SOLID WASTE MANAGEMENT IN INFORMAL SETTLEMENTS OF WINDHOEK

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ABSTRACT

The study examines the management of solid waste in the three informal settlements of Windhoek, which are Babylon, Okahandja Park and Okuryangava. Before independence, the apartheid government forbade natural urban expansion in "black" suburbs. This resulted in grossly overcrowded conditions, often with an entire family living in one small room. This was not the case after independence in 1990, when a democratic government took power; people began moving out of their overcrowded homes and started constructing shacks on the periphery of the town. At the same time others perceived this as an opportunity to migrate from rural to urban areas. This exercise contributed to the overcrowded squatter settlements and in turn contributed to a problem of waste.

This study focuses on alternative approaches, which are the increasing community participation and improving recycling and reuse of solid waste. The main objective of the study is to investigate ways in which community participation can be improved in solid waste management. The information was collected mainly through literature search, personal interviews with residents of the three informal settlements, various government and non-government officials. The study further suggests new methods and techniques on how to improve solid waste management in informal settlements.

One important findings of the study is that since human beings are generators of solid waste, their participation in managing waste is indispensable. The study further discovered that they introduction of recycling and reuse will contribute to a total reduction of solid wastes in informal settlements.

The study proposes that the 240 litre wheelie-bins and containers should be given to each dweller in order to replace the black plastic bag system that is currently in use. Transportation of waste should be improved; especially the use of tractors should be introduced.

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My word of thanks must also be extended to my elder brother, Dr Boniface Mutumba, my parents, David Mutumba and Magret Zambwe for all the support and encouragement they provided throughout my studies. This final line is devoted to my beloved family (Geldrin and Rachel) for encouraging and allowing me more time to do my studies. I love you very much.

DEDICATION

This dissertation is firstly graciously dedicated to my mother, Margaret Zambwe who contributed viciously to my study. I thank you for the everlasting love you are giving me.

Secondly is to my kids Jeldrin and Rachael for allowing me to do my studies without any disturbances.

DECLARATIONS

I hereby declare that this mini-thesis is my own, unaided work. It is being submitted for the degree of Master in Public Policy and Administration, Faculty of Economics and Management Science, University of Namibia/ISS. I further testify that it has not been submitted for any other degree or to any other institution of higher learning.

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LIST OF ABBREVIATIONS

MHSS: Ministry of Health and Social Services

MET: Ministry of Environment and Tourism

UNDP: United Nations Development Program

SADC: Southern African Development Community

SWM: Solid Waste Management

ISS: Institute of Social Studies

UNAM: University of Namibia

CHAPTER ONE

INTRODUCTION

1.1 INTRODUCTION OF THE STUDY

Before independence in 1990, apartheid government policy forbade natural urban expansion in 'black' suburbs. This resulted in grossly overcrowded conditions, often with an entire family living in one small room. This has changed when the country obtained independence in 1990. People began moving out of their overcrowded homes and started constructing shacks on the periphery of town and settled in what come to be known as informal settlements. At the same time others perceived this as an opportunity to migrate from rural to urban areas.

Like any part of the world, municipal authorities are tasked with the collection and management of wastes. Collection of wastes in informal settlement of Windhoek is undertaken by the City of Windhoek through the division of solid waste management.

Solid wastes: is defined as the organic and inorganic waste materials produced by household, commercial, institutional and industrial activities that have lost their value in the eyes of the first owner (Cointreau 1982 City of Windhoek 2003). For this study, solid waste management will be defined as the organic and inorganic waste materials, produced by households in informal settlements. This study will focus on solid waste, which will be defined, as all the wastes originating from human that are normally solid and relinquished as useless or unwanted.

It was estimated by Urban Dynamics, a local town-planning firm (2001), that some 28,000 residents are currently accommodated in these informal settlements. This is a phenomenal change as 12 years ago at independence there were no informal settlements at all in Windhoek. One of the major reasons given for migration into Windhoek is unemployment, and at least 43% of the settlers come in order to obtain employment. Another reason for migration is a search for better living conditions, such as access to schooling and health care. (Urban Environmental Action Plan & MET 2001). Informal settlements turn to be situated in areas with the least infrastructure development.

It has also been realized that most communities living there, ignore the fact that the environment will be destroyed if not managed properly. Informal households of these areas have income that is too low to contribute to the cost of services such as waste management. For example, the City of Windhoek is concerned that 16% of informal households may have incomes that are too low to contribute anything to the cost of services. That is to say that those households earn less than N$100 per month. A further 22% are thought to earn between N$100 and N$166 are therefore only able to make very limited contribution (MET 2001).

This study focuses on the two alternative approaches of Furedy (1992), which are the increasing community participation and improving recycling of solid waste. The study will also suggest new methods and techniques on how to improve solid waste management.

1.2 EMPIRICAL BACKGROUND

Out of the 37 tons of annual household refuse recorded, informal settlements generates unspecified amount of refuse. This means that the City of Windhoek cannot be able to manage the collection and recycling of all these waste (MET, 2001). In informal settlements two plastic bags are given per week, to each dwelling. Private individual collectors contracted by City of Windhoek remove the plastic bags twice a week. Waste collectors may only enter private property between the hours of 07h00 and 13h00 on weekdays. The area served by each private collector consists of 200 houses and the adjacent open spaces. Filled bags are collected daily between 07h00 and 13h00 by municipal compactor trucks.

When analysing these trend one will conclude that both time and equipment provided to these residents are not adequate to reduce waste management problems in these informal settlements. Proposals for solving the problems of solid waste management focus on organizational aspects notably, improvement in collection methods, systems of improving cost recovery, and privatisation of collection and transport systems. The problem has been compounded by the post-independence influx of people into the city, who have settled in informal settlements.

Many of the City's solid waste problems are caused by public ignorance, or in some instances public carelessness, with regard to the protection of the environment. It is well documented that success in solid waste management is only possible with public participation. Hence the importance of community involvement and participation in

urban solid waste management. Two policy papers World Bank and UNDP (1991) offers the following solutions to the problem of solid waste;

(i) To look at more environmental effective ways of collecting and disposing of waste,

(ii) To prevent waste from being generated.

Given this background, we state the research problem in section 1.3 below.

1.3 STATEMENT OF THE PROBLEM

Household waste is the largest component of urban solid waste in informal settlement. It consists of a large number of different elements such as food, garden waste, paper, plastic, cardboard, glass, leather and other substances. Littering led to problems of unhygienic conditions, plague epidemic, public health and environment degradation.

The most common method of managing solid waste in informal settlement in Windhoek is through uncontrolled open dumping, a method which entails little capital investment and has low operational costs. Uncontrolled dumps in informal settlement have a negative effect on the landscape, but more importantly on the surrounding environment and human health.

Namibia is one of the first countries worldwide to incorporate environmental issues and sustainable development in its supreme law, the Constitution of the Republic of Namibia. The Namibian Constitution recognizes that: "the state shall actively

promote and maintain the welfare of the people by adopting policies aimed at the maintenance of ecosystems, essential ecological processes and biological diversity of Namibia and utilization of living natural resources on a sustainable basis for the benefit of all Namibians, both present and future" (Article 95). The above stated commitment is upheld in the Pollution Control and Waste Management Policy, which may be viewed as set of principles and guidelines that determine how non-hazardous and potentially hazardous wastes are generated, transported, handled and disposed. Among others, some of the aims and objectives of the policy are:

(i) Encourage cross-sectoral cooperation and coordination of pollution control and waste management.

(ii) Create a legal framework to empower an inter-ministerial body, which would oversee the implementation of a national pollution control and waste management strategy.

(iii) Monitor compliance with international agreements relating to pollution control and waste management.

(iv) Provide legislative, regulatory and economic incentives for proper management of waste including waste minimization, reclamation and recycling.

(v) Encourage implementation of comprehensive pollution control and waste management education and capacity building programmes by government and the private sector.

Namibia's Green Plan (2001) drafted by the Ministry of Environment and Tourism and presented at the World Summit on Sustainable Development held in Johannesburg (2002), did embrace some broad fundamental principles, which were subsequently made part of local Agenda 21. For example, there should be national policies to reduce, reuse and recycle particularly domestic refuse. These principles have direct bearing on urban environment. Environment in this paper is defined as household environment issues, such as sanitation and solid waste management rather than the more usual 'green' interpretation. Reduction refers to the minimization of these household garbage and wastes. Reuse and Recycle refers to the renewal of materials so that it can be used more than once. Solid waste management has become a major problem in the informal settlement. The problem needs serious attention and this study will attempt to look into how communities in these areas can assist in waste management.

1.4 RESEARCH QUESTION

The above formulation of the research problem led to the following research question: how can we increase community participation in solid waste management in informal settlements and in turn increase recycling and reuse?

The study also considers other sub-questions.

- How effective are the methods and techniques used in the management of wastes?
- Can the Municipality provide better services with the facilities it has at its disposal?

- In what way can private actors and community organizations participate in the management of wastes in informal settlements?

1.5 OBJECTIVES OF THE STUDY

This study has the following objectives.

- To investigate ways in which community participation can be improved in solid waste management.
- To strengthen the existing methods and technical support services put in place in order to improve recycling and reuse.
- To review and formulate standards relating to solid waste management.
- To use the findings of this particular research to improve solid waste management in informal settlement.

1.6 SIGNIFICANCE OF THE STUDY

The study is significant in the sense that it identified ways on how solid waste management can be improved in informal settlements and in turn reduce environmental problems in the same areas. The study identified different methods, techniques and approaches in recycling and reuse, which will reduce cost incurred on solid waste management by the City of Windhoek.

The study will also be beneficial to other towns within Namibia, as well as other countries within SADC.

1.7 RESEARCH METHODOLOGY

1.7.1 Theoretical and Conceptual framework

Based on the theoretical and conceptual framework, Furedy's methodological approach is applied. Furedy (1992) proposes the promotion of increased community participation in solid waste management.

1.7.2 Literature searches

This study uses both primary and secondary data. Secondary sources include government and municipal publications, reports, academic journals and books. Primary sources will consist of structured group interviews. Data analysis is done through descriptive approach, which entails using tables and graphs.

1.7.3 Interviews

The following stakeholders were contacted for interview.

- City of Windhoek, solid waste division (Head of Divisions).
- Private Contractor Company for solid waste management e.g. individual collectors.
- Part of management staff of the Ministry of environment and tourism (Head of Divisions).
- Part of the management of ministry of health, especially the department of environmental health (Chief environmental officers).
- Different stakeholders concerned and part of the community living in informal settlements.

1.7.4 Sampling

A random sample of about 100 households in informal settlement of Windhoek were interviewed. In addition to those indicated above, a sample comprising of selected heads of divisions and line ministries that are directly involved in the management of solid waste management in the city of Windhoek were approched. They are all indicated above in 1.7.3. Unfortunately, the total number of those interviewed differs from the one estimated in the proposal because of difficulties with access to respondents. However, out of the twelve (12) intended interviewees, 7 were interviewed, of which five (5) were females and two (2) males. In informal settlements, out of the one hundred (100) dwellers interviewed, 58 were males and 42 females. The imbalance is due to the fact that heads of these dwellings were males.

1.8 CLARIFICATION OF TERMS AND CONCEPTS

Waste management: the collection, storage including interim storage, deposit, transfer, transport, treatment and final disposal of waste and after-care of disposal site.

Waste minimization: any activity to prevent the formation of waste or reduce the volume and/or environmental impact of wastes that is generated, treated or disposed of.

Reclamation of waste: the collection, sorting and upgrading of waste material to a usable standard.

Wastes: undesirable or superfluous by-products, emission, or residues of any process or activity that have been disposed of or accumulated for the purpose of disposal, wastes products may be gasses, liquid or solid or any combination thereof

Collection: as a functional element includes not only the gathering of solid wastes, but also the hauling of wastes after collection to the location where the collection vehicle is emptied.

1.9 SCOPE AND LIMITATION

This study is limited to the following informal settlements in Windhoek - **Babylon, Okahandja Park and Okuryangava.** The reason for choosing these areas is because they are fast growing squatter areas in Windhoek, and they generate a fair amount of waste.

Furthermore the study is confined to the management of solid wastes and community participation in informal settlements of Windhoek. Since the influx of people in the city started to increase drastically after independence, this study covers only the period 1990 to 2004.

1.10 ORGANISATION OF THE STUDY

The study consists of five chapters. Chapter one comprises of the introduction of the study that encompasses the empirical background, the statement of the problem, the methodology used, significance of the study, clarification of concepts, limitations, and organisation of the study. The second chapter provides a broad review of the literature. Specific attention is given to topics like the brief concept of solid waste, the origin and background of waste in informal settlements of Windhoek, local perception of solid waste management in informal settlements, community participation, International perception of solid waste in brief, the composition of urban solid wastes and lastly a brief summary of the whole chapter. The immediate chapter that follow will look at the background and nature of solid wastes in the chosen informal settlements of Windhoek.

Chapter three explores the historical background of solid waste management in informal settlements of Windhoek, specific attention will be given to issues like the structure of solid waste management division; the collection of solid wastes in informal settlements, the environmental problems caused by solid waste, analysis of the future needs and a brief summary of the whole chapter. Based on this same framework, Chapter four presents and analysis the data collected from the field. These will then confirm whether the objectives of the study have been achieved or not. Data has been presented using graphs and tables. Questionnaire was used to collect data. The conclusion and recommendations follow in the last chapter.

CHAPTER TWO

LITERATURE REVIEW

2.1 INTRODUCTION

Solid waste is a concept that is used worldwide. Solid wastes are divided into groups, e.g. household garbage; industrial wastes, hazardous wastes, and garden refuse wastes. This chapter therefore gives a general literature review as to how different authors contemplated on the concept. Furthermore this chapter will look at the experiences of other countries and how they manage their wastes or garbage. The immediate chapter that will follow will look at the background and nature of solid wastes in the chosen informal settlements of Windhoek.

2.2 SOLID WASTE: CONCEPT

Solid waste as earlier defined in Chapter 1 is the organic and inorganic waste materials, produced by households, commercial, institutional and industrial activities that have lost their value in the eyes of the first owner (Cointrean 1982, City of Windhoek 2003). For this study it is further defined as the organic and inorganic waste materials, produced by households in informal settlements. The study will mainly focus on all the wastes originating from human that are normally solid and relinquished as useless or unwanted.

Different authors defined solid wastes according to their categories. Likewise Cointrean further defined urban solid waste or commonly referred to as: material for which the primary generator or user abandoning the material for within the urban

area requires no compensation upon abandonment. In addition, it qualifies as an urban solid waste if it is generally perceived by society as being within the responsibilities of the municipality to collect and dispose of. Some of this materials discarded include household garbage and rubbish, residential ashes, commercial refuse, institutional refuse, construction and demolition debris, street cleaning and maintenance refuse, etc.

2.3 BACKGROUND OF SOLID WASTES IN INFORMAL SETTLEMENTS OF WINDHOEK.

Like any other part of the world, Windhoek informal settlements started to generate an excessive amount of garbage due to a high number of migrants into the City in search for good living standard.

The new municipal laws that govern land allocation allow municipality to accommodate low income groups in areas where they are not required to make payment for certain services they are rendered with. Hence, municipal council cannot manage to cope with a high demand of migrants that flocks to the city every month.

2.4 LOCAL ACTION ON SOLID WASTE MANAGEMENT IN INFORMAL SETTLEMENTS.

Gold & Muller (2001) view solid wastes as one of the contributor to environment degradation and in turn leads to environmental problems. Even though Windhoek is referred to as one of the cleanest city in Southern Africa its informal settlements still

needs to be encouraged to reduce their wastes. The Ministry of Health and Social Services (2002) indicated that solid wastes in urban environment manifest itself in the form of litter and indiscriminate dumping. As a result this has led to an increase in diseases and bacteria's in informal settlement especially the three informal settlement of Windhoek.

Local authorities in urban areas are required to undertake solid waste collection and disposal on a systematic and cost recovery bases. The effectiveness and safety of solid waste disposal system depends on the local authority and region. Hence, improvements are required in the planning, selection and management of waste disposal systems. A number of newly established towns are experiencing problems with solid waste collection, particularly in informal settlements.

There is currently no integrated planning and control system to deal with the environmental and health hazards and impacts from waste collection and disposal. For example, recycling and reuse of these wastes can be a better planning and controlled mechanism to be put in place.

2.5 COMMUNITY PARTICIPATION

MHSS (2002) suggested that community involvement and participation in the planning and implementation of environmental health projects and programmes is currently weak. The capacity of communities to improve and manage their environmental living conditions and health status are improving but requires strengthening.

2.6 INTERNATIONAL PERCEPTION ON SOLID WASTES IN BRIEF

Different writers on solid wastes have decided to share with their counterparts especially countries that are in the south and are still developing and lacks proper technology, skills, resources and equipment on how to control these wastes, (Furedy & Cointreau 1982).

Since the early 1990's, increasing attention has been given to urban issues, as the realization has dawned that the growth of cities, particularly in the countries of the south is exponential and the problems relating to infrastructure to cope with such growth, are not being adequately addressed. Several international organisations have been active in developing policy papers and economic development, an agenda for the 1990s. For example the UNDP strategy paper: "Cities, People and Poverty" (Band et al 1994).

The classical approach is to consider solid wastes as an urban planning problem. Accordingly the municipal authorities are the main actors in the field, responsible for collection and disposal of solid waste. The main problem considered within the bounds of this approach is the growing amount of solid waste in rapidly expanding urban areas of the world, and the way the municipalities can cope with it.

Some of the proposals suggested for solving the problem focus on organizational aspects; notably, improvements in quality of municipal management, systems of improving cost recovery from users, and privatisation of collection and transport systems, (The World Bank 1996, Beinstein 1991, Schertenleib and Meyer 1992).

Extensive attention has been given to technical aspects such as: upgrading of equipment used in collecting waste, developing environmentally safer methods of disposal, requiring capital intensive investments, e.g. composting, sanitary landfill, and combustion. This approach and system of combustion is definitely not recommended in Namibia's informal settlements as it can lead to air pollution and in turn leads to diseases.

Alternative approaches have been suggested. One such approach is based on greater resource recognition (Furedy 1992). This entails, reducing waste in production and distribution processes, and improving reuse and recycling of wastes. Furedy stresses the importance of extending the goals of solid waste management from technical improvements to general social and ecological goals. An essential aspect of such an approach is the increasing community participation. He further noted that factors that influence the qualities and composition of wastes are:

i. Average level of income
ii. The population number
iii. Social behaviour
iv. Climate
v. Industrial production
vi. The market for wastes materials.

Most cities in developing countries have to contend with an inefficient formal system of collection and processing of solid waste. Collection ought to take place with a high frequency because the waste content is highly organic and warm temperatures lead to rapid decomposition. However, costs involved make it impossible to do this,

so that municipal waste collection is limited to several times a week (Bhide 1984). Most municipal solid waste management schemes spend 90 per cent of their budget on collection and transport of waste, but only 50 to 70 per cent of waste generated is collected and less than 50 per cent of the population is served (Cointreau 1991).

It is clear that in most cities there is quite a hierarchical structure of informal networks within which various groups have differential access to various types of waste; the poorest that are directly dependent on collecting waste for their livelihood occupy the lowest ranks in such networks. Many people are also employed by dealers in small scale recycling workshops where waste materials are transformed into new products (Van Beukering 1993). Furedy indicates that those people work for very low income, in small, badly ventilated spaces and in unhygienic conditions should be co-opted to work in informal settlement areas in order to assist in managing these waste (Furedy 1989).

2.7 COMPOSITION OF URBAN SOLID WASTES

According to Cointreau (1982), many of the larger cities are in a state of transition. Part of their urban fabric consists of modern commercial development, and generates wastes similar in composition to those found in industrialized countries. Another part of their urban fabric consists of densely populated, low-income settlements, and cooking habits and refuse is characterized by organics and ash.

Reliable data concerning the quantities and characteristics of urban solid wastes is difficult to obtain. Wastes are frequently carried to communal Masonry bins or

designated neighbourhood dumping grounds, for collection by the city service. In these temporary storage and transfer places, wastes are subject to being eaten by animals, rained upon, picked over by human scavengers, naturally decomposed by micro-organisms, and mixed with dust and dirt.

2.8 SUMMARY

This chapter dealt with the theoretical framework of this study. As shown by different authors (Gold & Muller 2001) solid waste is the most contributor to environmental degradation and in turn leads to environmental problems. Uncontrolled litter and indiscriminate dumping leads to diseases and other forms of bacteria's in informal settlements. The most important lessons in this chapter are derived from Beinstein (1991), Schertenleib and Meyer (1992) who suggest ways to solve the problems of wastes in informal settlements.

CHAPTER THREE

HISTORICAL BACKGROUND OF SOLID WASTE MANAGEMENT IN INFORMAL SETTLEMENTS OF WINDHOEK

3.1 INTRODUCTION

This chapter highlights the origin, background and structure of solid waste in informal settlements of Windhoek. In Namibia, the pros and cons of waste in general have been one of the concerns since the country obtained independence, when the law was relaxed and informal settlements came into existence. Some have argued that the policy of the current government of allowing migrants to settle in the outskirts of the city is not good, as it damages the city's good image and reputation of being the cleanest city in Southern Africa.

3.2 ORIGIN AND HISTORICAL BACKGROUND OF WASTE MANAGEMENT IN INFORMAL SETTLEMENTS OF WINDHOEK

As already defined waste is rubbish, or anything that we don't want, that we throw out of our homes or our offices everyday, or anything unwanted that is produced by our industries and factories (City of Windhoek 2003). It may just be ordinary garbage in dustbins or it might be old leaves and branches from our gardens.

Before independence, housing was a problem in urban places. Due to a lack of a proper accommodation, migrants (labourers) were forced to live in overcrowded houses. Apartheid government policies forbade natural urban expansion in black suburbs and the formal low-cost houses in Katutura became grossly overcrowded

with an entire family living in one tiny room. At times backyard shacks were constructed to accommodate some of the family members or rented out to relatives and friends. The structures had to be deformed or not properly built or taken care off in order to try and deceive the authorities on the fact that people were actually not living in those structures (Gold and Muller 2001).

It was just after independence when the law was relaxed, and several locations and extensions were made. This nevertheless brought in a lot of problems not only to the authority, but also to residents as the problem of waste, other expenses such as water and electricity was experienced.

People perceived the new freedom of movement as an opportunity to improve their living standard. As indicated earlier many people who were living in overcrowded houses of Katutura started moving out in search of open land (unutilized land) in order for them to be settled. What started earlier as a small exercise later on resulted into something big, this contributed to the overcrowding of squatter settlements and in turn contributed to a problem of wastes. The number of people that moved in those informal settlements was vulnerable, and had no proper care over those structures because they did not pay for them.

City of Windhoek failed to control this trend as the new constitution of the Republic of Namibia allowed people to move freely where they wished. This whole trend was new to Windhoek and Namibia at large, so it was not surprising to see that it takes time to tackle waste and other problems in informal settlements.

The annual growth rate of Windhoek is currently ±5.4% of which 3.9% or more is people moving into Windhoek each month. This translates into about 600 people moving into Windhoek each month. Roughly one third of the migrants settled into the informal areas, namely the north-western suburbs that developed from Katutura Township. As indicated above more than 70% of Windhoek's population is already housed in this part of the city. These suburbs are predominantly low-income (Gold and Muller 2001).

3.3 PRESENT POLICY COMPONENTS

Solid waste division is guided by among others, the following enabling laws and regulations: local authority act of 1992, the local authorities health act and the recently launched environmental health policy.

Shipanga (2001) indicated that the squatter settlement policy of the City of Windhoek evolved over a period of ten years (1990-200). Its inception was in response to a major crisis at hand, which was how to deal with the emergency and growth of squatter settlements in the City of Windhoek as described. This led to a situation whereby ad-hoc policy decisions/statements were made in order to deal with specific situations that presented themselves, such as the urgent installation of basic infrastructure in some squatter settlements.

With the exception of 2000 households, all other squatter households do not have tenure rights for their "claimed" plot occupied. Some of the land is either leased from the city council or illegally occupied. The physical infrastructure in the

squatter area is elementary. It consists of internal dirt roads and an average of one commercial water tap per 140 households. Toilet facilities are almost non-existent and people make use of any nearby open space available (Shipanga 2001).

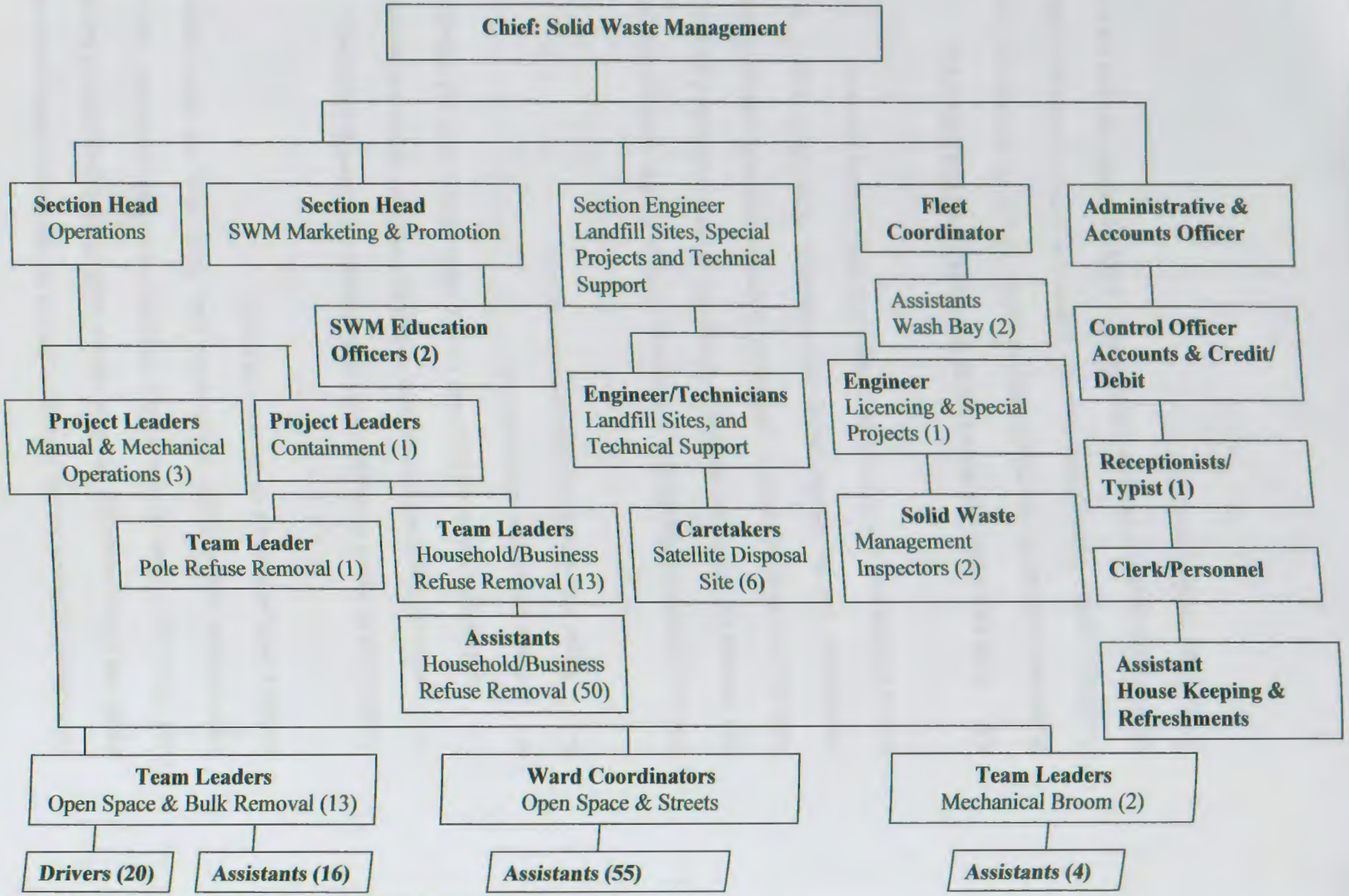
Shipanga (2001) states that the squatters build their shacks predominantly from light second hand recycled materials, with a floor ranging from 12 to 40 square meters. Since the areas are regarded as informal, no permanent building is permitted. The city is monitoring new arrivals through a register, which shows that about 1400 squatter households establish themselves in squatter areas each year. There are, however, no records of people leaving the city. It is therefore clear from the above that the poor constitute the fastest growing population in Windhoek.

The inability of the city to supply land on time in order to accommodate the annual influx of rural-urban migrants manifests itself through the illegal land invasion by squatters (Shipanga 2001).

3.4 STRUCTURE OF THE SOLID WASTE MANAGEMENT DIVISION

The City of Windhoek through the division of solid waste management (SWM), manages all wastes within Windhoek. This includes all informal settlement that exists within the city. Since its establishment in 1998, SWM division formed part of the Department of infrastructure, water and technical services. This structure is layed out in Figure 3.1 below.

Figure 3.1: **Structure of the Solid Waste Management Division.**



Source: City of Windhoek Information Booklet on Solid Waste Management, 2003

As indicated in figure 3.1 this division is headed by one section chief, two sections heads one for operation and the other one for Solid Waste Management, Marketing and Promotion. There is one section engineer, one fleet coordinator and one administrative and accounts officer under each head; there are other personnel assisting them, as outlined on the structure above.

As indicated by one of the heads, the division employs the following employees:

- About 250 permanent employees including a manager, engineers, educators, technicians, project leaders, team leaders, administrative staff and labourers.
- About 200 private contractors and
- About 300 community waste control volunteers.

The main function of this division is to manage all types of solid waste in Windhoek, this includes the collection, transport and disposal of these wastes to a proper and safer dumping areas. In order to achieve this exercise, equipment such as '240-litre wheelie-bins' and the big 6m^3 orange skip containers, black plastic bags to lesser known systems such as paid loads, open space and street cleaning are used.

3.5 COLLECTION OF WASTES IN INFORMAL SETTLEMENTS

In informal settlements two plastic bags are given by private contractors to each dwelling a week. These plastic bags are removed by private contractors twice a week. These private contractors may only enter private property between the hours of 07:00 and 13:00 on weekdays.

The area served by each private contractor consists of 200 houses and the adjacent open spaces available in that area of operation. The private contractor places the filled black plastic bags in a given area where the bags are later collected daily between 07:00 and 13:00 by municipality trucks.

When analyzing the above trend one will conclude that the collection of wastes in the informal settlement is not done efficiently, as time allocated for collection and equipments used are not enough to reduce wastes in informal settlements.

The study proposes that both '240-litre wheelie-bins' and $6m^3$ orange containers should be provided to dwelling and nearby open spaces. The disadvantages of the black plastic bags are that they can't keep some heavy materials. Adding on is the quality of these plastic bags given; in most cases these bags are damaged before been collected and taken to a certain removal point. It is therefore advised that private contractors and municipality should issue 240 litre wheelie-bins to each dwelling in informal settlements of Windhoek.

3.6 ENVIRONMENTAL PROBLEMS CAUSED BY SOLID WASTE

When waste is not properly controlled and managed, it can lead to environmental problems and in turn lead to environmental degradation. When dumped anywhere it can lead to bacteria and can affect human health.

As already indicated in Chapter one, environmental health has became a major problem in the informal settlements, largely due to a lack of adequate facilities.

Waste should be disposed in a manner and places where it will not cause pollution to the air, the soil or water and also where people cannot be exposed to it.

As indicated in the information booklet on solid waste of the City of Windhoek 2003, that if household rubbish is not disposed of properly, it will grow rotten and will become a place where harmful bacteria, flies and rats breed and bad smells will occur.

The booklet further indicated some harmful effects that can be experienced as a result of unmanaged wastes over a short period of time, i.e.:

- The environment looks untidy and smells bad
- Flies, rats, bacteria and other pests breed and spread diseases
- Plants, animals and humans can be poisoned
- The air, soil and water became polluted
- People can be injured by broken glass and other sharp objects like tins, bottles, nails etc.

Pollution can further lead to diseases such as cancer and birth defects in babies. It can also affect negatively the tourism industry of the country and the city in particular.

3.7 ANALYSIS OF THE FUTURE NEEDS

Solid waste management in informal settlements of Windhoek is still manageable if City of Windhoek together with other private company, including volunteers on waste collection will work together as partners in doing that. The urgent introduction of wheelie bins, containers and the introduction of recycling and reuse of wastes in informal settlement can be encouraged. The city will maintain its image of still being the cleanest city in southern Africa. Others like BP, Shell and Coca Cola should follow Namibia breweries in a good job they are doing in managing solid wastes through sponsorship.

3.8 SUMMARY

This chapter highlighted the structure, origin and background of wastes in informal settlements of Windhoek. This study indicated clearly how the City of Windhoek manages its solid wastes, by indicating the number of personnel involved and type of duties they do. The study indicated that solid wastes management started as a result of the inflow of people moving from the previously disadvantaged communities who lived in black suburbs such as Katutura and those that are migrating from rural areas of Namibia coming into the city in search of better living standards. This whole trend came into existence due to the relaxed policy that was brought by the new government that came in power during Namibia's independence.

The chapter outlined the most important methods and equipments used in the collection of solid waste in these areas. The chapter that follows outlines the presentation of research findings and data analysis.

CHAPTER FOUR

PRESENTATION OF RESEARCH FINDINGS

4.1 INTRODUCTION

The preceding chapter highlighted the structure and nature of solid waste management in informal settlements. This chapter presents data analyses and research findings of the study. Primary data were collected using questionnaire and face-to-face interviews with various role players in the whole process of managing solid waste management in informal settlements. The findings are presented using graphs, diagrams and tables.

The following themes drawn from the literature review and objectives are the basis for analysis.

- Community participation in solid waste management in informal settlements and in turn increased recycling and reuse.
- Methods and techniques used in the management of wastes.
- Participation of private actors and community organizations in the management of wastes in informal settlements.

4.2 PRESENTATION AND DATA ANALYSIS

This chapter analyses the data collected and presented as a form of findings in order to give answers to the main questions posed and the objectives thereof. Also in order to put the findings of this study into perspective and afford easy reference. These

findings cover all the three informal settlements where this research was conducted. This includes the following informal settlements of Babylon, Okahandja Park and Okuryangava.

4.3 POPULATION SIZE AND GROWTH

A recent survey on residential movements in Windhoek 2001, indicates that the total number of people living in informal settlement was ± 28 000. This total number of people in informal settlements is representing a 15,4% of the total population of Windhoek. Informal settlers might have increased significantly after the feasibility study had been undertaken.

It was indicated earlier by this study that strict control measures were enforced by the colonial government on informal settlement, as a result families who lived in black suburbs has doubled and this has made the current situation in informal settlement to be worse. Relaxation of control permitted the possibility for many existing inhabitants to claim unused and open land to erect their own informal housing. New migrants responded by also moving to these areas (City of Windhoek Survey 1996).

4.4 DEMOGRAPHIC CHARACTERISTICS

According to a survey conducted in 1996 there is only a slight decrease in terms of total figures and percentage available currently in informal settlement of Windhoek. The slight change of migrants into the city is caused by the government efforts of developing rural areas (e.g. Oshakati) where a substantial number of migrant used to come from has slightly reduced.

The 1996 survey revealed that 57,8% of the informal settler population consists of male whilst only 42,2% were females against a city wide average of 52% males and 47,8% females. The average age of the informal settler is 23,78 years with an extremely abnormal age distribution. The vast majority of 72,12% informal settlers are between 20 and 44 years of age with few older people and children aged 5–14 years. Children younger than four years, on the other hand, are proportionally more than the average.

The average household size in these settlements is a low 3,715 persons against a city average of 4,069 while an unexpected high proportion of households (81,5%) are male headed and 18,5% female headed. The average figures for the city, as a whole is 74,4% male headed and 25,6% female-headed households. 31% of all household members are other relatives with 27% heads, 22,5% children and 14% spouses. Most of the other relatives are aged between 20 and 34 years of age indicating the existing households as a reception system for the current mainly single, urban migrants who will in all probability set up their own households after a while.

4.5 MIGRATION

The main sources of migrants over the past 10 years were the Omusati, Oshana, Ohangwena and Oshikoto regions. With most of the inhabitants coming from the northern regions of Namibia and settling in informal areas, it is to be expected that the majority of future migrants will exhibit a socio-economic profile similar to that found in the north-western areas. They have lower average levels of education; high levels of unemployment; are younger than the average inhabitant of Windhoek; have

high rates of illiteracy and are characterized by a high proportion of pre-school aged children.

Their incomes are low and can afford to pay very little towards meeting their housing needs. This will further reinforce current informal settlement patterns (City of Windhoek Survey 1996).

A questionnaire was prepared and used during the survey conducted within the three main informal settlements of Windhoek. A copy of this questionnaire has been attached as appendix.

4.6 COMMUNITY DEFINITION OF SOLID WASTE

A question was posed on how the community would define solid waste?

It has resulted that almost 75% of the respondents defined solid waste as things lying around and regarded as useless and does not have value on them. Whilst the other 35% referred to it as dirt, such as plastic bags, bottles etc. This definition of solid waste corresponds well with that of the city of Windhoek 2003 which reads that rubbish is anything that is unwanted by the people and regarded as useless. From the researcher's point of view, all the people understood what solid waste was.

4.7 LENGTH OF STAY

Another question posed was to find out how long residents had been residing in the said areas (informal settlements).

The results in table 4.1 is clearly illustrated with the help of the pie-chart below.

Table 4.1: Length of stay in settlements

Length of stay in informal settlements	% of respondents
3 years and more	50
2 to 3 years	31
Less than 2 years	19

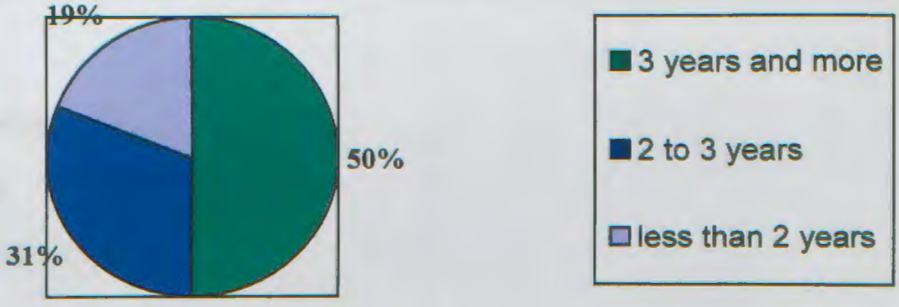


Fig. 4.1 Length of stay in settlements

Half of the population interviewed from the three informal settlements indicated that they have lived in these places for more than 3 years and unspecified number stayed for 10 or more years. 19% of the respondents lived in informal settlement for less than two years. Thirty one (31%) of the respondents indicated that they have lived for 2 to 3 years only and this are mostly respondents that resides in informal settlements of Okahandja Park. Reasons being that this informal settlement is

literally new. Those residents who indicated that they lived for ten years or more conforms to what Shipanga (2001) indicated as he said that the squatter settlement policy of the city of Windhoek evolved over a period of ten years (1990-2000). Its inception was in response to a major crisis at hand which was how to deal with the emergency and growth of squatter settlements in the city of Windhoek as indicated on page 18 of this study.

Another question posed was to determine the most contributor of solid waste in informal settlements. They were required to choose from the three

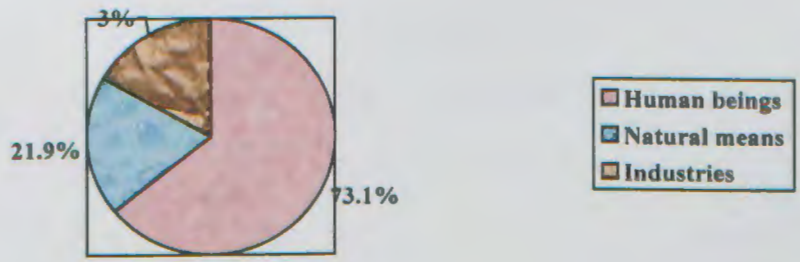
(i) Human being

(ii) Industries

(iii) Natural Means

These trends are indicated in figure 4.2 below.

Fig. 4.2: Contribution of solid waste



Out of the entire total respondents 73,1% responded that human beings are the most contributors of solid wastes in informal settlements. 21,9% said it is through natural means e.g. wind and rainfall whilst 3% said it is through industries.

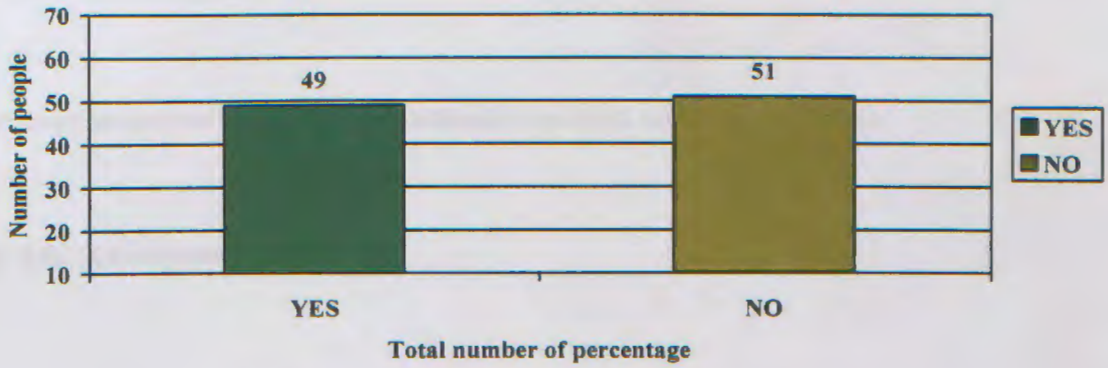
As clearly indicated by figures 4.1 and 4.2 the main contributors of solid waste in informal settlements are owners of these households. The study found that residents are aware of this problem, but they lack motivation and education in how to manage solid waste. This is important, as their perception of waste will be of importance in co-opting them in waste management. The study also concluded that according to the length of stay most dwellers leads them to ignorant in the sense that they do not attach value to the place they live in.

4.8 EDUCATION AND AWARENESS

Question on whether residents have received any education on solid waste management or not.

The following bar graph indicates the number of respondents in awareness in education on waste management.

Fig.4.3: Education on waste management



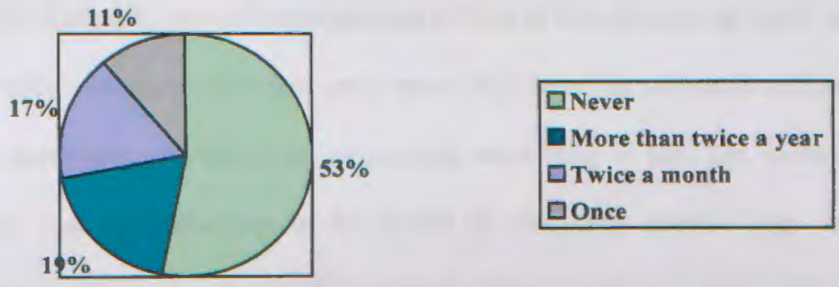
The bar graph indicates that fifty-one (51%) did not receive any education on how to manage waste and how to use equipments given whilst 49 percent from all the informal settlements received education on how to use black plastic bags. They all feel that more still need to be done by Municipality in order to encourage community representatives' e.g. municipal councilors and community developers to conduct more awareness among the community for them to be aware of the danger and risks involved in solid wastes.

City officials interviewed confirmed that educational awareness are conducted and mostly co-sponsored by Namibia Breweries Limited, politicians, and in some cases members themselves. As the study shows almost 51% of residents had different opinions; but seems to have little knowledge on how to manage wastes in informal settlements. Furedy (1992) proposed the promotion of increase community participation in solid waste management and through that waste can be reduced.

Another question related to awareness was as to how regularly they attend meetings on solid waste per year.

The chart below indicates meetings attended on solid waste management.

Fig.4.4: Awareness meetings



As shown by the pie chart above, 53% of the residents had never attended any meeting since they started living in those places, and most of these respondents are residents of Babylon. 19% of the people interviewed indicated that they had attended meetings more than twice a year and those are mostly residents of Okahandja Park. 17% of the total respondents attended meetings twice a month; and only 11% of them indicated that they only attended meetings once a year. This shows that awareness about waste management remains low, as resident's attendance of awareness meetings has been erratic. Only 17% indicated that they attended meetings regularly.

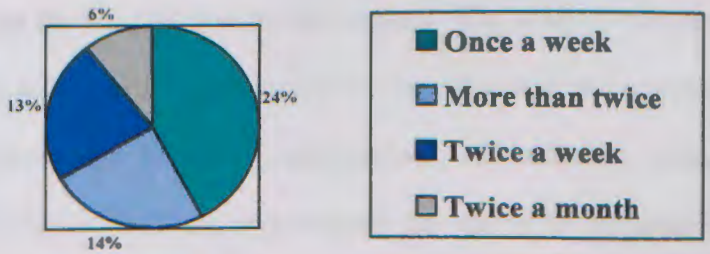
4.9 WASTE COLLECTION

According to the answers given by respondents 24% of the people interviewed indicated that their wastes is collected once a week, whilst 13% indicated that their wastes is collected twice a week, and 14% indicated that their wastes are collected more than twice a week and lastly 6% of the respondents says that their wastes are only collected twice a month.

According to Mr Kalundu, one of the education officer in the division of solid waste management, solid wastes is collected only once in a week in informal settlement and the circle continues. In informal settlements according to him the amount of waste does not require containers to be stored in, but only plastic bags as he confirmed that sometimes the plastic bags turn not to be filled up by these residents. This according to my view is not correct in the sense that residents responded that the size and number of this black bags are not sufficient and they proposed for the 240 litre wheelie-bins and containers should be provided.

The pie chart below indicates the number of times that waste are collected in informal settlements.

Fig.4.5: Frequency of waste collection

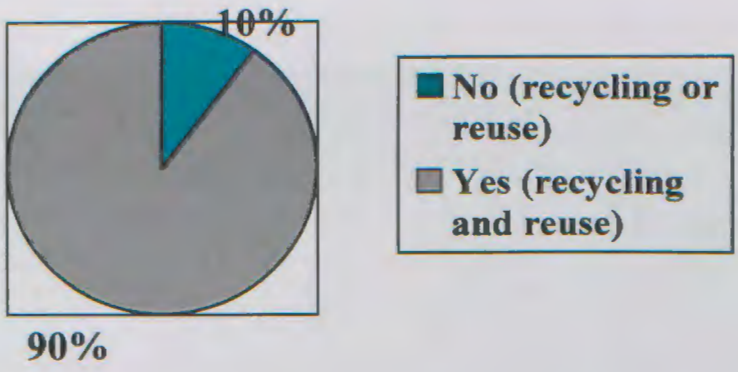


4.10 RECYCLING

One of the main objectives of this study is to investigate the possibility of recycling solid waste. Furedy (1992) suggested that that recycling and reuse of solid waste if applied will reduce solid waste in formal settlements of Windhoek. This can be done by introducing small recycling points in some parts of these informal settlements of Windhoek.

The chart below indicates the responses on recycling and reuse.

Fig. 4.6: Responses on recycling and reuse

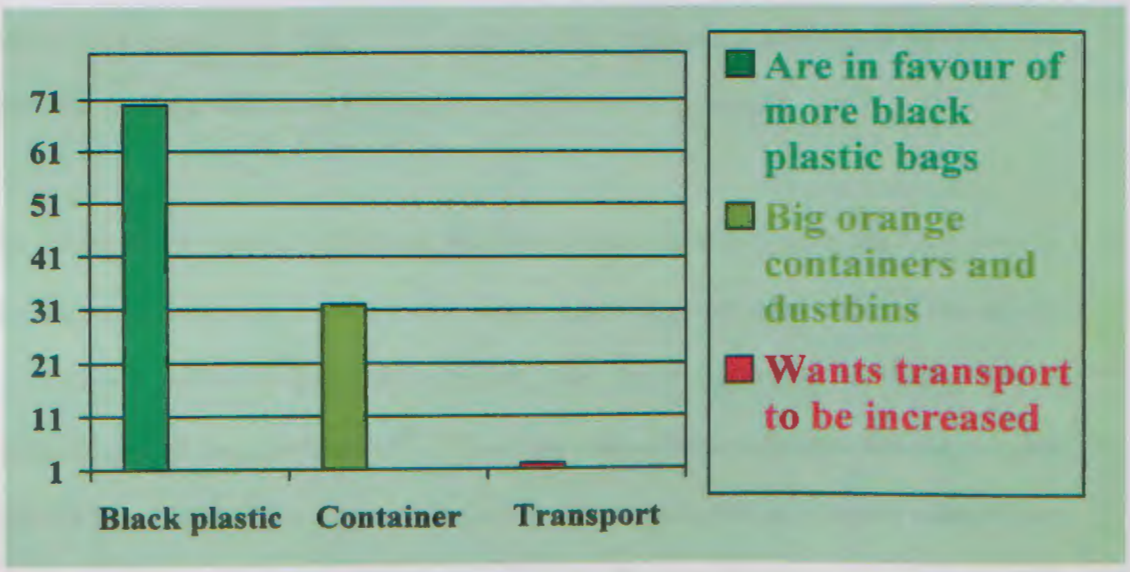


Ninety percent of the people interviewed supported recycling and reuse whilst only ten percent were against recycling and reuse and this small percentage of respondents did not understand the concept and its advantages. The study concluded that more awareness should be raised among residents of these informal settlements in order to improve their knowledge in waste management. Community should also be encouraged to be involved in the recycling of the wastes in informal settlements. They should also be given incentives, so as to mange waste at the source. Different

containers i.e., for different types of waste should be provided. Depositors of for example bottles and cans could be given small cash as compensation. A mechanism could be worked out, whereby a supervisor can record names of depositors. They could then receive compensation based on the weight of waste they have deposited.

Another question posed to residents was to suggest mechanisms or equipments that can be used by private collectors in order to improve the situation. Figure 4.7 indicates the different views of respondents on equipment to be used in improving the collection of solid waste in informal settlements of Windhoek.

Fig.4.7: Mode of collection



70% of the respondents indicated that more black plastic bags are needed. They further indicated that collectors should be provided with proper clothing when collecting wastes, including hand gloves, nose protectors, baseball caps etc, in order for them not to be infected with bacteria.

2% requested for the increase in transport especially tractors, 33% of the residents indicated that big orange containers and wheelie-bins should be given to residents of these informal settlements.

They further indicated that proper supervision among collectors should be done, as they feel that some private collectors tend to collect waste only in some households, but not in others. As indicated and explained 69% of the respondents are in favour of more black plastic bags while 31% opted for big orange containers and dustbins and 2% indicated that they are in favour of transport to be increased.

As shown by the study, the City of Windhoek takes the safety of its staff seriously to an extent that quality clothing and other essentials are provided. 73% of the respondents indicated that they normally pay for the services on waste, this is included in the charges of water. 27% of the respondents indicated that they do not pay for the services of waste collection. A substantial number of these respondents reside in Babylon and most of these residents share water taps with close to (20) twenty other neighbours.

73% of the respondents say that this payment does influence them and almost 27% of other respondent indicated that they are not influenced by any means as they don't pay for these services. A substantial number of residents of informal settlements indicated that they do pay a minimum fee on services rendered to them, and these helps them.

Fig.4.8: Views on recycling

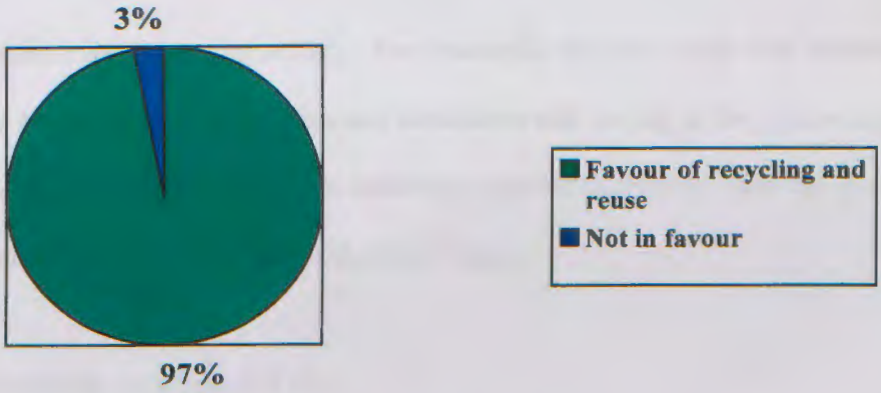


Figure 4.8 above shows that 97% of the respondents in all three informal settlements view recycling as good, whilst three (3%) of the respondents were against recycling.

A follow-up question was asked in order for them to highlight the importance of recycling and reuse in informal settlements. A total of 90% indicated the following advantages.

- It creates employment to communities of informal settlements.
- It gives money back to the community.
- It enables a certain product to be used twice and avoid total reduction in a specific commodity.

- It reduces the prices of recycled product.
- It keeps the environment clean and it reduces the rate of wastes in informal settlement including the entire country.

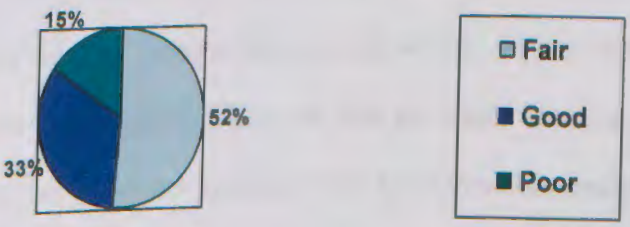
3% of the respondents of these informal settlements indicated that the only disadvantage will be that recycled products will turn to be more expensive while they are obtained free of charge from residents.

These suggestions are very important. For example, as this study has already suggested, the provision of wheelie-bins and containers and sorting at the source may increase recycling and reuse. Although relatively expensive, wheelie bins are more effective in waste management than black plastic bags.

4.11 CUSTOMER SATISFACTION

This section gauges customer satisfaction with regard to waste collection, particularly the use of equipments and transportation. The pie chart below indicates the respondents views on services given by collectors in terms of equipments and transportation.

Fig. 4.9 Customer satisfaction

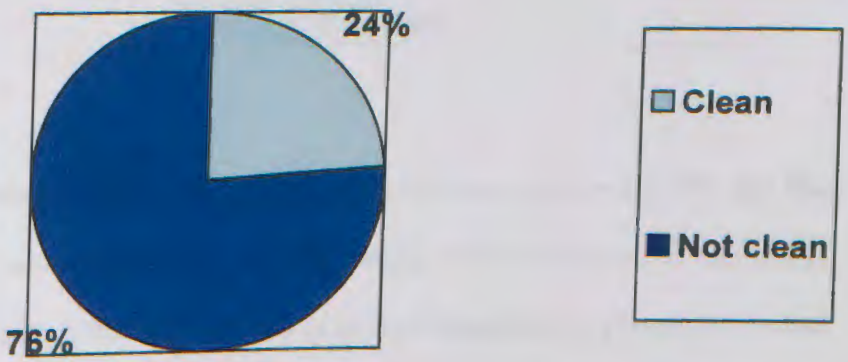


According to this study 52% of the respondents indicated that the equipment used by these private collectors are fair. 33% indicated that the transport and other equipment are good; whilst 15% of the respondents indicated that the equipment used by both contractors are very poor. A certain number of respondents referred to the poor quality of black plastic bags and most of them opted for bins or big containers.

4.12 EVALUATING ENVIRONMENTAL HEALTH

Perception of the dwellers on how clean their environment is, is important when any new measures are to be introduced. The chart below indicates' the respondents view on whether the place where they live is clean or not.

Fig.4.10: Environmental Health



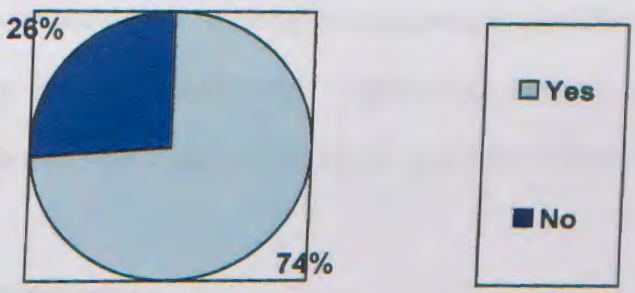
76 percent of the total respondents said that the places are not clean and the reason given was a problem of running water as there are no toilets. 24% of the respondents of informal settlements indicated that they felt that the place where they live in is clean. This indicates the residents concerns for environmental health. In other

words, they do appreciate cleaner surroundings and attempts to provide such an environment could be easily accepted by them.

4.13 SERVICE DELIVERY IMPROVEMENTS

The chart below indicates the respondents' views on whether the municipality can provide better services or not.

Fig. 4.11: Service Delivery



Out of a total number of respondents in all three informal settlements 74% felt that the municipality could offer a better service. Many of the residents felt that trucks used are far much better, the only problem is lack of manpower as private individual contracted are very few. 26 percent said that the municipality do not treat them equally like people who live in formal settlements.

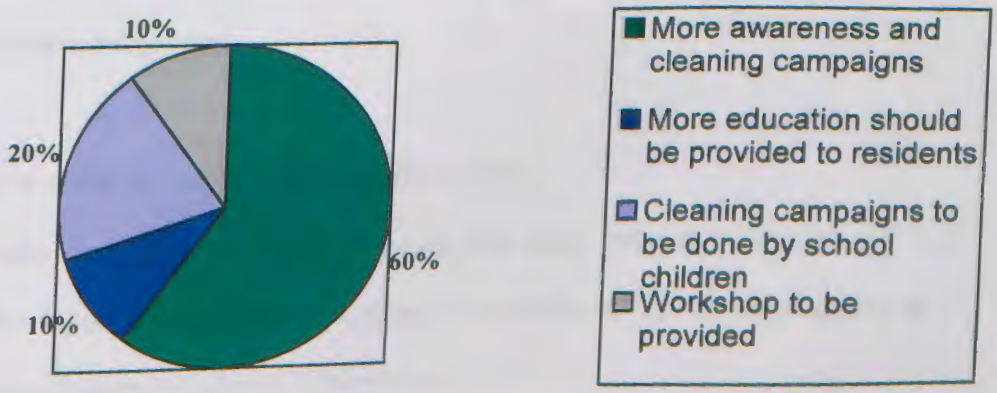
The study shows that the City of Windhoek can manage to provide good service with the facilitities and other stakeholders involved easily. Conclusions can be made that cases of illegal dumping will be minimized with the introduction of the mobile

transfer stations which will in turn help community waste volunteers in the removal of these wastes. According to Cointreau (1991) most municipal solid waste management schemes of which city of Windhoek is not an exception spend 90 per cent of their budget on collection and transportation of waste of which only 50-70 per cent of waste generated is collected and half of the population is served. In order to avoid this trend proper mechanism such as the introduction of tractors to be used in informal settlements of Windhoek should be encouraged.

4.14 PRIVATE SECTOR PARTICIPATION

In what ways can the private sector and community organisations participate in the management of wastes in informal settlements? Figure 4.12 indicate residents responses on different ways in which the private sector could participate in solid waste management.

Fig. 4.12 Private sector participation



60% of the respondents preferred awareness whereas private sector is requested to be involved in sponsoring cleaning campaigns at least twice a year. Community representatives should also organize community meetings in order for residents to be encouraged to clean up their places. Prices in a form of a reward should be given to those dwellers whose places are very clean. 20% of the respondents preferred school children to be involved in the cleaning up campaign and a budget for those campaigns should be sourced from the City of Windhoek and private sector.

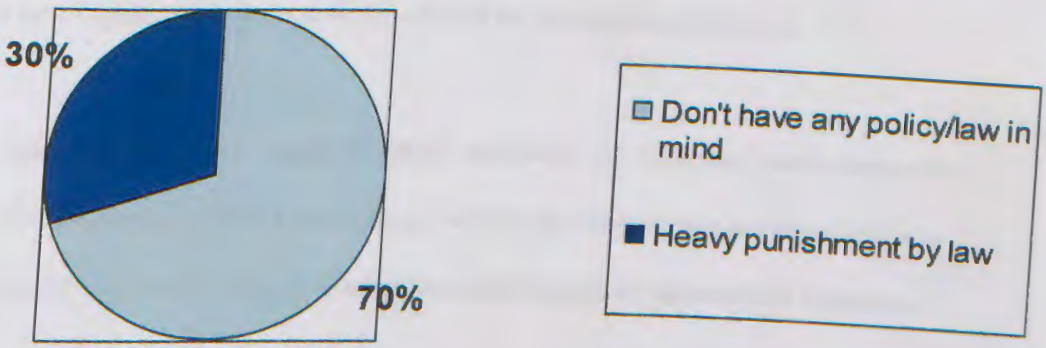
10 percent preferred meetings as well as workshop in order to educate the community at least once a month. They further felt that committees should be set up comprising of local residents of these informal settlements; which should monitor the activities that dwellers are undertaking.

The remaining 10 percent suggested that private sector should buy more orange containers for people living in informal settlements. They further indicated that meetings should be initiated with it's community for them to be guided and educated on solid waste management.

4.15 BY-LAWS AGAINST WASTE DUMPING

Another question posed to residents during the study requested respondents to suggest new laws or regulations that should be introduced by the municipality in order to reduce wastes in informal settlements.

Fig.4.13: Introduction of By-laws



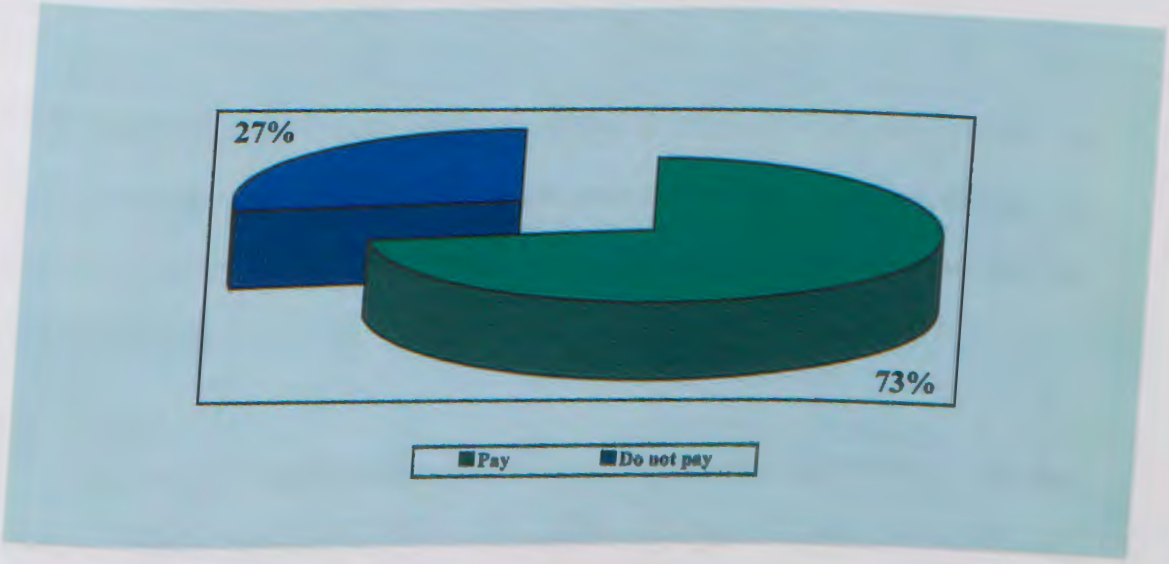
About 30% of the respondents indicated that heavy fines should be imposed on those people who neglect their households by not cleaning them properly. They further indicated that payments in a form of money should be charged. Such views of different stakeholders are very important as a number of them suggested for continuous education awareness on solid waste management. Whereas some opted for recycling and according to the study will serve as the main system to be put in place in order to reduce this problem. A dedicated municipal court should be encouraged in order to prosecute defaulters on matters regarding the city and its services.

They requested the municipality to put in place a regulation that will compel all households of the informal settlements to have proper dustbins like any other household in the city centre. 70% of the other respondents indicated that they don't have any law or policy in mind, but whatever law will be provided to prohibit polluters to do so will be most welcomed.

They further indicated that a law that will protect the health of their children in order to grow up in a proper clean environment would be good. Among them some indicated that higher charges on services should be imposed on polluters.

Another question that was asked required residents of informal settlements to indicate whether they do pay for services on waste and whether this payment and non payment has an influence on them or not. The following chart shows their responses.

Fig 4.14: Charges and disincentive to pollute



4.16 CITY OF WINDHOEK RESPONSE

The following responses were derived from interviews conducted with some officials from the City of Windhoek Solid Waste Management Division and Ministry of Environment and Tourism officials.

4.16.1 Waste Management

It has emerged from the interviews conducted between the head of the section on education and awareness that human being remains the highest contributor of solid wastes. This is done mostly through remains of household consumable foodstuffs. They also indicated industries as also contributing through the products produced especially the discarded pieces of materials that are not put to good use. This is mostly done either by wind or human beings themselves.

Officials indicated that in informal settlements, the City of Windhoek provides two black bags per household in the informal settlement areas. Theses black bags are primarily meant for household refuse. They get collected once per week and the cycle continues.

For any project to succeed there has to be strong network and bonding with the intended beneficiaries and so is the management of waste. Community mobilizing has proven to work for the City of Windhoek. Constant contact with residents by way of making the programmes known to all our clients through radios, TV and other print media.

The question of incentives is another key one. People coming to participate in Clean-up campaigns should have their efforts appreciated. Providing a 'thank you' for example a promotional T-shirt could serve the purpose.

The city officials hold that it is not that easy but it is possible to enhance community participation. They also felt that the private sector and community organisations could participate through donations/sponsorships, mobilizations and sensitisation.

4.16.2 Education and Awareness Raising

The City of Windhoek has moved from the fire fighting approaches in its awareness raising programme by establishing a fully fledged section with qualified and dedicated staff to plan and implement all educational and promotional projects in the city regarding waste management. This section has the jurisdiction over 58 schools in the city and the entire community.

Plans are drawn annually to continuously and strategically educate the residents of the city. There are concrete programmes in the informal areas on weekly basis. Information sharing sessions and clean up campaigns. The employees of the City of Windhoek are visible and hard at work in all the informal areas.

4.16.3 Laws and Regulations on solid waste

The operations of the division are surely guided by various enabling laws and regulations. The local authorities Act of 1992 is one that mandates to clean the surrounding of each and every city or town, the Local Authorities' Health Act is

another one, plus the recently launched Environmental Health Policy. On the lower part of the operations we have in place the transgression notice system, which is fully backed by the municipal laws regarding the trespassing of regulations e.g. illegal dumping and littering.

4.16.4 Services delivery and equipments

Not only does the City of Windhoek have the potential to expand and enhance the efficiency of its services – it has a proven and tested record of providing efficient and cost effective services to all its residents. Services are increasingly been improved in a sustainable fashion dependent on the resources at its disposal.

City officials responding to a survey question suggested other mechanisms or equipment that could be used by different collectors to improve services rendered. The ward coordination system, waste management volunteer system, black bag system, skip container system and the recently implemented mobile transfer station system – all these are forms of applications in the waste management – they have proven to work much efficiently – improvement could only be made here and there with this high influx of people to the city.

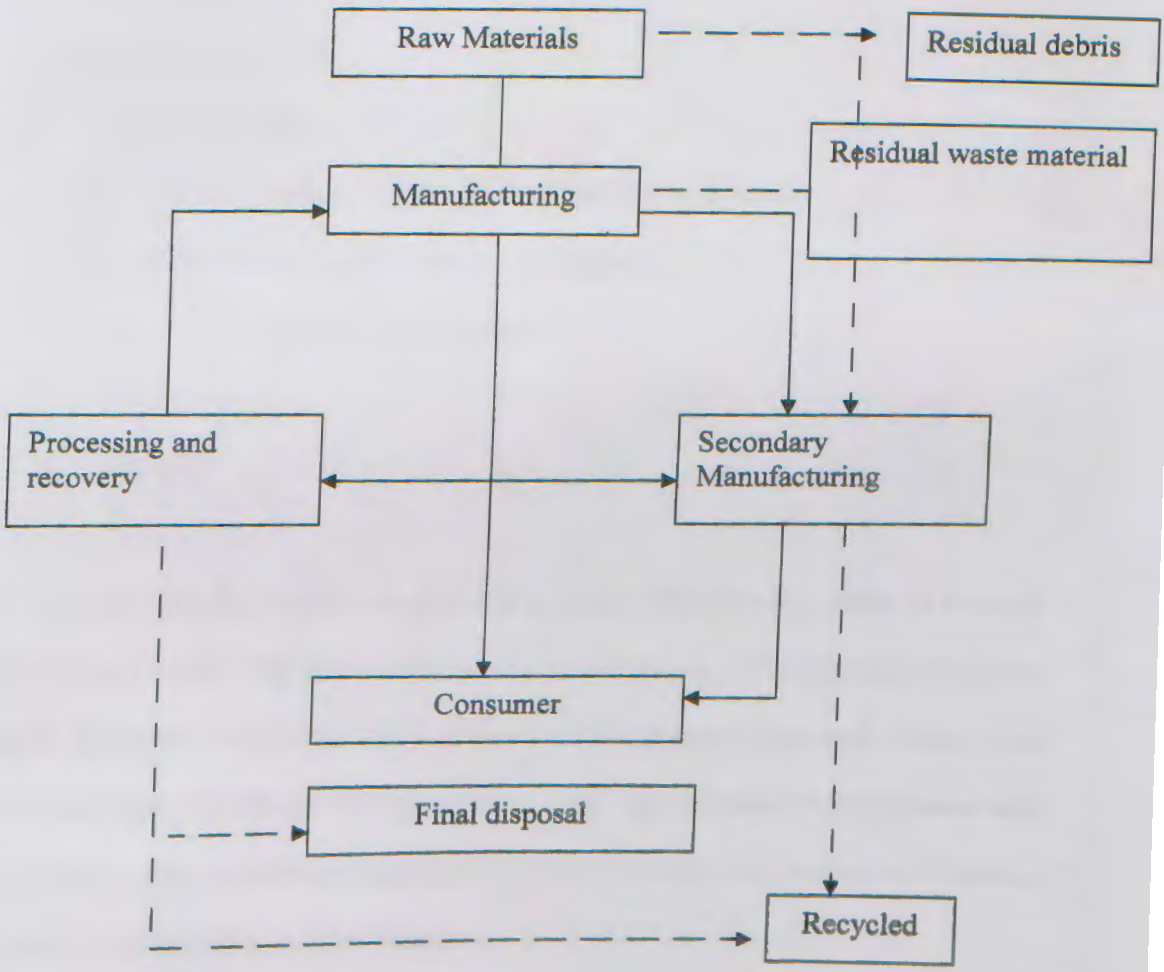
4.16.5 Recycling of solid waste

Investigations are underway to establish the viability of recycling and reuse initiatives in the entire city. In schools, this has kicked off and is proving to be a

success. If one looks at the volume of waste generated in the informal areas as compared to that in the formal areas, one can almost conclude that it is probably not so viable to start a fully fledged recycling project. On a smaller scale yes but not on a bigger scale. The volume of waste does not necessarily warranty the success thereof. However, this could encourage the culture of community participation, which could be indispensable should those settlements expand in size.

4.16.6 Proposed method of solid waste management

The diagram below presents the proposed methods that may reduce waste through increase recycling.



It is apparent from the structure above that the best ways to reduce the amount of solid wastes is to limit the use of raw materials and to increase the rate of recovery

and reuse of waste materials. Although the concept is simple, affecting this change in a modern technological society has been proved to be extremely difficult.

Some of the factors that influence the quantity of municipal waste generation include:

- geographic location
- season of the year
- collection frequency (number of times collection is done)
- characteristics of the population of that place
- extent of the population of that place
- public attitudes
- legislation

If City of Windhoek can put the above mentioned subjections in place to the said informal settlements, the amount of waste will be reduced. The communities or the "waste generators" should be made central in this proposed approach, which is in line with what Furedy (1992) proposes. With the technical requirements and incentives to users/communities proposed in this chapter (see e.g section 4.10) waste collection and recycling may be increased.

The following aspects should be put in place:

- System of improving cost recovery from users, and privatisation of collection and transport system.

- Even though the City of Windhoek Municipality does that, more systems should be encouraged.
- To increase community awareness and education in solid waste management, reduce wastes in production and distribution processes, and introduce reuse and recycling of wastes.

Waste in informal settlements of Windhoek can easily be managed if proper mechanisms such as the introduction of 240-litre wheelie bins and green bins can be introduced in these places in order to replace the black plastic bags.

Against this background, both residents and non-residents of these informal settlements should be sensitised about the importance of the environment and how they should conserve it for future development of the City of Windhoek.

4.17 FINANCIAL IMPLICATIONS OF IMPROVED WASTE MANAGEMENT

As estimated by the authorities the total annual budgets spend by the division of solid waste management varies from one year to another. The budget keeps on increasing as a result the overall estimated amount per year ranges from 60 million plus starting from the year 2002 up to this current financial year 2004. This amount covers both formal and informal settlements of the entire City of Windhoek. According to the information obtained from one municipal official who was interviewed is that it is stipulated in the policy that figures or amounts spend on wastes should remain confidential.

However, the following figures were obtained. During the current financial year, clean up campaign cost N$39 510 whereas N$5 059 850 was spend on private contractors and N$911 369 is been spend on community waste volunteers. The division initiated for a mobile transfer station system which was recently been introduced as a mechanism to help reduce wastes in informal settlements and this has cost the division N$3 2 million.

4.17.1 Costs of each alternative proposed

Before one determines which system is more effective, one needs to estimate the cost of each system put in place by the City of Windhoek through the solid waste management division. As indicated on the overview above, the costs indicated covers the entire City of Windhoek.

For example:	**(City of Windhoek budget 2003/4)**
1. Skip container system	N$2 320 205
2. Wheelie bins	N$1 283 179
3. Mobile transfer station system	N$3 200 000
4. Clean up campaigns	N$ 39 510
5. Private contractors	N$5 059 850
6. Community waste volunteers	N$ 911 369

As indicated by residents of the informal settlements, the most effective method to be introduced in these areas is the introduction of skip containers and wheelie

bins to be given to each household of these informal settlements in order to replace the black plastic bags currently used.

When looking at the current system, one tends to agree that in a short term that the system of black plastic is more effective and viable because the costs involved in purchasing this bags is very less. Whilst costs of containers and wheelie bins are high, but, their advantage is long lasting. When looking at this trend on a long term, one will recommend that it is advisable that the City of Windhoek should switch on the system of buying such equipment in informal settlements, and through that the division would save on their costs measured in buying these plastic bags every week. Black plastic bags are cheap and convenient in the short run but not in the long run, as one plastic bag cannot be reused again and again, while containers and wheelie bins lasts for one to three years if used properly.

4.17.2 Financial Estimates of Recycling

Collection and disposal of refuse within an urban area has been traditionally perceived as the responsibility of the local municipal government. Provision of services to collect and dispose of municipal refuse is expensive, even when the most primitive methods are employed. As indicated on the section of finances/costs involved in waste management of the City of Windhoek, it is usual for the costs to comprise of 30% to 40% of their total budget. In order to minimise these costs, recycling and reuse of these wastes should be introduced. This process might cost the city much but in the long-run will reduce their costs drastically.

The collection, disposal and recycling of solid wastes is just one of the problem that we are facing as a country and continent at large. The first priority even though an expensive exercise is for the municipality to introduce a removal bin that will have different pigeon holes in order for waste generator to sort their wastes before been finally sent for collection and transportation finally to their dumping areas. The city involved should not necessarily exclude informal sectors in recycling and handpicking of these wastes. This exercise can be fully transferred to informal sectors who will facilitate the process on behalf of the City of Windhoek. Through this system community participation and involvements will be encouraged in many ways i.e. collection of this wastes and payment will be given to them, based on the amounts of tons of refuse in comparison to rates of wastes determined.

According to estimated costs received from some breweries who are currently involved in the recycling of bottles, shows that the costs involved in purchasing new equipments such as plastic bags, container and wheelie bins is far much higher. This indicates that in the long-run the City of Windhoek will save on their solid waste service costs if greater recycling is promoted. Both the community who will be fully involved in the recycling and reuse and the City of Windhoek will benefit fully if the system of recycling and reuse is introduced.

4.17.3 Costs and outcomes of community participation.

Community participation and involvement in the management of solid wastes will cost the City of Windhoek a lot of money, but in return the city will achieve its goal of been the vibrant city and the most cleanest city in southern Africa. It was already estimated by the city that every financial year the city spend, with the help of donors like (Namibia Breweries) on community waste volunteers an amount equal to N$911 369.

If proper awareness can be raised by the City of Windhoek among residents of informal settlements, there will be a vast improvement in the outskirts of our city where the lower income group lives. Communities can be encouraged to collect wastes and payment should be given to them based on the amounts of wastes they have collected. This exercise had worked in other parts of the world such as the cities of Kanpur and Calcutta in India (Band & Schenk 1994).

CHAPTER FIVE

CONCLUSIONS AND RECOMMENDATIONS

5.1 INTRODUCTION

This chapter summarises the whole study and suggests recommendations.

5.2 BRIEF SUMMARY OF THE STUDY

Collection of solid wastes in informal settlements of Windhoek is undertaken by the City of Windhoek, and assisted by different stakeholders such as Rent-a-Drum, community waste volunteers who are directly contracted by the City through the division of solid waste management. The origin of solid waste in informal settlements started back in early 1990, when Namibia obtained independence. Before independence, government policy forbade natural urban expansion in 'black' suburbs. This resulted in grossly overcrowded conditions, often with an entire family living in one small room. This has changed when the country obtained independence, people began moving out of their overcrowded homes and started constructing shacks on the periphery of town and settled in what come to be known as informal settlements. At the same time others perceived that as an opportunity to migrate from rural to urban areas. Waste became a problem to an extent that it had lead informal settlements to be perceived as a health risk .

5.3 CONCLUSIONS DRAWN FROM ANALYSIS

The study discovered that household wastes are the largest component of urban solid waste in informal settlement. It has been realised that Namibia is one of the first

countries worldwide to incorporate environmental issues and sustainable development in its supreme law, the constitution of the Republic of Namibia (Article 95). The study also indicates that the importance of community involvement and participation in urban solid waste management can no longer be overlooked.

The municipal laws that governs land distributions, allows the municipality to accommodate low income groups in areas where they are not required to make payments for certain services they are rendered with. Hence, municipal council cannot manage to cope with a high demand of migrants that flocks to the city every month.

It was against this background that a study had been undertaken. It is significant in the sense that it has identified ways on how solid waste management can be improved in informal settlements. The study has identified different methods, techniques and approaches in managing and reducing solid wastes in informal settlement of Windhoek. Solid waste division is guided among others by the following enabling laws and regulation, which are the Local Authority Act of 1992, the Local Authority Health Act and the recently launched Environmental Health Policy.

The study also indicated that collection of wastes in informal settlement is only done once a week, and equipment used in the collection of these wastes are mainly black plastic bags. As a result the management of waste has become a serious problem that had lead to health hazards.

The 2004 study indicated that the most contributors of solid wastes are households with almost 48%, as shown by this recent study. Recycling of waste seems to be favoured by most respondents. 90% of the respondents said recycling will create employment, increase the quantity of production of used materials. Recycling does not contribute to air pollution and will keep the informal settlement clean, as each and every resident will need to collect and sell the waste in order to get an income on it. Only 10% of the respondents did not support recycling, they stated the process reduces the quality of the original products, and said to be very expensive.

5.4 RECOMMENDATIONS

From the conclusions drawn the following recommendations have been made for the City of Windhoek and any other municipality or council that deals with informal settlements.

The main objectives of the study were to investigate ways in which community participation can be improved in solid waste management. To strengthen the existing methods and technical support services put in place in order to improve recycling and reuse and to use the findings of this particular research to improve solid waste management in informal settlements. Based on the basis of the findings, the following recommendations have been made.

- Encourage community participation in the management and collection of solid waste by rewarding them for the services rendered i.e. pay certain amount of money in line with the amount of tons of waste collected.

- Establishment of recycling points or make use of the already existing recycling places in order to reduce costs and minimize waste in informal settlements.

- Employ or contract more people from these informal settlements in order for them to be able to collect wastes everyday of the week.

- Provide residents of the informal settlements with more and big plastic bags or replace them with the 240 litre wheelie-bins or orange containers.

- Provide one 240 litre wheelie-bin to each household and two more containers in each street.

- Provide informal settlements with tractors as they can easily be moved around between houses of these informal settlements, this in turn will reduce waste to a larger extent, as 90 per cent of waste will be collected compared to the current mode of transport used.

- Collection and disposal of refuse within urban areas has been perceived as the responsibility of the local municipal government, this should also be the case with solid wastes in informal settlements of Windhoek, and City Windhoek with the help of other stakeholders should commit themselves to that.

- Solid waste management has a large transportation component, it is advisable for municipal council to minimise the travel times and distances of the collection and transfer vehicles in order to provide minimum cost service, this will reduce the current amount of money spend, as costs involved in travel times for collection will be reduced.

- It is recommended that waste management typically remain in the hands of the local government is that no one wants it, because it has proven to be ineffective, even though private contractors does it only for the sake of making profit forgetting the most important reasons of been for the health problems to the public, the have proved to be more effective in Asian Countries Cointreau, 1982.

- Municipality must organize awareness of any kind and educate communities living within these informal settlements about the danger and risks involved in solid waste.

- Proper plot (erf) should be provided to each resident of this informal settlement in order for people to have autonomy over the land. This should be done in line with the squatter's settlement policy as indicated by Shipanga (2001).

- System of improving cost recovery from users, and privatisation of collection and transport system should be encouraged in informal settlements of Windhoek.

5.5 AREAS OF FURTHER RESEARCH

This study highlighted some of the important issues surrounding waste management in informal settlements. It also suggested increased community participation and recycling as possible solutions to waste. However, an in-depth study on the cost and benefits of recycling needs to be undertaken.

APPENDIX 1

General research questions

1. How effective are the methods and techniques used in the management of wastes?
2. Can the Municipality provide better services with the facilities it has at its disposal?
3. In what ways can private actors and community organizations participate in the management of wastes in informal settlements?

APPENDIX 2

Interview guide for different interviewees (Residents of the three informal settlements)

1. How would you like to define solid waste?
2. How long have you been staying in this place?
3. What do you think is the most contributor of solid waste management?
4. Did you ever receive any education on solid waste management?
5. How regularly do you attend meetings on solid waste management per year or since your stay here?
6. How regularly is your waste collected at your place?
7. Do you regard recycling and reuse to be a good method of managing wastes? For both yes and no answers we need reasons.
8. How do you rate the service given by collectors in terms of equipments and transport?
9. Do you regard the place where you are residing to be clean or not?
10. Suggest ways that the Municipality can employ to reduce wastes and the risks involved in.
11. Can the Municipality provide better services with the facilities it has at its disposal or not?
12. In what ways can private sectors and community organizations participate in the management of wastes in informal settlements?

13. Suggest other mechanisms or equipment that can be used by different collectors to improve services rendered.
14. Suggest some new laws or policies that should be employed to improve solid waste management in informal settlements.
15. Do you normally pay for services rendered on wastes?
16. Does this payment or non-payment influence you by any means on how to manage these wastes?
17. Do you regard recycling and reuse of solid wastes to be a good thing?
18. Highlight the most advantages of recycling wastes and reuse.

City of Windhoek and Ministry of Environment (questionnaire)

1. What do you think is the most contributor of solid waste management in informal settlements of Windhoek?
2. How regularly do you give education awareness on solid waste management to residents of these informal settlements?
3. How often is waste collected in informal settlement of Windhoek?
4. Which regulation or policy is currently been used by the city of Windhoek as a guideline in the collection of solid waste management?
5. Suggest some new regulation, laws that should be employed to improve solid waste management in informal settlements of Windhoek.
6. Can the Municipality provide better services with the facilities it has at its disposal.

7. Suggest other mechanism or equipments that can be used by different collectors to improve services rendered.
8. Do you regard recycling and reuse to be a good method of managing waste in informal settlements.
9. How can we increase community participation in solid waste management in informal settlements of Windhoek?
10. In what ways can private actors and community organisation participate in the management of wastes in informal settlements?

Appendix 3

List of proposed interviewees and the actual number of people interviewed

Different sectors	Proposed	Actual Interviewees	
		Male	Female
City of Windhoek	2	1	0
Private contractor company	3	1	0
Individual collectors (volunteers)	3	2	1
Ministry of Environment and Tourism	2	1	0
Ministry of Health and Social Services	2	0	1
Stakeholders (residents of informal settlements)	100	58	42
	112	**63**	**44**

63 + 44 = 107

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