

**INTEGRATING NON-MOTORIZED TRANSPORT INTO THE URBAN TRANSPORT  
SYSTEM A STUDY OF WESTLANDS COMMERCIAL CENTRE**

**OYIER ISHMAEL OWIRA**

**A THESIS SUBMITTED IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR  
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**SCHOOL OF THE BUILT ENVIRONMENT  
DEPARTMENT OF URBAN AND REGIONAL PLANNING  
UNIVERSITY OF NAIROBI**


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## DECLARATION

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

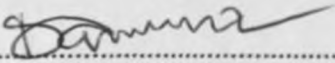
Signed.....  
OYIER ISHMAEL OWIRA  
(Candidate)

Date.....21/08/09.....

This Thesis has been submitted for examination with our approval as university supervisors

Signed.....  
MR.OMWENGA MAIRURA  
(Supervisor)

Date.....21/08/2009.....

Signed.....  
MR. CHARLES K. DADU  
(Supervisor)

Date.....21/08/2009.....

## DEDICATION

To Janet, Mum, for you believe in me.

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## ABSTRACT

The rapid development taking place in Westlands has been without commensurate infrastructure to support the activities and services offered which attract more pedestrians and motorists alike. The phenomena warrants for measures of integration to be set up as the NMT users are exposed to dangers of RTAs, congestion and uncomfortable walking conditions on the road. Since the area provides a mix of activities, walking seems convenient for mobility within Westlands Commercial Centre, to meet their needs.

The purpose of the study was to establish the integration of NMT into the urban transport system and come up with a proposal on how users of non- motorized transport can be accommodated in the urban transport system for; safety, comfort, mobility to ease the accomplishment of day to day activities.

The research was carried out in Westlands Commercial Centre on the major roads. The study centered on Ring road Parklands, Lower Kabete road, and Waiyaki way. The design applied in this study is a cross sectional since the study was aimed at finding out the problem of integration from a cross-section of the population and study area. Descriptive survey was useful in this design as the study involved collection of data, analysis and interpretation of data. Stratified random sampling to categorize the study into NMT infrastructure, integration, land use, transects in the study area and users within WCC.

The results of the study on integration reveal that integration starts with the recognition of NMT as a subsystem of the urban transport system. This means that it has to have its own network and attention given to point intersection between the two. This is only possible with proper co-ordination and co-operation within the institutions of management with the mandate of provision and maintenance of the road infrastructure. This has not been possible since the institutions of management are faced with challenges of finance,

diversity in the roads sector management and non- integration of land use and spatial development.

The study recommendations include a national NMT policy. It thus facilitates the integration of NMT within planning and design activities such as land development plans, traffic management schemes, road design, road maintenance and traffic safety programs, Facilitation of research and new initiatives to improve NMT performance, development of road design and maintenance standards that recognize NMT as a traffic component.

## TABLE OF CONTENTS

<b>CHAPTER ONE</b>	<b>1</b>
<b>Introduction</b>	<b>1</b>
1-1 Background of the study	1
1-2 Statement of problem	2
1-3 The purpose of the study	4
1-4 The Key research questions	4
1-5 Objectives of the study	5
1-6 Statement of research assumptions	5
1-7 Operational definition	6
<b>CHAPTER TWO</b>	<b>8</b>
<b>Literature Review</b>	<b>8</b>
2-1 Concept of Transportation	8
2-1.1 Transportation system	8
2-2 Land use and Transport interactions	9
2-2.1 Urban transport	9
2-2.2 Transport interactions	12
2-3 Integrating transport and land use	13
2-3.1 Land use planning	13
2-3.2 Transportation planning	14
2-3.3 Transportation planning process	15
2-4 Mobility and Transport	17

2-5 Integration of NMT into the urban transport system .....	18
2-5.1 The institutional Integration .....	18
2-5.2 Operational Integration .....	18
2-5.3 Physical Integration .....	18
2-6 Walking .....	20
2-7 Challenges of NMT .....	21
2-7.1 Road Traffic Accidents .....	21
2-7.2 Fatality Rates.....	22
2-7.3 Fatality trends .....	23
2-8 Institutional and Legal Frameworks .....	23
2-8.2 Regulatory Frameworks .....	25
2-8.3 Legislation .....	26
2-9 NMT Conceptual Framework .....	26
<b>CHAPTER THREE .....</b>	<b>32</b>
<b>Methodology .....</b>	<b>32</b>
3-1 Area of study .....	32
3-2 Research Design .....	33
3-3 Unit of Analysis .....	33
3-4 Data needed for the study .....	34
3-4.1 Land use.....	34
3-4.2 NMT policies and standards .....	35
3-4.3 NMT Infrastructure .....	35



3-4.4 Traffic .....	36
3-5 subjects of the study .....	36
3-5.1 Pedestrians .....	36
3-5.2 Pedestrian infrastructure .....	36
3-5.3 Motorist .....	36
3-5.4 City planning Urban design and development .....	37
3-5.5 Kenya police, traffic department .....	37
3-6 Data collection .....	37
3-6.1 Primary data collection .....	37
3-6.1.1 Observation .....	38
3-6.1.2 Interviews .....	38
3-6.1.3 Photography .....	38
3-6.1.4 Traffic survey .....	38
3-6.2 Secondary data collection .....	38
3-7 Sampling .....	39
3-7.1 Sampling procedure .....	40
3-8 Data analysis methods and techniques .....	41
3-8.1 Land use .....	41
3-8.2 NMT infrastructure .....	42
3-8.3 Institutional framework .....	42
3-9 Analytical framework .....	43
<b>CHAPTER FOUR .....</b>	<b>45</b>

<b>Area of study</b> .....	<b>45</b>
4-1 Historical Background .....	45
4-2 Location and psychological features .....	45
4-3 Climate .....	46
4-4 Drainage .....	46
4-5 Soils .....	47
4-6 Land use .....	47
4-6.1 Land use in Westlands Commercial Centre .....	48
<b>CHAPTER FIVE</b> .....	<b>51</b>
<b>Study Findings</b> .....	<b>51</b>
5-1 Introduction .....	51
5-2 Level of provision of NMT infrastructure and level of integration in WCC .....	51
5-2.1 NMT infrastructure .....	51
5-2.2 Land use .....	54
5-2.2.1 Land use along Parklands Road .....	55
5-2.3 Connectivity .....	58
5-2.4 Road design .....	59
5-2.5 Parking supply and management .....	61
5-2.6 Walking and cycling conditions .....	63
5-3 Policies and Regulations guiding the provision of NMT infrastructure .....	68
5-3.1 Integrated National Transport Policy, 2004 .....	68
5-3.2 Policy on provision of infrastructure for NMT .....	69

5-3.3 Physical Planning Act 286 .....	69
5-3.4 The local Government Act Cap 265 .....	69
5-3.5 Government Lands Act Cap 280 .....	70
5-3.6 The public Health Act Cap 242 .....	71
5-3.7 The Traffic Act Cap 403 .....	71
5-3.8 Kenya Roads Board Act 1999 .....	71
5-3.9 Zoning .....	72
5-3.10 Institutions of Management of roads in WCC.....	74
5-3.11 Ministry of Transport .....	74
5-3.12 Ministry of Roads .....	74
5-3.13 Ministry of Finance .....	74
5-3.14 Office of the Deputy Prime Minister and Minister for Local Government .....	75
5-3.15 Ministry of Internal Security .....	75
5-3.16 The Attorney General's Office .....	75
5-3.17 The Judiciary .....	75
5-4 Challenges and implications of integration of NMT .....	76
5-4.1 Financial Challenges .....	76
5-4.2 Diversity in the roads sector management .....	76
5-4.3 Land use and spatial development .....	77
5-5 Summaries and Emerging Issues .....	78
5-5.1 Lack of an urban Transport Policy .....	78
5-5.1 Lack of an Urban Transport Policy .....	78
5-5.2 Institutional Deficiencies .....	79

<b>CHAPTER SIX</b>	<b>80</b>
<b>Summary, Conclusion and Recommendations</b>	<b>80</b>
6-1 Summary	80
6-1.1 National NMT Policy	81
6-2 Conclusion	83
6-3 Recommendations	84
<b>BIBLIOGRAPHY</b>	<b>85</b>
<b>APPENDIX I</b>	<b>90</b>
<b>APPENDIX II</b>	<b>93</b>
<b>APPENDIX III</b>	<b>94</b>
<b>APPENDIX IV</b>	<b>95</b>
<b>APPENDIX V</b>	<b>96</b>
<b>APPENDIX VI</b>	<b>97</b>

**List of Tables:**

Table 3-1 Land use Factors .....	35
Table 3-2 Analytical Framework .....	39
Table 5-1 Origin of users in Westlands Commercial Centre .....	65
Table 5-2 On modal mix in Westlands Commercial Centre .....	66
Table 5-3 Physical development policy .....	73
Table 5-4 Summary of Transport Challenges .....	78
Table 5-5 Summary of Emerging Issues .....	80

**List of figures**

Figure 2-1 Urban Transportation problems .....11

Figure 2-2 NMT integration conceptual framework .....27

Figure 5-1 Showing appropriate design for NMT integration .....61

Figure 5-3 Pie Chart on modal mix .....66

## List of plates

Plate 5-1 Photo of pedestrians alighting on the carriage way .....	52
Plate 5-2 Showing pedestrians crossing at a Roundabout .....	53
Plate 5-3 Photo of privately done pedestrian walks .....	57
Plate 5-4 Showing various land use in Westlands Commercial Centre .....	58
Plate 5-5 Photo of privately done parking facility at Sarit centre .....	62
Plate 5-6 Segregated pedestrian walks in Westlands .....	64
Plate 5-7 Photo taken on Westlands Ring road showing poor road conditions .....	64

## List of Maps

Map 3-1 Map of study Area .....	42
Map 4-1 Map of Land use in WCC .....	48
Map 4-2 Map of Kenya Showing Nairobi .....	49
Map 4-3 Map of Nairobi showing Westlands and other Divisions .....	50
Map 5-1 Land use map of Westlands Commercial Centre .....	52
Map 5-2 Road Network in Westlands Commercial Centre .....	59



## **List of Acronyms and abbreviations**

**NMT** – Non – Motorized transport

**WCC** – Westlands Commercial Centre

**IMT** – Intermediate Means of Transport

**NMV**- Non Motorized Vehicles

**CCN** – City Council of Nairobi

**RMLF** - Road Maintenance Levy Fund

## CHAPTER ONE

### INTRODUCTION

#### 1-1 Background of the study

In most countries NMT has developed spontaneously and remains largely outside the normal process of transportation planning. Provisions for NMT, if made at all tend to be retrofitted to existing infrastructure, and to concentrate on minimizing the disturbance that it causes to the flow of motorized traffic. The more successful schemes for NMT integration in the urban transport system are for Tama town in Tokyo, providing for pedestrians and bicycle access within and to town centers (Kasuku, 2001).

In Kenya, Studies carried out on non - motorized transport and their provisions by many have dwelt on the larger centers in the urban areas and also the CBD. In Nairobi, studies conducted include areas like Eastlands, Industrial area and the CBD (Omwenga et al 1993).

A case study of Westlands Commercial Centre, takes a different turn given that it covers a smaller area yet, steadily growing and attracts land use activities that generates a lot of human traffic. Westlands is known for shopping magnates such as Sarit centre, one of the first shopping malls in Kenya established in 1983 having the concept of a city within a city with all services provided under one roof. Sarit Centre, which registers a minimum of 20,000 and up to 40,000 shoppers per day greatly, contributes to traffic generation in Westlands. The Mall, Uchumi supermarkets, Nakumatt stores also contribute a substantive number of shoppers in Westlands. The steady rise in growth of Westlands can be attributed to growth in terms of; the population, development within the urban area and especially the CBD, hence the sprawl as people are in search of more space to expand their businesses, and failure of the transport system as the city is congested with heavy traffic jams. Westlands Commercial Center then, seems convenient because of its proximity to the CBD.

The steady increase in growth and development however, has led to strain and pressure on the existing transportation infrastructure and especially for non – motorized transport. Subsequently the area is plagued by, vehicle – pedestrian conflicts, traffic congestion, RTAs (Road Traffic Accidents), inefficient use of the urban transport system. The challenges notably are faced by the non- motorized users of the urban transport system in Westlands, where they are faced with congestion, due to the limited number of NMT facilities and the discomfort associated with it especially in bad weather.

The study looked at integrating NMT in the urban transportation system in Westlands commercial center. This was achieved by analyzing three elements of integration (institutional, spatial and operational), and an analysis of the laws, policies and regulation on transport infrastructure in Kenya. An inventory of the available NMT infrastructure was also carried out, by use of an observational checklist. Interviews, questionnaires and discussions on the study were applied to obtain relevant information.

### **1-2 Statement of problem**

Mobility and transportation are key components in life in cities all over the world. People desire mobility both for its own sake and because it enables them to overcome distances between different places to satisfy different needs. The development of transport infrastructure in urban areas in Kenya (Nairobi) has tended to ignore Non- Motorized transport (Kasuku, 2001).

Although in the early 1960's there were provisions for pedestrian foot paths, bicycle and motor cycle parking bays in Nairobi and Mombasa, for instance, these have soon disappeared from the town and city planner's schemes and as of now, both NMT and motorized transport compete for the same space including pedestrians in many areas and statistics show that intermediate modes of transport (walking, bicycles and hand carts) users account for over 70 percent of all accident victims in Kenya (Kasuku, 2002).

According to Kasuku (2002), the situation has reached this proportion probably because of lack of appropriate infrastructure and partly because of cultural biases against NMT (often seen as inferior modes). There has never been a positive policy to develop infrastructure that can accommodate NMT.

Urbanization in the city of Nairobi has led to an increase in growth and development within the urban areas, increased investment and even population pressure. Nairobi has experienced some of the highest growth rates of any city in Africa. Since its foundation in 1899, Nairobi has grown to become the largest city in East Africa, despite being the youngest large city in the region with an estimated population of 2,143,254 (Census, 1999). The growth rate of Nairobi is currently 6.9%—It is estimated that Nairobi's population will reach 5 million in 2015.

The population pressure in the city has led to many people relocating their businesses and offices to the outskirts and away from the town centre. The result of this is the ever increasing growth of centers like Westlands, Hurlingham and Nairobi west. Westlands, which was originally for shopping purposes, has now grown into a mixed development area. The mixture in land use, which if left un-checked will lead to incompatibility in the future. The increase in pedestrian and vehicular traffic due to increased development unmatched with commensurate infrastructure illuminates the crisis of the absence of NMT facilities and infrastructure faced by users in Westlands.

The situation in Westlands where there is continued development without commensurate infrastructure integrated, will lead to greater planning problems in future. Lack of these infrastructure also put the users of NMT at risk. The safety and security of the pedestrians is not ensured as the large numbers have overwhelmed the existing pathways and most pedestrians find their way into the vehicle carriage way which poses a danger to them.

There is great discomfort and inconvenience to the users in the absence of these facilities. The pedestrians are faced with poor linkages of foot paths to various parts of WCC, congestion, especially during the peak hours. The phenomena in WCC then, warrants for a critical study on integration of NMT, to ensure mobility and transportation as key components of urban life in cities world over.

### **1-3The purpose of the study**

The purpose of the study was to establish the integration of NMT in the urban transport system and come up with a proposal on how Non- Motorized Mode of transport (NMT) can be accommodated in the urban transport system for comfort and safety.

Studies on transportation and especially NMT have dwelt on larger areas and also the CBD. A study on Westlands Commercial Centre will contribute to knowledge on smaller areas yet rapidly developing due to demand, and also proximity to the CBD.

The study brings to light the importance of NMT integration into the urban transport system, these being for safety, comfort, mobility and transportation.

The study sheds light on the potential of NMT which is often immobilized or even actively suppressed. The highlights which are the main focus, on importance of infrastructure investment and management, and policies that can make NMT transport safer and more attractive, to the benefits not only of the very poor, who are economically captive to NMT, but also the less poor.

### **1-4The key research questions**

- To what extent has the infrastructure for non – motorized transport been integrated into the urban transport system in Westlands commercial Center?
- What is the policy on NMT integration in the urban transport system?
- What institutions have been put in place to guide and regulate the provision of NMT infrastructure in Westlands Commercial Center?
- What are the challenges and implications of integrating NMT into the urban transport system?
- How can NMT integration be enhanced in the urban transportation system?

### **1-5 Objectives of the study**

- To examine the provision of the non – motorized infrastructure in the urban transport system in Westlands commercial center
- To review policies and regulations that guide the provision of NMT infrastructure in the urban transport system
- To examine challenges and implications of integration of non – motorized transport infrastructure in the urban transport system
- To propose measures of integrating non – motorized transport system into the urban transport system.

### **1-6 Research Assumptions**

Co-operation and co-ordination of institutions of management is essential for integration of NMT into the urban transport system.

Institutional co – ordination influences integration of NMT into the urban transport system.

Institutional co-ordination does not influence integration of NMT into the urban transport system.

## 1-7 Operational definition

**Integration** – a combination of parts or objects that work together well (thesaurus: English U.K)

**Non – Motorized transport (NMT)** – a transport system whose mode depends on non - motorized means of movement or propulsion, this includes walking, Cycling and hand cart, animal drawn carts, and pack animals (Sessional paper 1 2006)

**Transportation** – a service that enables people, firms and other entities to carry out activities at selected sites located separately.

Transportation is a critical service function facilitating the thousands of events and processes that together make up the daily life of an urbanized area. (Werner 1985)

**Transportation system;** – a circulatory system of any given area which maximizes accessibility for any essential movement between linked activities, giving due consideration to safety, comfort, amenity and cost

**Transportation planning** – is the field involved with the siting of transportation facilities (generally streets, highways, side walks, bike lanes and public transport lines) Wikipedia, 2009)

**System** – a set of interconnected things or parts or an organized body of material or immaterial things or a group of objects related or interacting, so as to form a unit. (Encarta)

**Urban system** – An urban system may be defined as a group of interdependent urban centers, which function together for a purpose. Such systems are the outcome of distinct historical process, at least during the initial stages of their development within the society. This is, urban systems evolve as sub systems of their societies (Ngugi George, 2007).

**Mode** – means of transport

**Trip** – One-way movement by a person from one place to another for a particular purpose

**Traffic** – Movement of person's goods and services using various modes, i.e. pedestrian, volumes and weight (Stover and koepke, 1988).

**Mobility** – Defined as trips per day (SSATP, 2005).



## CHAPTER TWO

### LITERATURE REVIEW

#### **2-1 Concept of Transportation**

Transportation is a critical service function facilitating the thousands of events and processes that together make up the daily life of an urbanized area. Transportation is the means by which persons and certain services can be moved from one place to another. Transportation is the movement of persons and goods over space and not movement of vehicles. Transportation is essentially a service that enables people, firms and other entities to carry out activities at selected sites located separately. The transportation system is an expensive venture and as long as the activities are situated at different spaces, there is need for the provision of transport services, in order to fulfill the human needs. When activities are precisely or permanently located in space it becomes a land use. Transportation becomes the linkage between the different locations of human activities for production (Werner, 1985).

#### **2-1.1 Transportation system**

Transportation is a rather conspicuous part of human activity. There is the hardware – trucks and airplanes, bicycles and bicycle paths, railway station and canals, parking lots, large free ways and small drive ways. The hardware is the means by which we move people and freight from place to place- that is, from where they currently are to where, by somebody's decision, they are supposed to be. The last point provides a convenient opening to the phenomena of transportation, that "the art of transportation is simply the implementation of a human decision", (Werner, 1985) The transport software includes the goods, freight transported in the system to various destinations, passengers traveling within the system, to fulfill the various needs offered on different land use in an area.

## **2-2 Land use and Transportation Interactions**

Land use and transportation are inextricably linked. Agencies often struggle to understand and respond to this linkage in a way that fulfills natural resource and quality of life objectives while fulfilling community economic objectives (Mary et al, 2005). New transportation infrastructure can help shape land uses by increasing the accessibility of sites and mobility of site users. For instance, on a highway corridor through undeveloped land, a new interchange offers some existing users of the highway network time saving over their current routes and destinations, thereby increasing demand for new development on these sites.

These pressures can result in land development, often at quite a distance from the interchange. While the new interchange may represent a transportation agency's good faith effort to fulfill its charge of improving mobility, it also produces powerful effects on land use. Other transportation investments produce "induced growth" in similar ways.

### **2-2.1 Urban transport**

Meyer and Miller (1984) observe that an urban transportation system is a basic component of an urban area's social, economic and physical structure. Design and performance of a transport system provide opportunities for mobility and over the long term it influences pattern of growth and the level of economic activity through the accessibility it provides to land. In further argument they state that, Transportation enhances economic viability of down town areas, it improves air quality, reduces dependence on petroleum based energy. Indeed, planning for the development or maintenance of the urban transport is for promoting the efficient movement of people and goods in an urban area for maintaining the strong supportive role that transportation can play in attaining other community objectives.

Barnister (1993) states that, '...it is important to recognize that transportation is an integral part of any modern economy. It not only provides a vital input to manufacturing processes but also permits individuals to enjoy a wide range of geographically desperate,

leisure activities. Transport use has grown with economic expansion being both a creative impetus to the economic development process and a consequence of it'. A transport system shapes urban form and is so influential in determining the spatial distribution of many economic activities.

Urban areas have in the past frequently suffered from transportation congestion. It has been recorded that in the first century vehicular traffic, except for chariots and official vehicles, was prohibited from entering Rome during the hours of daylight. While congestion has existed in urban areas the predominantly pedestrian mode of transport prevented the problem from becoming too serious until the new forms of individual transport of the twentieth century began to demand greater highway capacity. (Slater and Hounsell, 1996)

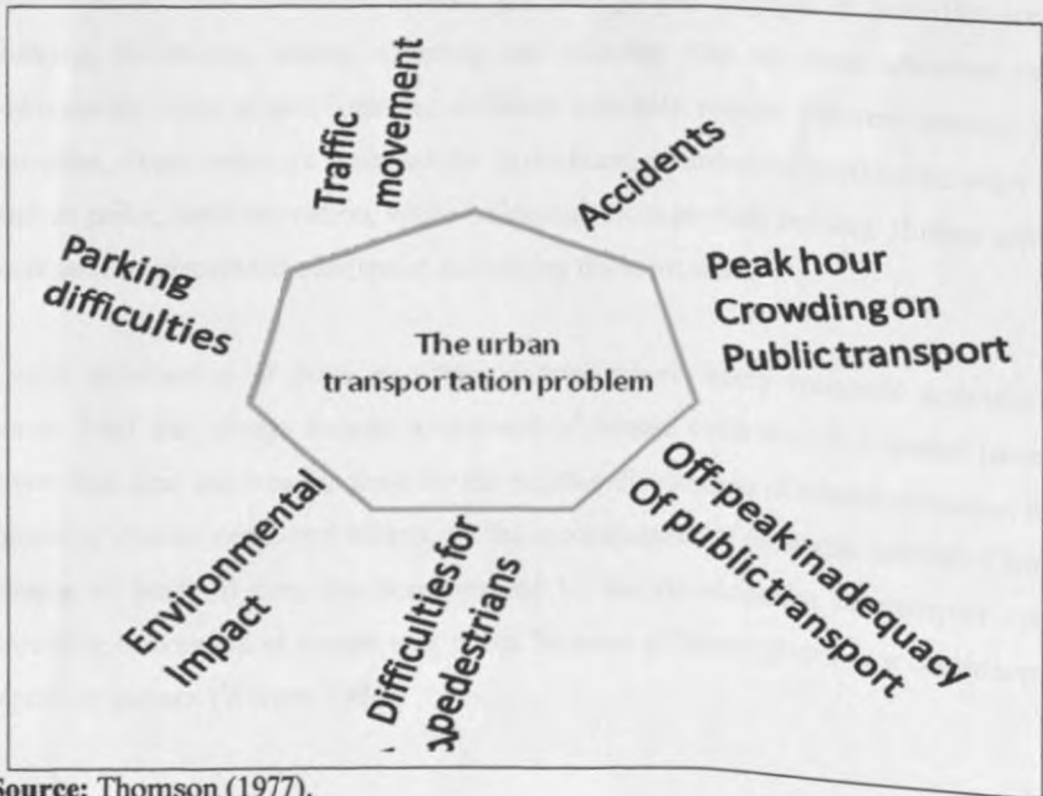
This is a clear indication that pedestrian mode of transport has been the predominant form of transport for many and this means helped to combat congestion in the large urban areas. The attention on the mode however has shifted with the entry of the individual transport or private allowing for congestion in the urban areas.

According to Salter and Hounsell, (1996) changes in transport mode frequently produce changes in land-use patterns '... more recently; the availability of private transport has led to the growth of housing development which cannot economically be served by public transport. Land use and transport planning are also closely connected because the demand for travel facilities is a function of human land activity and conversely the provision of transport facilities has often stimulated land-use activity'. Hence it is important for some attempt to be made to develop economic, environmental, land use, population and transport planning policies. The transport system affects urban quality of life in many positive ways. It aids the creation of wealth by enabling people to reach their work place, moving raw materials and distributing finished products. It affords access to shopping, health, education, leisure and other welfare facilities both by enabling individuals to travel and by conveying facilities to people.

The provision and use of a transport system can also have negative effects on quality of life by causing injury and premature death, by displacing people from their homes businesses and land. Other negative effects are; location patterns which accentuate class inequalities in the degree of access to activities and facilities, by degrading the environment, by the fatigue and frustration associated with some forms of travel, and by feelings of infringement of personal freedom associated with the enforcement of transport regulations. These negative effects often bear disproportionately on particular individuals and groups in society. Nevertheless, urban society as a whole accepts the negative effects because it values the positive ones so highly (Pacione, 1990).

Thomson (1977) identifies seven interrelated components of the urban transport problem which confront municipal authorities throughout the world. Particular attention has been devoted to the problems of traffic movement and congestion, public transport and the environmental and socio-economic impact of transport systems.

**Figure: 1 Urban Transportation Problems**



Source: Thomson (1977).

## **2-2.2 Transport Interactions**

Land use and transportation are two sides of the coin. Transportation affects land use and land use affects transportation. As a result, it is important to co-ordinate transportation and land use planning decisions so they are complementary rather than contradictory (Litman, 2008).

Throughout history, transportation and land development have been closely bound. As people settled, and cities and towns begun to grow, more and more sophisticated modes of transportation developed. Transportation and land development unites transportation and land use in an exiting and timely discussion of the planning and design of circulation systems from the standpoint of site development (Stover and Koepke, 1988).

In Stover and Koepke (1988), the spatial distribution of human activities and the differentiation in land use guarantees the need for transport; either of people to places of particular activities, or of material goods needed in the pursuit of these activities. Wherever we find human habitation, we find people engaged in activities such as working, socializing, eating, sleeping and relaxing. Not all these activities can be conveniently done at one location; different activities require different settings, tools, resources. Some areas are reserved for agricultural or industrial production; other areas such as parks, serve recreation, while residential areas provide housing. Human activities must then be distributed over space, occupying different sites.

Spatial distribution of these resources dictates where many economic activities take place. What has always emerge as a result of human settlement is a spatial pattern of diversified land use brought about by the existing distribution of natural resources, by the variety of human needs and wishes, by the specialization of economic activity. Changing pattern of land, in turn, are accompanied by the development of transport systems providing movement of people and goods between different places in a continuous and repetitive pattern (Werner, 1984).

## **2-3 Integrating transport and land use**

Transportation has much influence on land use and hence has dictated urban form. Transportation was designed to open vast land resources to development and to provide businesses and households with choices of local public goods and services.

### **2-3.1 Land use planning**

The first comprehensive urban plan of Nairobi city was commissioned in 1926, to recommend zoning arrangements. The 1948 master plan study was the basis for the development of guidelines for residential, industrial and other public purposes for the next 20 years (Thornwhite, Silberman and Anderson, 1948). Most of the current statutory planning rules and regulations originate from the 1948 master plan, while the by-laws are mainly patchworks of the various pre- 1948 rules and regulations, prepared largely in conformity with the 1932 United Kingdom Town Planning Ordinance and 1932 British Planning Act (Akatch, 1998). The 1948 master plan introduced the principles of neighbourhood units and is wholly responsible for the present layout of the industrial area. It also proposed important extensions to the road networks, including the relocation of the railway line and its replacement with the present dual Uhuru Highway. It recommended the institutionalization of an autonomous town-planning department within the City Council of Nairobi (Akatch, 1998).

The Metropolitan Growth Strategy of 1973 for the development of Nairobi up to the year 2000 made ambitious development proposals, which have only been implemented in a piecemeal fashion over the last 30 years (Nairobi Urban Study Group, 1973). The strategy aimed at maximizing land use in the CBD, utilizing existing infrastructure and public services, harmonizing the then prevailing haphazard zoning system, creating a balanced urban environment and creating incentives for development and redevelopment of derelict areas in the CBD. The strategy also made the following recommendations on the CBD:

- That maximum employment be limited to 100,000 jobs;
- That the industrial area be limited to its location and occupied predominantly by capital intensive enterprises;

- That government functions unrelated to policy and legislation or business administration be located outside the CBD;

### **2-3.2 Transportation Planning**

Transportation planning is the field involved with the siting of transportation facilities (generally streets, highways, sidewalks, bike lanes and public transport lines). Transportation planning historically has followed the rational planning model of defining goals and objectives, identifying problems, generating alternatives, evaluating alternatives, and developing the plan. Other models for planning include rational actor, satisfying, incremental planning, organizational process, and political bargaining. However, planners are increasingly expected to adopt a multi-disciplinary approach, especially due to the rising importance of environmentalism. For example, the use of behavioral psychology to persuade drivers to abandon their automobiles and use public transport instead. The role of the transport planner is shifting from technical analysis to promoting sustainability through integrated transport policies (Wikipedia, 2009).

Urban areas have in the past frequently suffered from transportation congestion. It has been recorded that in the first century vehicular traffic except for chariots and official vehicles was prohibited from entering Rome during the hours of daylight. While congestion has existed in urban areas the predominantly pedestrian mode of transport presented the problem from becoming too serious until the new terms of individual transport of the twentieth century begun to demand greater high way capacity (Slater and Hounsel, 1996).

This is a clear indication that pedestrian mode of transport has been the predominant form of transport for many and this means helped to combat congestion in the large urban areas. The attention on the mode however has shifted with the entry of the individual transport or private transport allowing for congestion in the urban areas.

### **2-3.3 Transportation planning process**

Planning means to choose a set of goals and to identify a set of actions that will lead to the realization of those goals. It includes taking inventory of the current situation, because it is the present condition that needs to be acted upon to achieve that desired future situation described by the goals (Werner, 1985).

People have common needs and desires, since they are social animals, they engage in joint efforts to produce solutions that meet the needs of many. Most activities and their associated forms of land – use teaching in colleges, religious services in churches, living in residential areas, and working in factories are joint endeavors and so is the provision of transport that links the area of specialized land use, allowing each to participate in a host of different activities. A highly organized and diversified society requires on the order of 20 percent of the gross National product on transport.

According to Meyer and Miller (1984) transportation planning is considered of problem definition, incorporation of alternative viewpoints of analysis and evaluation, development of goals and objective statement and completion of the technical analysis needed to determine impacts of alternative decisions. Second, access opportunities as well as limitations of the future, unlike the traditional approach to planning which focuses most attention on identifying where “problems” will occur in the transportation system;

Third, transportation planning should include a long – range and short perspective. The long range being a continuing activity that represents a statement of need and policy direction, thereby providing a content of periodic transportation decisions to be made in the near term. The short range component takes into account the more immediate needs of transport system performance.

Fourth, the evaluation of alternative choices is directly related to the goals and objectives established for the planning process. Finally, a transportation system that meets the mobility and accessibility needs of their constituents.



The transportation system as planned for some future time has to accommodate the demand for transportation at that time. The transport demand information is the direct result of the future pattern of land use.

According to Werner the process involves the following stages; first, the transportation planner subdivides the planning area into a set of subareas called traffic zones. (Often the boundaries of these zones are dictated by the spatial breakdown of the statistical data bases available, but they might also be delineated in preparation for a transportation plan) using models estimating the quantitative relationship between the types of land use and traffic generation. 'trip generation models' the planner then determines for each traffic zones the transportation demand it will generate, either as movement to other areas( that is out flow) or as movement attracted from other areas( that is , inflow)

Second, having estimated the demand generated by each land use area, the transportation planner needs to know what the destinations of the outflows and origins of the inflows are. (Trip distribution models) that use a variety of information about the urban area and its sub areas to establish the distribution in terms of origins and destinations for the transportation demands forecasting by the trip generation models.

Third, what transportation models will those anticipated flows use private car, train, bus, or truck? Again transportation scientists have developed several models referred to as, modal split or "modal choice" that estimate the distribution of the transport flows over the various transportation models.

Fourth, what route will the transportation flow take? In an urban area, ground transportation accounts for virtually all transportation flows, and these flows always take place along fixed routes, which together form transportation networks. To predict the route a transportation flow will take through a certain network, transport scientist have developed several "network loading procedures also known as "trip assignment" models. These models are usually based on the assumption that network users will try to minimize the time it takes then to get to their destination by choosing the quickest route. Taking into account delays resulting from congestion and intersections.

“Loading the pattern of future transportation demands onto the current transportation network permits the transportation planner to simulate future network performance. The simulation will establish whether the transportation system is adequate according to pre – established performance criteria – for example whether the average speed of the transportation flow is at least thirty miles per hour. In fact, many of the existing urban networks do not currently meet minimum performance standards and their performance would be worse for the flow volumes projected for future years.”

Fifth, how the existing network should be improved so as to meet the future anticipated demands. Once again, transportation science provides a series of models evaluating network designs; other models generate and evaluate different strategies of network designs; operate and use routes and schedules of public transit control of network access traffic regulations, traffic control in intersections, user charges, and the like (Werner ,1985).

#### **2-4 Mobility and Transport**

Nairobi acts as the central point where journeys begin to destinations all round the country and is itself the country’s primary destination. Transport in Nairobi can be divided into five categories: private vehicles, buses, matatus (minibuses), commuter trains and taxis. Sometimes ignored, but equally important are the non-motorized forms of transport, such as walking and cycling. Dealing with urban mobility issues is an economic, social and environmental priority. The city’s traffic jams, pollution and inadequate pedestrian facilities and cycle lanes represent a major setback to the productive capacity of the economy, affecting all segments of society (Mitullah, 2003).

## **2-5 Integration of NMT into the Urban Transport System**

The objective definition of NMT integration is to put together or combine with the motorized mode in the urban transportation system. The subjective definition of integration of NMT; it starts with the recognition that NMT is a sub system of the urban transport system hence the need for combination. NMT integration into the urban transport system means streamlining it in the larger transport system and this system integration occurs at three levels. The first is at the institutional level, the operational level and the physical level (Sharma, 2002).

**2-5.1 The institutional Integration;** institutional integration refers to the creation of an organizational framework within which joint planning and operation of transit services can be carried out. Four types of organizational arrangements named, tariff association, transit communities, transit federation and mergers are considered for implementing transit integration.

**2-5.2 Operational integration;** involves the application of management techniques to optimize the allocation of transit resources and co – ordinate services. The techniques of operational integration include;

- Rationalization of redundant services
- Matching modes of service requirements
- Initiation of fare structures
- Fare discounts
- Co – ordinated public information systems
- Reserved bus lanes and streets
- Development of feeder routes
- Development of co-ordinated schedules
- Parking controls

Development of feeder routes and schedules co-ordination for feeder services is the most important aspect of operational integration.

**2-5.3 Physical integration;** refers to the provision of jointly used facilities and equipment. Techniques of physical transit integration include;

- Inter – modal terminals
- Transit shelters
- Park – and – ride facilities
- Pedestrian facilities (Sharma, 2002).

## **2-6 Non – Motorized Transport (NMT)**

In medium-sized cities in Japan, Germany and the Netherlands, walking and cycling make 40-60 percent of all trips, while in similarly sized cities in India this share is as high as 80 percent (Heierli, 1993). Almost all rural transport in Sub-Saharan Africa is non-motorized and dominated by head- and back-carrying by women and children. In many Asian countries, non-motorized two- and three-wheelers are common sights, employing special adaptations to the vehicle for goods transport, hawking or passenger hire.

Though NMT users are the majority in many places, they are often neglected in the design and modernization of transportation infrastructure. For example, new construction and upgrading often does not provide physical infrastructure (e.g., overpasses or shoulders) for existing NMT users, sometimes resulting in higher NMT-automobile accident rates, longer travel times for NMT users, or even a complete elimination of NMT traffic. The result of this neglect is a transportation system that in many ways favors cars and other motorized traffic to the detriment of poorer segments of the population; thus consideration of NMT during infrastructure design is an essential element to providing equitable transportation opportunities (Guitink et al, 2004).

Non -Motorized Transport (NMT) walking is one of the oldest forms and modes of intermediate means of transport (IMT) in human history. The influence of the car in the expansion of cities and its spread to the tropics in the 19<sup>th</sup> – 20<sup>th</sup> and now 21<sup>st</sup> centuries, however, has not satisfied the need for travel especially in third world where: the majority (over half of the population live below poverty line; private car is out of reach for over 98% of the population; while public transport is still expensive to majority of

rural dwellers; and over 40% of urban dwellers still walk to work (Obiero 1992, Kasuku 1995, 2001).

### **2-6.1 Walking**

Walking is the most familiar form of Non-motorized transport (NMT). Other common forms of NMT include bicycles; human portorage: handcarts/ wheel barrows animal drawn carts; and other human powered vehicles. The definition of NMT includes any form of transportation that provides personal or goods mobility by methods other than the combustor motor (Guitik, et al 1994).

Walking was particularly popularized by the establishment of the “Landhies” (barrack-like accommodation initially built for the railway track maintenance staff during the colonial period) that were established close to key suburbs and the CBD, so that workers would not have too far to walk to work. Examples of these Landhies are found in Mathare, Kangemi, Kibera and Kawangware. Even today most of the low-income segment of the population walks to work every day, covering distances of 7–15 km (Reglogle 1990). This is because of the inadequacy of public transport, the unavailability of alternative forms of transport such as bicycles, and the fact that they cannot afford the daily bus-fare. Research in Nairobi found that on average 47 per cent of trips by adults are made on foot (Howe and Bryceson, 2000).

Walking is the most familiar form of non-motorized transportation (NMT) in Kenya. Other common forms of NMT include bicycles/tricycles; human portorage; handcarts/wheelbarrows; animal drawn carts; and other human powered vehicles. In fact, the definition of NMT includes any form of transportation that provides personal or goods mobility by methods other than the combustion motor (Sessional paper 6, 2004).

In addition to the poor and deteriorating road conditions in the country, there is a considerable lack of facilities such as footpaths, lanes for cyclists and other NMT modes, street lights to make walking safe, and fly-overs and by-passes to ease traffic congestion. Most of these are as important in rural areas as in urban ones. The government’s principal policy initiatives for promoting NMT beyond their conventional use aim to i) guarantee

urban local authorities a share of Roads Maintenance Levy Fund (RMLF) revenues raised within their jurisdiction, ii) continue major reforms through the Kenya Urban Transport Infrastructure Project (KUTIP), in collaboration with the International Development Association (IDA), and iii) encourage locality-specific interventions through the National Forum Group on Rural Transport and Development established in 1996 (Sessional paper 6, 2004).

While walking may be a cheap alternative, pedestrians face a number of hazards. Many roads are only designed for motorized transport and sidewalks for pedestrians are almost non-existent. Waste, parked vehicles or informal businesses often obstruct walking routes, making them generally unsafe and inconvenient (Howe and Bryceson, 2000). During the rainy season pools of water also present a major problem. Women are especially concerned with the security aspect of walking and the risk of attack. As result some women are forced to incur the expense of public transport, even for short distances, or take long detours. For most women mobility is severely restricted by insecurity, especially in and around the informal settlements. This even extends to inhibiting their use of bicycles, because they fear that they would easily be stolen (Howe and Bryceson, 2000).

For the majority of the population, the only practical alternative to walking or use of public transport is the bicycle. But usage is quite low, with most preferring to walk to work because the roads are too dangerous for cyclists. Only about 11 per cent of households own one or more bicycles (Replogle, 1990).

## **2-7 Challenges of NMT**

### **2-7.1 Road Traffic Accidents**

Each year, an estimated 1.2 million people are killed in road crashes and up to 50 million injured worldwide. Road traffic injuries are currently ranked 9<sup>th</sup> globally among the leading causes of disease burden, in terms of disability adjusted life years (DALYs) lost. In the year 2020, road traffic injuries are projected to become the 3<sup>rd</sup> largest cause of disabilities in the world. Developing countries bear the brunt of the fatalities and

disabilities from road traffic crashes, accounting for more than 85% of the world's road fatalities, and about 90% of the total DALYs lost due to road traffic injuries. The problem is increasing in these countries at a fast rate, while it is declining in all industrialized nations (Western Europe, North America, Japan, Australia and New Zealand). Odera (2004)

A recent Global Road Safety Project (GRSP) study shows that about 10 per cent of global road deaths in 1999 took place in Sub-Saharan Africa where only 4 per cent of global vehicles are registered. Conversely, in the entire developed world, with 60 per cent of all globally registered vehicles, only 14 per cent of road deaths occurred. However, given the widely recognized problem of under-reporting of road deaths in Africa (like the rest of the developing world); the true figures are likely to be much higher, as the police-reported road fatalities represent only the tip of the injury pyramid. According to this GRSP study, the adjusted true estimate of total road deaths for all Sub-Saharan African countries for the year 2000, based on the police department's records, ranges between 68,500 and 82,200. However, the estimated fatality figure of 190,191 for Sub-Saharan Africa presented in 2004 World Report, based on health care data, is much higher, and reflects the magnitude of under-reporting in police statistics (World report, 2004).

### **2-7.2 Fatality Rates**

There is no single accepted indicator that accurately describes the overall road safety situation in a particular country. The number of fatal crashes per million vehicle kilometers traveled per annum – as a measure of exposure to motor vehicle traffic – is the most common method often used in highly motorized countries. However, because of the absence of accurate data on vehicle usage in most African countries, it is not possible to apply this method. Instead, fatality rates, the number of reported fatalities per 10,000 registered motor vehicles, are regularly used. Fatality risk, calculated as the number of deaths per 100,000 per annum, is also the indicator commonly used by the WHO and the ministries of health sector to report diseases and causes of death (Odera, 2004).

### **2-7.3 Fatality trends**

Recent studies indicate that, from 1985/86 to 1995/96, there has been an overall increase in road traffic deaths of 7% in all countries in Africa, the figures for Kenya show some 8% reduction in road death between 1997 and 2002. The vulnerable road users – pedestrians and pedal cyclists- are the most affected, and a heavy toll for their participation in traffic. Pedestrians account for the highest proportion of road fatalities in Kenya. Involvement of pedestrians is much greater in urban environment than in rural areas. Pedestrians and passengers altogether represent over 80% of all road death. Drivers account for a small share of fatalities, of less than 10 percent (World Report, 2004).

### **2-8 Institutional and Legal Frameworks**

According to the Sessional paper 1(2006), Non-motorized transport includes bicycles, hand and animal drawn carts, pedestrians and pack animals. When these share the same space with motorized transport, NMT severely constrains the efficiency of motorized transport and creates conflicts and accidents. However, although NMT is generally affordable and environmentally friendly, it receives little attention, and its infrastructure is inadequate. Despite its importance, appreciation for NMTs is not in evidence and there is lack of respect and accommodation for NMT by motorists, and disregard by planners. There is a distortion in the allocation of resources against transport demands, with a large proportion of resources being allocated to motorized transport as compared to NMT.

The Policy Statement, Sessional paper 1, on NMT states, “Extensive use of non-motorized transport (NMT), including pedestrian movement, is a vital feature of the Kenyan transport sector. The Government shall develop NMT infrastructure and facilities where sufficient demand exists. This will include establishing design standards, provision of separate cycle-ways, tracks and footpaths and ensuring safe crossing places where NMT streams intersect with motorized traffic. One of the key policy objectives is to enhance road safety and cater adequately to the needs of Non Motorized Traffic.



### **2-8.1 Institutional Framework**

The management of roads needs to be more effective and efficient. The needs of the road sector have outgrown the organization structure applied since independence in which key functions were implemented under traditional civil service bureaucratic procedures. These procedures are not optimized for the road sector and there is thus a need to allocate certain key functions into separate specialized organizations that will pursue their designated individual mandates, leaving the policy formulation and harmonization tasks to the Ministry responsible for roads (Sessional paper 1, 2006).

The policy statement of management of roads reads, “The Government remains committed to the building blocks of the Roads Management Initiative namely ownership, financing, responsibility, management and transparency. The Government will require that all organizations involved in the delivery of roads be customer-focused and adopt best management practices.

To this end, the Government shall reform the Roads Sub sector as follows:

The Ministry responsible for roads shall continue to provide the regulatory framework, coordination, oversight, supervision, liaison with other Ministries and any services necessary for the smooth functioning of the reformed roads subsector. The Local Authorities under the Ministry of Local Government and the District Roads Committees shall continue to carry out prioritization and monitoring roles.

The Government shall establish the following autonomous statutory road authorities:

- (1) Kenya National Highways Authority (KeNHA) to be responsible for the development and management of major roads (Class A, B, C)
- (2) Kenya Rural Roads Authority (KeRRA) to be responsible for development and management of rural and small town roads (Class D, E & others)
- (3) Kenya Urban Roads Authority (KURA) to be responsible for development and management of roads in cities and municipalities. In addition, the Government shall realign the functions of the following existing organizations:
- (4) Kenya Roads Board (KRB) to fund maintenance of all public roads

(5) Kenya Wildlife Service (KWS) to be responsible for development and management of roads in national parks and national reserves.

The following service departments of the Ministry of Roads And Public Works will be restructured as follows:

**Mechanical and Transport Department**

M&TD to be restructured into a SAGA responsible for provision on commercial basis of equipment to the road agencies and private sector for development and maintenance of road infrastructure,

Materials testing & Research Department: Materials Department to be restructured so as to meet its mandate for materials testing and research more effectively.

Kenya Institute of Highways & Building Technology (KIHBT), to be restructured into a SAGA with responsibility for training public and private sector staff for road development, rehabilitation and maintenance (Sessional paper 1, 2006).

## **2-8.2 Regulatory Framework**

The existing legislation consists of various legislative instruments, which are in some cases overlapping and fragmented. For example the Kenya Roads Board (KRB) Act states that the District Roads Committees shall manage unclassified roads which is in contravention with the Local Authorities act which states that Local Authorities shall manage all roads apart from the main roads (Class A, B and C). There is also a need to have road classifications and the complete road inventory, including road reserves, published and disseminated (Sessional paper 1, 2006).

The paper states “The Government is aware that the various items of legislation relating to roads need clarifying and harmonizing, particularly with respect to the statutory responsibility for roads. All roads are owned by the State, and the Minister responsible for roads can assign statutory powers to other bodies. The various statutory instruments, especially legislative Acts on roads and road transport, will be revised as result of this and other policy changes. The Ministry responsible for roads will ensure that all public

roads are gazetted and will resolve any conflicts relating to statutory responsibility. The various statutory instruments relating to roads will be revised and ambiguities removed”.

### **2-8.3 Legislation**

Traffic Act chapter 403 Laws of Kenya. Transport issues are basically covered under the traffic Act chapter 403 laws of Kenya. Even though pedestrianization is a form of transport, there is no direct reference to it in the Act. For example the term pedestrian is not defined in section 85 of the Act, while interpretative section of the Act does not define the term pedestrian. The Act, however, refers to the offense of driving at section 87 that “any person who on any road or in any public place drives a vehicle other than a motor vehicle, without due care and attention, or in such a manner as to be an annoyance to the public, shall be guilty of an offence and fine” Section 88 of the Act refers to driving or conducting animals while section 89 restricts the riding of bicycles.

### **2-9 NMT Conceptual Framework**

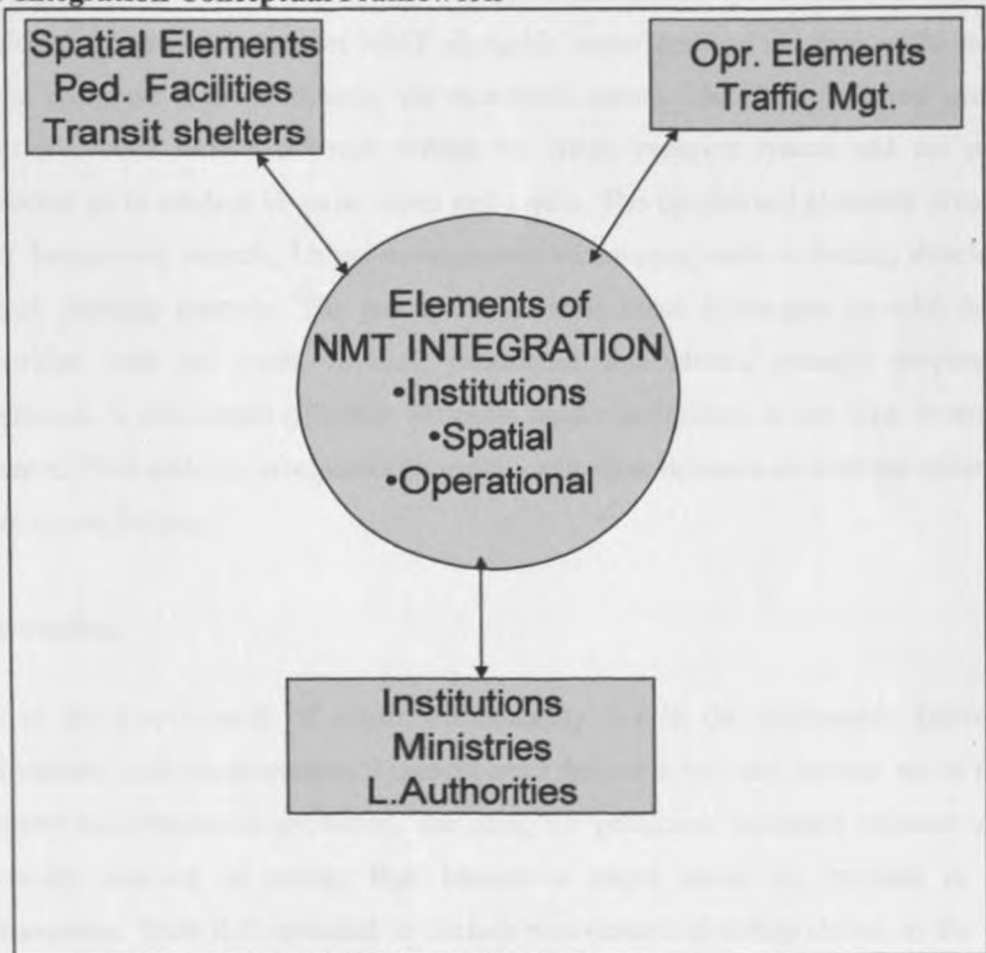
The availability of space in Westlands Commercial centre enables precise or permanent location of human activities forming land use on different sites. The various land use activities in turn generate massive traffic, creating a need for transportation service within the area. The land use however, is without commensurate infrastructure to meet the demand especially for NMT transport infrastructure such as; foot paths, streetlights, and terminal facilities. The provision of the transportation service is the responsibility of the management of the urban area, the City Council that has the mandate in accordance with the various policies and legislation put in place.

The NMT integration framework therefore presents the vital elements for the development and maintenance of infrastructure. Institutional elements responsible for the organization and provision of NMT points out to the local Council, City Council of Nairobi, who have the mandate to provide and maintain adequate sidewalks and pavements for pedestrians, footpaths and other facilities for NMT users, including ramps for the disabled.

The spatial elements include the physical infrastructure for NMT users. These facilities range from foot paths, traffic lights, transit shelters, inter modal terminus which play a complementary role to road and other transport modes for both passengers and goods.

The operational elements in the conceptual framework represent the management techniques of the roads in the country. The operational elements also entail the legal framework and other instruments that are relevant in administrative practices used by the government.

#### **NMT Integration Conceptual Framework**



**Source: Author's Conceptualization (2009)**

The NMT integration framework is a representation of elements which facilitate NMT infrastructure integration into the urban transport system. The arrows indicate the connection in a representation that NMT elements either affects or is affected by disconnect in the flow. Hence there has to be coordination between the elements for proper integration into the urban transport system.

NMT integration in the urban transportation system involves Institutional elements such as the central government, the Local authorities which must strongly support integration through, proper administration of services and funding. The spatial elements to be set up should be those which support NMT alongside motorized and not bias as the transport system designed is predominantly for motorized means. The NMT facilities/ pedestrian facilities should form a network within the urban transport system and not properly connected as is evident in most cities and towns. The operational elements involved in NMT integration include; Urban management techniques, such as zoning, development control, parking controls. The powers to exercise these techniques lie with the local authorities over the roads in their jurisdiction and should strongly support NMT integration. A disconnect of either elements hinder integration as the flow is broken by the same. This calls for co-operation and co-ordination between institutions under which the elements belong.

### **Case studies**

One of the key aspects of urban sustainability lies in the relationship between the environment and transportation. Transportation infrastructure and patterns are at the root of many environmental problems, including air pollution, increased reliance on non-renewable sources of energy that become a major cause for increase in energy consumption. Thus it is essential to include non-motorized transportation in the web of options to help create and plan for sustainable cities

NMTs offer low cost private transport, emit no pollution, use renewable energy, emphasize use of labor rather than capital for mobility, and are well suited for short trips in most cities regardless of income, offering an alternative to motorized transport for

many short trips. Thus, they are appropriate elements in strategies dealing with poverty alleviation, air pollution, management of traffic problems and motorization, and the social and economic dimensions of structural adjustment. NMVs have a most important role to play as a complementary mode to public transportation.

Cities in Asia exhibit widely varying modal mixes. NMVs — bicycles, cycle-rickshaws, and carts — now play a vital role in urban transport in much of Asia. NMVs account for 25 to 80 percent of vehicle trips in many Asian cities, more than anywhere else in the world. Ownership of all vehicles, including NMVs, is growing rapidly throughout Asia as incomes increase.

However, the future of NMVs in many Asian cities is threatened by growing motorization, loss of street space for safe NMV use, and changes in urban form prompted by motorization (Ndithi Batra 2009).

Transport planning and investment in most of Asia has focused principally on the motorized transport sector and has often ignored the needs of non-motorized transport. Without changes in policy, NMV use may decline precipitously in the coming decade, with major negative effects on air pollution, traffic congestion, global warming, energy use, urban sprawl, and the employment and mobility of low-income people.

As an outlook towards sustainable cities, Non Motorized Vehicles are now being encouraged in various cities- for short trips. These cities are being designed for upgrading the transport facilities for NMV and pedestrians.

Aspects of NMT that illustrate its usefulness when access is limited are:

### **Flexibility**

NMT provides a flexible form of transport that can be used for the door-to-door transport of persons and goods with improved travel time and route options.

### **Affordability**

With low operational costs they provide an independent mode of transportation for users to commute to places of work and leisure.

### **Ecological Sustainability**

Promotion of NMT (Cyclists & Pedestrians) environment will provide an opportunity for city to reduce its consumption of non-renewable source of energy thus addressing the issue of energy efficiency/climate change.

As cities in Japan, the Netherlands, Germany, and several other European nations demonstrate, the modernization of urban transport does not require total motorization, but rather the appropriate integration of walking, NMV modes, and motorized transport. As in European and Japanese cities, where a major share of trips is made by walking and cycling, NMVs have an important role to play in urban transport systems throughout Asia in coming decades. Transport investment and policy are the primary factors that influence NMV use and can have an effect on the pace and level of motorization. To maximize transportation efficiency and sustainability, transport planning in Asian and European cities have a focus on stratifying different travel markets by trip length and encouraging different travel modes for various market segments.

Various Indian cities are now taking pioneering steps towards Promotion of NMT, with roads designed with appropriate facilities for the NMT. It is defiantly a positive step towards Sustainable Urban Transport. Integration is the hope of modernization of our cities, with increasing dependency on Motorized Vehicle and understanding and promoting Non Motorized Transportation within the same milieu are to be mitigated together in Asian Cities, and developing World Class Sustainable Cities.

### **MUMBAI**

In Mumbai city, Cross road links are less developed and mostly over crowded. The streets in most part of Mumbai city are old and narrow, and their capacity is seriously

reduced by lack of appropriate management of traffic and parking. Barely inadequate pedestrian pathways are further made non-functional as the vendors and parked vehicles encroach into the sidewalks/footpaths.

Inadequate road space, severe congestion, and lack of infrastructure for non-motorized vehicles and inefficient transportation management have been major bottle-necks in Mumbai transport system which needs immediate attention. Apart from the above measures, authorities have to concentrate on efforts to control vehicular growth in order to achieve sustainability in transportation improvements.

Mumbai has three major lines of metro and each station on these lines is connected to a bus network. This creates considerable amount of shorter trip in Mumbai. Three-wheelers are used as feeder services to both the metro and bus networks meeting these shorter trips. Absence of “usable” pedestrian paths and facilities for non-motorized transport (bicycles, tricycle-taxis, and pedestrian ways) could be the reason for the rise in sharp trips (about 20 times in 20 years) by three-wheelers in Mumbai. Due to lack of infrastructure, most of the shorter trips which could be met by non-motorized transportation (NMT) modes are covered by the three-wheelers, which are usually more polluting (CO is the major pollutant coming from the transport sector, contributing almost 90% of the total emission) This provides support to the argument that non-motorized transportation modes need to be promoted in Mumbai. Such an effort not only controls the congestion on roads by controlling the number of three wheelers, it can also control environmental emissions and green house gas emissions

In Mumbai, number of road accidents is on higher side with no significant decrease over time this could be an indication for neglected infrastructure and facilities for NMT. About 30,000 people are meeting with accidents every year. Due to lack of proper pathways cyclists and walkers share road space with motorized traffic and this put the NMT users at a very high risk.



Though NMT users are the majority in many places, they are often neglected in the design and Modernization of transportation infrastructure. New construction and upgrading often does not provide physical infrastructure (e.g. overpasses or shoulders) for the existing NMT users, sometimes resulting in higher NMT-automobile accident rates, longer travel times for NMT users, or even a complete elimination of NMT traffic. The result of this negligence is a transportation system that in many ways favor cars and other motorized traffic to the detriment of poorer segments of the population; thus consideration of NMT during infrastructure design is an essential element to providing equitable transportation opportunities (Guitink et al.,1994; Guitink, 1996) Increasing trips lengths, due to the urban sprawl could be one major reason for this fall in share of non-motorized transportation apart from serious lack of infrastructure for NMT (Mohan and Tiwari, 1999).

## **CHAPTER THREE**

### **METHODOLOGY**

This chapter deals with the description of the methods to be applied in carrying the research study (kombo et al, 2006). The research conducted was a case – study, an investigative research to establish the challenge of integration of NMT transport infrastructure into the urban transport system in Westlands commercial center.

#### **3-1 Area of study**

The research was carried out in Westlands, and the main focus of the study was on the integration of NMT infrastructure into the urban transport system. Westlands is a dynamic commercial growth-centre three-km from the capital's central business district, at the axis of a road network to the affluent western and northern residential suburbs.

Westlands is a suburb of Nairobi that was until the early 1980s composed of residential homes and a few shops, which have now developed into a major commercial and economic area outside the central business district of Nairobi. It was initially considered part of Parklands area. Westlands commercial center has been selected as the study area given its rapid growth as a commercial centre which attracts a lot of land use activities hence contributing to the generation of a lot of traffic and especially non – motorized.

The choice of Westlands was due to its unique location, closely situated to the city center, the areas also experiences unique problems of increasing investment on available land without commensurate infrastructure to support the development.

The case study focused on Westlands commercial center and the major roads frequented by the pedestrians. The commercial center formed the core unit of the study because it experiences the highest number of pedestrian movement activity to various land uses in the area. The study was centered on; Ring road Parklands, Lower Kabete road, Waiyaki

way, Parklands road, Wood vale groove and major pedestrian magnet land uses such as the Mall, Sarit Center, Curio market, Nakumatt Westgate and the bus stops.

### **3-2 Research Design**

A traditional research design is a blue print or detailed plan for how a research study is to be completed operationalizing variables so they can be measured , selecting a sample of interest to study, collecting data to be used as a basis for testing hypotheses, and analyzing the results ( Thyer, 1993 :94 ).

The research design also defines the domain of generalizability that is; whether the obtained interpretations can be generalized to a larger population or to different situations. Its main purpose is to avoid the situation in which the evidence does not address the initial research questions hence design deals with a logical problem and not a logistical problem (Nachmias and Nachmias, 1976).

The cross sectional study design was applied in the study. In a cross sectional design the researcher decides on what the study needs to find out, identify the study population, select a sample from the study population and contact the respondents to obtain the information needed. This design is best suited given its nature of taking a cross section of a study area one at a time.

### **3-3 Unit of Analysis**

The unit of analysis in the case study was Westlands commercial center. Within the analysis, the main issues addressed include; an examination of the provision of non – motorized infrastructure in the urban transport system in Westlands commercial center, an investigation of the challenges faced by the users of the urban transport system in terms of conflicts, an examination of the implication of the integration of non- motorized transport infrastructure in the urban transport system. Policy issues were also covered in the analysis since many initiatives are as a result of policy attached to them.

### 3-4 Data needed for the study

#### 3-4.1 Land use

Land use and transportation are two sides of the same coin. Transportation affects land use and land use affects transportation. As a result, it is important to co-ordinate transportation and land use planning decisions so they are complementary rather than contradictory (Litman, 2008).

**Table 3-1: Land Use Factors**

<b>Factor</b>	<b>Definition</b>
<b>Density</b>	People or jobs per unit area of land area(acre or hectare)
<b>Mix</b>	Degree that related land use(commercial, housing, institutional) are located together
<b>Accessibility</b>	Location of development relative to regional urban center. Often measured as the number Of jobs accessible within a certain travel time (e.g., 30 minutes).
<b>Centeredness</b>	Portion of commercial, employment, and other activities in major activity centers
<b>Connectivity</b>	Degree that roads and paths are connected and allow direct travel between destinations.
<b>Roadway design and management</b>	Scale and design of streets, and how various uses are managed to control traffic speeds and favor different modes and activities.
<b>Parking supply and management</b>	Number of parking spaces per building unit or hectare, and the degree to which they are priced and regulated for efficiency.
<b>Walking and cycling conditions</b>	Quality of walking and cycling transport conditions, including the quantity and quality of sidewalks, crosswalks, paths and bike lanes, and the level of pedestrian security.
<b>Transit quality and accessibility</b>	The quality of transit service and the degree to which destinations are accessible by quality public transit in an area.
<b>Site design</b>	The layout and design of buildings and parking facilities. Mobility
<b>Management</b>	Various programs and strategies that encourage more efficient travel patterns

Source: Litman (2008).

A study of the land use activity in Westlands commercial center illuminated various issues on NMT infrastructure integration and the need for the facilities. The major land uses are the result of high pedestrian and motorized traffic generation within the urban transport system in Westlands commercial center. The information on land use in the area was useful in analysis of the current situation to clearly bring out the challenge of integrating NMT infrastructure into the urban transport system. The information was also useful in highlighting the need for integration of NMT infrastructure and the perceived mismatch of the same, thereby an understanding of the need for integration. In the analysis of land use in Westlands commercial center, the main focus is on the following land use factors, density and mix, and connectivity, roadway design, parking supply and management and walking conditions. The analysis of the above land use factors has been carried out using maps, figures to show the density and mix in various land uses (housing, commercial,). Observation and a discussion of the findings from the study have been carried out in the analysis of; pedestrian conflicts and motorists, pedestrian infrastructure, parking supply and walking conditions. The results are presented using photographs and maps of different kinds.

### **3-4.2 NMT policies and standards**

The policy guidelines on NMT infrastructure and services are the laws developed to guide planners, developers and designers on the acceptable standards for provision of NMT infrastructure. A focus on NMT policies and standards in the study helped in the highlight of general pedestrian planning issues and their provision to enable the study point out the challenge faced in integration on the NMT infrastructure in the urban transport system.

### **3-4.3 NMT Infrastructure**

In order to fully understand the challenge of integrating NMT in the urban transport system, an inventory of the NMT infrastructure was necessary, Walkways, pathways, street lights, benches, signs. The issue of integration of NMT into the urban transportation system has been brought out in the study, clearly indicating the

implications of combining the infrastructure, their presence and absence to the users in the area. The availability of the infrastructure for; safety, security, comfort and the absence; poses danger increase in road traffic accidents (RTAs), and insecurity.

### **3-4.4 Traffic**

The urban transport system users (motorists and pedestrians) who face the challenges brought by lack of proper integration of NMT infrastructure in the urban transport system, in their activities were studied to obtain first hand information on their experiences. The study of the motorists and pedestrians also targeted information on trip origin and destination, purpose, choice of route and opinion on integration.

## **3- 5 Subjects to the study**

### **3-5.1 Pedestrians**

The pedestrians are the most important subjects of the study as the focus is on integration of NMT infrastructure into the urban transport system. The information obtained from them contributed to knowledge on origin, destination, and purpose of the trip and choice of the mode used. The target pedestrians were interviewed at the entrance of shopping malls, markets and streets with heavy presence of pedestrians.

### **3-5.2 Pedestrian infrastructure**

The pedestrian infrastructure in Westlands commercial center include, the routes, walkways and other support facilities such as, signs, street furniture. These are important in the study to know the challenges and implications of integration of non – motorized transport infrastructure in the transport system

### **3-5.3 Motorists**

Motorists were important subjects of the study since they are faced by numerous conflicts with the non-motorized users in the urban transportation system, hence the need for information from the motorists on experiences, and views on integration of NMT infrastructure in the urban transport system.

### ***3-5.4 City planning urban design and development department/Eng.***

This department is the main planning authority dealing with the NMT infrastructure and other support facilities such as the street furniture and bins, under the Local authorities Act. An interview with the city planning department, urban design and development, and city engineers contributed vital information concerning provision of NMT facilities and management of the same in the urban transportation system.

### ***3-5.5 Kenya police, traffic department***

The Kenya police enabled the researcher to obtain information and statistics on the traffic and also reports on incidences of road traffic accidents (RTAs) resulting from conflicts in the urban transport system between motorized and non-motorized users.

## **3-6 Data Collection**

The methods employed in data collection during the study were;

### **3-6.1 Primary data collection**

This is the first hand information from the participants in the study. The methods employed in primary data collection include;

#### **3-6.1.1 Observation**

This is the commonly used method of primary data collection. The method was applied because through looking at the physical situation on the integration of the non -motorized transport facilities, pavements and pedestrian walks within the study area. Other infrastructure to be used by the non – motorized transport which include fly over, street lights, traffic lights, pedestrian crossings. Observation will also be used to gather information on the different land uses in Westlands commercial center and pedestrian activity in the area.

### **3-6.1.2 Interviews**

Interviews were conducted by the researcher on the target groups, people within the study area and using non – motorized form of transport. Interviews conducted during the study targeted the urban transport users both non – motorized and motorized users to get first hand information on their use of the system. The interviews with the authorities in Westlands was to enable the researcher to access information on development taking place in the area, the initiatives taken to ensure integration of NMT into the transport system.

### **3-6.1.3 Photography**

Photographs of the study area were taken in the data collection. These will show in detail the perceived problem of integration of the non- motorized transport in the urban system and their present state or condition of the NMT infrastructure already provided for in the transport system.

### **3-6.1.4 Traffic survey**

Traffic survey questionnaires were administered to the respondents to obtain more information on the study area and more on the subject of the study. The traffic surveys are targeting motorist and pedestrian who interact on the urban transport system. The traffic survey is important in the study to obtain the information on trip, origin and destination, purpose of the trip, choice of the mode of transport. The traffic survey questionnaires are also to obtain information on the challenge and conflicts faced in use of the urban transport system motorized and non – motorized and views on how best to integrate the same.

### **3-6.2 Secondary data collection**

The secondary data is the information got from previous studies conducted on the same or similar to the study and act as a guide in the study. These are important in the theoretical understanding of the study area and also in generating the conceptual framework with which to work on the primary data. The sources of such data include



written sources like books, journal articles, magazines, government reports, newspapers, seminar papers, maps and other relevant documents on Transport/NMT planning.

The secondary data for the study was centered on review of the Acts and policies on transportation, to obtain data needed on integration of NMT into the urban transport system with an emphasis on the best practices on the same. Documentation information was obtained from the local authorities, the city council of Nairobi, upon whom the planning authority rests and also governs NMT provision and maintenance. The information obtained was used in the study, which seeks to investigate the challenge of integrating NMT into the urban transport system.

### **3-7 Sampling**

Sampling is the process of selecting a few (a sample) from a bigger group (the sampling population) to become the basis for estimating or predicting the prevalence of an unknown piece of information, situation or outcome regarding the bigger group (Kumar 2005). This is done to save on time as well as financial and human resources, however an error is possible.

The sampling methods used varied and a combination applied to reduce chances of the survey concentrating on only one aspect. The sampling techniques applied in the area were with regard to the data needed and instruments used for data collection.

#### **3-7.1 Sampling procedure**

The design applied in this study is cross sectional since the study was aimed at finding out the problem of integration from a cross-section of the population and study area. This design was based on the number of contacts with the population. Descriptive survey was useful in this design as the study involved collection of data, analysis and interpretation of data. Stratified random sampling to categorize the study into NMT infrastructure integration, land use, transects in the study area and users within WCC.

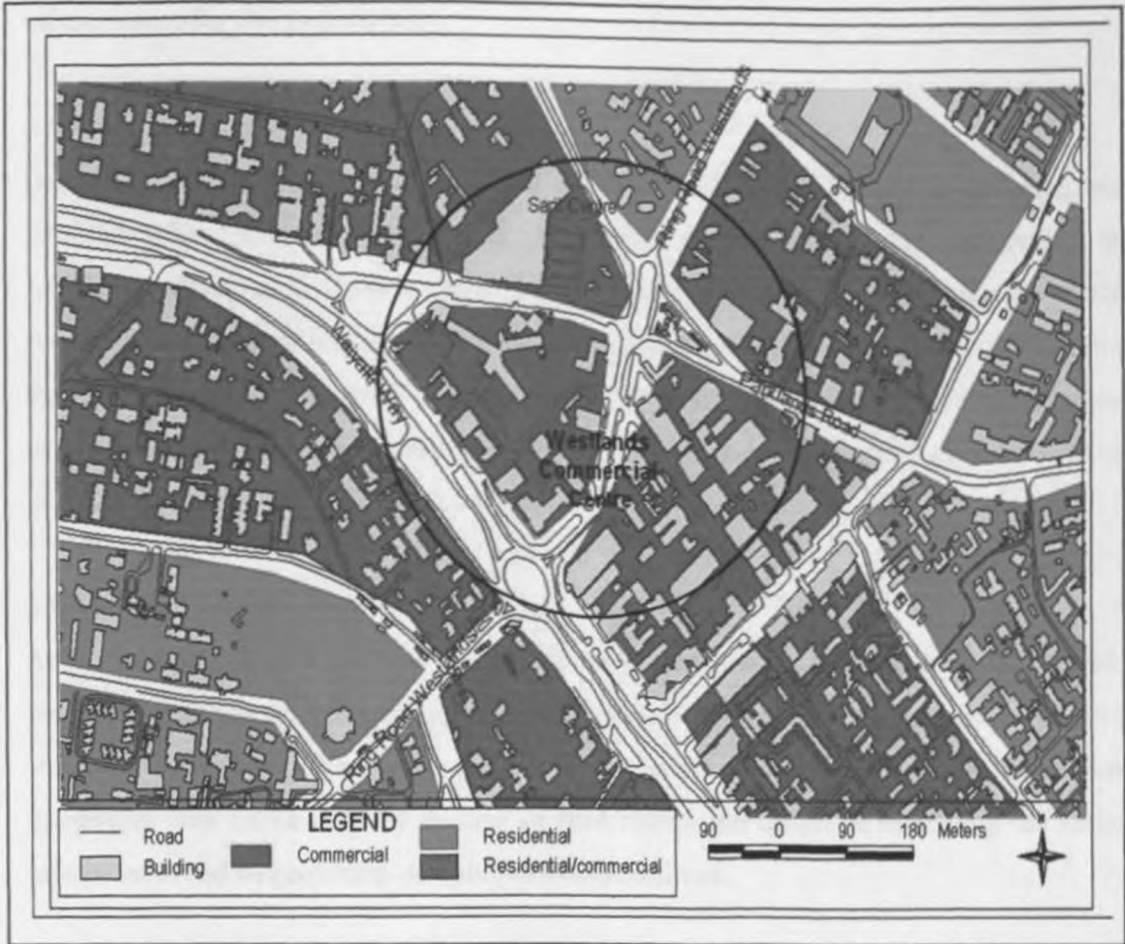
A sample of 84 users (n) users within WCC were interviewed through guided questionnaires, interview schedules guided by the central limit theorem which states that the higher the number of samples, the less the level of skewness within the normal curve and any sample more than 30 is assumed to be representative enough of the population Kombo and Tromp(2006). Of the 84 questionnaires and interview schedules, 8 interviews with professionals who have the knowledge on transportation planning were conducted, 24 interviews were conducted with users in WCC with six at the mall, 6 at Sarit centre, 6 at Nakumatt stores and 6 on Parklands road towards Parklands. 16 Interviews were carried out with users who work and have businesses in the buildings in WCC. The areas sampled were Westgate, Sarit Centre, Uchumi, the mall, Unga house and Curio market Westlands bus stop off Waiyaki way.

Purposive Sampling was used to select some streets to be included in the study. The Roads selected in the study include, Waiyaki way, Parklands road, Lower Kabete road, Woodvale groove and Ring road Westlands. The study on the sampled sections of the road focused on NMT infrastructure integration, land use and pedestrian traffic.

The target population involved the users of the Westlands commercial center. These included pedestrians, motorists, those working within the center also those traveling into and out of the center, students attending college and the users of various offices and establishments within the area. The accessible population for the study on integration of NMT into the transport system in Westlands commercial centre were; motorists and pedestrians in the study area.

The sample chosen for this study was, clustered random sampling. The clusters were picked at random given the concentration of users in the urban transport system in the study area, which included; the Mall shopping center, Sarit center, Nakumatt stores, users on parklands road, ring road and Waiyaki way. Other samples were collected from major roads frequented by the motorist and pedestrians.

Map3-1 Map of the Study Area



Source: Ministry of Lands (2009)

### 3-8 Data Analysis methods and techniques

The analysis of data was based on the collected information from the various instruments used, to examine the provision of non – motorized infrastructure in the urban transport system, the challenge of integration of NMT into the urban transport system. The data analysis and techniques focused on;

#### 3-8.1 Land use

The various land use in wetlands commercial center on different locations was analyzed in their relation to their generation of activity of the users of the urban transport system. The main emphasis in land use analysis was on land use factors such as density, mix,

connectivity, and roadway design, parking supply and management and non – motorized infrastructure for the pedestrians.

### **3-8.2 NMT Infrastructure**

Data analysis was focused on NMT infrastructure in terms of the provision, integration into the urban transport system in Westlands commercial center, the policy and regulations that guide the provision of NMT infrastructure in Westlands commercial center. An analysis of the best practices of integration as carried out in other countries of the world, Africa and in parts of the country was done to clearly bring out the mismatch in NMT integration in Westlands commercial center and also propose the best practices in the case studies of what can be adopted.

### **3-8.3 Institutional framework**

An institutional framework was integral in the understanding of the various levels within institutions responsible for provision, maintenance of NMT infrastructure in the urban transport system in Westlands commercial center. An analysis of the institutional framework was carried out by the use of flow charts and diagrams indicating the various sectors involved in provision of transportation facilities.

### 3-9 Analytical framework

The analytical framework is a summary of the author's conceptualization of the study, basing the analysis on the objectives, data needs for the study, methods of data collection method of data analysis and the expected output from the study

<b>Research objectives</b>	<b>Data needs</b>	<b>Method of data collection</b>	<b>Method of data analysis</b>	<b>Expected output</b>
To examine the provision of NMT infrastructure in WCC	Taking inventory of NMT infrastructure in the various activity areas in WCC.	Photography Observation	Comparison with the stipulated levels from policy	Recommendations on provision for more NMT infrastructure in WCC
To review policy regulations that guide the provision of NMT infrastructure in the urban transport system	Policy regulations on NMT integration in the urban transport system Institutional analysis	Documentation Interviews Books and case studies on policy on NMT infrastructure	Qualitative analysis using SPSS package	To establish the adequacy of existing policies for integrating NMT into the transport system
To examine challenges and implications of integration of NMT infrastructure in the urban transport system	Pedestrian /motorist information on the use of the urban transport system. Challenges and conflicts	Interviews Traffic surveys Photography	Qualitative analysis Using SPSS package	Recommend integration Highlight challenges on the use of the transport system
To propose measures of integrating NMT into the urban transport system	Documentation on the best practices of integrating NMT Planning regulations and standards on NMT	Documentation Case studies on NMT integration in the urban transport system	Synthesis of findings	Recommendation for adoption of the best practices of integrating NMT into the system

Source: Author's conceptualization (2009).

## CHAPTER FOUR

### AREA OF STUDY

#### 4-1 Historical background

Nairobi takes its name from the Maasai phrase “enkare nairobi”, which means “a place of cold waters”. The area was originally grazing land and a livestock watering point and there was no permanent African settlement. The city of Nairobi owes its early development and growth to the Kenya Uganda Railway. The railhead reached Nairobi in June 1899 and by July it had become the headquarters of the Kenya Uganda Railway (Rakodi 1997). This led to Nairobi’s growth as a commercial and business hub of the British East Africa protectorate (Mitullah 2003). By 1900, Nairobi had become a large and flourishing place with the settlement consisting mainly of the railway buildings and separate areas for Europeans and Indians, the latter mainly consisting of railway builders and laborers.

#### 4-2 Location and physiographic features

Nairobi was previously known as *‘the city in the sun’* because of its appealing environment. It is located at the Southeastern end of Kenya’s agricultural heartland, at approximately 1° 9’S, 1° 28’S and 36° 4’E, 37° 10’E. It occupies an area of about 696km<sup>2</sup> (CBS 2001) and the altitude varies between 1,600 and 1,850 metres above sea level (Mitullah 2003). The Western part of Nairobi is on high ground (approximately 1700–1800 msl) with rugged topography, the eastern side is generally low (approximately 1600 msl) and flat (Saggerson 1991). Key physical features include the Nairobi, Ngong and Mathare rivers and the indigenous Karura forest in Northern Nairobi. The Ngong hills stand towards the west, Mount Kenya towards the north and Mount Kilimanjaro towards the Southeast. As Nairobi is adjacent to the Rift Valley, minor Earthquakes and tremors occasionally occur.

### **4-3 Climate**

Nairobi has a temperate tropical climate with two rainy seasons. Highest rainfall is received between March and April and the short rainy season is between November and December. The mean annual rainfall ranges between 850- 1050mm (Lakin, undated). The mean daily temperature ranges between 12 and 26°C. It is usually dry and cold between July and August, but hot and dry in January and February (CBS, 2003). The mean monthly relative humidity varies between 36 and 55 per cent. The mean daily sunshine hours varies between 3.4 and 9.5 hours (CBS, 2003a). The cloudiest part of the year is just after the first rainy season, when, until September, conditions are usually overcast with drizzle.

### **4-4 Drainage**

Nairobi's main drainage follows the regional slope of the volcanic rocks towards the east, while subsidiary internal drainage into the Rift region is confined to the western part. The lava plains east of the line Ruiru-Nairobi-Ngong are underlain by a succession of lava flows alternating with lakebeds, streams deposits, tuffs and volcanic ash. These plains, comprising mainly the Athi plains and the northern section of the Kapiti plain, extend westwards, rising from 4900 feet (1493 m) at the Athi River to 6000 feet (1829 m) in the faulted region near Ngong. The lava plains are crisscrossed with steep-walled gullies and canyon-like gorges, such as those along the Mbagathi valley. Further east this valley widens slightly where soft material is being actively eroded (Saggerson, 1991).

Water draining eastward from the hill area accumulates on the low-lying ground between Parklands in the north and Nairobi South estate, forming a perched water table above the Nairobi phonolite. The Kerichwa Valley Tuffs lying to the east of the highway function like a sponge and the contact between them and the underlying impermeable phonolite thus forms a perfect aquifer, so much so that a number of channels containing water occur beneath Nairobi.

#### **4-5 Soils**

The rocks in the Nairobi area mainly comprise a succession of lavas and Pyroclastics of the Cainozoic age and overlying the foundation of folded Precambrian schist's and gneisses of the Mozambique belt (Saggerson, 1991). The crystalline rocks are rarely exposed but occasionally fragments are found as agglomerates derived from former Ngong volcano. The soils of the Nairobi area are products of weathering of mainly volcanic rocks. Weathering has produced red soils that reach more than 50 feet (15m) in thickness, a number of subdivisions are recognized in the Nairobi area according to drainage, climatic regions and slopes, and other categories have been introduced for lithosols and regosols (Saggerson, 1991).

#### **4-6 Land use**

Land resources in Nairobi include forests, freshwater systems and a rich biodiversity, all of which hold vast potential for development if managed sustainably. Many of the opportunities that they provide, such as agriculture, tourism, human settlements and a carbon sink for the city, are vital for the well being of the residents of the city.

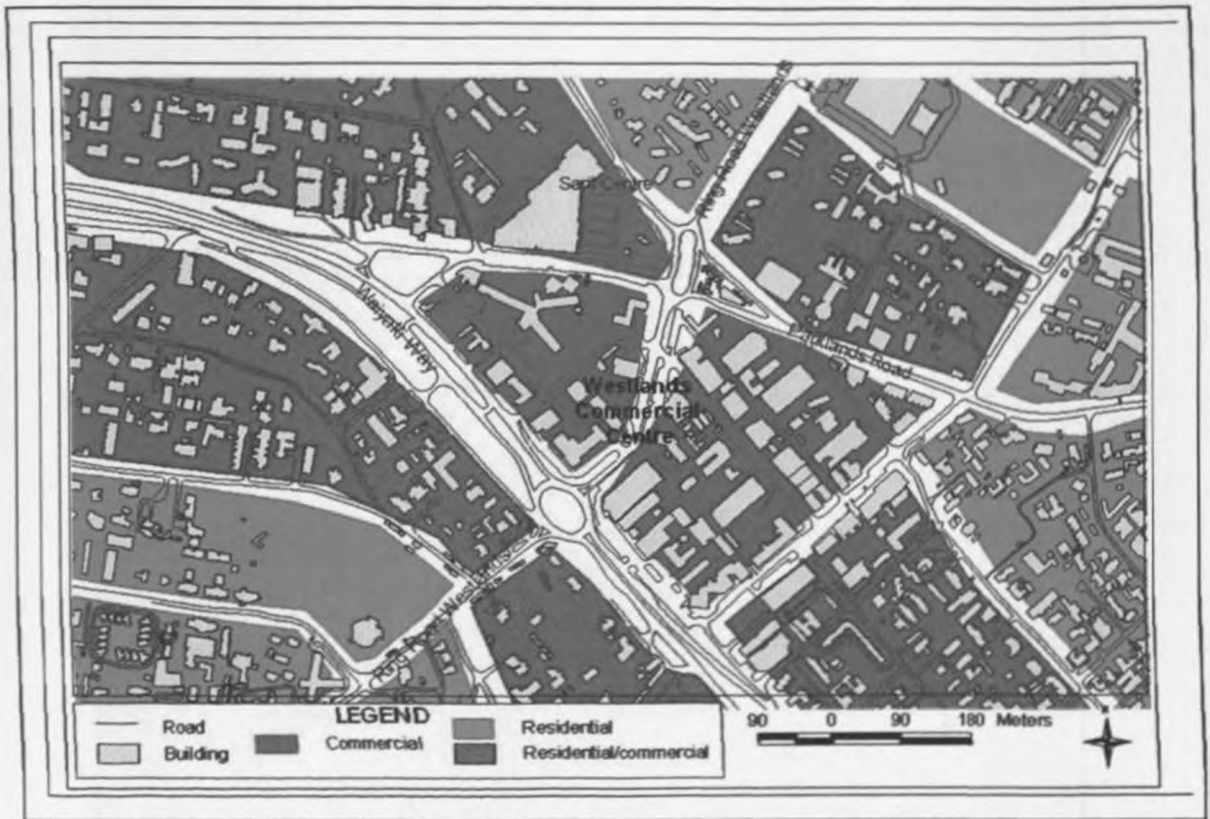
Infrastructure and the provision of services, such as energy, transport, provision of water and sanitation and safe disposal of waste, underpin growth, the improvement of livelihoods and urban development. Infrastructure development has in the past been the preserve of the Government. Provision and maintenance of infrastructure has been a major problem, especially within low-income urban areas. Poor infrastructure is a major constraint on economic performance and a major factor compounding poverty. Components of infrastructure and services discussed in this section are energy supply, transport (access roads), information and communication technology, water supply, sanitation, health and education.



#### 4-6.1 Land use in Westlands Commercial Centre

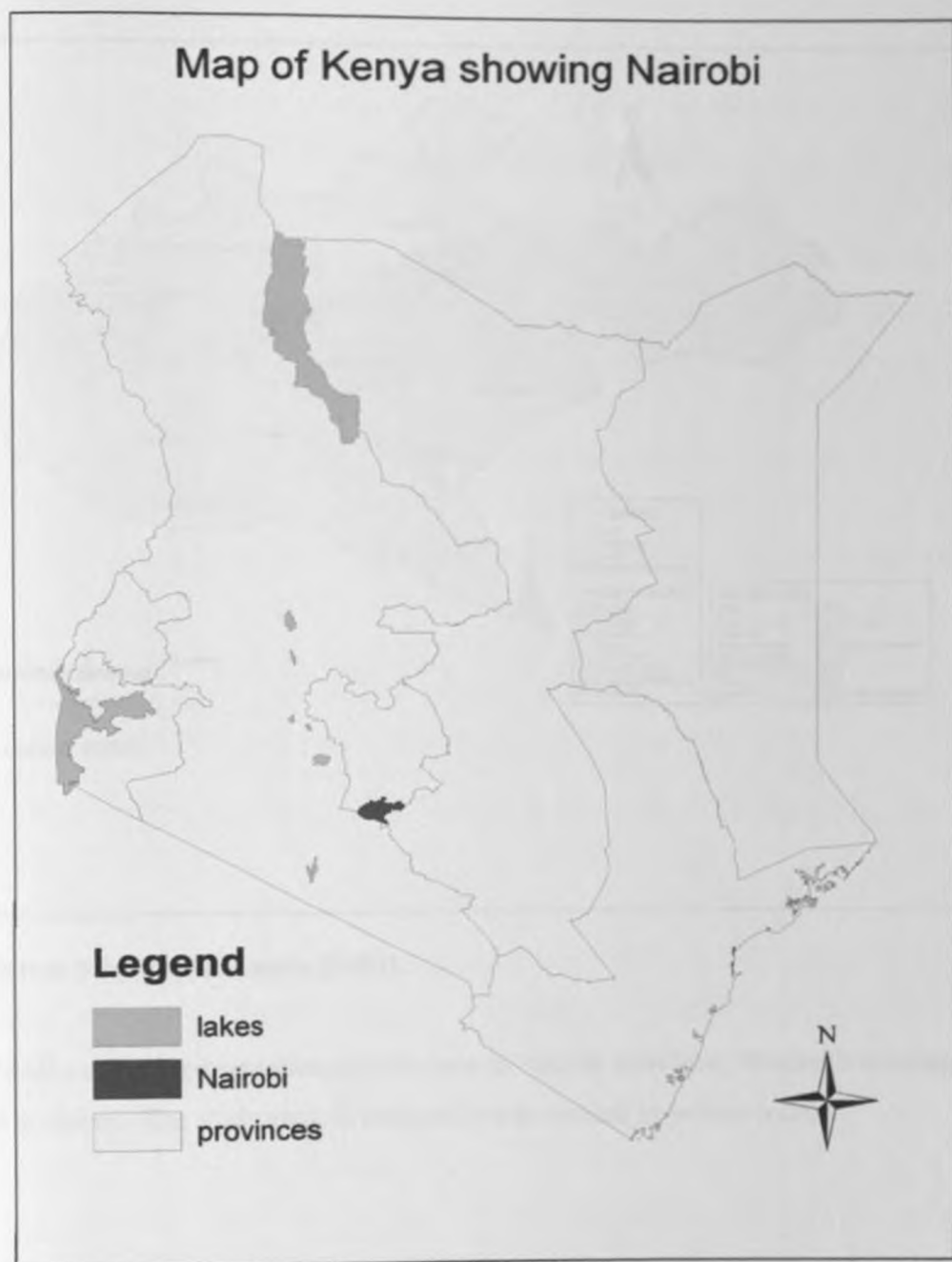
Westlands Commercial Centre is a continually evolving mixed- used area that has high density of high –rise commercial, retail and office buildings in the main centre and apartments and town houses on the periphery. Westlands is denoted as a city within a city due to the wide range of services and social amenities that it provides including hotels, restaurants, cinema halls, schools and shopping malls. Other facilities include the Ukay centre and Westgate complex, accentuated by a variety of smaller retail outlets that serve the area.

Map 4-1: Map of Land use in Westlands Commercial Centre



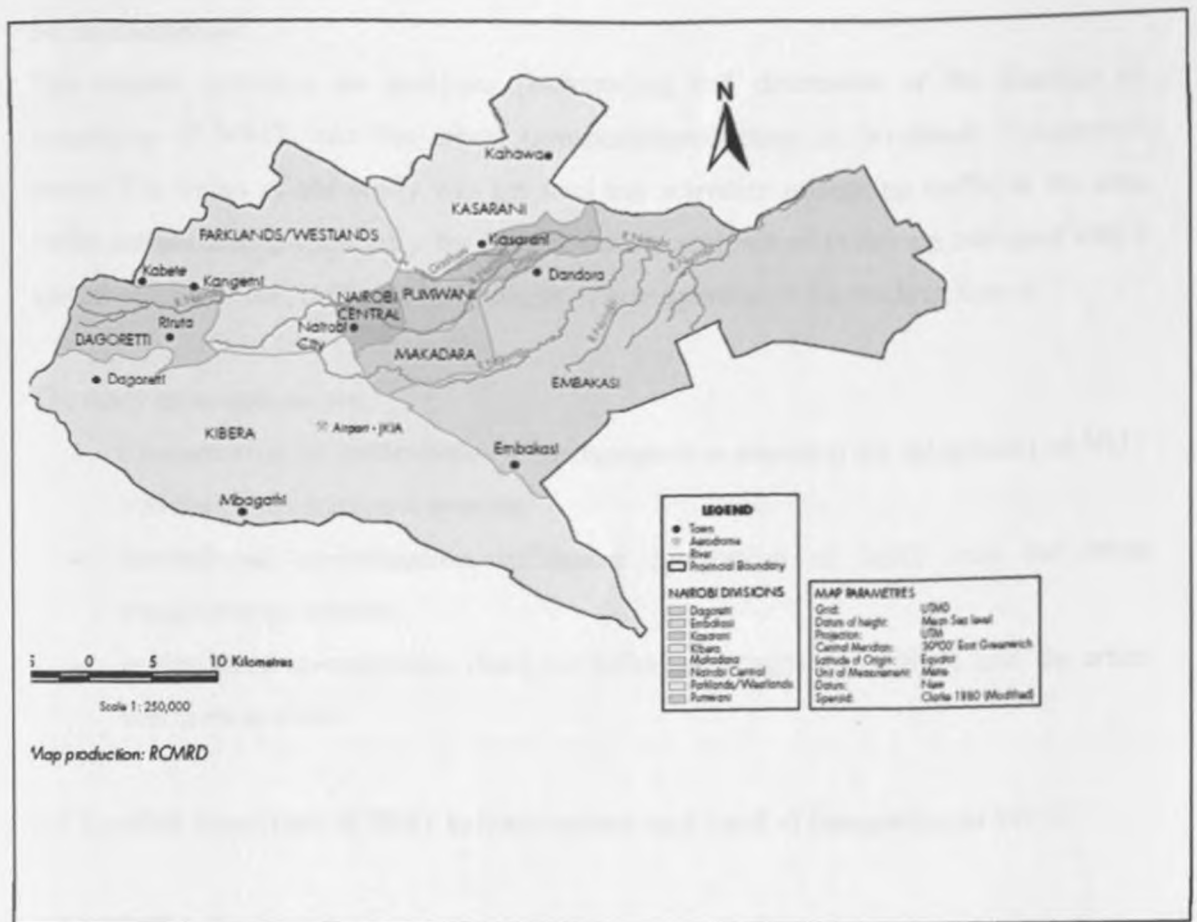
Source: Ministry of lands (2003).

**Map 4-2: Map of Kenya showing Nairobi**



**Source: Ministry of Lands (2003).**

**Map 4-3: Map of Nairobi showing Westlands and other divisions**



**Source: Ministry of Lands (2003).**

The above is a representation of divisions in Nairobi province, Westlands forming part of the divisions. The study area, Westlands is represented in yellow colour.

## **CHAPTER FIVE**

### **STUDY FINDINGS**

#### **5-1 Introduction**

This chapter presents an analysis, presentation and discussion of the findings on integration of NMT into the urban transportation system in Westlands Commercial centre. The focus of the study was on land use activities generating traffic in the area, traffic infrastructure especially for NMT, and an analysis of policy on transport with a special emphasis on NMT and institutions of management of the roads in Kenya.

The study assumptions are:

- Co-operation of institutions of management is essential for integration of NMT into the urban transport system;
- Institutional co-ordination influences integration of NMT into the urban transportation system.
- Institutional co-ordination does not influence integration of NMT into the urban transport system

#### **5-2 Level of Provision of NMT infrastructure and level of Integration in WCC**

##### **5-2.1 NMT infrastructure**

The urban transportation system is a set of interrelated parts consisting of roads, access roads, footpaths for NMT vehicle and pedestrians. The NMT infrastructure forms a sub system within the urban transformation system, hence the importance of NMT integration or combination into the urban transformation system. NMT infrastructure include foot paths, pavements, terminal facilities, zebra crossings, traffic lights, signs and speed humps to regulate speed at different levels in the urban transport system, for safety of motorized and non – motorized alike.

The two reasons for integration of NMT into the urban transportation system are for mobility and safety of the users. NMT infrastructure provision in Westlands Commercial Centre is wanting. The infrastructure is scarce and the few available cannot meet the

demands of the pedestrians and other users such as cyclists. For the main highway, Waiyaki way, the pedestrians crossing into Westlands Commercial Centre have no safe passage such as Zebra crossings, underpass or a flyover. The pedestrians have to contend with vehicles moving at high speeds on the carriageway to get to their destination. This puts them at a high risk as vehicles on the highway move at high speeds.

The terminal facilities for pedestrians off Waiyaki way are not properly integrated into the transport system. The terminal facilities are located immediately off the carriage way and the public transport have no service lanes. The passengers have to wait beside the road for the vehicles and those alighting do the same on the carriageway, which puts them at a risk of road traffic accidents. The main terminal facilities, Westlands bus stop is located off the highway and without proper access for both pedestrians and motorists. As a result pedestrians shun the bus stop and converge by the roadside for matatus, which do not find it necessary to use the facility siting delays within its circulation system.



**Plate 5-1: Photo take of pedestrians alighting of the carriage way in Westlands**

The bus stop is also underutilized since the pedestrians prefer to cross the road (Waiyaki way) after the intersection with woodvale groove behind Uchumi after picking a few items needed for home use. As a result, the matatus have opted to pick passengers on the road. This causes obstruction to other road users on the highway, and also puts the pedestrians at risk.

There is a disconnect in the linkage of footpaths in Westlands Commercial Centre to different land uses. Many sections of the paved areas were done by private developers hence there is no uniformity and consistency of the paths. Since the area has a mix of land use activities and offer different services, there is a lot of traffic generated in the area and hence pedestrians encroach on carriageways meant for vehicles.

### **On Parklands Road**

The infrastructure along parklands road is inadequate and cannot cope with the demand of human activities for the pedestrians. For instance on Parklands road, one of the major roads in Westlands commercial centre, its design lacks these facilities; there are no zebra crossings for pedestrians. The road has terminal facilities but without service lanes hence the vehicles have to stop on the carriageway to drop or pick passengers.

There are no traffic calming facilities to regulate the flow of both the pedestrians and motorists at the points of intersection between NMT and motorized transport. The behaviour observed include pedestrians crossing the road at the roundabout and further interfering with the landscaping done for beautification, the pedestrians are also at risk of being hit by vehicles because from the point of intersection, the motorist cannot be able to see from a far.



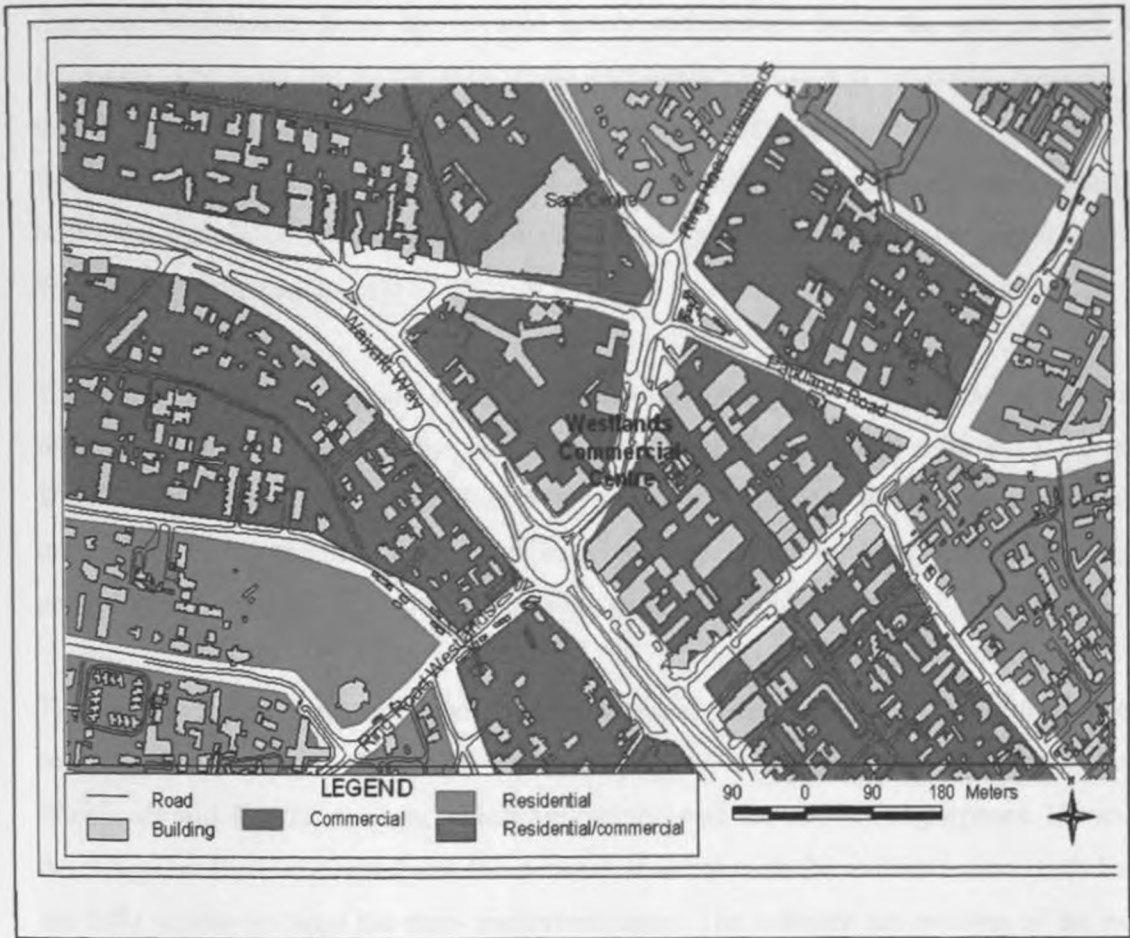
**Plate: 5-2 showing a pedestrian crossing at a roundabout**

Most of the pedestrians who frequent this road come to work in Westlands commercial centre from as far as Ngara area, Pangani, Mathare on foot. The walking conditions on Parklands road vary at different sections, the paved paths are just but patches, and the road shoulders have not been extended to accommodate NMT users. In contrast one section of the road is paved; the surface is smooth and easy to walk on and also of sufficient width about three metres.

### **5-2.2 Land use**

The analysis of land use in Westlands Commercial Centre was based on uses along the major roads that network in the area. The land uses on the roads (Waiyaki way, Wood vale groove, Parklands road, and Lower Kabete road) were noted to present a mixture of uses. Along Waiyaki Way, the main highway to Nairobi CBD, the land use is predominantly for commercial use. The land use include, petrol stations, and bus stops, shopping malls including “the mall”. There are arcades along the highway with several office blocks and company buildings which host banks, colleges and several offices for small business holders. The land use along the highway is of high density and there is little land left undeveloped.

**Map 5-1: Land use map of Westlands Commercial Centre**



**Source:** Ministry of lands (2003).

#### **5-2.2.1 Land use along Parklands road**

The area transversed by Parklands road in Westlands Commercial Centre is of a high density. The area is heavily built and has a mixture of land uses. On Parklands round about at the police station, the area has residential houses and apartments adjacent to the road. The land use mix in this area includes; commercial use, the area has petrol stations shopping malls and an arcade by the road side; educational use, there are colleges and schools located off parklands road, but it offers the main access to these educational facilities.



The land use along Parklands road is also for industrial; there are light industries next to ring road Westlands; there are several hotels and casinos hence the area is used for recreation. The land use in the area along Parklands road is also for public purposes as there is a terminal facility opposite the curio market located just before the roundabout on Ring road Westlands. The area has a museum the (Global Museum) frequented by tourist both local and international adding to the list of land use mix along Parklands road in Westlands Commercial Centre.

The area is used as a transport channel to link other land uses on either side of parklands road. Parklands road acts as the major distributor of traffic to and from the CBD into Westlands Commercial Centre after Waiyaki Way. Parklands road experiences heavy traffic flow during the peak hours, 7- 9 in the morning and 5-8 in the evening as motorists prefer to drive through to avoid the main highway (Waiyaki way).

The land use along Parklands road is well connected with tarmac roads and several access roads to the premises. The road network is good and distributes traffic easily into Westlands and Parklands area, which are mainly used for residential purposes. However the design on Parklands road and the network it forms with the various access roads have not fully accommodated the non- motorized users. The network has sections of the road for NMT users and others do not have. The area suffers from lack of continuous, connected and maintained walkways to the center.

The available walkways have been privately done by industries, hotels, and institutions but just to cover their area and have neglected other sections. Pedestrians then have to cope with the uneven levels and surfaces while walking within Westlands Commercial Centre.



**Plate 5-3: Photo taken to show privately done pedestrian walks**

On sections where the NMT walkways have been provided only on one side, pedestrians and cyclists alike both around the walkways creating congestion. This is mostly experienced in bad weather as the pedestrians avoid the water logged areas and mud to use the paved areas. The available walkways are also narrow, less than two metres and hence pedestrian are forced to squeeze or walk in a line to use them, making their travel uncomfortable.

The findings on the study, integration of NMT into the urban transportation system reveal that Westlands Commercial Centre is a fast growing area with a lot of mixed development taking place. The land use is rapidly changing from residential to commercial and also old buildings are finding replacement with new storey buildings against the zoning regulations for the area.





**Plate 5-4: Photo on land use in Westlands commercial centre**

The new developments are without commensurate infrastructure to support the activities encouraged by the various land use. The most affected areas lack infrastructure for parking, open spaces for recreation, safety and NMT facilities such as sidewalks, bicycle lanes, pavements for users' connectivity within the area. This is because there is disconnect between development control policies and implementation of the same, a subject of management of the urban area.

### **5-2.3 Connectivity**

The connectivity of the various land uses along Waiyaki way largely depends on Westlands round about and the various exit points from the highway, for motorists. However the pedestrians are not well connected to the various land uses on either side of the highway (Waiyaki way) and have to contend with motorist to move across. The highway lacks traffic calming facilities to regulate the speed of vehicles on the highway. There are no zebra crossings or designated places for pedestrians to cross either side of Waiyaki way. The fly over on the highway is located far away from the sections in which pedestrians converge in wait of public transport or access much needed services off the highway.

**Map 5-2: Road Network in Westlands Commercial Centre**



**Source:** Ministry of Lands (2003).

#### **5-2.4 Road design**

The road design on Waiyaki way does not match the land use activity around it. Waiyaki way has a typical design of a highway with a round about, entry and exit points in between; the road has three lanes on both sides and commands heavy motorized traffic into and out of Nairobi CBD. Owing to the land activity in Westlands Commercial Centre, Waiyaki way needs an improvement on the road design to accommodate users for safety and ease in accessibility to other land uses.

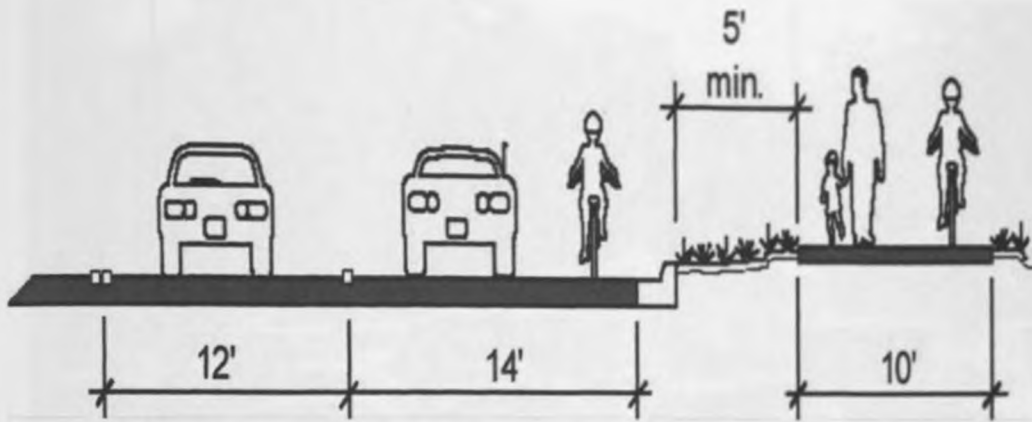
Waiyaki way has no zebra crossings, fly over or an underpass for the pedestrians despite the fact that it has several terminal facilities including Westlands main bus stop. These facilities are used by thousands of pedestrians from different parts of the city and require

NMT infrastructure for comfort, safe and easy movement from one section to another. The road design of Waiyaki way as it dissects Westlands Commercial Centre is contributory to the road traffic accidents (RTAs) between motorists and between pedestrians and motorists.

The traffic pile up on the highway can also be linked to the road design, which is not compatible to the land use activity in Westlands Commercial Centre. The highway has terminal facilities located just off the carriageway without service lanes. As a result, the 'matatus' public transport operators drop and pick passengers while still on the carriageway. This behaviour is also contributory to traffic pile up, obstruction and even Road traffic accidents (RTAs) where the pedestrians have to alight on the carriage way and cross the road without looking out for on coming vehicles.

The main stage located off the highway is not linked and the design does not provide access to the highway and as a result, many motorist driving public transport vehicles avoid using it. The pedestrians then have to contend with waiting for their transport by the roadside. The pedestrians and travelers who converge by the roadside and negligence of some motorists are contributory to the ever-increasing road traffic accidents on the highway. The walking conditions on the road shoulders are bare and uncomfortable to walk on. The absence of NMT infrastructure on the road shoulders has resulted in a continual habit of the pedestrians walking on the garden and destroying plants put up for beautification.

The figure below is a representation of the ideal road design fully integrated for use of NMT means (walking and cycling) in transport. The design is a representation of what should be done on Parklands road in Westlands as it is the most frequently used and links the area through intersections with other roads in the area.



**Figure 5- Showing appropriate design for NMT integration**

### **5-2.5 Parking Supply and Management**

The land use in Westlands commercial Centre is dotted with the development of new buildings. The latest developments in the area are predominantly buildings for offices or office blocks numberings up to 10 storeys. Apartments are also on the rise in Westlands Commercial Centre. However, these latest developments are without commensurate infrastructure especially parking spaces, which are on high demand. The space on which the buildings are put up do not allow for equal space for the stipulated parking spaces.

The parking spaces within Westlands Commercial Centre are inadequate and the few spaces remain occupied until evening. This makes it difficult for one stopping by for a service to get parking space, and one has to look around for quiet some time which is time consuming and a lot is lost in terms of fuel consumption. Several parcels have been dedicated for private parking within the centre though at higher fees. Westlands has several private parking lots managed by private developers who charge higher fees and the Council has no control of the rates and this has lead to exploitation of users in Westlands Commercial Centre.



**Plate 5-5: Photo taken in Westlands of a private parking facility**

The investigation brought out the fact that many users of the centre prefer parking their vehicles at the private car parks for safety. As a result users park their vehicles away from their offices, especially those whose office premises do not offer sufficient parking spaces, and have to walk to their work place within the area. This phenomenon clearly brings out the need for integration of NMT into the urban transportation system in Westlands Commercial Centre, as the users have to shift their modes of transport from one place to another.

Other users who are unlikely to get parking slots have developed a continual habit of parking on pedestrian walks or pavements outside the buildings. Others also park by the roadside to obtain services in areas, that do not offer parking spaces for their customers. This habit has become a problem to motorists and pedestrians alike as the pedestrians

have to divert into the vehicle carriage way and the motorists have to use the narrow space or are held up as the road is narrow. This phenomenon causes traffic snarl up and accidents between motorists and pedestrians alike.

### 5-2.6 Walking and Cycling Conditions

There is a disconnect in the linkage of footpaths in Westlands Commercial Centre to different land uses. Many sections of the paved areas were done by private developers hence there is no uniformity and consistency of the paths. Since the area has a mix of land use activities and offer different services, there is a lot of traffic generated in the area and hence pedestrians encroach on carriageways meant for vehicles.







**Plate 5-6: Segregated pedestrian walks in Westlands.**

**Source:** Author (2009).

Studies have also shown that most of the access mode to/from bus stop/matatu is walking. The maximum walking time to/ from bus stop/matatu is 30min. The average walking time is 11.7 min. Studies also show that there are increasing levels of road accidents in Nairobi city. The major reasons for traffic accidents are bad driving behaviour and poor physical conditions of roads.



**Plate 5-7: Photo taken on Westlands Ring road, showing poor physical road conditions**

The pedestrian traffic generators in Westlands Commercial Centre and the corridors used include; Sarit centre, which is a huge generator of traffic, motorized and non- motorized within the centre, the Mall Westlands, it hosts arcades, shopping centres, restaurants, Nakumatt stores. These pedestrian magnates have greatly contributed to the formation of pedestrian routes through intermodal means within the transport networks.

The origin and destination of the journey in WCC depends largely on; place of work, availability of the forms of transport and ability of the user to afford the service largely influence the modal mix of traffic. The modal mix in Westlands Commercial Centre is a cross section of walking and other means of transport such as matatu, or buses. Other users prefer use of taxis but still have to walk to the various taxi ranks in Westlands Commercial Centre.

**Table 5-1: Origin of users in Westlands Commercial Centre**

Origin	Frequency	Percent	Valid Percent	Cumulative Percent
Within Westlands	3	18.8	18.8	18.8
Out of Westlands	11	68.8	68.8	87.5
Parklands	2	12.5	12.5	100.0
Total	16	100.0	100.0	

**Source:** Author (2009).

Table (5-1) indicates the origin of most users in Westlands commercial Centre and is an indication that a lot of users (68.8 per cent), come from without Westlands area for various reasons from shopping, college, entertainment to work. This has greatly contributed to high demand for NMT facilities in the area hence the need for integration.

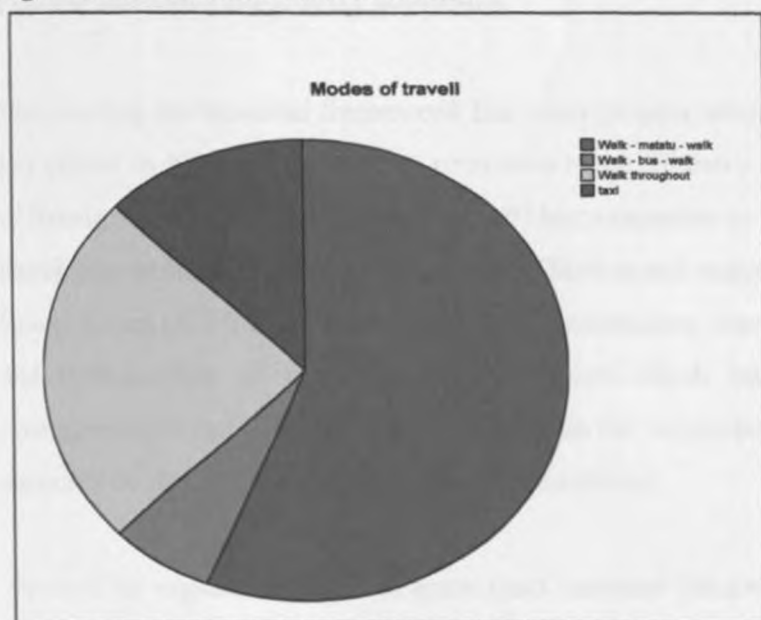
Traffic is the movement of person's goods and services using various modes available within the urban transport system. Westlands commercial centre commands heavy traffic given the various land use activities in the area. The table shows the modal mix in WCC and is evident that at some part of the journey, walking takes a fraction of the same.

**Table 5-2: On Modal mix in Westlands commercial area**

Modal mix	Frequency	Percent	Valid Percent	Cumulative Percent
Walk - matatu – walk	9	56.3	56.3	56.3
Walk - bus – walk	1	6.3	6.3	62.5
Walk throughout	4	25.0	25.0	87.5
Taxi	2	12.5	12.5	100.0
Total	16	100.0	100.0	

Source: Author (2009).

**Figure 5-3: Pie chart on modal mix**



Source: Author (2009).

The pie chart shows the different modes of transport used in WCC, and walking stands out to be the most used option. This adds to the realization that integration of NMT into the urban transport is important. The intermodal mix will add to efficiency in the system and safety for NMT users.

The scope of road infrastructure comprises the entire road network in Kenya and includes all road facilities upon which road transport operates, whether classified or unclassified, of regional or local importance, public or private. This includes bridges, footpaths, footbridges, traffic lights and terminal facilities (such as parking, modal interchange and amenities among other road transport support facilities). Although walking among the various forms of NMT and IMT is in use as part of travel mode, little has been done to integrate it into the road transport. There is need for recognition, development, funding and technical support from various government bodies responsible.

The responsibility of roads infrastructure is fragmented among different government ministries, departments and levels of government. These include the Ministry of Roads, office of the Deputy Prime Minister and Minister for Local government, Ministry of Finance and other supporting ministries.

The existing institutional framework has many players who are not linked optimally. The key player in NMT infrastructure provision is the Ministry of Roads. Under the Ministry of Roads, the Kenya Roads Board (KRB) has a mandate to oversee the road network and thereby co-ordinate its development rehabilitation and maintenance. The reviewed Kenya Roads Board (KRB) Act vests authority of undertaking actual development, rehabilitation and maintenance of roads to Road agencies which include Local authorities. The arrangement is not properly linked and allows for loopholes. The result of this is that the agencies do not adequately cover the entire network.

There is an urgent need to integrate road transport infrastructure planning with overall economic planning, to take into account the rising needs of the users of the transport system and especially for NMT. It is also necessary to establish an optimum balance in the development of road infrastructure to achieve a harmonized mutually complementary and competitive road infrastructural development on a sustainable basis.

World over, advanced technologies are increasingly playing a major role in the planning, development and management of road transport infrastructure to enhance efficiency and

safety. However, such systems have not been put in place in Kenya thus, hampering integrated and efficient inter-modal infrastructure provision.

Adherence to standards of roads infrastructure is key, though most of the in Nairobi Westlands Commercial Center are not good enough. This is evident by the high rate of road deterioration that has tended to exceed that of road maintenance. This situation has been aggravated particularly by the maintenance mechanisms in force.

The government should then adapt appropriate and efficient contracting methods, which provide for in-put based and performance based contracting for maintenance work.

### **5-3 Policies and Regulations guiding the Provision of NMT infrastructure in Westlands Commercial Centre**

The country Kenya does not have a well-articulated framework or policies for non-motorized transport. The present legislations are piecemeal policy documents that have been developed out of need or developed out of circumstances. It is therefore paramount that the relevant policy makers and experts embark on making a long and short term policy and management guidelines for NMT. Some of the policies include;

#### **5-3.1 Integrated National Transport Policy, 2004**

This policy document was developed in 2004 by the National Transport Policy Committee, in the Ministry of Transport and Communications and the main objective of this policy was to provide an integrated, efficient, reliable, and sustainable road transport infrastructure that meets national and regional passenger and freight transportation goals and supports the government's socio-economic development strategies to promote accessibility to services and the safe movement of people and goods, while being environmentally and economically sustainable. The policy also recognizes the role played by Non-Motorized transport and other objectives include;

To incorporate NMT in the national transport policy as part of the government's strategy for wealth creation / poverty reduction strategies;

To encourage and develop NMT alongside other means/modes of transport to increase accessibility and mobility in the urban/rural centres;

To Complement and enhance the impact of motorized and other modes of transport NMT and thus develop an integrated and seamless transport network at various levels of affordability and to encourage the development and use of NMT in the country as part of an integrated transport system that meets basic needs of low-income individuals and households.

### **5-3.2 Policy on Provision of Infrastructure for Non-Motorized Transport**

A principal roads policy reform initiative over the 1990s which recognized the poor and deteriorating road conditions in the country, considerable lack of facilities such as footpaths, lanes for cyclists and other NMT modes, street lights to make walking safe, and flyovers and by-passes to ease traffic congestion. The policy aimed at:

- i. Guarantee urban local authorities a share of revenues raised within their jurisdiction,
- ii. Continue major reforms through the Kenya Urban Transport Infrastructure project (KUTIP), in collaboration with the International Development Association (IDA),
- iii. Encourage locality-specific interventions through the national forum group on rural transport and development established in 1996.

Under KUTIP, the government was to contribute US\$115 million as part of IDA's Sub-Saharan Africa transport policy programme for upgrading the urban infrastructure in 26 towns in Kenya and strengthening the financial, management, and institutional capacity of the local authorities (Gok, 1997). The project, which was scheduled to run from 1995 to 2000, included an NMT component dealing with the construction or improvement of bicycle paths and footpaths.

### **5-3.3 Physical Planning Act Cap 286**

The Act was enacted in 1996 and it defines "development" as making of any material change in the use and the density of any building or land or the subdivision of any land,

which for the purpose of the act is, classified as class A (section 3(a). Section 30(1) states that no person shall carry out development within the area of a local authority without a development permission granted by the local authority. The Act also gives qualified Physical Planners the mandate to carry out any land-use planning work.

#### **5-3.4 The Local Government Act Cap 265**

This is an Act of parliament, which provides for the establishment of authorities for local government defining their functions and roles pertaining to development issues within a specific area of jurisdiction.

Section 161 (e) of the Act gives the Local Authorities power to construct footways along the side of any road or street, and to pave or surface any such footway with concrete blocks or stones or in any other way, and to recover from the owners of land abutting upon such footways the whole or any part of the expenses incurred in such construction, surfacing or paving where such construction and to control the construction, surfacing and paving of footways, where such works are carried out by any such owner.

This section of the Act emphasizes on the role played by footways or pedestrian lanes and hence the need to provide them. Section 166 of the Act gives every Municipal council, County council or Town council powers to prohibit and control the development and use of land and buildings in the interest of the proper and orderly development of its area.

#### **5-3.5 Government Lands Act Cap 280**

In the subsidiary legislation on the government lands (road reserves) rules: *no government land shall be let or sold outside the area of any township or station within a distance of 100 feet from the centre of any public road. At the same time, no building, fencing or other obstacle shall be erected within a distance of 100 feet from the centre of any public road outside the area of any township or station.* The above clause emphasizes on the need to protect the road reserve from where the infrastructure and facilities for pedestrians and cyclist or NMT can be sited.

### **5-3.6 The Public Health Act Cap 242**

The Public Health Act makes provisions for securing and maintaining health. Sec 115 of the Act guard against nuisance that can be injurious or dangerous to health. Sec 116 gives the Local Authorities the powers of maintaining its district at all times in clean and sanitary condition, and for preventing the occurrence therein of, or for remedying or causing to be remedied, any nuisance or condition liable to be injurious or dangerous to health, and to take proceedings at law against any person causing or responsible for the continuance of any such nuisance or condition.

This Act highlights the need to maintain a clean and healthy environment for the public and devoid of pollution such as noise, air from vehicle fumes, which may be harmful to users.

### **5-3.7 The Traffic Act Cap 403**

The traffic Act gives the police the powers to regulate all traffic, keep order and prevent obstruction in all roads, parking places and places of public resort. The police can also divert traffic temporarily, restrict, close, deny public access to any road. Sec 52; 1(b) mandates drivers to conform to the indications given by any traffic signs provided for in Sec 70; 1 of the Act. This is vital in managing traffic especially in the Westlands Commercial centre that experiences congestion as a result of the massive traffic. This law also gives the local authority the mandate to designate parking spaces. Parking bays on the other hand are to have minimum time of parking beyond which a fine can be appended but this is not the case as parking spaces are a problem in Westlands.

### **5-3.8 Kenya Roads Board Act 1999**

One of the strategic policies the Kenya government has adopted to improve road maintenance is to strengthen the management of and the institutional framework for roads. A study on road sector institutions was commissioned between 1995 and 1999 with support from the European Union. The objective was to develop an institutional framework within which the management of the entire road network would most



effectively be undertaken. In 1998, Kenya Roads Board (KRB) bill was drafted for establishing an autonomous, executive (or national) roads board to manage all roads. The bill was discussed and passed by the parliament in December 1999 as the KRB Act 1999. The KRB is responsible for coordinating implementation of all policies relating to the maintenance, rehabilitation and development of the network coordinate maintenance, rehabilitation and development of the road network with a view to achieving efficiency, cost-effectiveness and safety. In essence, the board provides an institutional framework within which the entire road network is managed, and is entrusted with the authority to efficiently use KRB funds to develop, rehabilitate and maintain the network.

The City of Nairobi, like other cities in the developing world, is experiencing rapid transformation. The main challenges felt everyday are unplanned and uncoordinated urban growth, inadequate infrastructure, deterioration of the urban environment and increasing poverty. Nairobi City has not had a comprehensive plan since Metropolitan Growth Strategy of 1973, which expired in the year 2000. Its expiry underscores the urgency of the preparation of the Strategic Structure Plan to guide the overall development of the city.

### **5-3.9 zoning**

Zoning is a system of land use regulation in various municipalities, which in practice designates permitted and extend of uses of land, based on mapped areas which separate one set of land uses from another. Zoning regulates building height that is, how many levels can be built, plot coverage and ratio and similar Characteristics or some combination of these. Local governments use zoning as a permitting system to prevent new development from harming existing residents or businesses and to preserve the quality of a community. The main zoning classifications are; residential, commercial and industrial. Residential zoning applies to residents and multi family dwellings, commercial zoning usually applies to office blocks and businesses, and industrial zoning normally applies to manufacturing shops and plants.

Westlands falls under zone 3 according to the zoning policies for various areas as delineated by the Council. Currently many parts of Westlands Commercial Centre are

experiencing immense development pressure, which has overtaken the development policies. In particular, Zone 3 (Westlands, Parklands) have been experiencing undue development pressure, mainly as a result of the rising demand for housing, office and commercial developments. The Local Physical Development Plan for Zones 3 aims to promote sustainable development, improved infrastructure and service delivery, and conserve the areas serene environment and built environment (City Council of Nairobi, 2004).

**Table 5-3: Physical Development policy for zones 3 Westlands**

ZONE	AREAS COVERED	GC %	FR %	Dept Ref Map	TYPE (S) OF DEVELOPMENT ALLOWED	MIN. AREA (Ha.)	REMARKS/POLICY ISSUES
3	<b>Parklands</b>			CP/PP/XX X	Commercial/Residential (High-rise Flats)	0.05	
	• Commercial	50	100				
	• Residential	35	75				
	City Park Estate /Upper Parklands	35	75				
	<b>Westlands</b>			CP/PP/XX X	Commercial/Offices/Residential (High Rise Flats) – Four Storeys Max.	0.05	
	• Westlands CBD						
	• Westlands/Museum Hill						
	o Block 1 Commercial	80	200				
	o Block 2&3 Offices & Highrise Residential	35	80				
	o Block 4 Offices	80	200				
o Block 5 Commercial/Residential Hotels							
4	<b>Spring Valley</b>	35(a)	75(b)	CP/PP/XX X	Residential (Apartments allowed on sewer only) – Four Storeys Max.	0.05	• Policy Under Review
	Riverside Drive						
	Kileleshwa						
	Kileleshwa						
	Thompson						
Woodley							
5	<b>Upper Spring Valley</b>	25	25	CP/PP/XX X	Low-Density Residential One-Family House	0.2(u) 0.1(S)	• Maisonettes Allowed On Sewered Areas Of Lavington
	Kyuna						
	Laresho						
	Lavington /Bernard Estate						
	o On sewer						
o Unsewered	25	25					
6	<b>Muthaiga</b>	25	25	CP/PP/XX X	Low-Density Residential	0.2	Single Family Dwelling
	New Muthaiga						

SOURCE: CCN (2004).

Much needs to be done on policy regulation for this particular zone. So far, development has mainly been driven by the demand for housing, commercial and office developments.

This is evident with the numerous applications for change of user for various parcels. However, these are without commensurate upgrading of the existing level of infrastructure to support it and especially for NMT.

### **5-3.10 Institutions of Management of roads in Westlands**

The institutions responsible for provision and management of NMT infrastructure in the urban transportation system in Westlands commercial Centre;

### **5-3.11 Ministry of Transport**

The ministry of transport is responsible for the general transportation policy. The policies on roads and highways is shared together either with the ministry of Roads, in charge of road transport, water transport and air transport. The ministry is also in – charge of public transport through the transport licensing board (TLB).

### **5-3.12 Ministry of Roads**

The ministry of roads is bureaucratic ministry. The minister for roads heads it; the ministry is responsible for general roads and highways operations and development of policy on roads. The ministry is also responsible for design and performance standards in the road sector. It implements the road transport except when it is undertaken by authorized bodies. It maintains roads under its jurisdiction; the person in charge is the chief Engineer Roads and assisted by the Chief Engineer Materials, Chief engineer – provincial Engineer, District Engineer.

### **5-3.13 Ministry of Finance**

The ministry is in charge of the general development policy including transportation. It is in charge of budgetary allocations and financial allocations to the various ministries concerning transportation.

### **5-3.14 Office of the Deputy Prime Minister and Minister for Local Government**

The mandate of the ministry includes the following;1) Formulation and implementation of local authorities policy, 2) oversight, management and development support to cities,

municipalities, towns and country,3) Council by- laws for local authorities,4) facilitating the winding up of loans authority,5) providing oversight and management support to – Local Authorities provident Fund and Local Authorities Pensions Trust,6) Administration of Local Authorities Trust Fund.

The Ministry of local Government is responsible for local authority policies including budgetary and financial control. Through the urban local authorities deal with the issues relating to urban transportation, its agents are the urban roads authority as concerns roads. The ministry is concerned with urban development, through the urban development department (UDD) whose offices are located at the city council offices. The department is concerned with infrastructure development in the urban areas such as roads, provision of infrastructure services for NMT such as streetlights, benches, street furniture, pavements, and walkways, parking facilities ([www.localgovernment.go.ke](http://www.localgovernment.go.ke), 2009).

#### **5-3.15 Ministry of Internal Security**

The ministry of internal security is responsible for other departments within it that deal with roads. These departments include; road traffic, policing regulation and some aspects of licensing in the transport sector. It is also responsible for Kenya railways policing and regulation, traffic police and the railway police.

#### **5-3.16 The Attorney General Office**

Through the attorney generals chambers and the courts the roads management in Kenya, the traffic offenders are prosecuted in the courts according to the traffic laws of Kenya Cap 403.

#### **5-3.17 The Judiciary**

The judiciary is an independent and accessible institution, provider of quality justice for all. The institutions overriding objective is; To provide an independent, accessible, responsive forum for the just resolution of disputes in order to preserve the rules of law and to protect all rights and liberties guaranteed by the constitution of Kenya. The judiciary is very instrumental in settling disputes which often arise as conflicts between

NMT users and motorists. Hence its importance in management of the roads sector in Kenya ([www.judiciary.go.ke](http://www.judiciary.go.ke), 2009).

#### **5-4 Challenges and implications of Integration of NMT into the urban transport system**

##### **5-4.1 Financial challenges**

The current road infrastructure financing is inherent in central government, is inadequate, arbitrarily allocated and does not allow for innovative ways for funding infrastructure development and maintenance. Similarly, the current road infrastructure financing is fragmented between different Ministries, departments and levels of government, which result to thin spreading of resources. For instance, road infrastructure financing is fragmented among the following institutions: Fuel Levy Fund (Kenya Roads Board), Local Authority Transfer Fund –LATF (Office of the Deputy Prime Minister and Minister of Local Government), Central Government allocations and Donor assistance and sugar levy among others.

In general, the funding levels are inadequate for new infrastructure; the upgrading of the existing infrastructure where there are capacity constraints or low service levels and inter-modal facilities within the road transport infrastructure.

##### **5-4.2 Diversity in the roads sector Management**

The diversity in and wide range of road sector related statutes and statutory instruments poses a potential for duplication, contradiction and conflict. The enactment of the Kenya Roads Board Act (KRB), in the year 1999 heightened this potential for conflict greatly, creating grounds for impairment of efficiency and cost effective road management.

It is therefore important that a comprehensive review of the legal regime and administrative practice affecting the roads sector be undertaken as soon as possible with a view of rationalizing and streamlining the law and practice in order to minimize duplication, contradiction and conflict. Further, a comprehensive legal review of the role

of local authorities in the legal framework created by the KRB Act 1999 be taken with appropriate recommendations.

### **5-4.3 Land use and spatial development**

Land use planning and development especially in urban areas and road passenger transport development are currently not integrated. This is due to poor coordination of responsibilities for administration, planning and regulation of the various aspects of land use, infrastructure and operations. This is due to understaffing of planning department in the city. As a result the situation has given rise to spatially disconnected developments especially with the NMT infrastructure, urban sprawl, and long travel distances and times. The land meant for infrastructural development is not secure and is susceptible to illegal allocation to private developers.

The control of land use and spatial development is possible by the establishment of structures, which facilitate integrated planning of infrastructure operations and land use. Preparation of integrated land use plans for the area, Westlands Commercial Centre, to facilitate the regulation of the ever increasing developments at all levels so that development approval is subject to conformity with integrated land use transport plans.

**Table 5-4: Summary of the transport challenges**

<b>Transport Sub-sector</b>	<b>Main Challenges</b>
Non- motorized and Intermediate Means of transport	Failure to incorporate NMITS in planning and development of transport infrastructure Lack of supportive legal, institutional and regulatory framework Development of NMIMT standards incorporating weather and climatic considerations
Urban transport	Inappropriate integration of transport planning into land use planning Poor institutional frameworks for urban land use policy and traffic management Lack of adequate human resource capacity and capital resources deficits within local authorities Increased journey times, often due to transport system deficiencies and urban sprawl Poor state of transport infrastructure has had a bearing in increasing cost of transport operations

**Source: Author's Conceptualization (2009).**

## **5-5 Summaries of emerging issues**

### **5-5.1 Lack of an urban Transport Policy**

Kenya has no urban transport policy yet. As such, there is no clear decision as to which modes of transport and facilities, the urban areas should encourage. Urban transport received little attention, as investment went more in infrastructure development for inter-urban linkages and for opening up links to rural growth centres. The Metropolitan Growth Strategy for Nairobi formulated in 1973 with a plan period of 30 years, was never fully implemented. Currently, the City of Nairobi, like most other urban centres lacks an urban development strategy that would serve as a focus for urban transport development.

Thus development of an urban transport policy, which should aim at developing an integrated, balanced and environmentally sound urban transport system in which all modes play their roles.

### 5-5.2 Institutional Deficiencies

Institutional deficiencies in the transport sector, in general, have weak and ineffective structures. Lack of capacity and shortage of serious resources seriously undermines their capability for good corporate governance, sound policymaking and public management. This results in loss making state enterprises, lack of adequate and appropriate investments in transport infrastructure, and corruption. There are also serious deficiencies in the current planning approach adopted by different agencies, with very little or no cognizance of stakeholders views.



**Table 5-5: Summary of Emerging Issues**

<b>Problem</b>	<b>Effect</b>	<b>Solution</b>	<b>Expected output</b>
Institutional deficiencies	Inefficient structures  Lack efficacy in problem solving  Slow implementation of policies	Strengthen institutions by staffing, empowerment.  Provision of resources needed.	An effective service superstructure.  Good corporate governance.  Sound policymaking.
Lack of urban transport policy	No/less attention given to urban transport especially NMT.  Lack of urban development strategy.	An integrated urban transport policy.	Integrated, balanced and environmentally sound urban system.  Participation by all modes of transport
Pollution	Ill health of residents	Pollution control by legal reinforcements	Clean environment  Pollution free
Urban sprawl	Increase in informal activities.  Congestion.	integrated land use plan	spatial organization and land use compatibility

**Source:** Author's conceptualization (2009).

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## CHAPTER SIX

### SUMMARY, CONCLUSION AND RECOMMENDATIONS

#### 6-1 Summary

Westlands Commercial Centre has the highest density of development in zone 3 as categorized by the district physical development plan. The area is well planned and a magnet for property development investors. The area experiences rapid growth and expansion, what can be said to be relieving the pressure from Nairobi's CBD. However, the various developments in Westlands are without commensurate infrastructure to match the demand created by the services provided. The building developments are inadequately supported by infrastructure especially parking spaces as most of the developments are for office suits. There is over densification outside the zoning policy and building development control regulations. The area also experiences incompatible uses and many developments have gone against zoning policies

The transport network in Westlands Commercial Centre is good and the area is well connected and easily accessible, however, this is not the case for NMT users. Given the various land uses within Westlands |Commercial centre, there is high traffic generated by the NMT users, but the available infrastructure does not properly serve the users.

#### 6-1.1 National NMT Policy

To be fully effective, NMT strategies should fall within the framework of a national NMT policy. It should include broad NMT strategies that address all aspects of NMT as well as the organization of horizontal (inter-departmental; inter-district/municipal) and vertical (several administrative levels; public-private) institutional responsibilities. The national policy provides a framework and direction for the development and coordination of programs in the different sectors and at all levels of government. Furthermore, a national strategy constitutes government's commitment to various initiatives and actions. It thus facilitates the integration of NMT within planning and design activities, such as land development plans, traffic management schemes, road design, road maintenance and traffic safety programs.

The National NMT policy to recognize the particular role and complementarity of non-motorized transport in comprehensive transportation systems. To appreciate the benefits of NMT with respect to, for example, traffic congestion, air and noise pollution, consumption of non-renewable energy sources, improved public health and poverty alleviation. It also recognizes the deficiencies of NMT, such as its limited radius, and addresses those with targeted interventions, such as good compatibility with public transport.

The objectives of a National NMT Policy can include, inter alia:

- Integration of NMT into the transport system and into infrastructure and land use planning;
- endorsing and facilitating the use of non-motorized transport modes, stand alone, or combined with other modes;
- Facilitation of research and new initiatives to improve NMT performance;
- Development of road design and maintenance standards that recognize NMT as a traffic component;
- Reduction of the number of traffic fatalities/injuries of vulnerable non-motorized road users; and development of traffic legislation that takes account of NMT as a fully-fledged transport mode (Guitink, 1996).

## 6-2 Conclusion

Integration of NMT into the urban transport system largely remains outside the normal process of transportation planning. The study carried out shows that there is a wide gap to be filled in terms of provision, maintenance and prioritizing NMT integration into the urban transportation system for safety, comfort and mobility of users. The consequence is that users of NMT have to unequally contend with motorized users in the system putting them at greater risks of Road Traffic accidents and also is evident in the conflicts on the road.

Although there is a willingness to modify elements of the transformation system not originally designed for NMT, for instance, the introduction of traffic calming facilities to reduce speed differentials between motorized and non motorized traffic, much needs to be done on proper integration of NMT into the transport system. This starts with the recognition that NMT is a sub-system of the urban transportation system. As a sub – system NMT has to have its own network and attention to be paid at intersection points with the motorized system in the urban transport system.

This has not been possible in Kenya given that the institutions of management are de-fragmented and lack proper co – ordination and co-operation in provision of this essential service, transport. The legislation on transport, Traffic Act chapter 403 laws of Kenya needs to be reviewed to clarify ambiguities on NMT and offer clear guidelines for integration into the urban transport system. The implementation of the policies agreed on and provision of roads should be fully supported as per their demand and be held accountable for lack of the same. All these can be attained by having an integrated transport policy that looks at all transport modes and how these can be synergized.

### **6-3 Recommendations**

Integration of NMT into the urban transport system requires concerted efforts from the various sectors involved in transportation management and institution responsible for provision of the same. The proposed efforts to be made to improve NMT integration include;

The development and maintenance of infrastructure for NMT to be supported by the local authorities, in the urban areas the local authority should have the mandate to provide and maintain adequate sidewalks and pavements for pedestrians, footpaths and other facilities for NMT users, including ramps for the disabled.

To enhance the funding for infrastructure, the government should consolidate all existing and future road transport infrastructure financing into a single co-ordinating institution. As far as possible, road infrastructure maintenance should be funded through user charges such as the fuel levy and or investments by the private.

To avoid duplication and conflict in service delivery, appropriate working mechanisms between the Kenya Roads Board and the roads agencies and clear chains of command within the roads sub- sectors be established. It is recommended that a comprehensive review of the legal regime and administrative practice affecting the road sector be undertaken as soon as possible with a view of rationalizing and streamlining the law and practice in order to minimize duplication, contradiction and conflict.

Reforms in the road sector in which road development, rehabilitation and maintenance take place within a suitably supportive framework, for integration of NMT into the urban transport system, founded and optimized to provide proper services.

A review of the physical planning policies and regulation to reflect the changing trends in Westlands Commercial centre of high density of developments. A review of zonal guidelines; the building code, development densities of ground coverage, building

heights, minimum plot sizes and support of future infrastructure improvements by developers.

Establish communication channels within and between council and the community to create awareness and sensitization of people, developers, professionals and officers on development regulation in the zone.

Westlands should be developed in to neighbourhoods conveniently planned to be accessible to all residents and to major activity areas by different modes of travel, motorized, and NMT walking and bicycle.

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**APPENDIX I**  
**UNIVERSITY OF NAIROBI**

**SCHOOL OF THE BUILT ENVIRONMENT**

**DEPARTMENT OF URBAN AND REGIONAL PLANNING**

**INTEGRATION OF NON- MOTORIZED TRANSPORT IN THE URBAN  
TRANSPORT SYSTEM**

**STRUCTURED QUESTIONNAIRE USERS IN WESTLANDS COMMERCIAL CENTRE**

**Declaration:** The information given will be treated with confidentiality and used for academic purposes only

Please answer the questions as instructed

Qtn No. \_\_\_\_\_

**Respondents Details**

1. Name (Optional) \_\_\_\_\_

2. Age / Year of birth \_\_\_\_\_

3. Sex: Male   
Female

4. Marital Status: Single

Married

Other Specify \_\_\_\_\_

5. Educational level; \_\_\_\_\_

6. Occupation; \_\_\_\_\_

7. Where is your place of origin? \_\_\_\_\_

8. Where is your destination? \_\_\_\_\_

9. What is the purpose of your journey?

(Tick where appropriate)

- Work  Shopping   
School  Medical   
Business  Other (specify) \_\_\_\_\_

10. What time(s) of the day do you make your trip?

- Morning  Noontime   
Evening  Night time  Other (specify) \_\_\_\_\_

11. What mode of travel do you use?

1. Walk – Matatu – Walk   
2. Walk – Bus – Walk   
3. Walk throughout   
4. Other (Specify) \_\_\_\_\_

12. How would you describe the condition of each of the pedestrian infrastructure (foot paths, street lights, zebra crossings, traffic lights) on the route used?

- a) Footpaths 1. Excellent  2. Good  3. Satisfactory  4. Poor   
b) Street lights 1. Excellent  2. Good  3. Satisfactory  4. Poor   
c) Zebra crossing 1. Excellent  2. Good  3. Satisfactory  4. Poor   
d) Traffic lights 1. Excellent  2. Good  3. Satisfactory  4. Poor

13. Suggest the likely pedestrian infrastructure you would like to see added on the streets and specify the exact location.

**Infrastructure**

**Location/ Street**

1. \_\_\_\_\_, \_\_\_\_\_
2. \_\_\_\_\_, \_\_\_\_\_
3. \_\_\_\_\_, \_\_\_\_\_

**Thank you!**

APPENDIX II

UNIVERSITY OF NAIROBI

SCHOOL OF THE BUILT ENVIRONMENT

DEPARTMENT OF URBAN AND REGIONAL PLANNING

REGISTRATION OF NON-MOTORIZED TRANSPORT IN THE URBAN  
TRANSPORT SYSTEM

TRAFFIC TALLY SHEET FOR WESTLANDS COMMERCIAL CENTRE

Traffic type	08:00 -08:15	08:15 -08:30	08:30 -08:45	08:45- 09:00	TOTAL
Passenger Car					
Public transport • Buses • Matatu					
Light goods Transport					
Heavy goods transport					
Motorcycle					
Bicycle					
H/ cart					
Pedestrian					

Cordon point: No. \_\_\_\_\_, location \_\_\_\_\_  
In bound traffic       Out bound traffic

APPENDIX III

UNIVERSITY OF NAIROBI

SCHOOL OF THE BUILT ENVIRONMENT

DEPARTMENT OF URBAN AND REGIONAL PLANNING

INTEGRATION OF NON- MOTORIZED TRANSPORT IN THE URBAN  
TRANSPORT SYSTEM

INTERVIEW SCHEDULE FOR EXPERTS/PLANNERS/ENG.

**Declaration:** The information given will be treated with confidentiality and used for academic purposes only

**Name of interviewer:** Oyier Ishmael Owira

1. What are the challenges faced in integration of NMT into the urban transport system in Westlands Commercial area?  
.....  
.....

2. What is the transport situation in Westlands Commercial Centre?  
.....  
.....

3. What are the implications of integrating NMT into the urban transport system?  
.....  
.....

4. What is the extent of NMT infrastructure integration in the urban transport system in Westlands Commercial Centre?  
.....  
.....

5. What are the major transportation planning problems in Westlands Commercial Centre?  
.....  
.....

6. What policy and regulations govern the provision of NMT in the urban transport system in Westlands Commercial Centre?  
.....  
.....

7. How then, can integration be enhanced into the urban transport system in WCC?  
.....  
.....

APPENDIX IV

UNIVERSITY OF NAIROBI

SCHOOL OF THE BUILT ENVIRONMENT

DEPARTMENT OF URBAN AND REGIONAL PLANNING

INTEGRATION OF NON- MOTORIZED TRANSPORT IN THE URBAN  
TRANSPORT SYSTEM

INTERVIEW SCHEDULE FOR MOTORISTS

**Declaration:** The information given will be treated with confidentiality and used for academic purposes only

**Name of Interviewer:** Oyier Ishmael Owira

1. What challenges do you face in the use of the transport system in Westlands Commercial Centre?

.....  
.....  
.....

2. What conflicts do you experience on the road with the Non – Motorized users (Pedestrians, cyclists) during peak hours in Westlands Commercial Centre?

a) What is the nature of the conflict in the area?

b) What in your opinion is the cause of the conflict?

c) What interventions do you propose for such conflict resolution in Westlands Commercial Centre?

3. What proposals for proper combination of NMT into the urban transport system would you suggest for Westlands Commercial Centre?



APPENDIX V

UNIVERSITY OF NAIROBI

SCHOOL OF THE BUILT ENVIRONMENT

DEPARTMENT OF URBAN AND REGIONAL PLANNING

INTEGRATION OF NON- MOTORIZED TRANSPORT IN THE URBAN  
TRANSPORT SYSTEM

INTERVIEW SCHEDULE FOR PEDESTRIANS

**Declaration:** The information given will be treated with confidentiality and used for academic purposes only

**Name of interviewer:** Oyier Ishmael Owira

1. Which mode of transport do you frequently use to travel from home to Westlands Commercial Centre?

Modes: Bus  Walking   
Matatu  Other \_\_\_\_\_

2. What modal slit do you take in traveling to your destination?

- 1. Walk – Matatu – Walk
- 2. Walk – Bus – Walk
- 3. Walk – throughout
- 4. Other \_\_\_\_\_

3. What challenges do you face and during which part of your journey within WCC?

4. Give suggestions on how to improve on the infrastructure facilities for pedestrians in Westlands Commercial Centre

.....  
.....

5. What measures do you propose for combination of NMT into the urban transport system in Westlands Commercial Centre?

6. In your view, what other infrastructure facilities for NMT would you like to see put up in Westlands Commercial Centre?

.....

**APPENDIX VI**  
**UNIVERSITY OF NAIROBI**

**SCHOOL OF THE BUILT ENVIRONMENT**

**DEPARTMENT OF URBAN AND REGIONAL PLANNING**

**INTEGRATION OF NON- MOTORIZED TRANSPORT IN THE URBAN  
TRANSPORT SYSTEM**

**Observational form**

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The following will form the unit of observation of the study on integration of Non – motorized transport in the urban transport system; pedestrian and motorist conflicts, NMT infrastructure integration on the road network in Westlands Commercial Centre.

**Roads**

Waiyaki way  
Woodvale groove  
Lower Kabete Rd.  
Parklands Rd.

**1. Pedestrian and motorist conflicts on the roads in WCC.**

- ❖ Pedestrian crossing the roads away from the designated areas
- ❖ Vehicles giving way to pedestrians at pedestrian crossings.
- ❖ PSV vehicles causing obstruction to drop and pick passengers
- ❖ Pedestrians walking on the carriage way for vehicles

**2. NMT infrastructure integrated in the road network in WCC.**

- ❖ Foot paths
- ❖ Zebra crossings
- ❖ Street lights
- ❖ Road design to accommodate NMT