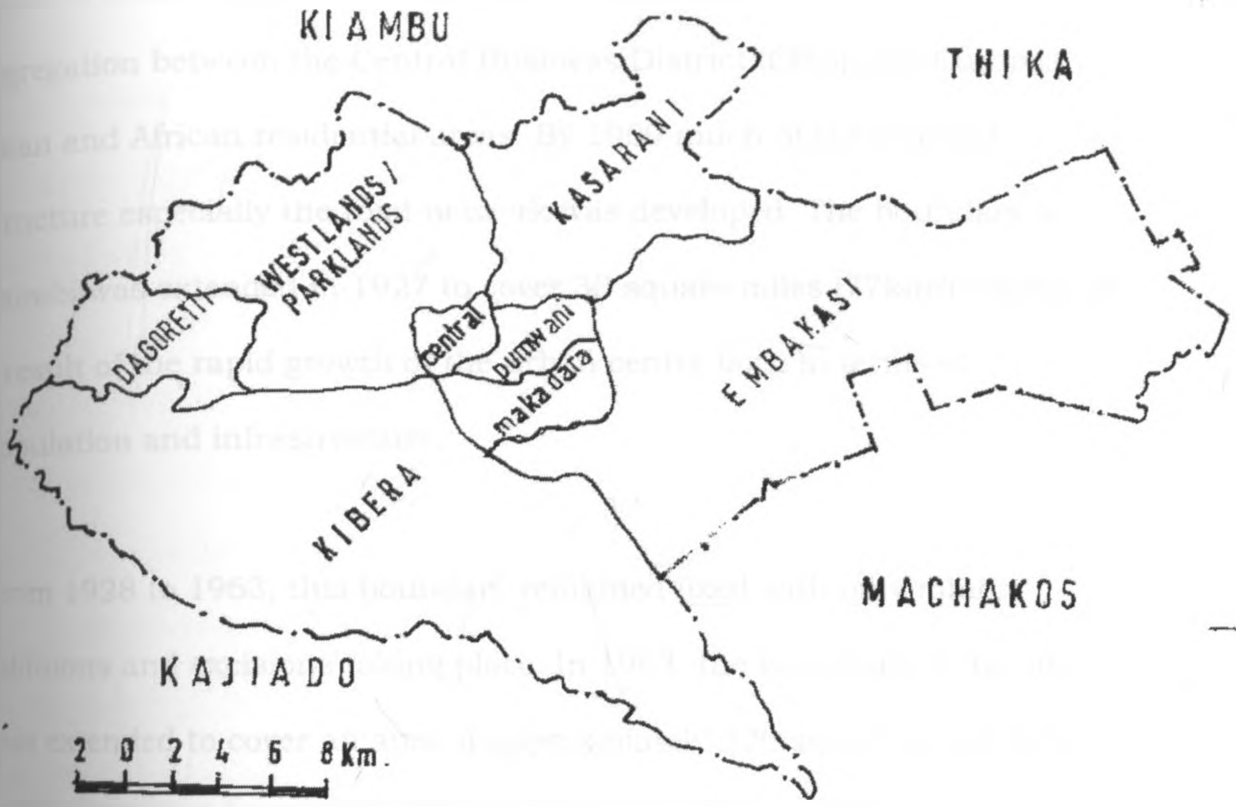
Nairobi lies at the southern end of Kenya's agricultural heartland, 1.19 degrees south of the equator and 36.59 degrees east of the meridian. Its altitude varies between 1,600 and 1,850 metres above the sea level. The climate is generally the temperate tropical type, with cool evenings and mornings becoming distinctly cold during the rainy seasons. There are two main rainy seasons, with the long rains occurring between April and June, and the short rains coming in November and early December. There is a constant 12 hours of daylight. Average daily temperatures range from 29° C in the dry season to 24° C during the rest of the year.

The city neighbours Kiambu district to the north, Thika district to the north-east, Machakos district to the east and south and Kajiado District to the West (see maps 1 and 2).

MAP 1: Nairobi City in Its National and Regional Setting.



Map 2: Nairobi's Administrative Boundaries and Neighbouring Districts.



3.3: The Spatial Development of Nairobi

From its earliest times, emerging spatial patterns in Nairobi showed segregation between the Central Business District (CBD) and European, Asian and African residential areas. By 1909 much of the internal structure especially the road network was developed. The boundary of Nairobi was extended in 1927 to cover 30 square miles (77km^2) mainly as a result of the rapid growth of the urban centre both in terms of population and infrastructure.

From 1928 to 1963, this boundary remained fixed with only minor additions and excisions taking place. In 1963, the boundary of the city was extended to cover an area of approximately 226 square miles (696 km^2). There has been no other boundary changes since then.

From this early growth, the city's functions have developed and expanded such that today it has achieved an overwhelming dominance of political, social, cultural and economic life of the people of Kenya and the whole East African region.

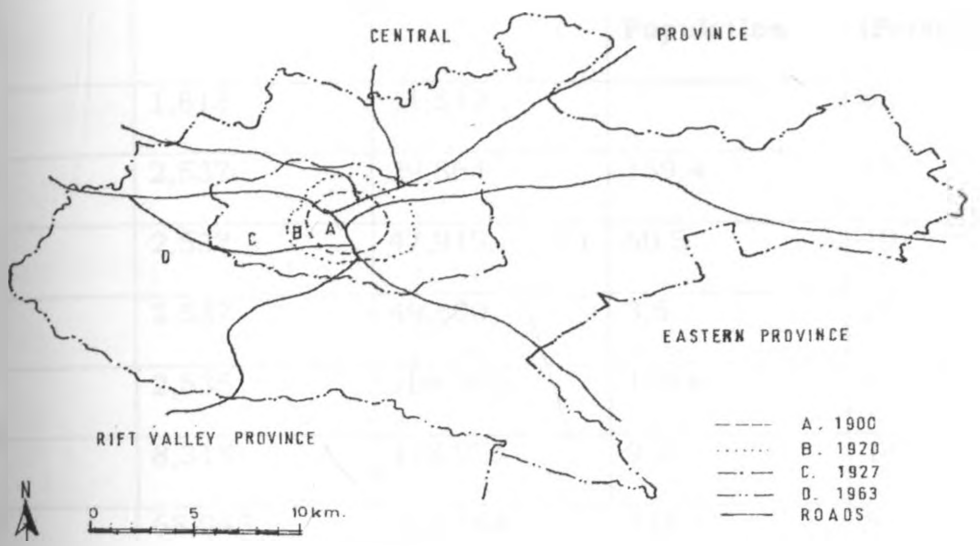
It is worthy noting that, the Nairobi Municipal Committee Regulations of 1960 defined the initial boundaries of the then Nairobi town as:

"The area within a radius of one and half miles [about2.25 km] from the offices of the sub-commissioner of the then Ukambani province" (Morgan, 1967 p 102, cited in Obudho and Aduwo, 1992, p51).

[Map 3 below gives an illustration of the boundary changes that occurred in Nairobi between 1900 and 1963 after which no further changes have taken place].

It can be seen that most of the city's expansion has been taking place towards the eastern sub-region mostly in the direction of Machakos and Thika. This presents us with a great challenge as far as planning for future solid waste dumping sites is concerned given that most of the land in this sub-region is already in private hands and/or settled. Shifting the current dumping site from the already filled up one at Dandora to far-flung areas, like the proposed Ruai site (some 35 km away) would also mean higher haulage costs. The other sub-regions to the North and West form part of the high potential agricultural zone which is already densely populated.

Map 3: Nairobi's Boundary Changes: 1906-1963.



Source: Obudho, R.A and G.O. Aduwo (1992, p 53).

3.4: Population Dynamics and Social Stratification in Nairobi.

The population of Nairobi has also changed significantly over the years (see Table 4). Its main sources of growth have been immigration especially from Central Province. The long distance sources have been mainly Eastern, Nyanza and Western Provinces of Kenya (Obudho and

Aduwo, 1992). Other sources of population growth have been the boundary changes and natural growth factors.

Table 4: Population of Nairobi Between 1906 and 1999.

Year	Area (Ha)	Population	% Increase in Population	Density (Persons/Ha)
1906	1,813	11,512		6
1928	2,537	29,864	159.4	12
1931	2,537	47,919	60.5	19
1936	2,537	49,600	3.5	20
1944	2,535	108,900	119.6	43
1948	8,315	118,976	9.3	14
1963	68,945	342,764	118.1	5
1969	68,945	509,286	48.6	7
1979	68,945	827,755	62.5	12
1989	68,945	1,324,570	60.0	19
1999	68,945	2,143,254	61.8	31

Source: *Compiled from Olima 2001.*

By 1963, the Africans who formed a major part of the population lived in the eastern parts, while the Europeans and Asians lived in the western suburbs with access to better services. This position is reflected today

not so much in terms of race, but rather in terms of incomes as well as population densities. The people living in the western suburbs are generally the more affluent while the lower and middle –income elements of the society dominate the eastern suburbs. Nairobi displays a complex surface structure, making it difficult to decipher the distinct land uses of the city surface. However there are wide variations in population densities reflecting different land use patterns within what Obudho and Aduwo (1988) see as six distinct and different land use divisions, namely;

- the Central Business District (CBD)
- Industrial area;
- Public and private open spaces;
- Public land;
- Residential areas; and
- Undeveloped land.

Apart from the CBD and the Industrial areas which contain low population densities and low incidence of housing, Obudho and Aduwo (1988) indicated five residential areas of varying population density and social mix (see table 5).

Table 5: Population Sizes and Densities in a Select Number of Areas in Nairobi.

Settlement/estate	Population	No. of households	Area (sq. km)	Av. Household size.	Density
Low density/high income areas					
Karen	9,764	3,381	27.30	3.00	358
Muthaiga	6,786	1,681	14.10	4.00	481
Lavington	18,966	5,815	11.00	3.00	1,724
Loresho	15,784	5,131	9.50	3.00	1,661
Medium density/middle income areas.					
Langata	16,118	5,051	44.50	3.00	362
Higridge	46,642	13,019	42.30	4.00	1,103
Parklands	11,456	3,369	4.60	3.00	2,490
Nairobi West	42, 532	9,654	23	4.00	1,849
High density/low income areas.					
Kibera [illegible]langa	16,518	6,281	0.20	3.00	82,590
Korogocho Gitathturu	22,899	7,415	0.30	3.00	76,330
Huruma	60,348	18,977	0.70	3.00	86,211
Mai[illegible]o	17,640	5,937	0.20	3.0	88,200
Mathare North	49,279	16,242	0.70	3.00	70,399

Source: compiled from GOK, National Population Census, 1999, Vol.1, 1.1 –1.4.

These are [see Map 4 below showing the urban structure of the present-day Nairobi]:

1) Upper Nairobi lying to the west and North of the CBD. This is an area of low density, high income population (350-1,700 people per square km in 1999) and comprises many of the former well-known expatriate residential areas such as Woodley, Kileleshwa, Kilimani, Lavington, Bernard, Thomson and Muthaiga.
2) Parkland, Eastleigh and Nairobi South, an area of medium income, medium density population, (360-2,500 people per square km in

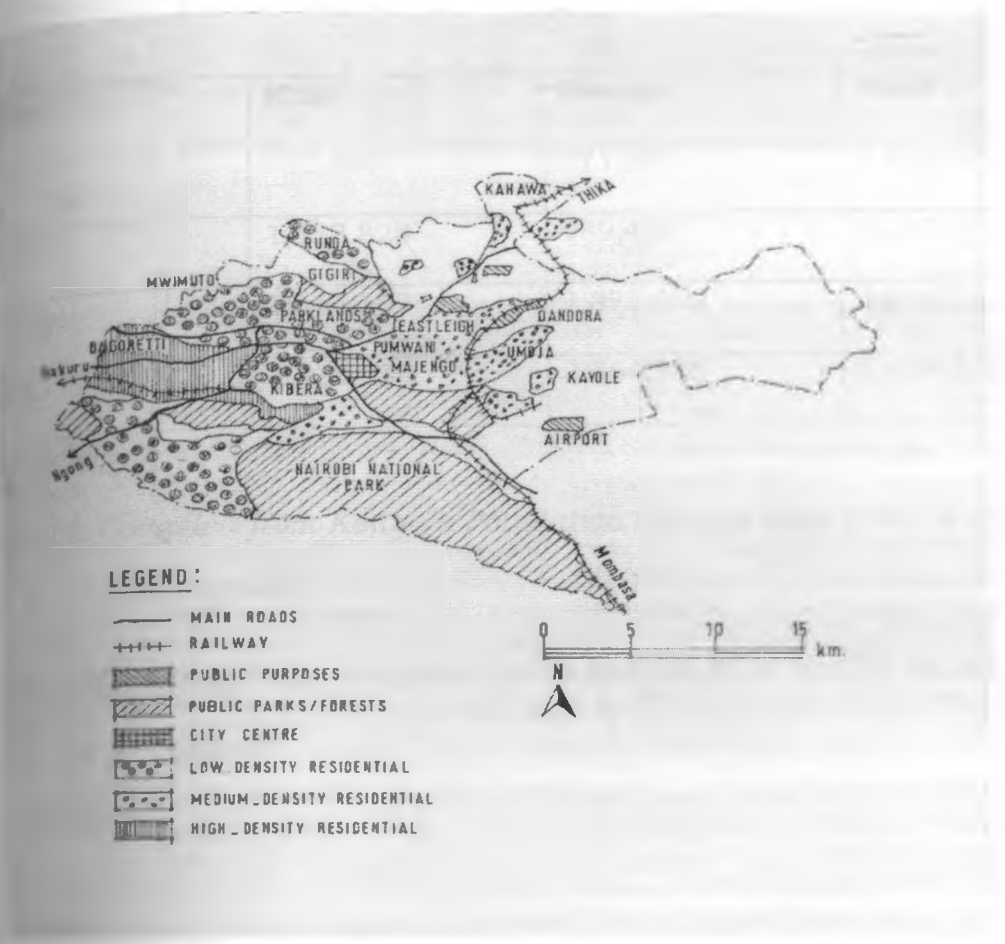
1999) and consists of mainly owner-occupier housing (many owned by Asians).

3) Karen and Langata, to the south and southeast, are also high income, low density residential areas, typified by large housing, gardens and paddocks. These areas are in transitional phase in that several mid-income estates often owner-occupied by civil servants are growing to absorb the population spilling from the other areas.

4) Eastlands in the marginalized urban fringe to the east of and away from the CBD, is low-income, densely populated area (some areas having as high as 76,000-88,000 people per square km in 1999) with the core region of the old NCC housing areas and new institutional housing estates (Race Course, Ngara, Shauri Moyo, Pumwani, Mathare Valley, Eastleigh, Kariobangi, Kaloleni, Bahati, Jericho, Mbotela, Dandora, and recently Kayole – very good examples of urban deprivation and disadvantage) with densities as high as 200-300 people per hectare in 1980. However within this zone, there are several modern estates whose living conditions have never less been quickly deteriorating due to lack of development control. Examples are Buru Buru, Doonholm, Umoja, Komarock, Fedha and Avenue Park.

5) Mathare Valley to the east of the city and Kibera to the west form the most famous, largest slum settlements in the city, with densities as high as 56,000 people per square km in 1999. The populations of these areas and other similar ones are characterized by uncontrolled, spontaneous mushrooming of squatter settlements, narrow access roads, overcrowding within rooms (as high as 5 people per room of 10 x 12 ft), lack of services and general poverty combined with high rates of crime. It is in these low-income, high density areas that the bulk of the solid waste generated is biodegradable and so of very low value to scavengers. It is the same areas, which are rarely served by the private sector leading to rampant dumping of solid waste on every open space available. This is mainly due to high costs of collecting user charges combined with high rates of defaults in payment as well as narrow, inaccessible and poorly maintained access roads. How to improve the coverage of the private sector in SWM in these neighbourhoods is the main challenge today.

Map 4: The Urban Structure of Present-day Nairobi



Source: Obudho and Aduwo (1992).

Planning for public services demands a thorough understanding of the dynamics of the population to be served. According to the National Census data of 1989 and 1999 the population of Nairobi was 1,324,570 and 2,143,254 respectively. This translates to an annual growth rate of 4 9 per cent, hence the current population size (2006) can be estimated at 2,995, 725. [The projected population for the city is as shown in table 6 below]:

Table 6: Population Projections, Nairobi City.

Year	Male	Female	Total
1989	752,597	571,973	1,324,570
1999	1,153,828	989,426	2,143,254
2006	1,604,169	1,375,600	2,995,725
2025	3,923,639	3,364,583	7,434,236

Source: Compiled from Kenya's Population Census data 1989 & 1999.

The present population distribution in Nairobi is as shown on map 5 (see also table 7 below):

Map 5: The Nairobi's Population Distribution (2006).

LEGEND:

1: 200,000 — 300,000
2: 300,001 — 400,000
3: 400,001 — 500,000
4: 500,001 — 600,000
5: 600,001 — 700,000
6: 700,001 — 800,000
7: 800,001 — 900,000

Table 7: Actual Population Figures (1989&1999) and Projected 2006 Population.

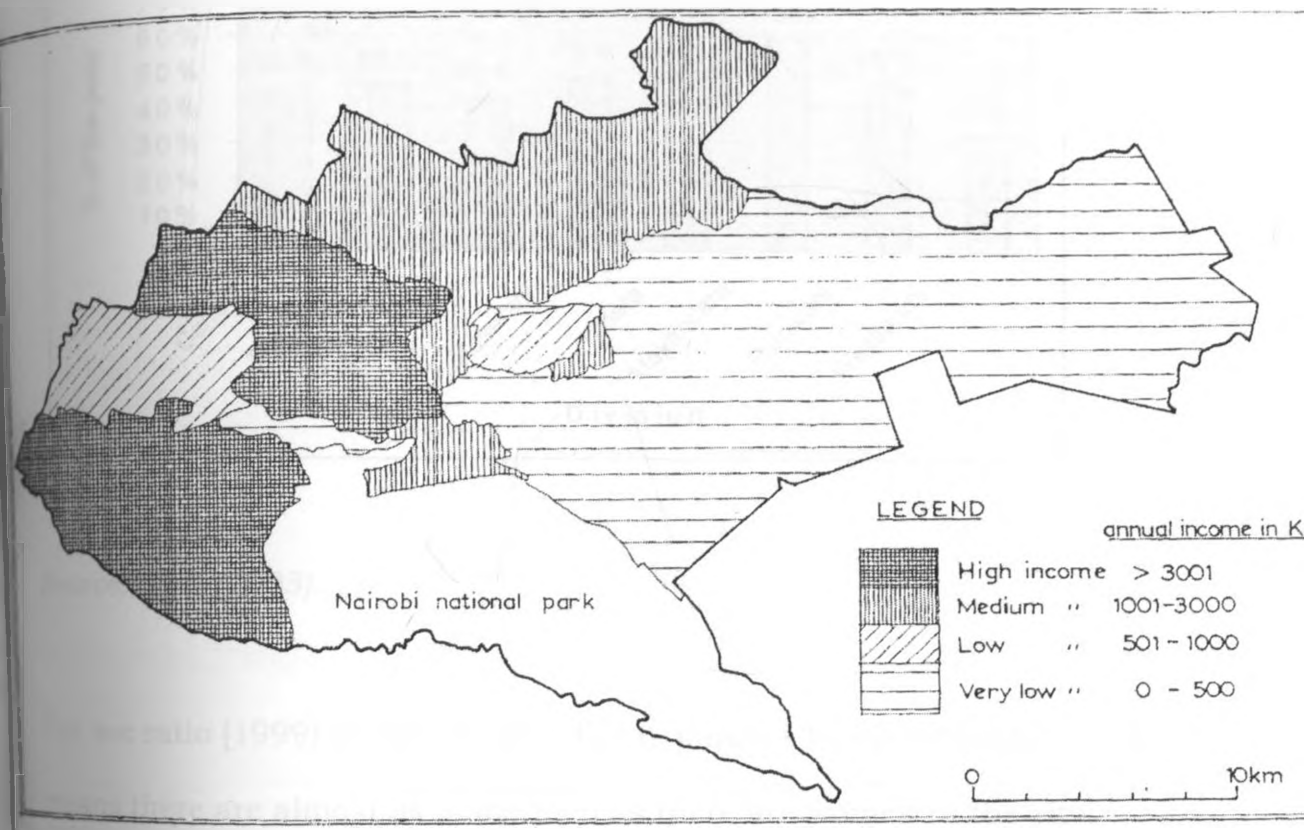
Administrative Zone	Area sq. km	1989	1999	Growth Rate %	2006	Density (2006).
Kasarani	85.70	294,898	338,925	1.40	373,568	4,359
Embakasi	208.30	160,962	434,884	10.45	872,034	4,186
Pumwani	11.70	146,718	202,211	3.26	253,122	21,634
Westlands/ parklands	97.60	121,882	209,610	5.57	306,334	3,138
Makandara	20.10	156,283	197,434	2.36	232,452	11,565
Central	10.60	74,600	234,942	12.15	524,271	49,459
Dagoretti	38.70	144,779	240,509	5.20	342,958	8,862
Kibera	223.40	224,448	286,739	2.48	340,377	1,524
Total	**696.1**	**1,326,559**	**2,147,253**	**5.36**	**3,247,122**	**147**

Source: Compiled from Kenya's Population Census data 1989 & 1999.

It is in most of the high- density areas, especially in the Eastlands where a majority of the poor live. 44 per cent of the total population in Nairobi lives below the poverty line (i.e. On less than Ksh 2,648/= per person per month) (GOK, 2003). In other words, this is the proportion of the population that can not afford to purchase the basic basket of goods.

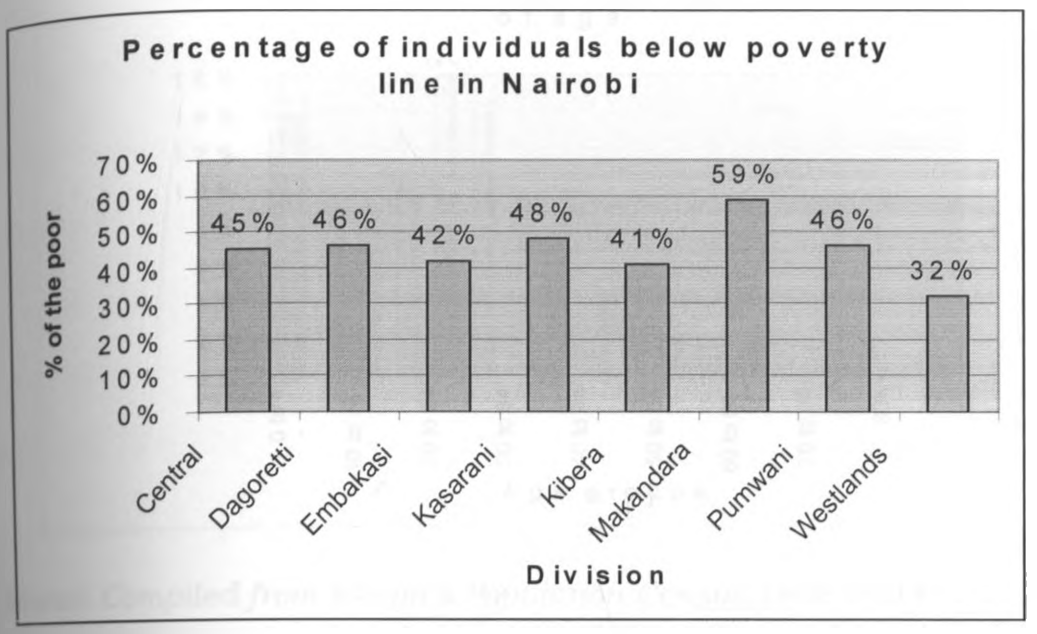
Most of the poor are found within the Eastlands area of the city (see map 6 and chart 5).

Map 6: Nairobi's Income Distribution Pattern.



The inability to pay for private SWM services among the poor may hamper privatization efforts in Nairobi. It is also within the poor areas that the road network is poorly maintained and insecurity is widespread hence discouraging penetration of the private sector.

Chart 3: Poverty Incidence in Nairobi by Division.

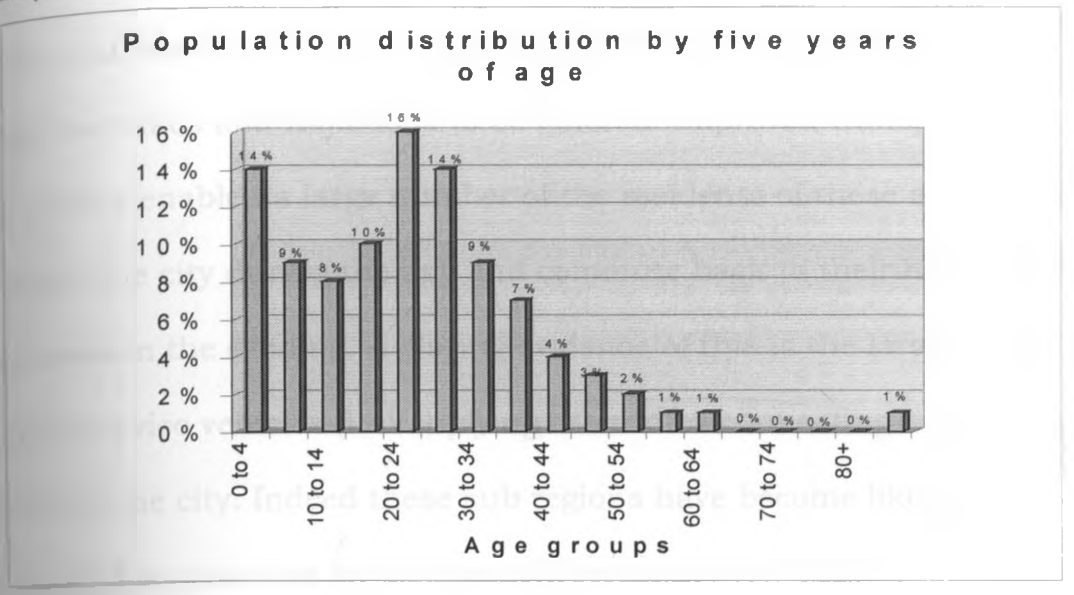


Source: GOK (2003).

The sex ratio (1999) in the city was 117 (i. e males to 100 females) which means there are almost as many men as there are women in the city. This shows a trend totally different from that exhibited in the early years of the city's growth whereby a majority of immigrants were men. These days a large proportion of the city's male immigrants especially the well educated live together with their families in the city. There is also a large number of women migrating to the city these days.

Again Nairobi's population is basically a young one (see Chart 4 below)

Chart 4: Nairobi's Population Distribution by Five Years of Age (1999).



Source: Compiled from Kenya's Population Census Data 1999.

From the above, it can be seen that,14 per cent of the city's population is 0-4 years old, 16 per cent is 20-24 years and 14 per cent is 25-29 years but overall, 87 per cent of the population is below 40 years of age. This is a young population, which is likely to experience high growth rates especially with improved medical technology. This together with improved health care is likely to lead to an unprecedented population explosion in the city.

It can thus be expected that as the above trends continue and as the economy grows, there will be more and more solid waste to take care of.

However an analysis of the city's population for the purpose of planning for a service like solid waste management is likely to be misleading if the impact of at least four of its neighbouring districts namely; Kiambu, Thika, Machakos and Kajiado is to be ignored. Improved transport network has enabled a large number of the residents of these districts to move into the city during the day and commute back to their homes in these areas in the evening. A glaring evidence of this is the large number of public service vehicles (PSVs) plying the routes connecting these districts to the city. Indeed these sub regions have become like part of the city and so planning for service delivery in the city without considering these areas could lead to failure to meet the actual demand. These commuters generate solid waste in Nairobi which means the estimates of solid waste generation given in many past reports based on the city's resident population could be misleading. At the same time these districts form autonomous local authorities which are likely to resist any attempt by the Nairobi City Council to transfer its dumping site to their areas. Maybe extending Nairobi to cover these areas could be a good step towards easier management of the cosmopolitan region. [Population data for the four districts is as shown in table 8 below]:

Table 8: Population of Four Neighbouring Districts (1999)

District	Males	Females	Total	No. of Households	Area sq.km	Density
Kiambu District	369,109	374,909	744,018	189,706	1,324	562
Thika District	323,479	322,234	645,713	171,569	1,960	329
Machakos District	442,981	463,753	906,734	186,297	6,281	144
Kajiado District	206,353	199,701	406,054	96,621	21,903	19
Total	**1,341,922**	**1,360,597**	**2,702,519**	**644,193**	**31,468**	**86**

Source: compiled from the Kenya's population census data, 1999.

The above gives a total population of 2,702,519 for the four districts. However these are not the only sources of the city's extra daytime population given that there are similar movements of people from as far as Nyandarua and Makueni districts.

CHAPTER FOUR: RESEARCH METHODOLOGY

4.1: The Target Population

The target population was set out as follows:

- Households in selected clusters in the city.
- Key personnel at the Environment Department and other departments at the city council.
- The various private garbage collection firms operating in Nairobi.

4.2.0: Sampling Techniques and Data Collection

This involved the following:

4.2.1: The Households

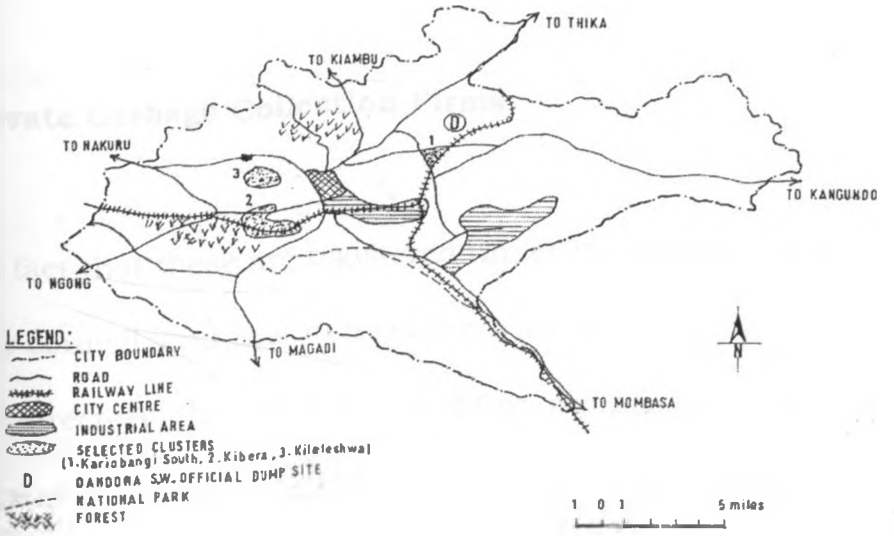
To carry out the research to conclusion, first the entire city was zoned into two regions - one covering the western part and the other the eastern part. The border between the two runs along Kiambu road, Muranga road, Forest road, Limuru road, University way to Uhuru Highway and Mombasa Road. The aim of this segregation of the two regions was to enable critical comparison of the characteristics of solid waste generation as well as the private sector service coverage between

the regions. Nairobi is divided into 8 administrative areas with Dagoretti, westlands and Kibera falling on the western region while Kasarani, Pumwani, Makandara and Embakasi fall within the eastern region. Given the diversity of human settlements in each of the two regions, there was need to purposefully establish clusters in each zone based on the income level factor, location of residence relative to the official dumping site, whether planned or unplanned and population density. This way it was possible to comprehensively capture the existing diversity. Given the existing social stratification in the city, three main clusters were purposefully identified, to represent the high-income/low density areas, middle-income/medium density areas and low-income/high density areas. Selection criteria used in selecting the clusters were mainly income levels, location relative to the official dumping site, population density and whether the settlement is planned or unplanned as well as where it falls among the two zones of the city. The existing clusters in each zone made up of the various residential neighbourhoods were first recorded then random sampling was used to select the three clusters. Because of the large number of households in each cluster, systematic random sampling was adopted in selecting a representative sample from each cluster. Due to time and financial constraints, the total number of households interviewed in each cluster was pre-set at 30 households giving a total of 90 households to be visited. It was hoped that this

number would be adequate to give a clear view of the household sector as the main consumers of SWM service in the city.

The above process led to selection of three clusters namely Kariobangi south estate, which is a planned low-income/high density neighbourhood close to the official dump site, Kibera slums which is an unplanned low-income/high density settlement to the western part of the city and Kileleshwa estate which is a high income/low density area also to the western part of the city (see map 7 below). Coincidentally these clusters satisfy the various selection criteria; i. e. income, planned/unplanned, density and distance from the official dumping site.

Map 7: Location of the Selected Clusters Relative to the Official Dumping Site.



4.2.2: The Local Government

Key personnel at the environment department of the city council especially the SWM section were visited for the purpose of finding out the main SWM efforts being tried as well as the challenges facing the department as far as privatization of SWM is concerned. Focus group discussions were also held with these officials to establish the existing SWM privatization plans, difficulties faced in implementing the plans and their views on the role of the private sector in SWM in the city. A two days visit was also made to the official dumping where in-depth discussions were held with the private sector solid waste disposal crews, the scavengers, the residents in the neighbourhood, as well as the city council officials at the weighbridge site office. Then efforts were also made to locate the main illegal dumpsites in the city.

4.2.3: Private Garbage Collection Firms

Given the fact that these are registered under the companies Act and not by the city council, and that most of them are not recorded in the telephone directory, the best way to capture a representative number of the firms was to use snow bowling sampling technique whereby the first firm identified would help in identifying others. To complement this, a two days visit to the newly installed weighbridge at the Dandora dumping

site was made whereby vehicles belonging to various private companies taking solid waste to the official dumping site were identified and their physical addresses and telephone numbers of contact persons taken down. A highly informative focus group discussion was also held with representatives from Ten of the identified firms for the purpose of ironing out the key issues affecting their operations as well as seeking views from them on the best way forward. Although the return rate of the distributed questionnaires among the 45 licensed firms identified was too low, at least 15 of these firms did return the questionnaires dully filled in within the one month period allocated to data collection. This represents about 33 per cent of the identified firms which is a good representative sample of the total identified population for the purpose of the study.

4.3: Instruments Used in Data Collection.

These included, inter alia:

Secondary data

- Government policy documents
- Past research documents
- Existing City Council records
- Maps

- Documentary evidence on the various aspects of the main variables such as the SW generation rates in the city, coverage of the private sector, factors affecting solid waste generation, key agents involved and their respective roles, the current situation of SWM in the city as well as existing policy instruments.

Primary data

Here various tools were used including:

- Questionnaires
- Participatory surveys
- Focus group discussions
- Direct measurements
- Case studies
- Personal observations at the source, during collection, transfer and disposal of SW;
- Photograph taking
- Mapping

4.4: Data Analysis and Presentation.

Simple analytical tools mainly descriptive statistics were used as well as simple presentation tools including tables, graphs, charts and maps. The idea was to make the final product as easy to understand as possible

even to a person without a statistical back ground. Where possible simple inferential statistics were employed to bring out the key relationships between various variables.

CHAPTER FIVE: RESEARCH FINDINGS

5.1: Introduction

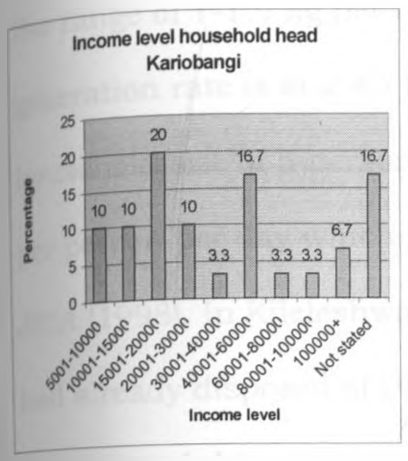
This section contains findings on the collected and analyzed data on households, the local government and the private sector. Findings on the households cover mainly the key domestic waste generation parameters in Nairobi that may affect the performance of the private sector in SWM. Those on the local government reveal the organizational structure as well as capacity of the relevant departments, the programmes in put in place to enable easier privatization of SWM in the city and identified weaknesses and/or problems.

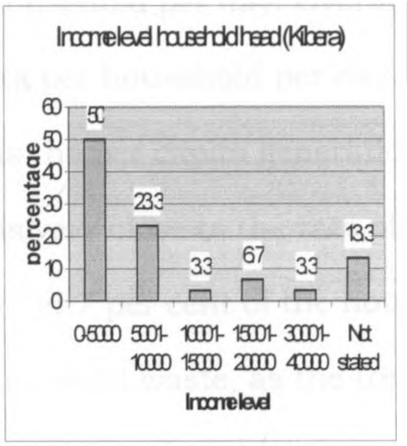
5.2: Households

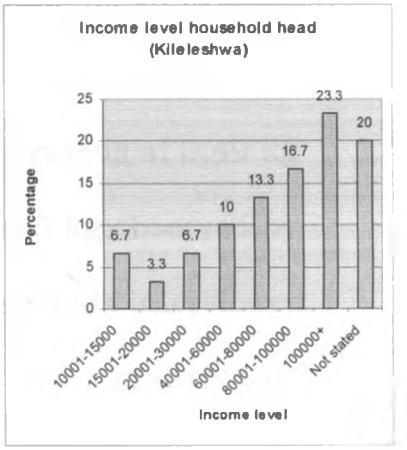
This subsection contains data findings on the key domestic solid waste generation parameters that may affect performance of the private sector in SWM in Nairobi.

Charts 5& 6(a-c): Income Levels Household Head (Ksh p.m.) and Quantity of Domestic SW Generated in Kariobangi S, Kibera and Kileleshwa (kg. Per household per day)

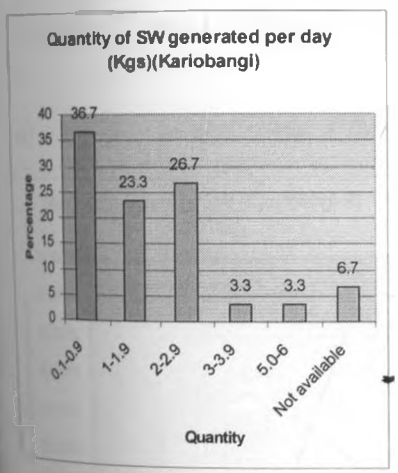
5) a) b) c)

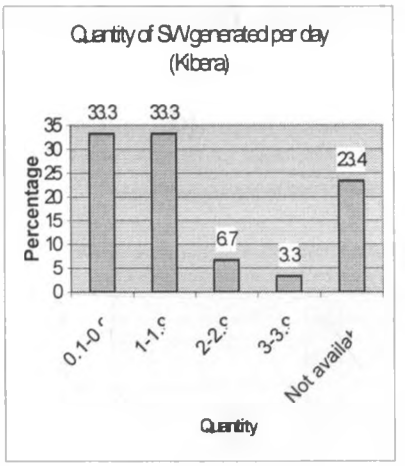


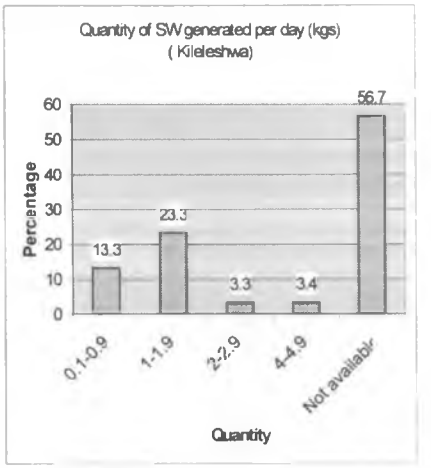




6: a) b) c)





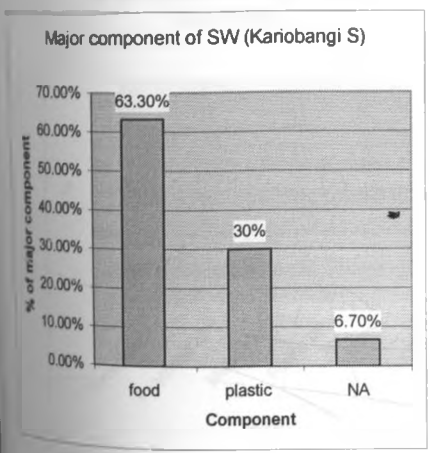


From the above two sets of charts, it can be seen that quantity of SW generated tends to relate closely with the income levels thus confirming what the existing theory says that SW generation increases with

affluence. In this case a majority of households in the low income areas of Kariobangi and Kibera generate mostly in the range of 0.1-0.9 kg while a majority of the households in the high-income Kileleshwa generate in the range of 1-1.9 kg per household per day. Overall, the mean generation rate is at 2.45 kg per household per day. Taking a mean household size of 5 persons the per capita generation rate is at 0.49 kg per person per day which is very close to the rate of 0.5 kg observed by JICA (1998). In Kileleshwa, 56.7 per cent of the households interviewed had already disposed of their solid waste, as the frequency of disposal here is much hire than that of the other two areas.

Charts 7 (a-c) : Major Component of SW Generated by Cluster

a)



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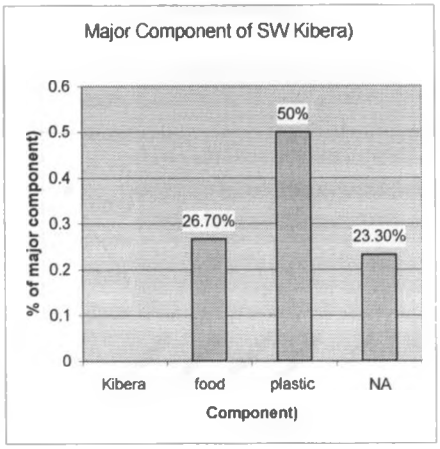
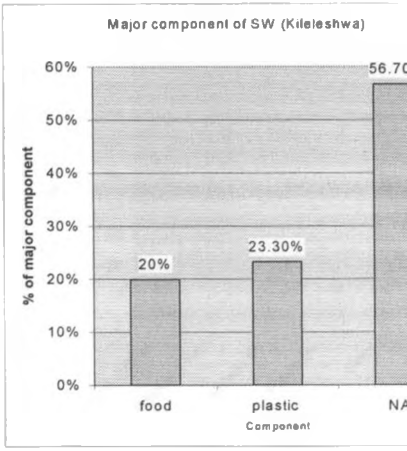


c)

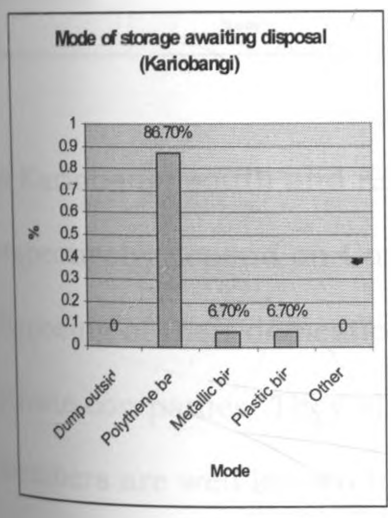


From the above set of charts, and looking at Kariobangi south and Kileleshwa, it is evident that there is a close relationship between income levels and the content of domestic solid waste in Nairobi, with the low-

income high density Kariobangi generating mostly food waste and the relatively wealthy Kileleshwa generating mostly plastic materials used in packaging of food products. The high portion of plastic waste in the very low-income Kibera demonstrates further how the plastic bag is becoming a real environmental menace in the city even in the very poor areas like slums. The high volume of biodegradable food waste generated by a majority of households demonstrates further that solid waste management in Nairobi will continue to involve mainly haulage yet the city council lacks the capacity for the same hence the need to consider possibilities of engaging other players especially the private sector.

Charts 8 (a-c) : Mode of Storing SW Awaiting Disposal by Cluster

a)



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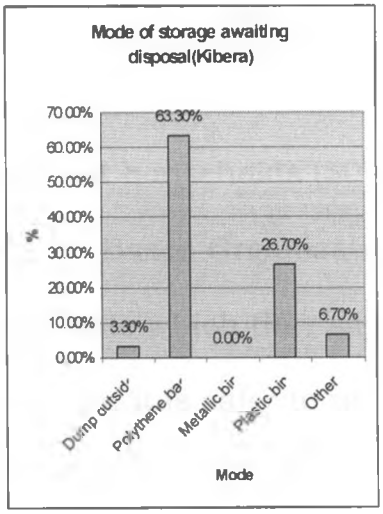
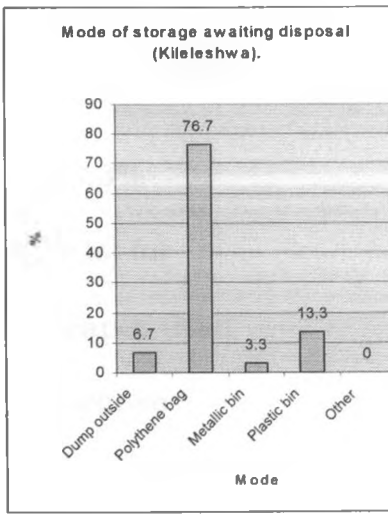


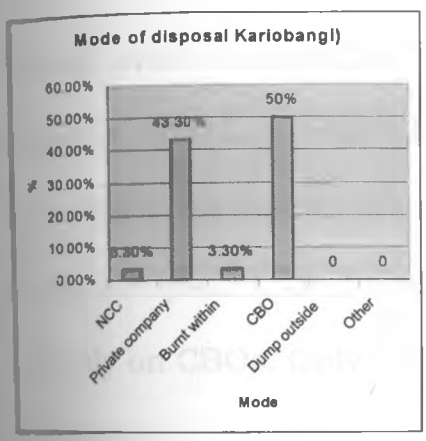
c)

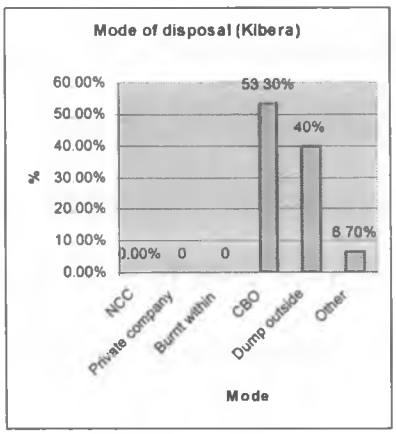


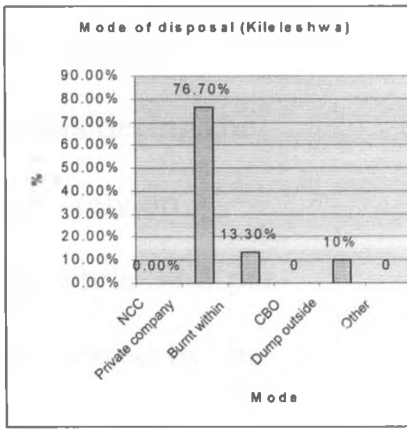
In all the three clusters, a majority of households interviewed use polythene bags in storing SW awaiting disposal. Further interviews reviewed that most of them prefer these polythene bags because they are easier to handle, are cheap and do not make noise like the metallic bins as well as the fact that they are re-usable hence more economical.

Charts 9 (a-c): Mode of Disposal of solid waste used by Cluster

a) b) c)





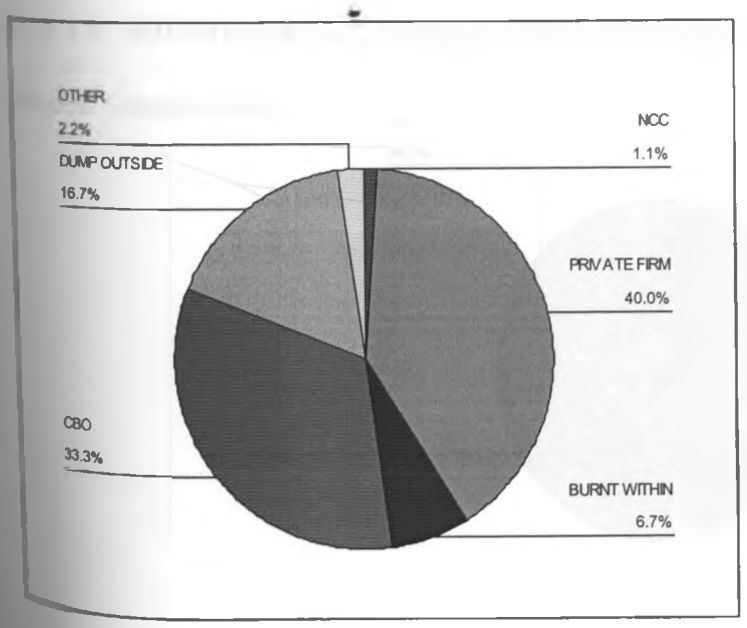


In Kariobangi south and Kibera most households (50% and 53.3% respectively) depend on Community Based Organizations (CBOs) for disposing of their domestic solid waste which they say are cheaper than private companies. They also say that it is safer to use CBOs whose members are well known to the residents given that most of the members are also members of the local societies in the respective neighbourhoods. However, there is still a large number of households using private companies in the Kariobangi south which is relatively more affluent than

Kibera. In the much wealthy Kileleshwa estate, 76.7 per cent of respondents prefer private companies. All this is crucial when deciding on the best way of privatizing the service given the different preferences among the various groups. Ability and willingness to pay are important factors to consider here. Note also the high rate of illegal dumping (at 40 per cent) taking place in Kibera, which may be blamed on lack of awareness.

Overall, there is a high preference for private companies in the three neighbourhoods as depicted in chart No.10 below where considering the three areas together shows that 40 per cent of the residents rely on private companies for the management of their solid waste while 33.3 per cent rely on CBOs. Only a 1.1 per cent of the residents are served by the city council.

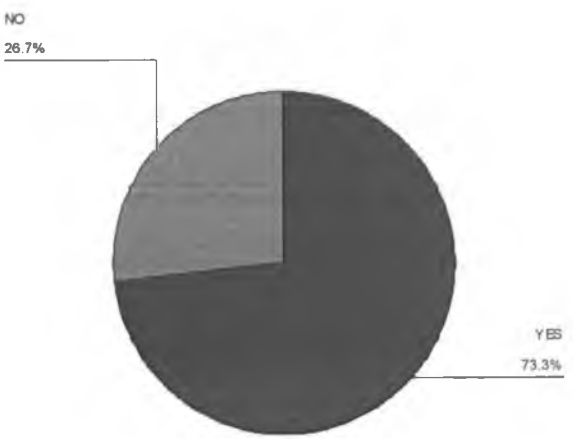
Chart 10: Mode of Disposal Three Areas Considered Together.



Willingness to engage private companies in solid waste management is approximately 35 per cent in Kariobangi south, 28 per cent in Kibera and 37 per cent in Kileleshwa. These are substantial rates but the implication of the slightly lower rate in the very low-income areas like Kibera should not be ignored. This may be an indication that, while we may privatize SWM in the relatively wealthier neighbourhoods, we need to be cautious when designing a similar policy for the relatively poorer areas like Kibera slums where a majority of the residents lack the capacity to pay for a competitively priced service.

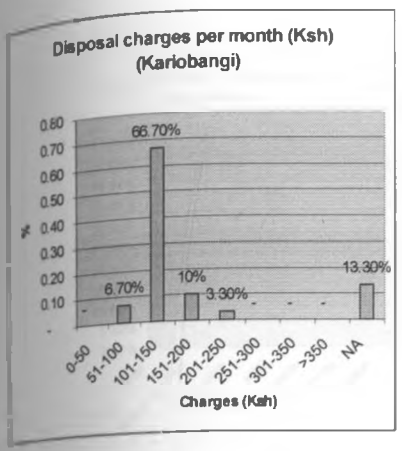
Overall, considering the three clusters together, 73.3 per cent of the residents in the three areas are willing to engage private companies in providing them with SWM services (see chart 11 below). This is a clear indication that there is a high chance of success if the private sector were to be appropriately involved in SWM in the city.

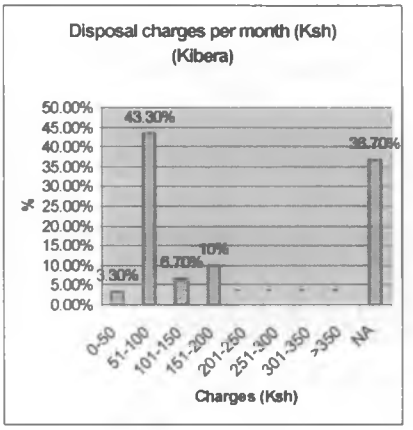
Chart 11: Willingness to Engage Private Companies in SWM (Three Clusters Combined).

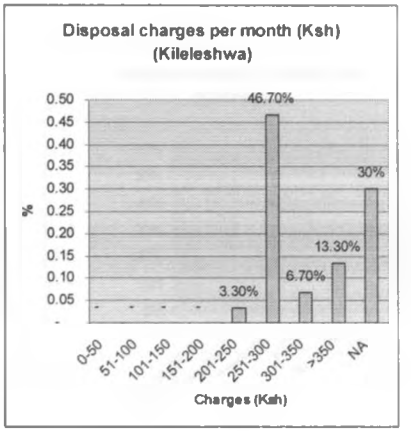


Charts 12(a-c): Current Charges for SW Disposal, Ksh/Month

a) b) c)





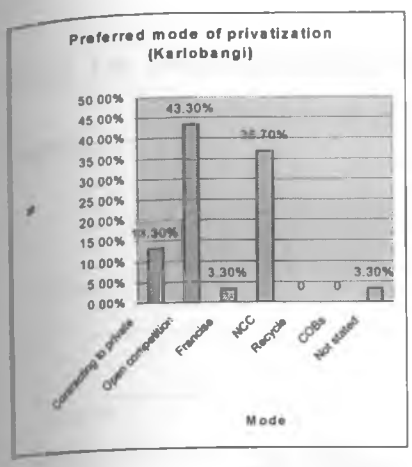


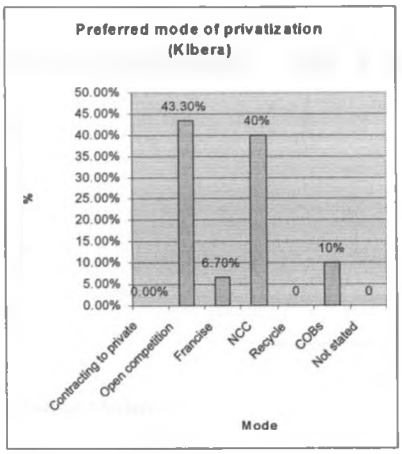
A majority of residents pay Kshs 101-150 per month in Kariobangi south, Kshs 51-100 in the very low-income Kibera area, and as high as over Ksh 300 in more affluent Kileleshwa area. This shows that charges for the service depend on the ability to pay with Kibera residents paying upto Ksh 200, those of Kariobangi paying upto Ksh 250 and those of the more wealthier Kileleshwa paying more than Ksh 350. Consequently, for any privatization policy to succeed this should be keenly considered.

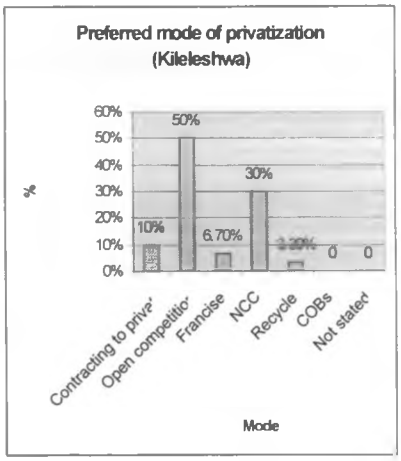
Data on preferred mode of privatization is as shown in Chart 13 below. It should be noted that a number of respondents in some of the clusters responded outside the choices given in the question and that is why there are cases where some requested that the city council continues offering the service while others still went as far as requesting that waste be recycled.

Charts 13 (a-c): Preferred Mode of Privatization by Cluster

a) b) c)



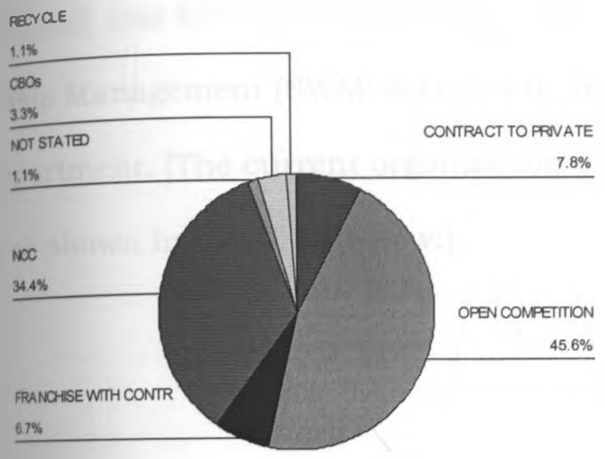




In Kariobangi south, 43 per cent of the respondents prefer open competition, and only 13.3 per cent prefer contracting. However still a large number of respondents (at 36.7%) in the estate feel SWM should remain the mandate of the city council. In Kibera the same trend is repeated with 43.3 per cent preferring open competition and 40 per cent NCC. On the other hand, in Kileleshwa , 50 per cent prefer open competition, 10 per cent contracting and 30 per cent NCC while some 3.3 per cent prefer recycling the waste. It appears that open competition is the most preferred mode throughout. Those interviewed said with proper controls and regulation by the city council, open competition has the potential to lead to lower charges for the service. Others are skeptical

about any franchising or contracting efforts because of the rampant corruption and nepotism within the city council.

Chart 14: Preferred Mode of Privatization – The Three Clusters Together.



Considering the three clusters together, still open competition is the most preferred at 45.6 per cent followed by NCC at 34.4 per cent while contracting and franchising are at 7.8 and 6.7 per cent respectively.

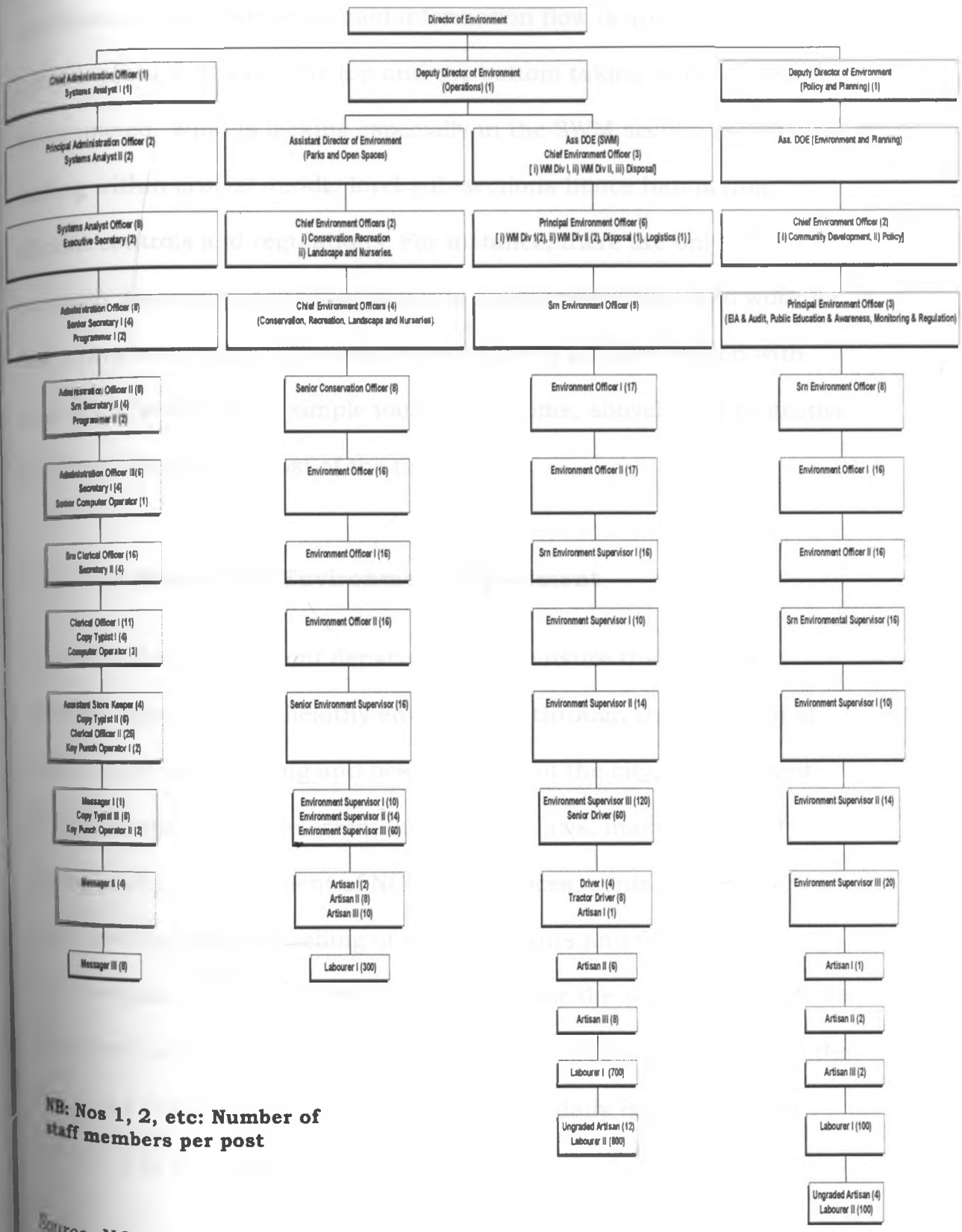
5.3.0: The Local Government

This section reveals crucial data obtained from the city council, mainly the SWM section of the Environment Department. It is mainly a documentation of the current efforts the city council is carrying out towards better involvement of the private sector in SWM in Nairobi.

5.3.1: Organization Structure and Personnel Capacity.

Previously SWM at the city council was under the cleansing section of the public health department which was made up of the Cleansing, City Engineering and Parks sections. However in 1996 the various sections were reorganized into three main sections comprising Environmental Planning and Management (EMP), Parks and Open Spaces and Solid Waste Management (SWM) sections to form the Environment Department. [The current organization structure of the entire department is as shown in Chart 15 below:].

Chart 15: The Organization Chart-Department of Environment NCC.



NB: Nos 1, 2, etc: Number of staff members per post

Source: NCC, Department of environment.

Despite the fairly complex and bureaucratic organizational structure, members of staff interviewed said information flow is quite efficient with communication between the top and the bottom taking at most a day to be completed. What is lacking especially in the SWM section is sufficient staffing within crucial middle level sub-sections hence hampering efficient controls and regulations. For instance, there are only two computer operators at the dumping site weighbridge office who work for long hours without rest. The bottom most levels are over staffed with most of the staff lacking simple tools like brooms, shovels and protective gear hence being idle most of the time.

5.3.2: The Role of the Environment Department

The role of the environment department is to ensure that Nairobi residents enjoy a clean, healthy environment through the provision of services such as cleansing and beautification of the city, enforcement and implementation of deterrent laws and by-laws, maintenance of existing parks, improvement of NCC open spaces, control of leisure parks, development and selling of selected plants and flowers (see http/www.nairobicity.org/departments) however the service in which the department has glaringly failed in is SWM. Only about 20 per cent of the estimated 1,500 tones of solid waste generated daily is collected and disposed of at the designated dump site.

Due to its lack of capacity, the department began to encourage private sector involvement in SWM in January 2006 through contracting to individual firms each to operate within a certain zone. However growth of the private sector has been blamed for problems of control and haphazard dumping of waste. As a result, the department formulated and is in the process of implementing a policy on private sector involvement in SWM.

5.3.3: The Decentralization Programme

Decentralization of service is a case where authority and responsibility for specific decisions has been delegated to broader base executives who are at the lower level hierarchy. This way it is hoped that:

i.) Decisions can be made by ward managers who know the customer well;
ii.) Clients have problems addressed at local levels;
iii.) Managers can concentrate on wider issues and be able to sensitize residents on various council services;
iv.) Lesser time is taken to solve problems;
v.) There is greater democracy and freedom as residents have a say in identifying and solving problems in their areas; and

vi.) It will provide a forum for residents' participation in project implementation and management.

The decentralization of basic council services to the wards programme was initiated in January 2003 following a government directive. To this end, the ministry of local government in conjunction with the city council identified 55 wards and 8 divisional offices based on the existing administrative boundaries as the first step towards the implementation of the programme. Staff were also re-deployed to the decentralized offices.

The CBD, which was initially part of Pumwani Division was later curved off to form the eighth division due to the high volume of basically commercial SW generated there. Divisional offices were also established in each of the above zones to handle SWM in the respective areas. However the programme seems to have failed mainly because most of these offices are yet to be equipped with the necessary facilities like computers, the communication equipment, vehicles as well as the right personnel. The qualifications of those put in charge of the decentralized offices are not commensurate with the duties they are expected to perform. Records obtained from the section's head office in Kaloleni indicate that there only three working radio communication equipment in the entire section while most personnel seconded as heads of the zonal

offices are not professionally trained to handle management issues but are rather chosen depending on who they know among the senior management of the council.

5.3.4: Equipment

Out of the 72 vehicles allocated to the SWM section, only three SW collection vehicles are operational. The rest, apart from the few supervision vehicles, are grounded either due to old age or lack of spare parts (NCC, SWM section, 2006). This forced the department to resort to hiring private garbage collection trucks from the private sector effective January 2006. Indeed, even the 2 wheel loaders at the dumping site at Dandora are hired. The hiring process involved subdividing Nairobi into nine zones and identifying a suitable contractor for each zone who was to provide not less than four trucks at any given time. However most of the contractors are yet to provide the required minimum number of vehicles. The current position on the hired vehicles is as shown in table 9 below:

Table 9: Hired Vehicles by Zone as at June 2006.

Zone	Contractor	Vehicles Registration Numbers	Number of Vehicles Provided
Embakasi	Bulk refuse removal	KAA667, KRZ132, KUL314.	3
Kamukunji (Part of Pumwani)	Jesker enterprises	KAV790P, KAL883K, KAN339Y, KAA846R, KYB876, KAB855K, KAA919X, KAA929X, KXV519, KAB404E,	10
Langata (Kibera)	Kenlo investments	KAK538Z, KAK924Z, KVA705	3
Central	Business division - Kange construction	KQH916, KAS688G, KWY463, KZL276, KAD623P	5
Westlands	Jesker enterprises	None	0
Starehe (Part of Pumwani)	Vineyard holdings	KUZ524, KTV059, KAS030T, KYC104, KSZ974	4
Kasarani	Tema home care	KAA975T	1
Dagoretti	Tema home care	KAM840B	1
Makandara	Junjo commercial agencies	KZX191, KZX314, KVH468, KTL008, KWZ048.	5
Total			**32**

Source: NCC SWM section

The above table shows that hiring has attracted only 32 vehicles against the minimum required 36 vehicles (i.e. 9 x 4). Westlands, Kasarani and Dagoretti are the most affected divisions. It should also be noted that most of the hired vehicles are too old and so keep on breaking down. One interesting trend noted is that most of these firms are owned by people

who are well connected with the city council a majority being councilors or senior officers. It is due to this reason that none of them was willing to divulge any information on their operations for fear of losing business.

The slow pace of implementing the decentralization and privatization programme is a major concern to those in charge of the programmes.

5.3.5: Current SW Collection Performance After Contracting.

The above weaknesses have contributed to the falling efficiency in collection of SW in the city. Compared to the 25 per cent collections per day observed by JICA in 1998, currently total collection per day amounts to about 18.8 per cent of the total 1,500 tones generated every day which is a major drop from the 1998 figures (see table 10 below).

Table 10: Recorded Dumped SW at Dandora Official Dumping Site (Jan-June 2006)

Month	SW BROUGHT IN (KGs)	AVERAGE WEIGHT (KGs PER DAY).
JAN FROM 2ND	8,283,440	276,115
FEB	8,490,980	303,249
MAR	8,635,480	278,564
APRIL (7 DAYS HAD POWER FAILURE SO NOT RECORDED)	4,997,180	217,269
MAY	9,253,180	298,490
JUNE UPTO 11 AM 10TH.	3,003,120	316,118
Total	**42,663,380**	**281,634**

Source: NCC, Weighbridge Office.

The above gives an average daily delivery of 281,634 Kgs against 1,497,862 Kgs generated every day. It can thus be said that currently only about **18.80** per cent of the total solid waste generated in the city is collected and disposed of at the designated dumping site. However it should be noted that much more SW ends up in undesignated dump sites within the city as identified in the various areas including Uthiru in Dagoretti division, Roysambu in Kasarani, Kariobangi North and Embakasi (see plate 2 below). This is dumped mainly by the CBOs operating in these areas but still a large number of the private sector participants confessed to dumping there too citing the long distances to be covered to the official dumping site as well as poor road network and heavy traffic which leads to high costs.

Plate 2: An Illegal SW Dumping Site at Kariobangi North Estate Along the Outer Ring Road

The weighbridge became fully operational on 2nd January 2006. This has greatly facilitated proper documentation of weights and so more efficient monitoring of the operations of the private sector especially the hired companies who used to demand money for work not done leading to loss of huge amounts of money by the city council.

5.3.6: Performance by Different Agencies

Table 11 below shows that hired vehicles are collecting the bulk of the solid waste in the city and disposing of the same at the designated dump site. The city council seems to have given up as it does not have enough vehicles to operate on its own. The city council hired contractors are collecting almost three times the amount collected by private firms.

Table 11: SW Collections by Different Agencies Jan-May 2006.

	Estimated Tonnage				
Month	**NCC Trucks**	**NCC Operation Hired Trucks**	**NCC Hired Normal Beat Trucks**	**Private Firms Trucks**	**Total**
January	94.7	1316.18	4984.66	2331.97	**8727.51**
Februar y	106.32	886.46	5363.37	2170.81	**8526.96**
March	230.06	1693.62	4325.8	2404.97	**8654.45**
April	302.6	3692.36	3482.43	2044.6	**9521.99**
May	307.68	2457.01	4894.02	2242.82	**9901.53**
Total	**1041.36**	**10045.63**	**23050.28**	**11195.17**	**45332.44**

Source: *NCC SWM section monthly reports.*

Again the above figures for January to May 2006 translate to about 20 per cent collection of the daily waste generation of about 1,500 tones which is very close to the weighbridge office records.

This is a clear indication that even with the concerted effort by the local authority to involve the private sector in SWM their performance still remains very poor.

5.3.7: The Official Dumping site

This is a 12 hectares (30 Acres) parcel of land (personal communication- the in-charge dumping site) forming part of the Dandora site and services scheme in Nairobi's eastlands. Indeed within the dumping site there are buildings which formed part of the proposed phase VI of Dandora but which have since been abandoned. The garbage is spread over the entire parcel of land extending all the way to Nairobi river which marks its north-western extend (see plate 3). The rest of the borderline is surrounded by high rise residential buildings.

The estimated average height of the dumped waste is about 2.5 metres which means the site so far has approximately 303,512 cubic metres of mixed garbage (see plate 4 below). This is most of the time occupied by hundreds of men, women and children scavenging for valuables and

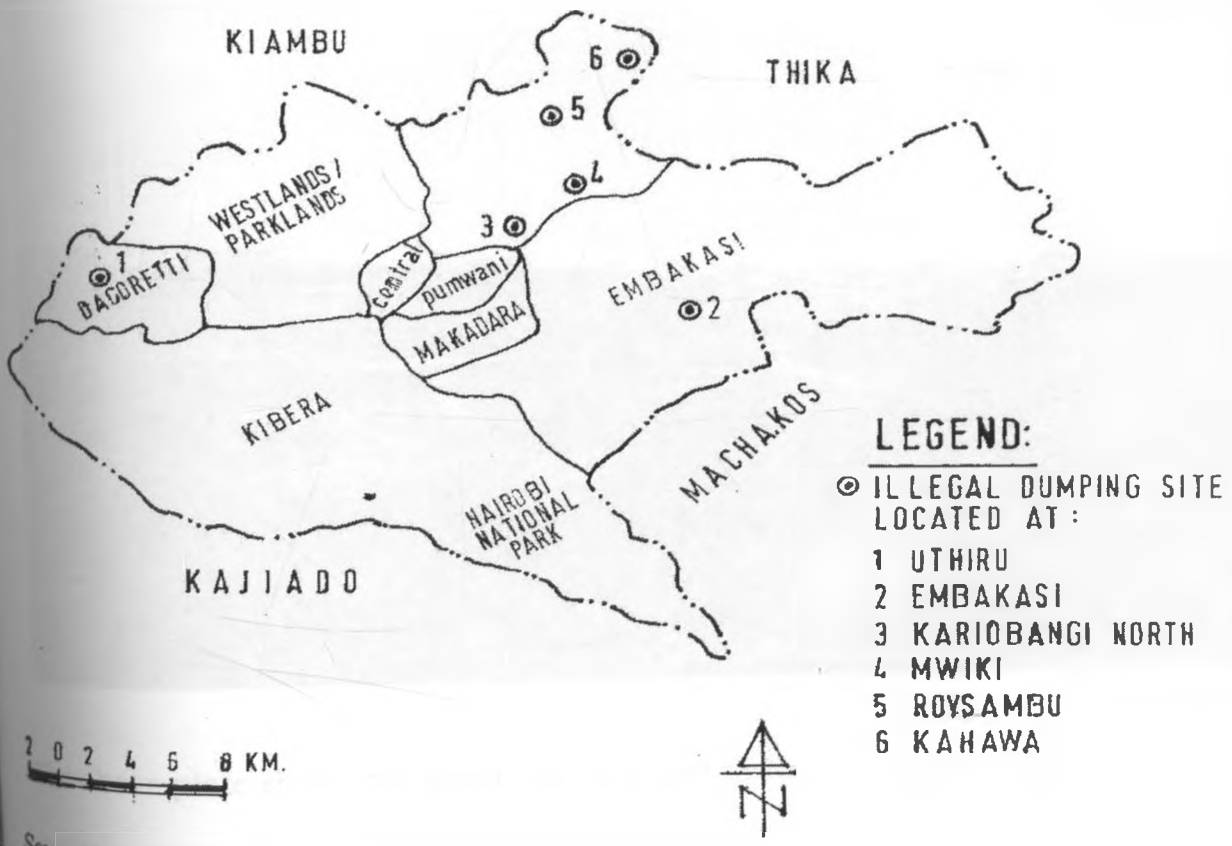
recyclable materials, as well as herds of cows, goats and flocks of marabou stocks birds. As one of the scavengers put it, it appears like there are unwritten rules on the dump with man coming first whenever fresh loads of waste are brought in followed by Marabou stocks then cows and goats in that order. Stealing among the scavengers is also not allowed and any misdemeanor among the members is punishable by mob beating.

The main problems noted include uncontrolled dumping of waste, poor management of the dumping site leading to spillage of garbage towards peoples' homes, schools and markets as well as poor access roads and pollution of Nairobi river (see plates 3-5). The garbage is a mixture of biodegradable, non-biodegradable and hazardous materials making it difficult to sort and recycle or re-use. The area around the weighbridge office is also too dusty thus exposing the site office staff to possible health problems. Maintaining the roads has become a problem mainly because there are a number of underground water and sewer lines passing over the site which keep on being cut off during the roads maintenance process. All the council wheel loaders and tractors at the site are grounded. Security is also poor thus forcing the private firms to bribe gangs of youth to be allowed to dump waste at the site. The official dumping charges are Ksh 280/= per lorry load and Ksh 140/= per pick-

up truckload but the gangs take another Ksh 100-200/= per load (personal communication, weighbridge office and private firms' crews).

The above problems are the main cause of the rapid growth of illegal SW dumping sites in the city. Indeed 6 major illegal dumping sites were identified in the city. These are as shown on Map 8 below:

Map 8: Approximate Location of Identified Illegal Dumpsites in Nairobi.



Source: *Author.*

From the above it can be seen that five out of the six identified illegal dumping sites are within the poor eastlands area with Kasarani Division

having four of these sites. It was also observed that a large amount of the waste dumped in these illegal dumping sites originates from areas outside the neighbourhoods within which the dumpsites are located.

Plate 3: Edge of the Dumping Site Along Nairobi River.

The above plate shows the great threat posed to Nairobi River by lack of control over the dumped garbage. When it rains both the waste and leachate ends up in the river causing more pollution.

Plate 4: The Expansive Dumped Garbage at The Dandora Site - See Residential Houses Neighbouring the Site on The Back Ground, The Raised Object Near The Wooden Posts is a Tipper Offloading Garbage With its Engine and The Rest of The Vehicle Buried Under Waste.

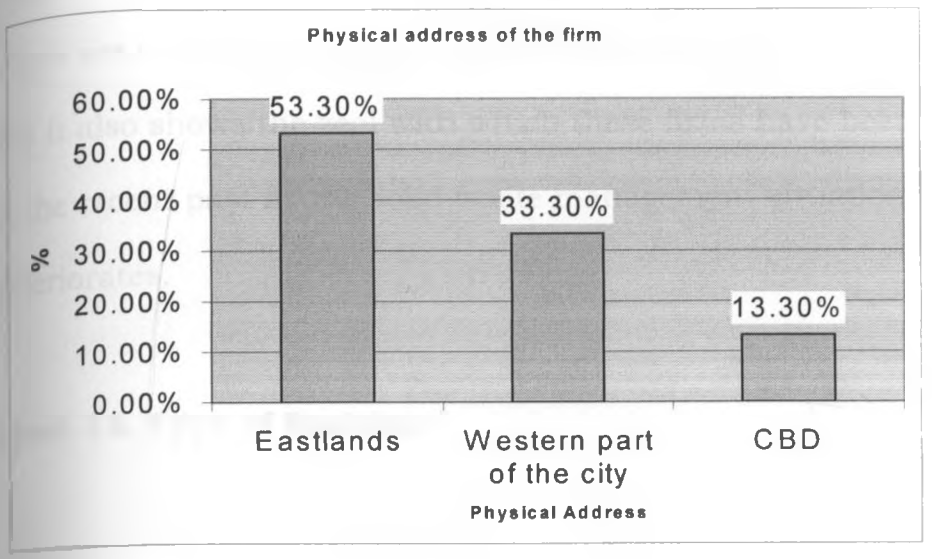
The access roads are at their worst during wet seasons when vehicles get stuck in the dirty mud some being left there overnight to be guarded by the established cartels of scavengers who charge exorbitantly for such a service. It is also under this condition that many vehicles experience the worst rate of breakdowns forcing the owners to spend a lot of money on repairs.

Plate 5: A City Council Special Purpose SWM Vehicle Stuck in a Muddy Road and Being Pulled Out With a Wheel-Loader at The Dandora Dumping Site.

5.4.0: The Private SWM Sector

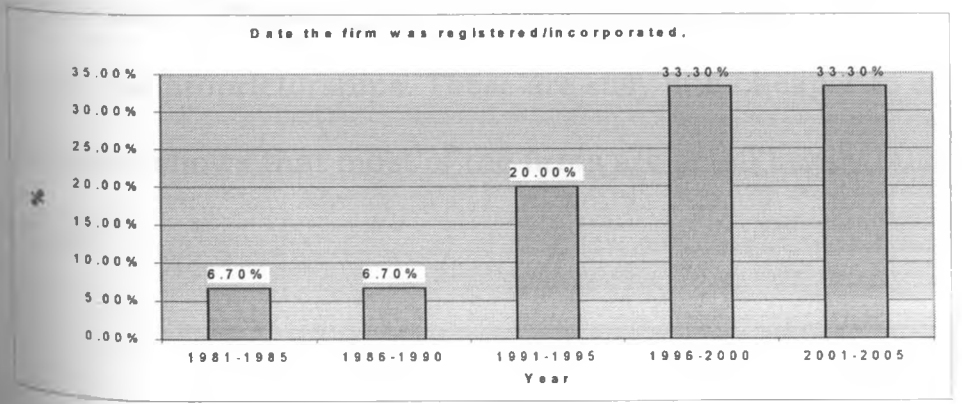
This section contains crucial findings on the operational capacity of the private sector in SWM in Nairobi. It also contains views and suggestions by the private sector participants on the possible best way forward towards better involvement of the private sector in SWM in Nairobi.

Chart 16: The Physical Address of Private Firms.



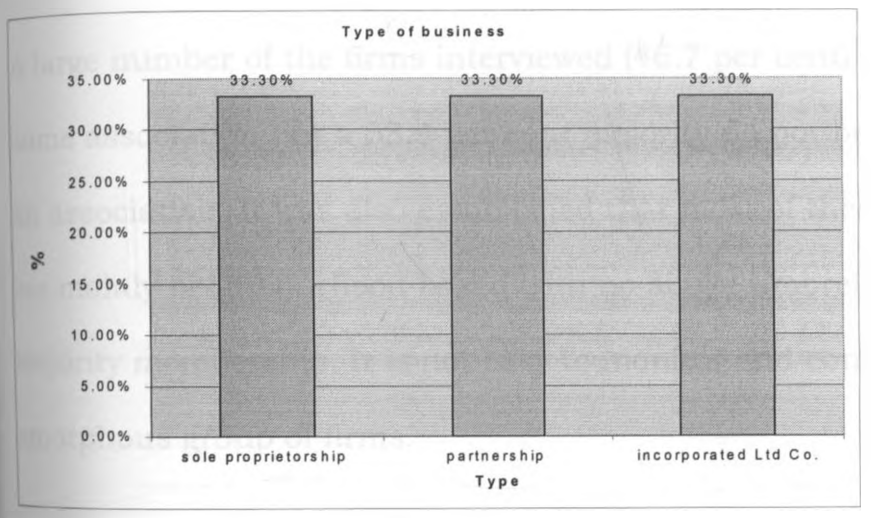
The above chart shows that 53.3 per cent of the private firms interviewed are located within the eastlands area of the city. Reasons cited for this trend included availability of cheaper offices as well as availability of open yards for parking the trucks. Office spaces in the western parts of the city are relatively highly priced while open yards are scarce and also costly.

Chart 17: Date of Registration/Incorporation of the Firms.



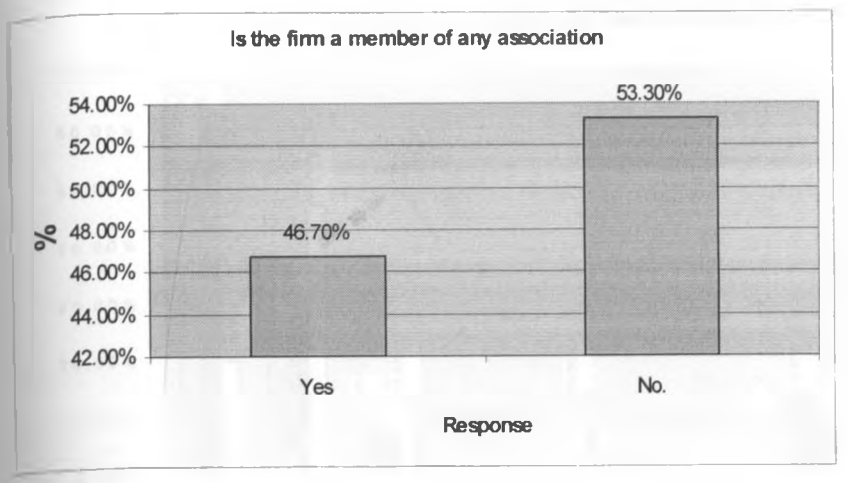
A majority of the firms interviewed (66.6 per cent) were set up between 1996 and 2005. Indeed 33.3 per cent of the firms are barely 5 years old. These are very young companies, which are yet to be firmly established. But it also shows the zeal with which these firms have been being set up in the recent past as the solid waste management situation in the city deteriorates.

Chart 18: Type of Business



66.6 per cent of the firms interviewed are business names, either sole proprietorships or partnerships, not yet incorporated. Indeed 33.3 per cent are sole proprietorships. These are easy and cheaper to establish. This further shows that most of the firms are small family business ventures.

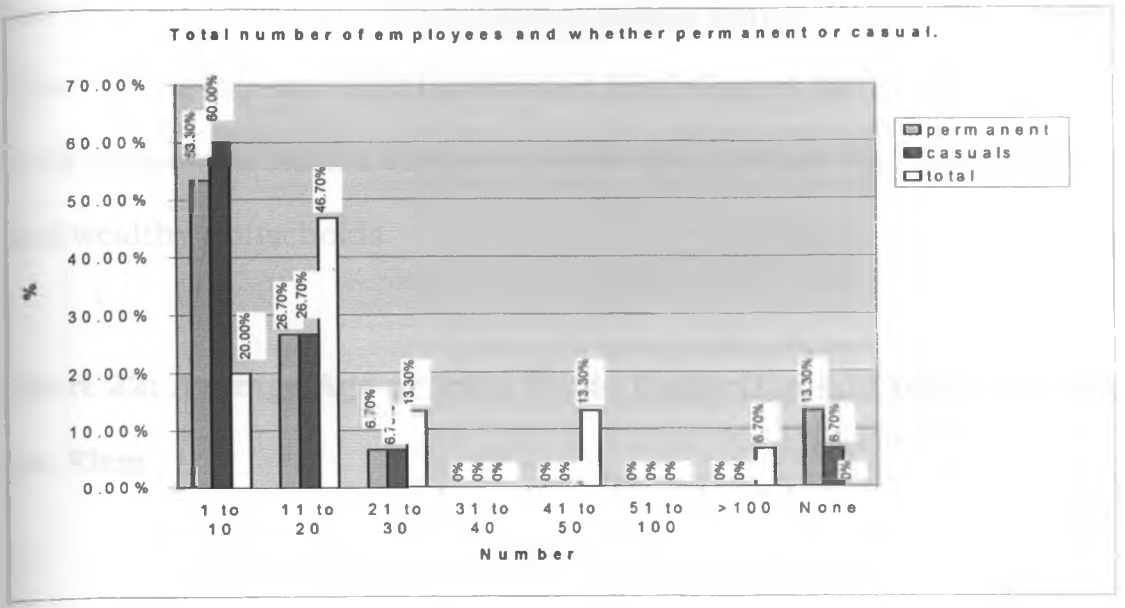
Chart 19: Membership to Organized Associations.



A large number of the firms interviewed (46.7 per cent) belong to at least some association but a 53.3 per cent majority do not belong to any such an association. It was also established that most of these associations are mainly neighbourhood based with no single umbrella body claiming a majority membership. It is not easy to monitor and control such an amorphous group of firms.

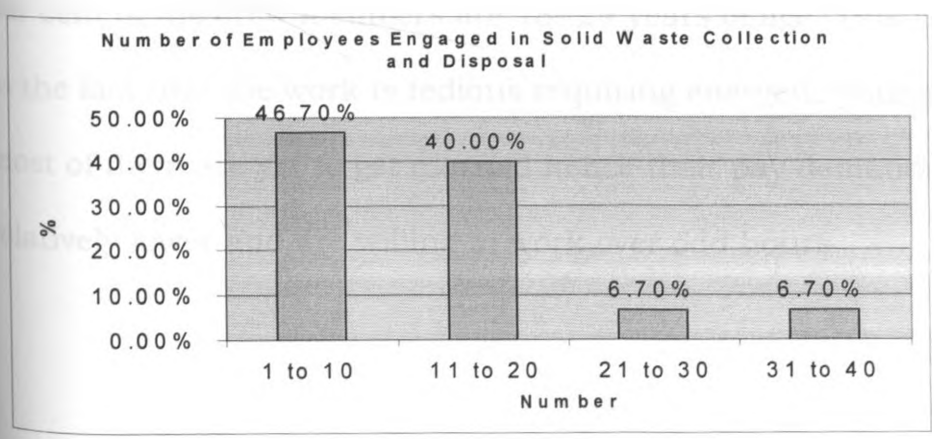
The total number of employees and terms of employment per firm are as shown in chart 20 below.

Chart 20: Number of Employees Per Firm and Terms of Employment



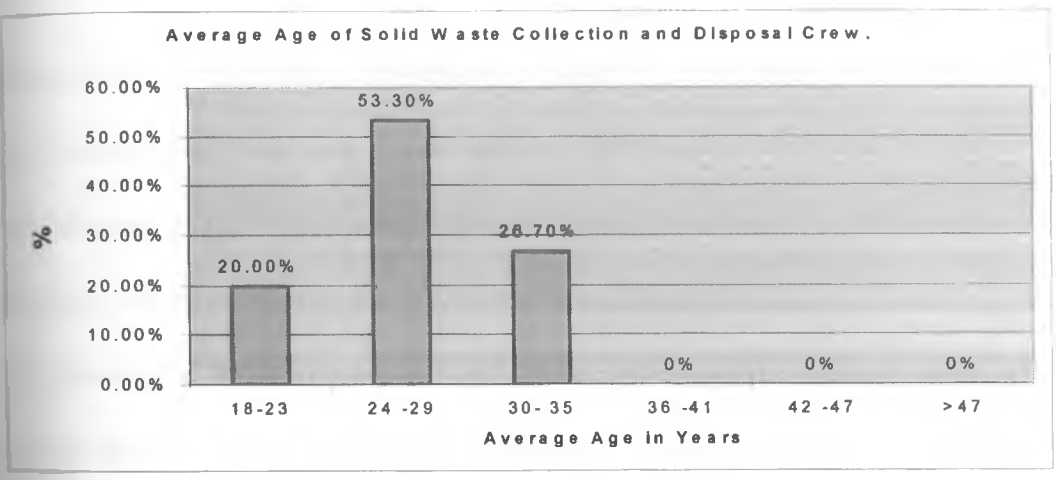
46.7 per cent of the firms interviewed have between 11 and 20 employees with a large number of them engaging staff on a casual basis further confirming that these are small businesses, which are yet to be firmly established. The frequent break down of trucks and the temporary nature of most of the assignments also contribute to this scenario.

Chart 21: Size of Solid Waste Collection and Disposal Crew Per Firm.



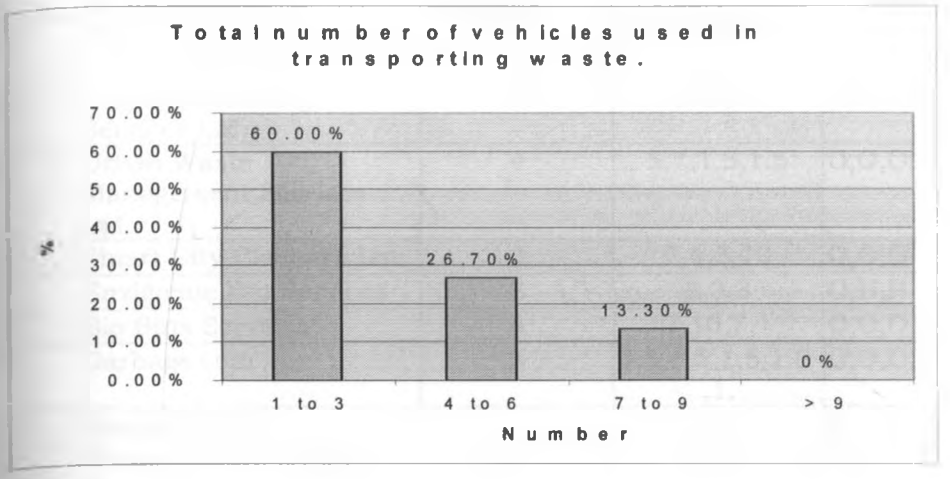
The above chart further shows that most of the firms have a limited crew size with 46.7 per cent of the firms engaging only 1-10 members of crew. This was mainly attributed to the fact that most of them are small businesses with limited clientele mainly from commercial institutions and wealthy households.

Chart 22: Average Age of Solid Waste Collection and Disposal Crew per Firm.



From this chart, it can be seen that a majority of the firms (53.3 per cent) employ crew members ranging from 24 – 29 years in age and overall 73.3 per cent of the crew members are 18- 29 years of age. This is attributed to the fact that the work is tedious requiring energetic young men. Again most of them are yet to get married hence their pay demands are relatively lower and are willing to work over odd hours.

Chart 23: Total Number of Solid Waste Disposal Vehicles per Firm



60 per cent of the firms interviewed have 1-3 vehicles only further confirming that they are small family businesses yet to be firmly established in the business. Most of these vehicles are old multipurpose vehicles, which experience frequent breakdowns especially during the rainy seasons. This shows lack of financial capacity among most of the private firms involved in SWM in the city. This is further exemplified in table 12 below where again majority of the firms own 1-3 vehicles most of which are open body lorries. This again shows how small and financially constrained most of these business ventures are.

Table 12: Number and Type of SWM Vehicles per Firm.

No.	Name of Firm	No. of Vehicles	Capacity(tons)	Owned/Hired	Body Type.
1	Domestic Refuse Disposal (K) Ltd.	6	3,3,3,3,3,3	O,O,O,O,O,O,	OP,OP,OP,OP, OP,OP
2	Creative Cleaning Services Ltd.	5	7,7,7,7,7	O,O,O,H,H	C,OP,OP,C,CT.
3	Urban Waste Management Services Ltd.	4	5,7,1.5,1.5	O,O,O,O	OP,OP,OP,OP
4	Smart City Cleaners Ltd.	3	7,4.5,10	O,O,O	OP,OP,OP
5	Envigienic Bin Services	3	3,3,3	O,H,H	OP, OP, OP
6	Bio Bins Services	4	7,10,7,1	O,O,O,O	C,C,C,OP
7	Garbage.com	5	1.5,1.5,1.5,1.5 ,1,	O,O,O,O,O	OP, OP, OP, C, C.
8	Mazingira Bins	1	4,	O	CT.
9	Riruta Evironmental Group	3	7,7,7	O,O,O	OP,OP,OP
10	Jewaka & Co.	2	7,7	O,O,O	OP,C
11	Harriz Services	2	1.5,1.5	O,O	OP,OP
12	Roc Refuse Collectors	2	7,5	O,O	OP,OP
13	Greenklean Ltd	1	8	O	OP
14	Omega Garbage Services	3	7,7,5.6	H,H,H	C,C,C
15	Binbag Services	2	7.6,7.6	O,O	OP,OP

NB: O: owned by the firm, H: Hired, OP: Open body lorry/pickup, C: Closed body lorry/pickup, CT: Closed Tipper.

Source: Author.

Most of these vehicles are very old multi-purpose lorries converted from other uses. Some of them are used for other purposes like carrying building materials and food when not being used for ferrying garbage. A good number of ex-army trucks were also noted in many fleets. Most of the vehicles were manufactured in the 1960s and 1970s. Some do not have spare parts readily available locally and if available they are not cheap (e.g. Mercedes Benz trucks).

A majority of the vehicles used are either open body lorries, or pick-ups. This can be blamed for the huge amounts of solid waste left scattered all

over the road sides whenever such a vehicle is taking garbage to the dumping sites as well as the foul smell normally associated with these vehicles (see plate 6 below).

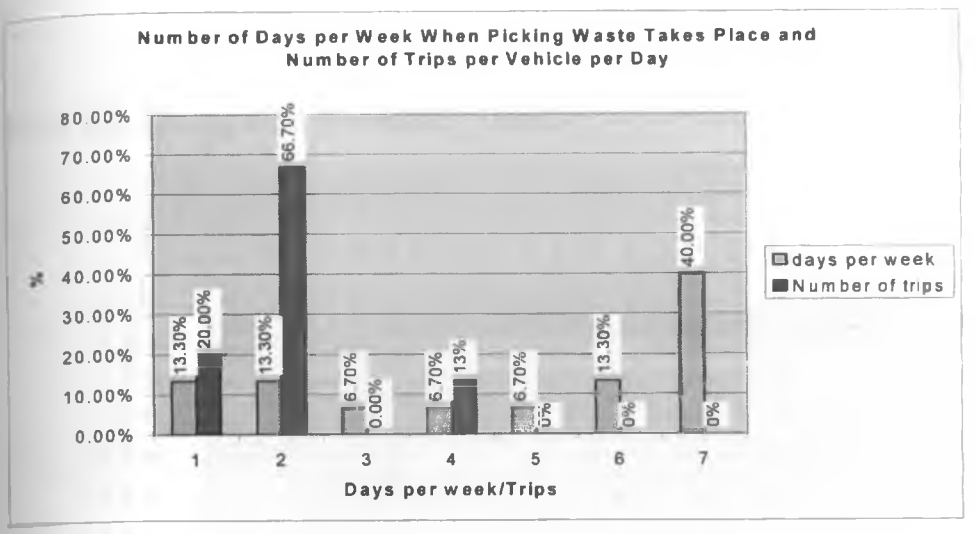
Plate 6: An Old Multipurpose Open Body Lorry Ferrying Solid Waste to The Official Dumping Site.

However most of the firms use large capacity vehicles which shows the operators' sense of economy because these large capacity vehicles enables them to achieve favourable economies of scale given that they can ferry huge loads per trip, they ensure minimal size of crew is used,

and save on fuel as compared to a large fleet of lower capacity vehicles. However there are some zones with very narrow streets with sharp corners, especially in the high-density low-income areas, where the large capacity vehicles can not penetrate and so those firms with small vehicles take advantage of this. It was also noted that most of the vehicles in use are quite old and poorly maintained leading to frequent breakdowns. Experience shows that trying to maintain such a vehicle can be highly costly [Plate 7 below shows the pathetic state of some of these vehicles being used].

Plate 7: One of the Old Trucks Being Used By the Private Sector in Solid Waste Disposal Captured on the Weighbridge at the Official Dumping Site.

Chart 24: Number of Days per Week When Picking Waste Takes Place and Number of Trips per Vehicle per Day

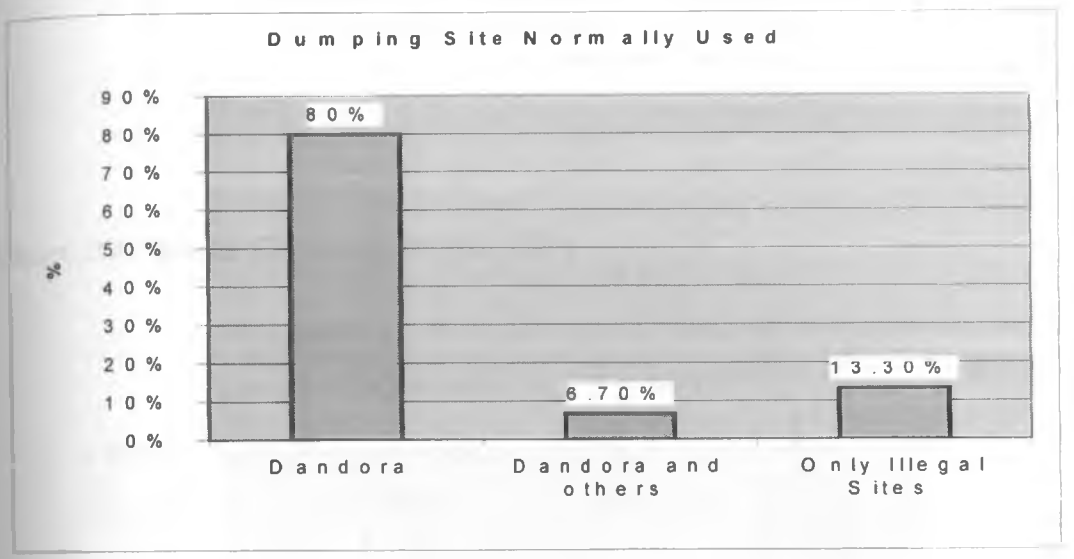


40 per cent work throughout the week with a majority of the firms (66.7 per cent) making only two trips per vehicle per day. This requires mostly workers who are paid on a piece rate basis with many working 8-11 hours shifts, hence the high number of casual employees reported earlier on. The few number of trips made per vehicle per day is attributed to the fact that most of the firms combine a large number of clients in different locations per every trip of picking solid waste made and this combined with the heavy traffic on most of the city's roads and the long distance to the dumping site takes a lot of time.

Most of the firms interviewed (80 per cent) said they normally use the official duping site but still a large proportion (20 per cent) dispose of the

waste in illegal dumping sites (see chart 25 below). This was attributed to the poor condition of the official dumping site and the long distance to be covered from far-flung areas on poor roads to the official dumpsite.

Chart 25: Dumpsite Normally Used.



Charges for tipping solid waste at the dumping sites range from Ksh 100 to Ksh 600/= per trip but 73.3 per cent of the firms interviewed said they pay between Ksh 201 and 400/= per trip (see chart 26 below). At the Dandora dumpsite, it was confirmed that charges are fixed at Ksh 140/= per pick-up load and Ksh 280/= per lorry load. However most of the firms interviewed said that there are extra charges ranging from Ksh 100-200/= payable to gangs of scavengers and other cartels at the sites before one can be allowed to offload the waste. This, they say, unfairly increases their operational costs.

Chart 26: Charges for Tipping Waste at the Dumpsite (Ksh/Trip)

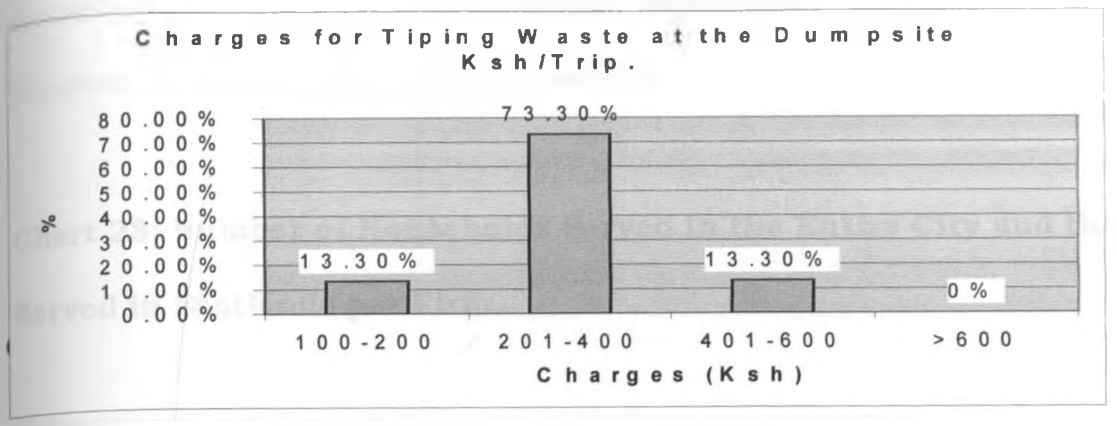
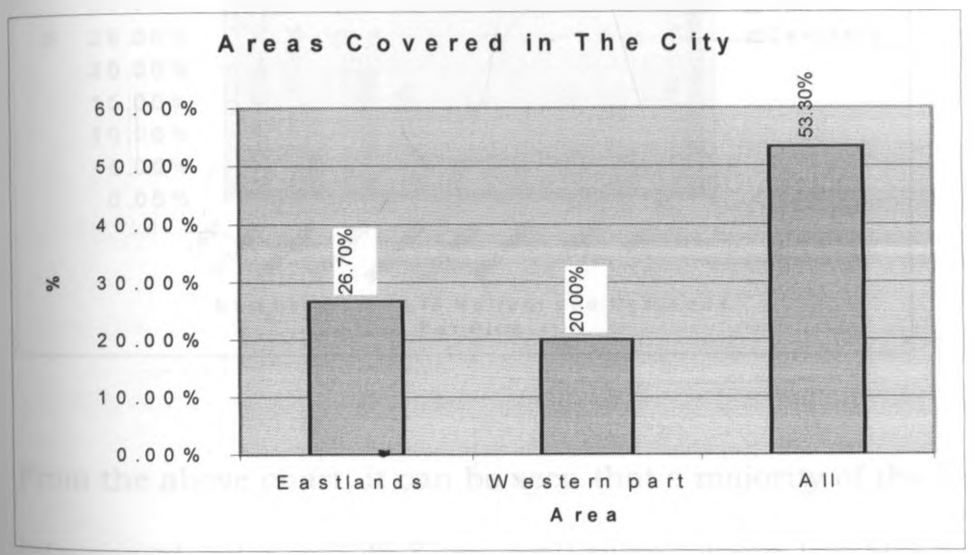


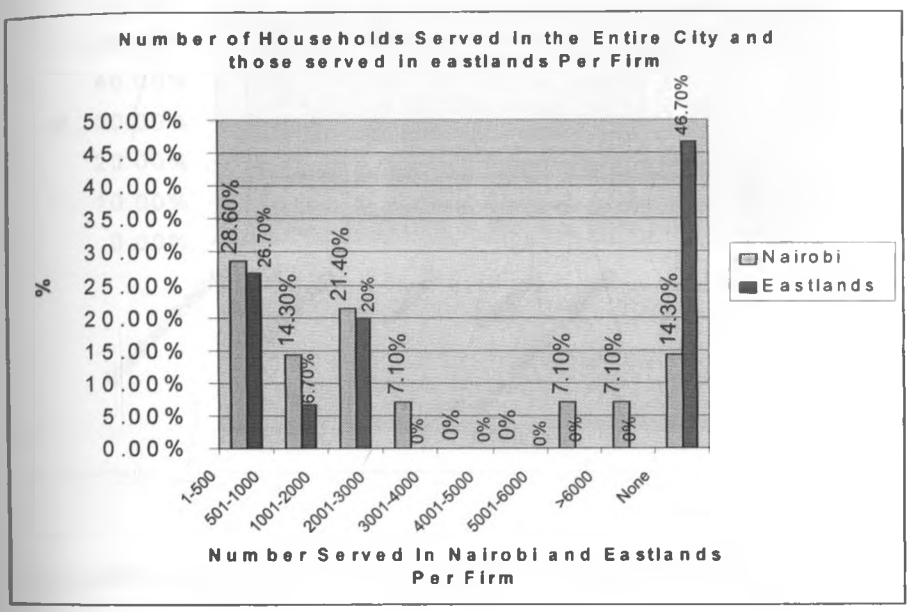
Chart 27: Areas Covered in the City



From the above chart, it can be seen that, a majority of the firms interviewed serve both the eastern and the western parts of the city and indeed 26.7 per cent serve exclusively the eastern part. However it was established that most of the firms serving eastlands do not serve households as they prefer serving only commercial institutions (see chart

28 below). They attributed this to the low payments offered by the households for the service in eastlands, high default rates, evasion of payment, insecurity and poor accessibility.

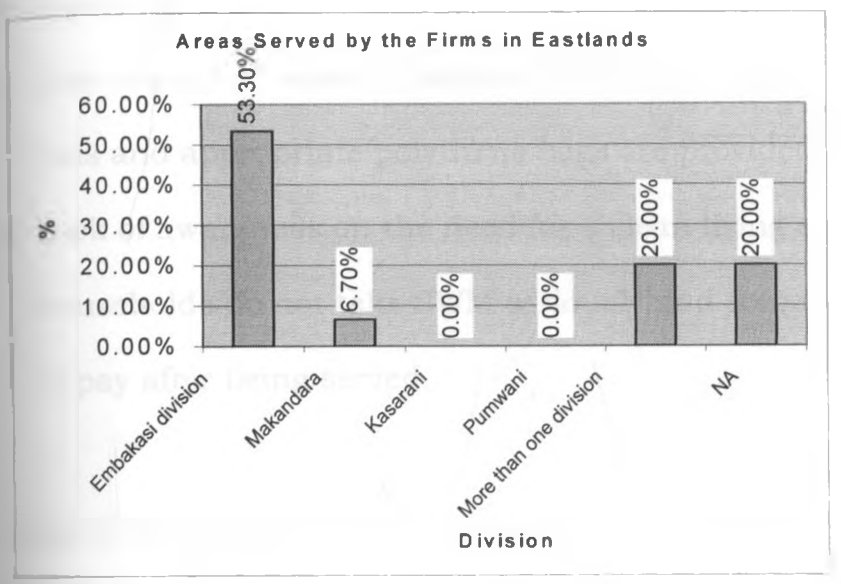
Chart 28: Number of Households Served in the Entire City and those Served in Eastlands per Firm.



From the above chart, it can be seen that a majority of the firms interviewed (28.6 and 26.7 per cent) serve a mere 1 to 500 households in both the entire city and eastlands respectively. This shows a very low coverage of domestic solid waste disposal. At the same time, although a large number of them covers eastlands, in most cases they do not serve households. It was also established that although a large number of firms interviewed serves households in eastlands they only serve the

relatively wealthy estates in Embakasi including Fedha Estate, Avenue Park, Doonholm and other neighbouring middle-income settlements (see chart 29 below).

Chart 29: Areas Served by the Firms in Eastlands

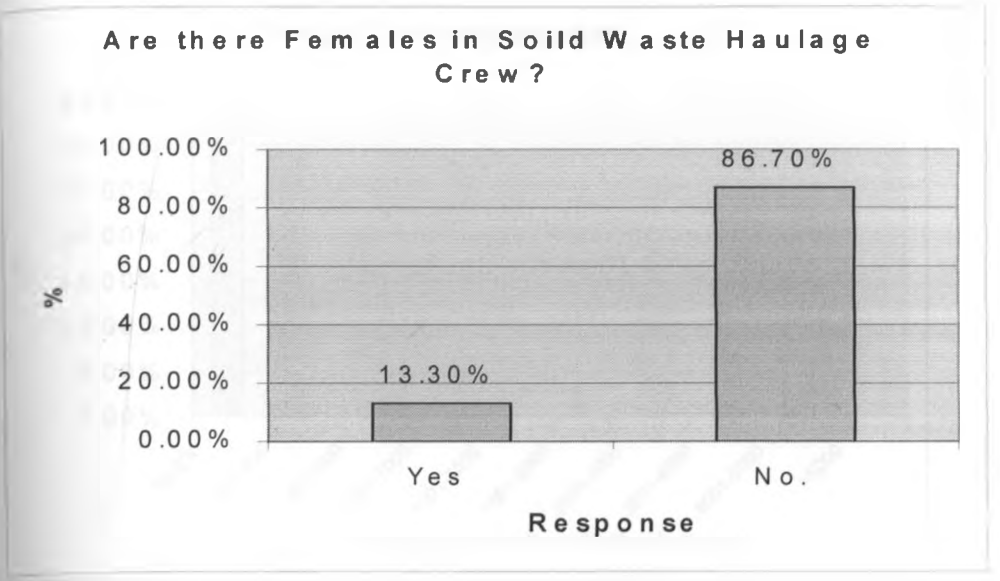


From the above chart, it can be seen that 53.3 per cent of the firms serving eastlands serve in Embakasi division, and only 6.7 per cent of them covers Makandara division while none of them exclusively serves either Kasarani or Pumwani which are among the poorest divisions in the city. It can thus be said that, there is a tendency among the solid waste disposal firms to avoid venturing into the very poor neighbourhoods. Some of the reasons cited for low coverage of the poor neighbourhoods include:

- High default rates whereby even some residents shift residences after accumulating arrears;
- Low charges;
- Difficulties in collecting user charges;
- Inaccessibility due to poor and narrow roads;
- Insecurity ;
- Poor storage of waste at source- it is only in well-off estates where bins and appropriate polythene bags are provided; and
- Lack of awareness on the need for a clean living environment- many households do not take SWM seriously and some of them even refuse to pay after being served.

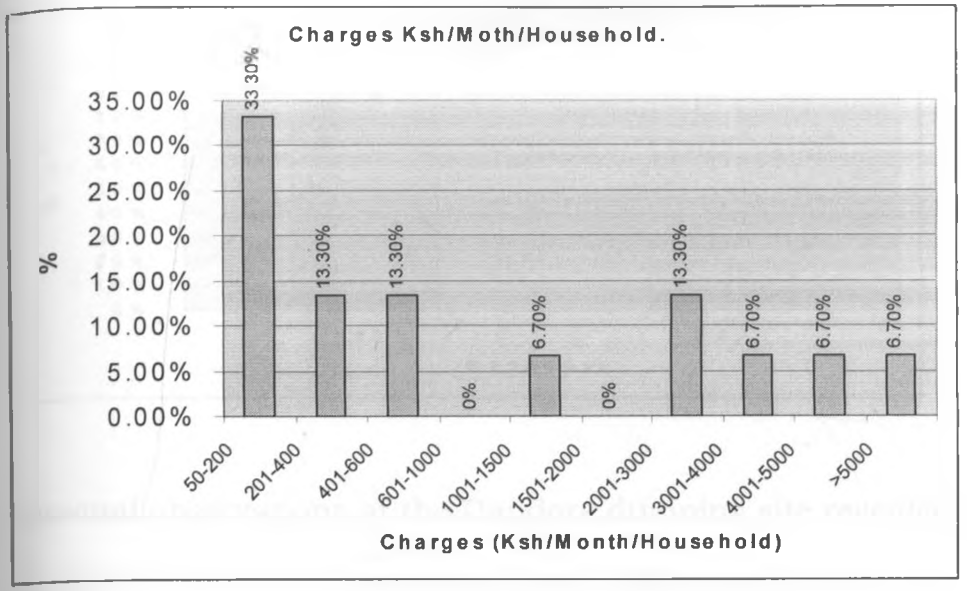
Asked if they engage female workers in garbage collection and disposal only 13.3 per cent confirmed to be having female workers among their crew (see chart 30 below). However even where engaged the number of females is normally minimal mostly ranging between 1 and 3. This further confirms that solid waste collection and disposal is a tedious job requiring young energetic men. The working conditions also tend to put off most prospective female recruits.

Chart 30: Prevalence of Females in Solid Waste Disposal Crew



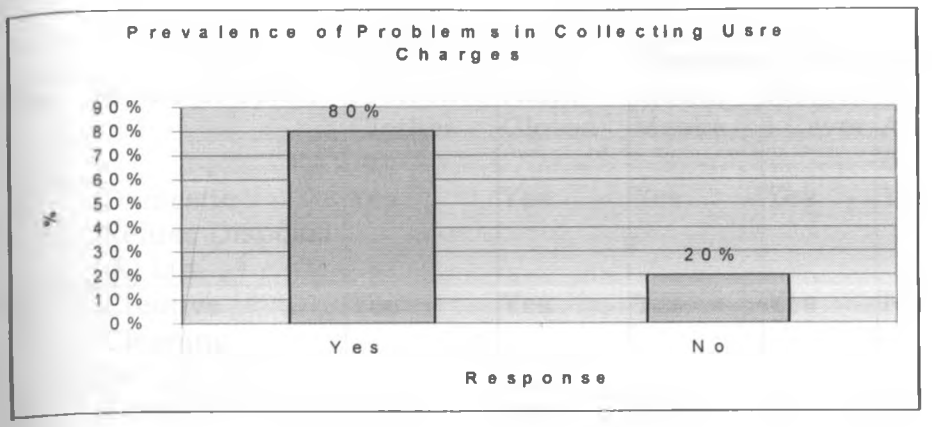
On charges, it was established that 86.7 per cent of the firms interviewed charge on a monthly basis. A majority (33.3 per cent) charge Ksh 50-200/= per household per month. However, charges vary from estate to estate depending on income levels with the very rich paying as much as Ksh 5,000/= per household per month. This trend encourages the private sector to concentrate on the higher income neighbourhoods leading to accumulation of solid waste in the low-income areas.

Chart 31: Charges Per Household Per Month (Ksh).



A majority of the firms (80 per cent) also complained of difficulties in collecting user charges even within the high-income neighbourhoods (see chart 32 below). It was also confirmed that 66.7 per cent of the firms normally insist on entering into some form of written contract with their clients. However most of these contracts rarely include clauses on the rights and obligations of each party or the kind of redress each can take in case either of them breaches the terms of the contract. This could be encouraging the increase in default cases which in turn discourages the private sector from venturing into some zones especially the very poor. This requires intensive sensitization of the city's residents on the need to pay for the service to ensure a clean living environment as well as the private firms on contract drawing and enforcement procedures.

Chart 32: Prevalence of Problems in Collecting User Charges



Personal observations at the Dandora dumping site revealed that there is a high level of awareness among the solid waste disposal crews on the need to protect themselves in the course of collecting, transporting and disposing of waste. However it was also noted that a large number of the private firms, especially those contracted by the city council, do not make provisions for protecting their crew from possible injuries or infections. [Table 13 below summarizes the level of employee welfare among the interviewed firms).

Table 13: Provisions for Private Sector Solid Waste Disposal Crew.

No.	Name of FIRM	Provided/Not Provided						
		Protective Clothes	Hand Gloves	Mouth Masks	Medical Cover	Leave Allowance	Overtime Allowance	Training
1	Domestic Refuse Disposal (K) Ltd.	Yes	Yes	Yes	Yes	Yes	Yes	Yes
2	Creative Cleaning Services Ltd.	Yes	Yes	Yes	Yes	No.	Yes	Yes
3	Urban Waste Management Services Ltd.	Yes	Yes	Yes	No	Yes	Yes	No.
4	Smart City Cleaners Ltd.	Yes	Yes	No.	Yes	Yes	No	Yes
5	Envigienic Bin Services	Yes	Yes	No	No	Yes	Yes	No
6	Bio Bins Services	Yes	No	No	Yes	Yes	Yes	No.
7	Garbage.com	Yes	Yes	Yes	Yes	Yes	Yes	Yes
8	Mazingira Bins	Yes	Yes	No	No	No.	Yes	Yes
9	Riruta Evironmental Group	Yes	Yes	Yes	Yes	Yes	Yes	Yes
10	Jewaka & Co.	Yes	Yes	No.	Yes	Yes	Yes	No.
11	Harriz Services	Yes	Yes	Yes	Yes	Yes	Yes	No
12	Roc Refuse Collectors	Yes	Yes	Yes	Yes	Yes	Yes	Yes
13	Greenklean Ltd	Yes	Yes	Yes	Yes	Yes	Yes	Yes
14	Omega Garbage Services	No	Yes	Yes	No	No	No	No
15	Bibag Services	Yes	Yes	Yes	Yes	No	No	Yes

Source: Compiled by the Author.

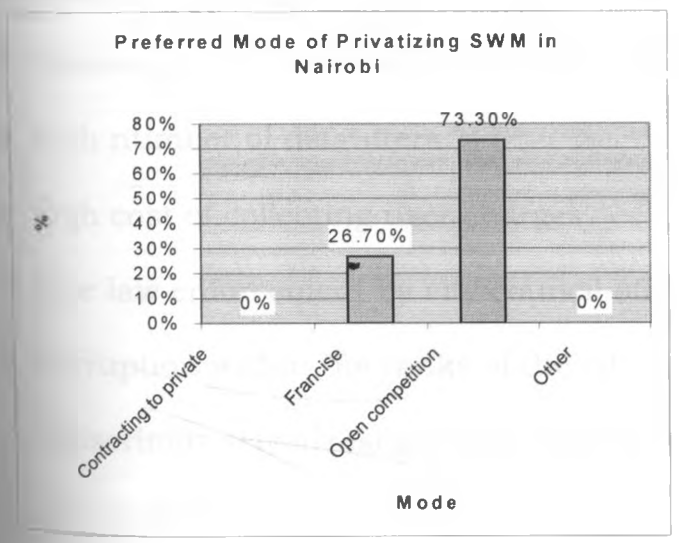
Most of the firms interviewed normally provide their crew-members with the necessary gear for collecting and disposing of garbage. However there are still some who do not provide necessities like protective footwear, mouth masks, hand gloves and protective clothes. [Plate 8 below shows

some crew-members offloading garbage at the Dandora site using bare hands and lacking most of these necessities). This exposes the crewmembers to foul smell, injury and even infections. According to personal observations made at the official dumping site, it is mostly the city council hired contractors who do not provide protective gear to their crew.

Plate 8: Private Sector Solid Waste Disposal Crew Members Offloading Garbage at the Dandora Site Using Bare Hands and Without Protective Gear.

On the preferred mode of privatizing solid waste management in the city, 73.3 per cent of the firms interviewed said open competition would be the most ideal mode of privatization (see chart 33 below). This, they argued, has the potential to lower user charges hence leading to a wider coverage of the service in the city. They are also highly skeptical about the current contracting arrangements being tried by the city council citing lack of transparency, corruption and nepotism in awarding the contracts. At the same time, 26.7 per cent of the firms interviewed preferred franchising which they said would ensure self-regulation among the various firms operating in a franchised zone for fear of losing their franchises.

Chart 33: Preferred Mode of Privatizing SWM in Nairobi.



5.4.1: Problems Faced by Private Firms in Their Operations

80 per cent of the firms interviewed said they face a myriad of problems in their operations. Some of the problems normally faced by the various firms in their operations include:

- Low payments by the clients
- Unfair competition from unlicensed firms
- Lack of capital and credit facilities
- Poor roads leading to frequent break down of trucks especially during the rainy seasons.
- Poor condition of the official dumping site
- Insecurity especially at the dumping sites.
- Harassment by gangs at the dumping sites
- High number of defaulters
- High cost of collecting user charges
- Poor law enforcement by city council officers
- Corruption within the ranks of the city council officers who indiscriminately arrest garbage collection crews and unnecessarily detain their trucks.
- Lack of training opportunities – however two of the private sector operators interviewed said they have had a chance to travel to Tanzania, Mali and other developing countries through the support of

NGOs to learn best practices in SWM and they are quite happy about it. Some of them are even embracing garbage recycling after such exposure. However they say that such training chances are hard to come by.

CHAPTER SIX: CONCLUSIONS, RECOMMENDATIONS, AND FURTHER RESEARCH OPPORTUNITIES.

6.1: Introduction

This section contains conclusions, key research proposals aimed at improving private sector participation in SWM in Nairobi and further research opportunities. The research proposals were derived from a synthesis of the main research findings contained in the preceding chapter on the households, the City Council and the private sector. The idea was to seek solutions from the three key participants in SWM in the city in a participatory manner aimed at reaching a consensus towards better SWM service delivery in the city.

6.2: Conclusions

This research work has established that willingness to pay for private SWM services in Nairobi is there especially among the high and middle-income areas. This is an opportunity that can be taken advantage of in any planned privatization programme. However due to inability to pay for competitively priced private sector services as well as lack of well-organized monitoring and control mechanism in the local government, a three-tier privatization process is recommended. This should involve

open competition within the high-income areas, franchising in the middle income areas and contracting backed with normal city council operations and tight controls and regulations within the poor areas. There is also need to support the private sector through funding and other fiscal or monetary policies aimed at making acquisition of better equipment more affordable as well as training. There is also need to sensitize the city residents on the need to minimize solid waste generation, need to sort solid waste at source, need to re-use or recycle waste and the need to pay for private sector services. Generally there is a role for the private sector to play in riding the city of its accumulating heaps of garbage. What the sector lacks is the capacity, coordination and policy guidelines together with law enforcement to ensure compliance with the environmental laws governing solid waste handling in the city.

6.3: Recommendations

A synthesis of the key findings from the three main sectors established that contracting which is currently being tried by the city council is riddled with corruption and nepotism within the city council. On the other hand low returns, unfair competition from unlicensed firms and difficulties in collecting user charges hampers smooth penetration of the private sector into the very poor zones of the city through open competition. Open competition is also ruled out in the poor zones mainly

due to lack of proper monitoring and controls, which leads to illegal dumping of waste. As a result a three tier process is recommended whereby contracting combined with normal city council operations, use of Community Based Organizations (CBOs) and awareness creation is carried out in the very poor areas, franchising is used in the middle-income areas and open competition in the wealthy zones. Franchising in the middle-income zones will ensure self regulation among the franchised firms out of fear of losing their franchises hence they are likely to be more cautious in their operations. Open competition would work more efficiently in the wealthy areas where the willingness and the ability to pay are well grounded. It is also likely to translate into lower charges. There is also need to support the private sector through funding, lower taxes on equipment and training. However for competition to be effective, there should be a level playing field because if one of the competitors gains unfair advantage over the others, the disadvantaged players are likely to withdraw. The final result is that there is no effective competition. The city council should also intensify monitoring and control over the franchised, contracted or the competing entities to ensure compliance with the set down rules as well as to avoid collusion and price setting.

Further recommendations are as follows:

1) Foremost, there is need to change the existing environmental laws to enable the various private firms engaged in SWM in Nairobi to embrace SWM recycling and re-use. Currently the law forbids anyone from ferrying SW such as biodegradable materials for re-use on farms and gardens in the city's surrounding farmlands without a license to do so. Many a private firms representatives interviewed cited incidences when they have been arrested and prosecuted by the city council's law enforcement officers while ferrying biodegradable materials (including grass for feeding their cows) to their farms on the grounds that they indent to dump the waste illegally.

2) Private SWM firms should be allowed to built and operate their own SW dumping sites and landfills either through Built-Own - Operate (BOO), Built-Operate - transfer (BOT) or Built-Own-Operate -Transfer (BOOT) arrangements. Given that most of them are still too young and financially unstable, they should be encouraged to come together to pool funds for acquiring private land and building such facilities. This will help in achieving a complete decentralization of SW dumping sites so as to shorten the distance covered from the various SW sources to the dumping sites hence lowering the cost of disposing of the waste. It makes no economic sense to ferry SW over 15 kilometres when it can be disposed of within much shorter distances from the source.

3) There is need to identify strategic donor partners who can help in funding special purpose SWM vehicles for the operations of the growing private sector. There is a general consensus among the private sector actors that they are all financially constrained and so it will be highly difficult for them to invest in modern special purpose SWM vehicles without either cheaper credit or some donor funding.

4) There is need to change the existing public procurement laws to ensure speedy and transparent procuring of private sector services. Currently, the procedure involves tendering by way of purchase of expensive tender documents, which are open to abuse by senior procurement officers. The private sector is complaining that most a time they are forced to purchase these documents and lodge their bids with the local authority only to find out later that only the well connected were short-listed as the sole suppliers of the service. The cost of such tender documents has risen to as high as Ksh 20,000 yet one is not guaranteed that he/she will be awarded the contract. As such, the private sector deems this a waste of funds and time. A change in the procurement laws should also be complemented by more strict anti-corruption laws while the Kenya Anti-Corruption

Commission (KACC) should be given more powers to prosecute corrupt public officials.

5) There is need to lower duty on special purpose SWM vehicles as well as need for consideration to subsidize their costs so as to make it easy for the private sector to acquire these important equipment for better delivery of SWM service in the city. Currently most private firms use old vehicles, which were meant for other uses. This is mostly caused by the high cost of importing special purpose vehicles, inhibiting rates of interest on credit and complex credit arrangement procedures and requirements.

6) It has also been observed that whenever the government identifies SWM training opportunities, especially outside the country, it is only the senior government officials who are given a chance to attend such training sessions. This amounts to sending the wrong people for training, as the real solid waste managers especially in the private sector are never given such a chance. There is need to involve the key participants in SWM training to expose them to best SWM practices being undertaken in other cities in the world. We should stop viewing them as passive participants in SWM and aggressively involve them in SWM workshops, seminars and other

training activities to ensure that they get a chance to learn by experience how to handle SWM in the city.

7) There is also need to ban production and use of the very low-density polythene paper bags. Most private sector representatives expressed their concern over the fact that transporting this material has proved highly difficult because most of it ends up being blown off the open trucks by wind hence causing littering along the roads. Given that these materials are not recyclable, when mixed with other waste materials at the dumping site, they make the rest of the waste difficult to separate and recycle or re-use.

8) There is need to create awareness among the city residents on the need to separate SW at the source, as well as re-use and recycling of solid waste. This can go a long way in saving money and resources. Currently, most of the waste dumped at the Dandora site is a mixture of valuable and toxic as well as non-recyclable material making it difficult to separate in its current condition. Indeed even farmers have not been able to use any of the completely decomposed material as compost, given that most of it contains toxic material, which can pollute their farms. Maybe there should even be law barring anybody from storing or transporting unsorted waste. If we are to allow the currently growing throwaway culture to continue

then we should expect the amount of waste dumped to keep on increasing requiring more resources to get rid of.

9) There is also need to sensitize the city's residents on the need to pay for private SWM services for the sake of ensuring a safe and clean living, work and leisure environment. This should start with the councilors who are believed to be having a lot of influence on the residents because they are the ones who advise the city residents that SWM should remain the mandate of the city council as a vote wooing strategy. The next important target in sensitizing the city residents on the need for waste minimization, sorting and re-use as well as the need to pay for private service would be the mothers in the households who together with their house-helps know better where the household's daily waste generation ends up.

10) For any new policies to succeed, there is need for more law enforcement officers at the city council. There is also need to re-train these officers on the existing environmental laws. Without proper enforcement of the law, illegal dumping will continue taking place because most private firms will always be tempted to save on transport costs by dumping on the nearest open space from the source. The law enforcement officers also need further training on environmental law to ensure that they keep abreast with all the

existing and future SWM laws for better enforcement of the law to take place. Of concern here also is the way both public and private solid waste workers are subjected to unhealthy working conditions and poor social and health care services. Proper equipment and protective clothing should be made mandatory for solid waste handlers both in the private and the public sector. Proper clothing and better equipment may also not only help to "professionalize" the work of waste pickers but may also help to alleviate the social stigmatization which is often associated with waste work.

11) There is also need to ensure proper management of the official dumping site. Currently, waste has been allowed to spread over the whole 26.5 hectares of land encroaching not only on people's homes but also the Nairobi River. The roads within the dumpsite have also been neglected causing costly damage to vehicles. This encourages illegal dumping elsewhere. The site is also crisscrossed by a number of underground water and sewer lines, which make maintenance of the roads impossible. These lines should be mapped and re-routed to avoid contaminating especially the water supply leading to people's homes beyond the dumpsite. The newly installed weighbridge is also under-manned with only two data entry clerks who work for long hours without rest. This is likely to encourage laxity and lead to poor data entry and retrieval hence compromising

the purpose of the weighbridge. There is also need to beef up security at the dumping site to ensure that any licensed private firm wishing to dump there does not have to pay extra protection fee. Currently many a private firms do not go to this site due to the extra costs and harassment by the well-organized cartels of scavengers and other gangs. The waste should be confined to the centre while sanitary landfills should be established on one side complete with leachate ponds where leachate should be treated before it is discharged into the river. Moving the site to far-flung areas might in the long run prove to be a poor strategy due to possible high transportation costs, which might encourage further illegal dumping of waste.

12) There should also be a deliberate attempt to introduce and promote other non-regulatory instruments in the management of SW in the city. These may include use of deposits on returnable packaging materials like bottles and paper bags. It is hopped that these instruments can greatly reduce the amount of waste reaching our dumping sites.

13) Any privatization effort should consider the existing variations in the ability to pay for private SWM services in the city. While the high and middle-income groups are willing and able to pay for private

services, the very poor may not be able to pay yet their neighbourhoods are the most congested. It should be remembered that 60 per cent of Nairobi's residents live on a mere 5 per cent of the city's land mostly in the city's eastlands area. Consequently, the poor areas should be zoned and contracted service providers appointed to serve these areas with the full support of the normal city council operations together with aggressive monitoring and controls. The private sector believes that it is not easy to collect user charges directly from the poor even where they claim to be willing to engage the private sector. CBOs operating in specific neighbourhoods can also complement the efforts of the contracted firms. In the well off areas, open competition should be encouraged with the hope that with proper regulations, it will lead to lower charges for the service with possible widening of SWM service coverage.

14) All existing illegal dumping sites should be regularized and properly managed. Most of these are on private land and so will be easy for the interested private firms to acquire through open market systems. This can be supported through appropriate funding strategies to enable the private sector Built, Own and operate (BOO) these facilities. Most of the private firms interviewed expressed their desire to operate their own dumpsites at different locations in the

city to ease congestion at the Dandora site and also to minimize on transport costs. This can also translate into lower charges on the residents. However participation of the city residents in the design, development and operation of such facilities is important. While adjacent residential population may understand the need for such facilities, they would in most cases rather have them located elsewhere due to the common "Not In My Back Yard" or "NIMBY" attitude especially among the residents in the well off areas. Overcoming this attitude requires general public understanding of the requirements of waste management, effective communication and participation of the concerned community in siting decisions.

15) There is also need to guarantee the private sector that their operations are legally recognizable and that there is a future and possible financial stability in the business. Most of private firms interviewed viewed the business as a temporary venture with no future and so tend to employ temporary staff who can be laid off any time the business shows signs of collapsing. They also make use of old multipurpose vehicles, which can always be diverted to other uses if the core business ceases to be profitable. Indeed most of the private firms interviewed expressed their concern that political changes can cause uncertainty and changes in the contractual arrangements. The local government should provide some guarantee

on stability and continuity of contracts. This can be achieved through longer contract durations and restrictions regarding formation and termination of contracts to help maintain service arrangements even in the face of political turbulence. This can also help the private sector to mobilize long-term credit for acquisition of better vehicles and equipment.

16) Accountability on the part of the private sector can be built on well-structured contractual agreements, enforcement of terms of contracts and a clear understanding that there will be financial penalties if expectations are not met. This can be backed by encouragement of use of micro-enterprises who draw workforce from the communities being served as such workers feel accountable towards their neighbours who know them well and expect a fair and satisfactory service from them. The mushrooming of such micro-enterprises and CBOs in Kariobangi South and Kibera is a clear testimony to this requirement.

17) Extending the city's boundaries to cover all the neighbouring areas in Kiambu, Thika, Machakos and Kajiado which consist of mainly urban population using the city's services for free can go a long way in ensuring that these people contribute to the total cost of providing such services like SWM in the city. These areas could be

much better administered within the lager cosmopolitan region if acquiring land from these zones for extra dumping sites is to be made easier. Currently most of the land in these areas falls under the jurisdiction of different local authorities who will always block any attempt by the city council to acquire land for dumping waste in their regions.

18) It also emerged that most of the private sector firms involved in SWM in Nairobi are members of at least an organized association. However there is no single central professional association bringing these firms together. It is not easy to monitor and regulate such an amorphous group of business ventures. It would be easier to monitor, regulate and control the operations of these firms and even encourage self-regulation if they were brought together into a recognized organization with own codes of ethics and charging standards. This could also help standardize charges for the benefit of both the clients and the firms.

19) The main cause of the current financial constraints at the city council have been traced to poor and outdated rating laws mainly The Valuation for Rating Act and The Rating Act. These should be amended to ensure that valuation rolls are reviewed much more frequently to continuously capture newly acquired property rights as

well as the rapidly rising property values. Rates recovery procedures should also be reviewed to ensure a higher rate of compliance given that rates taxation is already a well accepted tax system in the country.

6.4: Further Research Opportunities.

The following are some of the identified possible further research areas that may help in shedding more light on the problem of solid waste management in Nairobi and more so the role of the private sector in SWM in the city.

A functional interaction analysis between Nairobi and its surrounding districts can help in identifying the extend of influence the City has on its neighboring regions just in case the city's boundaries are to be extended to bring these regions into its boundaries. This will also help in determining the actual demand for services in the city given that currently, the exact number of people to be planned for in the city is not yet known. Gravity model is one of the analytical tools that can be used here.

There is a growing number of CBOs involved in SWM especially in the poor areas of the city whose role is yet to be established. Some have the

tendency to dump solid waste on the nearest open space away from the eyes of the residents. A good example is an NGO operating in Kayole, a planned high-density low-income neighbourhood within the Embakasi division, which has been dumping waste in rivers passing through the neighbourhood. Other similar cases were recorded in Kibera where although the inner areas of the slum look rather clean, most of the garbage generated ends up in the nearby rivers and the Nairobi Dam.

The existing illegal dumpsites are located mostly in the low-income neighbourhoods and so far no organized resistance to their existence has been raised. An in-depth investigation needs to be carried out to determine the acceptance level of these dumpsites by the local communities before they are considered for regularization. This will help to avoid possible future conflicts with the neighbouring communities.

There are various CBOs and private enterprises involved in recycling of solid waste in the city but still very little waste ends up being recycled. There is need to investigate the possibility of assisting these agencies to set up large scale recycling plants as well as the possibility of securing a sustainable market for their products.

Mathematical models can help in determining the exact distance over which garbage should be transported in the city if we are to establish the

possible location of the most economically and environmentally sustainable landfills and transfer stations. This calls for determination of the best routing of waste from the various sources in the city.

The actual cost of establishing and operating various sizes of garbage landfills as well as their possible economic life also needs to be established. This can help in determining the amount of funds required as well as assist in seeking donor funding for such projects.

Bibliography

1) Alden J. & Morgan R. (1974): Regional Planning: A Comprehensive View, Leonard Hill Books, London.

2) Ayenew M (1999): The City of Addis Ababa: Policy Options for the Governance and Management of a City With Multiple Identity; *Forum for Social Studies Discussion Paper No. 2 of December 1999.*

3) Ayeni B (1981): Lagos in M. Pacione, et al, Problems and planning in Third World Cities; ST. Martins' Press, New York.

4) Bartone, C.R., L. Leite, T. Triche and R. Schertenleib (1991): Private Sector Participation in Municipal Solid Waste Service: Experiences in Latin America. Waste Management & Research, No. 9, 1991.

5) Bubba N & Lamba D (1991): Urban Management in Kenya: *Environment and Urbanization.*

6) Cointreau-Levine S & Coad A. (2000): Guidance Pack: Private Sector Participation in Municipal Solid Waste Management, Swiss Centre for Development Cooperation in Technology and Management, Switzerland.

7) Cointreau-Levine S (1994): Private Sector Participation in Municipal Solid Waste Services in Developing Countries, published for the Urban Management Programme by the World Bank, Washington D.C.

8) Cointreau-Levine Sandra (1995): Private Sector Participation in Municipal Solid Waste Services in Developing Countries; Volume 1:

Informal Sector, Urban Management Programme Discussion Paper No. 13, The World Bank, Washington D.C.

9) Daily Nation (5th June 2006), Nation Media Group, Nairobi.

10) Dillinger W (1988): Urban Property Taxation in Developing Countries; Working paper No. 1, Washington D.C. August 1988.

11) Friedmann J. (1966) : Regional Development Policy: A Case Study of Venezuela , The MIT Press, Cambridge, Massachusetts.

12) Furedy M (1990): Social Aspects of Solid Waste Recovery in Asian Cities; Environmental Sanitation Reviews, No. 3, Bangkok, Thailand, 1990.

13) Gerlagh R, Beukering P.V, Verma M, Yadav P.P & Pandey P (1999): Integrated Modeling of Solid Waste in India- *CREED working paper series No. 26 of March 1999.*

14) Gilbert, R, Stevenson D, Girardet H, and Stern R (1996) : Making Cities Work: The Role of Local Authorities in Urban Environment (London, Earthscan Publications Ltd.).

15) GOK (1968): The Local Government (Adoptive By-laws) (Building Order). Government Printer, Nairobi.

16) GOK (1968): The Local Government Act, Government Printer, Nairobi.

17) GOK (1981): Kenya Population Census 1979, Central Bureau of Statistics, Nairobi

18) GOK (1984): The valuation for Rating Act Government Printer, Nairobi.

19) GOK (1986): The Rating Act, Government Printer, Nairobi.

20) GOK (1994): Kenya Population Census1989, Volumes I & II, Central Bureau of Statistics, Nairobi

21) GOK (1996): The Physical Planning Act, Government Printer, Nairobi.

22) GOK (1999) The environmental Management and Coordination Act, Government Printer, Nairobi.

23) GOK (2001): 1999 Population and Housing Census, Volumes I & II Central Bureau of Statistics, Nairobi

24) GOK (2002): The Water Act, Government Printer, Nairobi.

25) GOK (2003): Geographic Dimensions of Well-being in Kenya, Where Are the Poor? From Districts to Locations, Volume 1, Central Bureau of Statistics, Nairobi.

26) IDB (2003): " Economic Instruments for Solid Waste Management: Global Review and applications for Latin America and the Caribbean", Environment Network regional policy dialogue study series, Inter-American Development Bank, Washington DC.

27) Ikiara M. M., Karanja A. M., & Davies L. (2004): " Collection, Transportation and Disposal of Urban Solid Waste in Nairobi", in Baud I. J., Pst & Furedyc (eds.), Solid Waste Management and Recycling: Actors, Partnerships and Policies in Hyderabad, India and

Nairobi Kenya, Chapter 4, Kluwer Academic Publishers, Dordretch, The Netherlands.

28) JICA (1998): The Study on Solid Waste Management in Nairobi City in the Republic of Kenya, Japan International Cooperation Agency.

29) Kantai P. (2000): The Treasure Buried in Nairobi's Dumps ,The East African 18th December 2000, Nairobi.

30) Kasarda J. D. & d. a. Rondinelli (1990): Mega-Cities, the Environment and Private Enterprise: Towards Ecologically Sustainable Urbanization; Environmental Impact Assessment Review, 10:393-404.

31) Kaseva E. M & Mbuligwe E. S (2005): Appraisal of Solid Waste Collection Following Private Sector Involvement in Dar es Salaam City, Tanzania: *Habitat International, Elsevier, June 2005, 253-366.*

32) Kim p in Association With Mazingira Institute (1998): Community Based Waste Management for Environmental Management and Income Generation in Low-Income Areas: A case Study of Nairobi, Kenya , Urban Agriculture Notes, March 1998, (City Farmer Canada's Office of Urban Agriculture).

33) Klundert A & Lardinois I (1995): Community and Private (formal & informal) sector involvement in Municipal Solid Waste Management in Developing Countries: A Paper Prepared for Discussion at the "Ittingen Workshop" Jointly Organized by the Swiss Development Cooperation (SDC) and Urban Management Programme (UMP) in Ittingen, Switzerland, 10-12 April 1995.

34) Majani, O.P. (1991): "Solid Waste Management in the Markets" A Paper Presented at the 17th WECD Conference, Nairobi, Kenya, 19th-23rd August, 1991.

35) Maleche Z. (2004): Approaches and Framework for Regional Development; Paper Prepared for the UNCRD Training Workshop on Stakeholders Consultants in Regional Development Planning and Plan Preparation in Ewaso Ng'iro North River Basin, 10-11th August, 2004, Nanyuki, Kenya.

36) Mbui, P.M. (1995): The Role of Community Participation in Residential Solid Waste Management: The Case for the Urban Poor, Nairobi; Unpublished M.A (Planning) Thesis, University of Nairobi, Nairobi, Kenya.

37) Miller G. Tyler Jr. (1979): Living in the environment (2nd Ed.), Wadsworth Publishing Co, California.

38) Muthoni A.M. (1999): Community Participation in Solid Waste Management Within Urban Informal Settlements: A case Study of Kibera, Nairobi. Unpublished MA (Planning) Thesis, University of Nairobi, Kenya.

39) Mwaura P. M. (1991): An Assessment of the Management of Garbage Collection and Disposal in Nairobi ; Unpublished M.A (Planning) Thesis, University of Nairobi, Kenya.

40) National Center for Resource Recovery, Inc. (1973): Municipal Solid Waste Collection , Lexington Books, Lexington.

41) Nazih E.J,(2000): Regional Study on Policy and Institutional Assessment of Solid Waste Management in Five Countries- Cyprus, Egypt, **Lebanon**, Syria, Tunisia; Regional Activity Centre, Blue Plan-Lebanon Final Report,

42) NCC Official Web site (see http//www.nairobicity.org/departments)

43) Ngayu M (1997): Community Participation and Local Development; paper presented at the MELSSA Workshop in Dakar, Senegal, 19-21 Nov. 1997.

44) Obudho R.A & Aduwo (1988): "The Role of Nairobi in Spatial Planning in Kenya, Towards a Planning Alternative", First International Conference on Urban Growth and Spatial Planning in Nairobi.

45) Obudho R.A and G.A. Aduwo (1992): The Nature of the Urbanization Process and Urbanism in the City of Nairobi, Kenya. *African Urban Quarterly, 5/(1/2): 50-62.*

46) Obudho R.A. (1997): Nairobi: National Capital and Regional Hub, in Racodi C. (ed.1997): The Urban Challenge in Africa: Growth and Management of its Large Cities, United Nations University Press, Tokyo.

47) Oepen M. (1993): Scavengers and Recycling in Indonesia; GATE, No. 1. 1993.

48) Olima, W.H.A (2001): "The Dynamics and Implications of Sustaining Urban Spatial Segregation in Kenya- Experiences from Nairobi Metropolis", A Paper Presented at the International Seminar on Segregation in the City Held at Lincoln Institute of Land Policy in Cambridge, MA, USA, July 25-28, 2001.

49) Schubeler P., in collaboration with Wehrle K., & Christen J. (1996): Conceptual Framework for Municipal Solid Waste Management in Low-income Countries: working paper number 6 of August 1996, Swiss Center for Development Cooperation in Technology and Management (SKAT), Berne.

50) Sicular D. T. (1991): Pockets of Peasants in Indonesian Cities: the Case Study of Scavengers; World Development 19 (2/3) of 1991.

51) Situma, FDP (1992): "The Environmental Problems in the City of Nairobi", African Urban Quarterly, Vol. 7 Nos. 1 & 2, February 1992.

52) Smoke P (1994): Local Government Finance in Developing Countries: The Case Study of Kenya , Oxford University Press, Nairobi.

53) Syagga P (1992): Problems of Solid Waste Management in Urban Residential Areas in Kenya; in The Proceedings of African Research Network for Urban Management (ARNUM) Workshop: Urban Management in Kenya, Malombe J (ed), University of Nairobi, August 20, 1992.

54) The World Bank (1992): World Development Report, Oxford University Press, New York.

55) The World Bank (1993): World Development Report, Oxford University Press, New York.

56) The World Bank (1994): World Development Report, Oxford University Press, New York.

57) UNEP (2005): Selection, Design and Implementation of Economic Instruments in the Solid Waste Management Sector in Kenya- *The Case of Plastic Bags*, UNEP, Nairobi.

58) United Nations Center for Human Settlements (1996): *An Urbanizing World, Global Report on Human Settlements,* UNCHS, Nairobi.

59) United Nations Center for Human Settlements (1998): Financing Cities for Sustainable Development: With Specific Reference to East Africa, UNCHS, Nairobi.

60) United Nations Center for Human Settlements (1998): Privatization of Municipal Services in East Africa: A Governance Approach to Human Settlements Management, UNCHS, Nairobi.

61) United Nations Center for Human Settlements (2001): The State of the World Cities, UNCHS Habitat Publication Unit, Nairobi.

62) United Nations Centre for Human Settlements (Habitat) (1999): Basic Facts on Urbanization; Habitat Publications Unit, Nairobi, Kenya.

63) United Nations Centre for Human Settlements (Habitat) (2001): The State of the World Cities; Habitat Publications Unit, Nairobi, Kenya.

64) United Nations Population Division (UNDP)(2004): See www.un.org/esa/population/unpop.htm.

65) Wunsch J. S (1991): Institutional Analysis and Decentralization: Developing an Analytical Framework for Effective Third World Administrative Report; in Vol II of *Public Administration and Development, 431-451, New York, Johnson Wiley & Sons.*

APPENDIX 1: QUESTIONNAIRE-HOUSEHOLD SURVEY

UNIVERSITY OF NAIROBI

DEPARTMENT OF URBAN AND REGIONAL PLANNING

THESIS TITLE: TOWARDS A POLICY FOR BETTER PRIVATE SECTOR PARTICIPATION IN SOLID WASTE MANAGEMENT IN NAIROBI CITY - KENYA.

Any information provided during the study shall be kept confidential and used for academic purposes only.

Name of interviewer.....
Date of interview .....
Place of interview.....

QUESTIONNAIRE: HOUSEHOLD SURVEY.

1) Parliamentary constituency within which the residence falls.....

2) Estate's name.....

3) What is the household size (number of members).....

4) Please state the highest level of education attained by the household head.....

5) Please state the household head's income per month (Kshs):

- 0-5000
- 5001-10000
- 10001-15000
- 15001-20000
- 20001-30000
- 30001-40000
- 40001-60000
- 60001-80000
- 80001-100000
- Over 100,000

6) Please state the size of residential unit occupied:

- single room,
- bed sitter,
- 2 rooms,
- 1 bedroom,
- 2 bedrooms,
- 3 bedrooms,
- 4 bedrooms,
- 5 bedrooms,
- 6 bedrooms,

7) Please state the amount of rent paid (or payable for similar unit) per month (Ksh)

- 100-500
- 5001-1000
- 1001-2000
- 2001-4000
- 4001-6000
- 6001-8000
- 8001-10000
- 10001-20000
- 20001-40000
- 40001-60000
- 60001-80000
- Over 80000

8) Please state the quantity of solid waste generated per day (to be weighed) (Kgs).....

9) What is the major component of solid waste generated:

- Paper
- Food
- Glass
- Plastic
- Other (specify).

10) How do you store your solid waste awaiting disposal –

- dump outside
- use polythene paper bag
- use metallic dustbin
- use plastic bin
- other (specify)

11) Are you aware that poor disposal of solid waste can be harmful to your health? Yes/No.

12) What mode of solid waste disposal do you normally use?

- NCC
- Private company
- Burnt within the estate
- Community Based Organization
- Dump outside.
- Other (specify).....

13) If you are served by private firm please state charges **per month** (Ksh).....

14) If not served by private company please state why.....

15) Would you be willing to pay for disposal by a private company - Yes/No.

16) If yes up to how much per month (Ksh)?.....

17) Do you separate waste (sort) at source Yes/ No.

18) Do you recycle solid waste or re-use solid waste... Yes/No.

19) What is the frequency of disposal?

- Daily
- Once a week
- Twice a week
- Thrice a week
- Four times a week
- NA.

20) Are you satisfied with the current mode of disposal... Yes/No.

21) Which of the following arrangements would you prefer towards enhanced Solid Waste Management service delivery in Nairobi?

- ❖ Contracting to private firms to be paid by the city council who will collect user charges.
- ❖ Open competition for clients by private companies with private companies determining and collecting user charges.

- Franchise (with license paid for) to private companies to operate in specific zones collecting user charges from service users on their own but with regulations from NCC.
- Should be done purely by the city council.

APPENDIX 2: QUESTIONNAIRE- PRIVATE SOLID WASTE MANAGEMENT FIRMS IN NAIROBI

UNIVERSITY OF NAIROBI

DEPARTMENT OF URBAN AND REGIONAL PLANNING

THESIS TITLE: TOWARDS A POLICY FOR BETTER PRIVATE SECTOR PARTICIPATION IN SOLID WASTE MANAGEMENT IN NAIROBI CITY-KENYA.

Any information provided during the study shall be kept confidential and used for academic purposes only.

Name of interviewer.....
Date of interview .....
Place of interview.....

QUESTIONNAIRE: SOLID WASTE MANAGEMENT FIRMS IN NAIROBI

1) Name of the firm:.....

2) Physical address .....

3) Postal address.....

4) Date of registration/incorporation.....

5) Ownership .....(sole/partnership/incorporated).

6) Are your firm's operations licensed by the local authority?
.....yes/No.

7) Are you a member of any association? ..... Yes/No.

8) If yes please provide the name of the association.....

9) If No please give the name (s) of any existing association to which you would fit to be a member for the purpose of better carrying out of your operations.....
.....

10) Please state the number of employees in your firm.....

11) Please indicate the number of those engaged in solid waste collection and disposal.....

12) Please indicate the average age of your solid waste collection and disposal staff (years).....

13) Please state those on permanent employment and those engaged on casual basis ..

(a) Number permanently employed.....
(b) Number engaged on casual basis.....

15) Please give the total number of vehicles used in solid waste haulage in your firm.....

16) Please indicate the total number of other vehicles in use in your firm.....

17) Please fill in the following table giving all the details where provided.

Number.	Vehicle registration number	Year of manufacture.	Make	Owned by the firm/hired (specify)	Used for solid waste haulage	Used for other purposes	Approximate capacity (tonnage)	Type eg. open body tipper, closed body tipper, closed body tipper, tractor with trailer, pick up, Open Lorry, hand cart.
1								
2								
3								
4								
5								

6								
7								
8								
9								
10								
11								

18) How many times per week does picking waste take place?.....

19) How many trips do you make per vehicle per day?.....

20) Please give the estimated solid waste collected and disposed of per week (Tones).....

21) How many households are you currently providing solid waste collection and disposal services to in Nairobi? .....

22) Which areas of the city do you cover?.....

23) How do you charge your clients for the service?
.....Daily/Monthly/Quarterly/Annually.

24) How much do you charge per client per month (Ksh)?.....

25) Do you experience any problems in collecting user charges?
.....Yes/No..

26) What problems do you experience in collecting user charges if any?.....
.....
.....
.....

27) Where do you normally dump the waste?.....

28) Which route does your crew use mostly to the official dumping site?
Juja Rd/Jogoo Rd/Muranga –Thika Rd/Eastleigh-Bahati/Mombasa Rd.

29) Why that route?.....

- Less traffic
- Shorter
- Less residential estates
- Road is in a better condition of repairs
- Less steep climbs
- Less sharp corners

30) Do you cover any areas in the Eastlands? Yes/No..

31) If yes which areas do you cover in Eastlands? (Estates).....

32) If you do serve Eastlands how many households are you currently serving there?.....

33) What factors make it difficult for you to serve some areas in the eastlands?

- Difficulty in collecting user charges.
- Inaccessibility of neighbourhoods.
- Insecurity.
- Poor storage of waste at source.

35) Please fill in the following table;

Item description	Provided	Not provided	Plans in place to provide.	No plans.
Protective clothes				
Gloves				
Mouth masks				
Medical cover				
Leave allowance				
Overtime allowance				
Training				
Maternity leave.				

36) What is the average duration of work shifts.....

37) Do you have any female workers in the haulage workforce.?
..Yes/No..

38) If yes how many .....

39) Have you faced any labour dispute(s) in your firm in the past ?
Yes/No.

40) When?.....

41) Are the contracts between your firm and the clients verbal or in writing?...verbal/written/Both (if possible please provide a copy of a sample document).

42) How much do you pay for tipping at the dumping site per trip?.....

43) Which of the following arrangements would you prefer towards enhanced SWM service delivery in Nairobi?

- ❖ Contracting to private firms to be paid by NCC who will collect user charges.
- ❖ Franchise (license paid for) to private firms to operate within specific areas collecting user charges on their own.
- ❖ Open competition for clients by the private firms.
- ❖ Other (specify).

44) What problems do you normally face in your operations?.....
.....
.....

45) Please suggest solutions to the above.....
.....
.....

46) Please give your own suggestions on how to improve privatization of solid waste management in Nairobi.....
.....
.....
.....