TOPIC: TOWARDS A STRATEGY FOR THE OPERATION AND MANAGEMENT OF PUBLIC TRANSPORT SERVICES IN NAKURU TOWN.

By

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Declaration

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

(Patrick Waweru Gachangɔ, Candidate)

This Thesis has been presented for examination with my approval as the appointed university supervisor.

(Dr S. V Obiero, Supervisor)

Dedication

This work is dedicated to my parents from whom am indebted to for having provided both the moral and financial support during the course of my studies.

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Work of this magnitude cannot be done without the help of other people. However I will not be able to mention all of them because the list is endless.

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Abstract

Public transportation is an essential service and a necessary input in the development process of a town/city and the nation at large. For towns/cities in developing countries like Nakuru, the role of public transport is even much more given that majority of people cannot afford private car and the only next cheap motorized transport is public transport. However, public transport in Nakuru is facing various problems (internal and external) which make it ineffective and inefficient thus leading to deterioration of the level of services it provides to commuters.

There are several causes of urban public transport problems in Nakuru town. Mainly, these include: inadequate and lack of proper maintenance of the transport infrastructural facilities; concentration of economic, employment, and other landuse activities in central area of the town resulting in huge traffic that is increasingly becoming unmanageable or unsustainable; skewed supply of public transport services; lack of adequate traffic management and disorganized operations of the mode of public transport.

The main focus of the this thesis is on the operations and management of paratransit/*matatu* transport services within Nakuru. A lot of emphasis has been placed on the levels of services provided which are basically composed of density of route network, period of operation, and frequency of operation. A background of the evolution of public transport in Nakuru town has been discussed to show how public transport agencies/operators have responded to the growing demand. The study, subsequently concentrates on matatu (the only mode of public transport) and looks at the various aspects of matatu industry/operations which are discussed before summarising the problems revealed by the study.

To appreciate the discussions and analyses in this study, a number of aspects and characteristics of the study area have also been discussed.

Possible solutions to the public transport problems in Nakuru town were given in form of policy recommendations based on the findings.

In conclusion, the study stresses that to solve the public transport problems in Nakuru town, concerted effort is required among all those concerned; the government, the MCN, the operators and the general public. The study finds that *Matatu* is here to stay and will continue to offer public transport services for many years to come since it is cost effective than publicly owned bus companies or the conventional buses therefore every effort should be made to incorporate it in the public transport system. A deliberate effort should be made to consolidate minibuses and taxis into cooperative type organizations which would make for better returns and improved services to the riders, since the expanding self-managed firm experiences less cost increase due to managerial diseconomies of scale than private and public companies.

This will in the long run offer effective and efficient public transport services to residents.

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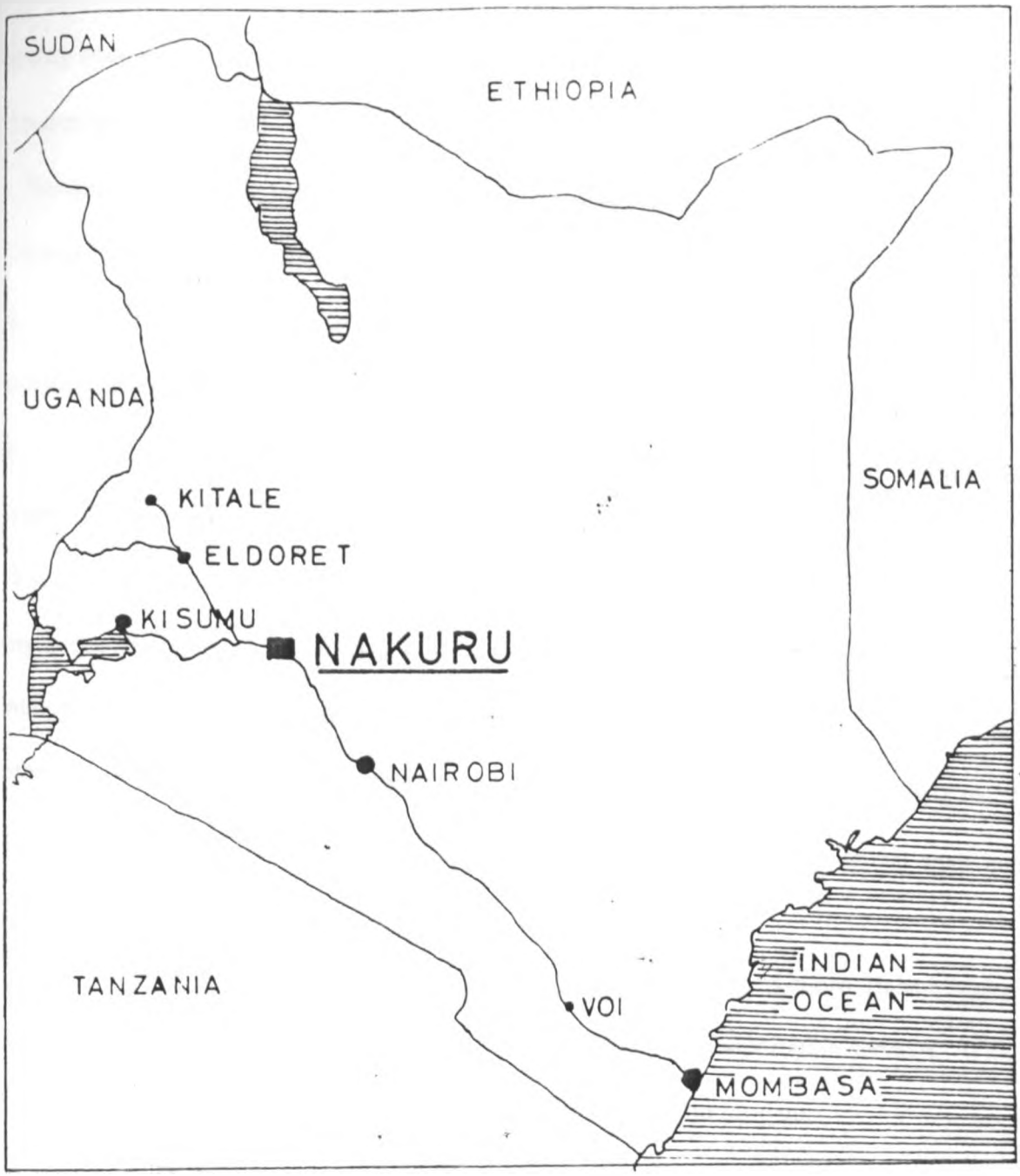
CHAPTER ONE : INTRODUCTION

1.1 Overview

Nakuru Municipality is the provincial headquarters of Rift valley Province. It is also the fourth largest town in Kenya after Nairobi, Mombasa and Kisumu respectively. Several industries are located in the town and have attracted a large number of job seekers with the resultant problems of inadequate service provision such as transportation, housing, education, water, etc (Malombe,1993).

Nakuru town is situated approximately 160km North - west of Nairobi as shown in map 1.1. Like most urban centres in Kenya, it owes its origins to colonial period and settlement. It grew not only as a service centre for the colonial administration, but, being along the railway line, also became the nodal point for the clusters of European Settlements which began to form in the early 1900s around the Mau Escarpment, between the rivers Molo and Njoro. By proclamation in 1904, it was declared a township, a status that enabled the administration to levy rates and taxes on buildings and other activities for municipal purposes. It was upgraded to a Municipality in 1929 which placed it under a Municipal Board whereas its boundaries were vastly extended.

In 1979 the population of Nakuru was pegged at 92851 people and was growing at a rate of 7 percentage per annum. In 1989 the population of Nakuru was 163,237 people. According to estimates the current population is approximately 234423 people(1989 Census).



NATIONAL CONTEXT
OF NAKURU TOWN

0 100 200 300 Km.

MAP 1.1

Nakuru is a fast growing town. The spatial expansion of the town has been rapid. In 1993, the municipality covered an area of 78 Km^2 but today the municipal boundaries have been extended to cover an area of 266 Km^2.

Several manufacturing Industries, small scale enterprises and commercial services are located in the town and have attracted a large number of job seekers from the hinterland and other parts of the country. Therefore, a large number of households depend directly or indirectly for their livelihood on incomes earned from commercial, small scale enterprises and manufacturing industries in the town. Similarly there is a lot of informal sector activities which offer a substantial part of the population's employment. These people expect better lives in the town than in the rural areas.

The current exceptional rates of urban growth are unlikely to diminish in the near future aid infant may accelerate (Obudho 1987). The town is home to Lake Nakuru with its national park and bird (flamingo) sanctuary which increases its stature as a future development and tourist centre. Like all the other major urban centres in Kenya, the employment areas are concentrated at the Central Business District (CBD) which also houses the administrative centre while the residential areas are mainly located at the periphery.

Nakuru also happens to serve its hinterland which include centres such as Njoro, Bahati, Molo, Naivasha etc. There is therefore a high demand for services, including transportation services. With inadequate resources, it is difficult to meet such the demand hence problems crop up.

1.1 Statement of the problem

Transport is a vital function in the daily life of any urban centre. Its importance lies fundamentally in its contribution to the large economies of scale and specialization associated with urban growth. It is the binding material of a city or town with technological sophistication. The efficiency of large cities and towns, as a form of spatial organization of human activity, and the quality

of life of urban dwellers, greatly depend on the development of transport systems as urban transport is a catalyst for overall development.

If well developed transport systems can strengthen the economy, enhance the productivity of human resources and contribute to the social utility of material and cultural assets accumulated in major urban centres. The availability of urban - transport infrastructure and affordable transport services (especially public transportation), is a condition for meeting basic needs of the urban population, because transport services allow access to employment and housing, and use of services.

The rapid rate of urbanization, (population increases, rising vehicle ownership and traffic volumes, increasing land-use densities and expanding areas) has made the management of Nakuru town centres complex (Habitat,1994).

Essentially any urban transportation problem results in lack of mobility, or mobility purchased at a very high social and economic cost. In Nakuru the situation of urban transport is alarming. Despite low levels of private automobile ownership compared with Nairobi, Nakuru's transportation problems are severe in degree and scope.

The major problems facing Nakuru town's public transport include; poor road conditions, skewed public transport services, inadequate terminal facilitates, abuse of traffic rules and regulations, lack of public transport modal choices , unroadworthy vehicles, poor traffic management, unreliable and unregulated public transport services. To the commuters these problems have translated into long walking distances to bus stops, long waiting hours, and ultimately long journey times. Due to the town's increasing demand for public transport, there has been an increase in the number of public road transport operators and an increase in car ownership in the town. However there is no organized public transport services in form of a limited bus company or a cooperative organization of minibuses and commuter services are provided on an informal basis by paratransit commonly known as 'Matatu'. The Matatu has several alleged advantages over the conventional buses among them; faster journey speeds, slightly shorter waiting periods, greater penetration, cost effective especially in the medium towns like

Nakuru. It is against this background that the study sets out to find out whether and how these advantages have improved the accessibility and mobility within the town. This was to be tested against the levels of services provided to the commuters in the town. In this study the levels of services is composed of three basic elements: the density of route net work, the time of operation and the frequency of operations.

The flouting of traffic rules and use of unroadworthy vehicles, causes a lot of concern to the government and the public at large. The government in its development plan (NDP,1994/96) recognizes the important role played by paratransit mode of transport and hopes to device an appropriate institutional framework for raising the level and quality of 'Matatu' services. Upto date this has not been done. In Nakuru the situation of urban transport is deplorable and needs attention. This view is supported by a study carried out by the Ministry of Local Government in conjunction with Norconsult (1993). The study found that majority of the roads in the town are in poor state. The study also revealed that most roads in the residential ares are earth roads and become impassable during the rainy season. Furthermore as the town grows and different land use activities are located far away from each other, a proportionate expansion in transport facilities and particularly public transport facilities and services is required.

The response to the urban transportation problems in Nakuru has not been encouraging. Several formal public bus transport companies have operated in Nakuru but wound up as a result of mismanagement and poor operational practices. Among these transport companies included: Nakuru transport company (NATCO) and Nyayo Bus Services (NBS). There is therefore no organized formal public bus transport services in Nakuru town and such services have left to informal privately owned paratransit commonly known as 'Matatu'. Therefore at the moment we are left with the option of a low cost strategy which is of immediate importance to the town. Such strategy therefore involves a proper operation and management of the existing infrastructure to achieve an agreeable equilibrium between demand and supply. This research is therefore dealing with intermediate or paratransit or

locally matatu mode of transport. This is because it is only motorized mode of public transport in Nakuru. Experience has shown that if properly managed this form of public transport can play an even greater role in meeting mobility needs and doing away with loss making conventional public transport services like Nyayo Bus services(NBS). *Matatus* have played a key role in alleviating the problems of public transport for which the government recognizes in its national development plan (NDP, 1994/96). However there is generally lack of knowledge and information about their dynamics and problems they encounter. There is little that is known about their mode of operations and management and the problems they encounter which are likely to affect the level of services offered to the commuters and other road users. For example how could one explain over speeding and overloading?. An explanation might be that the operators (drivers and conductors) want to retain their jobs and thus have to make as much money as possible. Another explanation would be that they are not aware of the effects of overloading only they know that overloading is a crime. Similarly since commuters accept to board overloaded vehicles then the operators cannot stop them since it means more money and if they turn them away, they (operators) might lose customers.

The issue of maintenance and replacement of rolling stock is important. A good management will ensure that old vehicles are replaced with new ones so that at no time should there be no vehicles on the road. A well maintained and serviced vehicle is likely to be more efficient in fuel consumption than poorly serviced one. This will ultimately reduce the operation costs. This translates into reduced costs to commuters. The absence of an association to articulate the interests of the operators also has led to poor levels and quality services being offered to commuters. The commuters have no where to take their grievances incase they are mistreated by some operators. There is no one to discipline errant operators. The issue of ownership of Matatu is very important. This is because there are allegations that matatus are owned by rich people who get away with traffic offenses. Similarly allegations have been that the owners of matatus form gangs that make it difficult for new entrants to enter the market by asking hefty route membership fee through proxies. Some problems and difficulties in the

management and operation of public transport services may not be internal but external. Poor roads will definitely tear and wear down vehicles quickly and reduce speeds consequently more fuel is consumed. This translates into high operation costs which are ultimately borne by the commuters. Poor traffic management/inadequate bus parks will manifest itself in public transport vehicles picking passengers on the streets thus inconveniencing other road users a situation currently prevalent in Nakuru Municipality.

Matatu , being the dominant mode of motorised public transport in Nakuru Municipality faces the above problems among many others which hamper the management and operation of public transport services. The understanding of the problems and the dynamics of the mode will help in improving public transportation services in Nakuru town suffice to say that any policy recommendations which do not adequately take into account and address management and operational problems of public transport, may well not give any solution to the general public transport problems It is with this in mind that this thesis research studies the management and operations of public transport services in Nakuru Municipality. The town's transport system is indeed in need of policy recommendations that will give a solution to public transport problems

1.2 **Justification for research**

Nakuru is a fast growing town with a varied economic base (industries, commercial, service and tourism), with clear urban planning and management constraints. It is also observed that urban development of Nakuru is increasingly becoming unsustainable due to, among others, infective urban planning methods and inadequate development control, the fallen standards of urban services such as poor road maintenance and public transportation (Habitat,1995). Therefore without proper planning, as the town expands (in population and size) the accompanying public transport problems will multiply. This will not only hurt the residents (who rely on public transportation) and economy of the town but will also have an impact on national economy.

There is also need to streamline the public transportation operations in Nakuru to adequately meet the demand. This can only be done by examining the problems of present public transport via the level of services provided to commuters.

Nakuru was chosen because unlike Nairobi very little research has been done on transportation despite it being the fourth largest town in Kenya. Unlike Mombasa,Nakuru has no Limited Bus Company which operates systematically (Kenya Bus Services has a fleet of buses in Mombasa). Kisumu was not chosen because of limitation of both funds and time. The government in its development plan (1994/96) has proposed Nakuru, Mombasa and Kisumu for elevation to city status. The study therefore finds it is important to study public transportation in Nakuru with a view to solving current problems and also contributing to comprehensive planning of the new 'City' of Nakuru.

1.3 Objectives of the study

The objectives of the thesis research are:-

(i) To examine and analyse the existing public transport system with emphasis on the operation, maintenance and service levels.

(ii) To develop a strategy for the operation and management of the public transport services in Nakuru Town.

1.4 Assumptions

(i) Nakuru will continue to grow in size and population thus increasing demand for travel.

(ii) Public transport (especially paratransit) will continue to dominate Intra-urban transport as majority of the people cannot afford private car transport.

(iii) The level of services offered by existing public transportation in Nakuru is far from satisfactory and adequate.

1.5 Scope and limitations of the study

The study focuses on journeys that have an origin and destination within the town. The study also looks at the operations and management of *matatus* as far as they affect the demand for travel and level of services provided to the commuters.

The thesis is composed of seven chapters. Chapter one is basically defining the research problem and the research methodology adopted. Chapter two looks at the literature background and also the theoretical basis for the study. Chapter three looks at the background information of the study area with emphasis on those aspects that affect directly or indirectly public transportation systems in Nakuru. Chapter four looks at transport in Nakuru where the channels and methods of propulsion have been analyzed. Chapter five analysis the socio-economic and travel characteristics of the residents of Nakuru town. Chapter six analysis the information on those who directly deal with the public transportation services, that is the commuters and the operators. Chapter seven is the final part of the study and is composed of conclusions and recommendations of the study.

1.6 Research methodology

1.6.1 Overview

This section is composed of four Sections. The first section is concerned with library study where the author reviewed the existing literature on the subject. This was followed by general reconnaissance of the study area (with particular attention to the modes of transport existing in the area). Preparation of various study requirements and field tools was undertaken followed by the actual field work where both primary and secondary data were collected. It is also important to note that both primary and secondary sources of information are used in this study. In some cases, both are used interchangeably to verify or supplement in cases of loopholes or suspected inaccuracies.

1.6.2 Data sources and collection techniques

Both primary and secondary sources of data were collected. A number of survey methods were used in the collection of data.

(i) Observation and photography

These are important methods of primary data collection. They helped in covering a wide area of the study area. The information obtained helped in proving certain inferences and supporting/Strengthening facts discussed.

(ii) Discussion and interviews

These techniques were used to obtain information from officers/personnel involved in the policy making, and management of public transport. Among those interviewed included the personnel of MCN, route 'associations' wardens and traffic department personnel.

(iii) Interviews with questionnaires

Here questionnaires with open-ended and close-ended questions were administered to various target groups.

The target groups included: the operator-supplier (Drivers, conductors, owners where possible) and the commuters or consumers. Household questionnaires were also administered to verify and enrich the information provided by commuters.

(iv) Documentary data collection

This was done by reviewing the secondary information from various sources including the Literature from the library. Documented Information from the MCN, the defunct Matatu vehicle owners Association (M.V.O.A) reports, were also obtained.

1.6.3 Sampling techniques/procedures

Any study on the efficiency, level and quality of service, operation and management of an urban transportation system should include both the operator supplier and the commuter-consumer. This is because the supplier - operator does not control or invest all the required inputs nor benefit from utilizable outputs coming to the system. In order to get the views of the operators and commuters who are the major actors in provision and consumption of public transport services, a sample of them were interviewed.

1.6.3.1 Household and commuter sampling

Nakuru has 19 administrative wards among them; Viwanda, Afraha, Kaptembwa,Langa langa,Lake View, Shabab, Rhoda, Bondeni, Hospital, among others.

Because of the large population involved, five wards LakeView, Rhoda, Kaptembwa, Shabab, and Langa Langa were selected for household questionnaires. The land use activities in these areas have a mix of low, medium and high density developments and therefore offers a representative sample. Furthermore, the chosen areas have the highest public transport services in the town. A total of 90 plots were randomly selected from the sampled wards. With the aid of cadastral and topocadastral maps the individual plots were identified on the ground and household heads interviewed. Incase where the household heads were absent the next plot was chosen and household heads interviewed. To complement the household information and also capture commuters of the mode a survey of public transport commuters was conducted. A total of 40 commuters were interviewed which is statistically adequate. These commuters included those from those routes that were not included in the household questionnaire like Lanet ward to solicit their views and compare with the other routes. It is important to note that it was difficult to interview commuters because most of them were in a hurry to get to their destinations and argued had no time to waste. However the response from those interviewed was quite good.

1.6.3.2 *Matatu* sampling

There are approximately 200 public transport vehicles (matatu) operating within Nakuru Municipality. These vehicles operate on the following routes: Shabab, Langa Langa, Free Area, London, Rhoda/Kaptembwa, Mwariki and Lake view. The exact number could not be obtained because of unavailability of records. A total of 40 vehicles were selected for the sample which presents 20% of the population. The records of the 'route warden' which indicate the list of vehicles and their order of arrival and departure was utilized to pick the subjects. A systematic random sampling was used. The first vehicle was picked randomly and every third and multiple of three vehicle was chosen. The driver or the conductor was interviewed at the terminal facilities shown on map 4.2.

1.6.3.3 Measure of *Matatu* network distribution

The areal coverage of matatu road net work in each zone as a measure of efficiency and efficacy of matatu in meeting demand/ promoting mobility and the levels of accessibility.

According to Giannopoulos (1989)

$DS = A/L$ .....(1)

$Ca = A1/A$ .....(2)

Where:

Ds = the network's density of access (Km/Km^2)

Ca = the network's comprehensive accessibility by ratio.

L = the total length of operational matatu routes in each zone.

A = area in each zone in Km^2

A1 = area within 400 m from operational matatu routes.

These equations measure the spatial coverage of matatu road network. The study considers those within 400 m of the matatu route to be conveniently accessible. The length of matatu routes were measured from the town centre since that is where they start. They were scaled off from the topo

maps. The 1979 population census data and topomaps were used to compute the areas. This is because there is no current information on the areas of administrative wards and therefore the areas computed are approximate

1.6.4 **Data processing, analysis and presentation**

Both qualitative and quantitative analyses of data have been used in the study.

Coding of the questionnaire and subsequent preparation of data structure were done before the data could be analyzed. For quantitative data, ordinal scale of measurement was utilized. Tables, frequencies, and averages were obtained for various variables or attributes investigated.

The method of presentation is both descriptive and quantitative. A simple Correlation analysis has been used to describe the relationhip between population density and Matatu distribution which seems to be high.

The formula used is :

$$Y = A + BX.$$

where Y is the dependent variable

X is the independent variable

A is a constant

B is the slope/gradient

Nevertheless, maps, plates (Photographs), tables and figures have also been used.

CHAPTER TWO: LITERATURE REVIEW

2.1 Introduction

The provision of mobility and equality of access to employment, health, educational, and cultural opportunities is the most cited benefit of public transport (Nancy et al, 1973:5). By its nature, public transport is a more efficient means of transporting large numbers of people in Urban areas than is the admittedly more flexible car (Wells, 1975). The basic objective of any public transport undertaking is to provide a good service to the public. This service can be subdivided and its impact therefore improved to include the provision of: a reliable and preferably quick service; a convenient service; a comfortable service and an affordable service.

Dimitriou (1973:112) argues that urban transport facilities expand the options for work and give access to health, educational and other amenities which because of scale of economies can often be effective in urban areas.

Dimitriou (1992:161) argues that,

> **'... deficiencies of public transport in the third world can be largely attributed both to the pace of urbanization outstripping that of public sector investment in passenger transport services, and to poor-coordination among constituent parts of public transport system. This in turn has contributed to the poor maintenance of vehicles, insufficient supply of buses, and inadequate provision of public transport services, frequencies, and routes'.**

Brees W. (1966:37) in specific reference to the problems of provision of urban public transport services states that:

> **'...providing mass transportation facilities in the cities of developing countries is an extremely costly and complex problem, partly because the movement of people is complicated due to the wide variety of vehicles available for this purpose, and partly because of the poor equipment ordinarily provided for mass transportation system.'**

As far as resources are concerned Aduwo and Obudho (1992) argue that most third world countries are faced with an acute shortage of resources to find the required additional infrastructure in their major urban centres such as the provision of transport facilities especially as related to those modes of transport for public use.

A paper written by world Bank (1972) has attributed rapid population growth and urbanization to the inability of cities and towns in developing countries to provide services and facilities as stated:

> **'...problems of urban poverty and unemployment, of inadequacy of housing and urban infrastructure has been recorded throughout history, what distinguishes the current urban problems of developing countries is their scale and intensity. The severity of the problems reflects primarily the rapidity of overall growth and acute shortage of resources to equip the addition to urban population.'**

The paper projects that the population and spatial areas of many cities/towns will triple within 20 years, necessitating heavy investment in roads, other transport infrastructure and equipment for majority of the population who cannot afford private automobiles. The issue of social justice and equity in the provision of urban transport is equally important as 50 percent of urban population in the third world are poor (Dimitriou, 1992: 164). Dimitriou (1982) argues further that:

> **'...for the poorest, who often can only afford to walk, most traditional efforts at urban transport system improvement are therefore of marginal help, unless focused on facilities such as pedestrian infrastructure and low-cost public transport facilities servicing basic needs.'**

As far as land use planning is concerned the world Bank (1972) sector working paper argues that:

> **'...while transportation facilities play a large part in determining urban growth patterns transportation requirements can be greatly reduced by appropriate sitting of employment and residence. Strong interrelations also exist between different transport modes necessitating their consideration in the context of the urban transportation as a whole.'** This paper argues further that:

> **'...for large cities, general urban speeds based on concentrated employment in a single central district is densely uneconomically in resources base. An urban pattern with several nuclei of relatively high densities connected by major arteries and with considerable low density development preserved between them can offer considerable advantages. The existing urban pattern, particularly housing and employment, greatly determines transportation needs.'**

The situation in Nakuru is as depicted above in that major employment centres are concentrated in the central business district (CBD) while the residential areas are located at the periphery.

2.2 Policy and management response

The world Bank has done a number of urban transportation studies in the third world countries. A sector policy paper by world bank (1975) identified problems in third world countries as congestion, failure to expand transport networks, proportionately to urban growth;

the poor state of bus system, and the spontaneous development of intermediate personal transport services to alleviate the efficiencies of the existing modes of public transport.

The paper recommends some of the ways of solving these problems which include: **rational use of transport facilities, improvement in the efficiency of transport undertakings and their coordination, and a considerable reduction in transport requirements in urban physical patterns.** The recommendations call for improved management and operations of public transport which closely relate to the theme of this thesis research; **Towards a strategy for the operation and management of public transport services in Nakuru municipality.**

Dimitriou (1982) identifies four kinds of access problems which require a policy and management response which are experienced by the poor in the third cities as:

physical proximity to the transport facilities; ease of access into public transport vehicles; affordability of public transport services; and city-wide access provided by the transport system.

The policy and management response closely relates to the theme of this thesis research. The world Bank (1986) paper on urban transportation policies notes that:

'...solving urban transportation problems has become one of the chief tasks confronting government in developing countries... primarily because of importance of efficient transport to urban productivity and to national development'.

The report states that the priorities for future world bank lending to developing countries and emphasized that such countries should consider the policy options such as:

strengthening the exiting transport institutions, using low-cost measures such as traffic management and road improvements and improving public transport, particularly buses and minibuses; improving road networks with an emphasis on the needs of commercial traffic and public transport (especially those serving poor neighbourhoods), and giving preference to capital-intensive projects such as major improvements in existing road networks and transport system that produce high rates of return.

These policy options have a direct bearing on the improvement of urban transportation through minimization (if not elimination) of the transport problems of management and operations. Indeed Klassen et al (1981) argues that to perform as required a transportation system must contain three elements- vehicle, road and operational management interconnected as a trinity. If one element fails, the whole system fails.

As concerns the institution that are responsible for urban transport, in third world Dimitriou (1992) agues that there **is wide spread duplication of responsibilities in urban transport planning and traffic management that has led to lack of clarity as to who does what.** He states that;

'... among public transport operators, this has proven especially problematic where it concerns coordinating the services of the informal sector with those of the formal.'

Indeed Rimmer (1986) reports in Asian cities/towns the traditional modern modes of transport operate side-by-side, sometimes complementary but in many instances conflict. The urban management seminar (1987) held at kenya institute of Administration (Nairobi) is particularly in agreement with the view of the world bank. The seminar considered the following as 'areas which need serious attention.'

i. **Problem of provision of urban transport infrastructure. These problems could be entified at level of planning, designing, financing and implementing of urban infrastructural projects.**
ii. **Problems of provision of urban public transport. These problems include supply, emand, distributions and quality of services.**
iii. **Traffic management and safety aspects. The problems of traffic flow were identified as e course of delays, frustrations and accidents.**
iv. **The contribution os the transport sector to the national development.**

The above problems are part theme of the main theme of this research thesis. The seminar calls for research and understanding of the problems of management and operations of public transport with a view to finding solutions which is the main theme of this thesis research. However studies on third world cities and towns only offer general attempt in understanding the problems and prospects of urban transportation and are not specific.

In Nakuru there has not been any comprehensive work done on the problems of productivity and efficiency of the urban public transportation system. Yet public transit is perceived by planners as an essential service and continuing responsibility for all metropolitan centres as Habitat (1993) argue;

> **'...whatever the nature of metropolitan authorities, they should play the key role in the management of urban transport.'**

The studies that have been carried out in Kenya have been mainly in Nairobi but to a larger extent apply to major urban centres of Kenya (Nakuru municipality included). These studies include Nairobi Metropolitan Growth Strategy (1973), Nairobi Buslanes and Bus ways Feasibility Study (1977), Situma (1977), Nairobi Urban Transport Project (1979), the *matatu* mode of public transport in metropolitan Nairobi (1982); and Transurb Consult Study (1986).

The Nairobi Metropolitan Growth Strategy(1973) included transport among many subjects it studied. Its main recommendations on transport was on the promotion of cheap public transport and reduction in fares coupled with promoting rational traffic management in the city, staggering working hours and provision of roads etc.

Nairobi Buslanes and Busways Feasibility study (1977) focuses on the improvement of the road network of the city with particular emphasis on creation of bus priority routes. The study reflects an intention to reduce investment costs of new infrastructure.

The *matatu* public transport in Nairobi by Situma (1977) focuses on the matatu industry. The study reports on the number of *matatu*, their trips and operational problems. This study was presented to the world Bank by the Nairobi city council (department).

Nairobi Urban Transport Project (1979) is a study comprising a series of components. It focuses mainly on creation and improvement of infrastructure and discusses the policy matters and monitoring procedures of doing so.

Matatu mode of public transport (1982) by Mazingira institute argues for the promotion of matatu mode of public transport. It discusses issues such as matatu licensing, matatu vehicle design, access to capital by *matatu* operators and matatu terminal. Its policy recommendations are along these factors. Transurb consultant study (1986) assesses the future urban public transport needs of the city of Nairobi. It then proposes and evaluates various options of transport supplies from the summary of the urban Transport studies, above a number of things come out clear. Majority of studies have concentrated in the capital city, and very little has been done in the other major urban centres namely Mombasa, Kisumu and Nakuru. The studies consider the general public transport problems and the transport network systems. In some cases these studies have presented only one side of the problem. None of the studies have worked at the management and operation of public transport services especially in the other major urban centres like Nakuru. This research thesis hopes to fill this void. To improve the public transport system in terms of efficiency and efficacy, the management and operation aspects of the existing modes of public transport must be examined. This is aptly supported by world Bank (1975,41) which argues that:

> **'...standards of management and efficiency of publicly run transport undertakings in developing countries vary greatly but are generally poor.'**

The reason for this is perhaps explained by the world bank (1986:21) report that states:

> **'... without the profit motive and the staff accountability that exist in the private sector, public owned systems have little incentive to strive for cost effectiveness, to compete for revenues, or to sustain the high degree of effort necessary to overcome the numerous day-to-day problems.'**

This perhaps explains the collapse of Nyayo Bus Services (NBS) which has literally wound up in the town. The World Bank (1975) report specifies the goal of management bodies of public transportation and what it takes public to achieve this by stating that:

'...purposeful action over considerable periods is involved in achieving efficiency of individual transport undertaking, in ensuring a more appropriate balance between different forms of public transport, and in developing methods of coordination that result in an economical integrated transport system in which different elements complement each other.'

The government of kenya has been keen to see that there is a legal way of ensuring improved overall public transport services and road and driving standards. This resulted in the amendment of traffic Act in 1986.

The traffic Amendment Act of 1986 had the following objectives.

i. **To reduce overloading**

ii. **To reduce driving hours.**

iii. **To ensure better safety by more vigorous police vehicle inspection.**

The above objectives can only be fully realized if the management and operation of public transport services is fully understood and a strategy evolved.

2.3 Coordination and regulation of public transport

The main objective of coordinating and regulating public transport operations is to balance the demand for travel and supply of transport services. In developing countries there exist both traditional and modern modes public transport which operate along side each other and at times they compete and hence must be coordinated.It is important to note that the demand for travel is a derived demand which implies that the demand for movement is generated by forces at play both outside and within the transport sector hence transport is only a means to an end. Among the factors that influence demand include; travel cost, price of other (comparable) goods and services, influence of taste, income levels and distribution of income of consumers, demographic characteristics and changes, and improved transport infrastructure and service provision and landuse systems and forms. Among the factors that affect supply of public transport services include ; the number of available transport vehicles, the operational costs, the profit margins, operational and management systems among others. Therefore

both supply and demand for public transport services must be coordinated as an oversupply leads to operational losses while under supply leads to provision of poor quality and levels of public transport services.

On the coordination and regulation of public transport operations in third world countries the report (World Bank, 1975) says that:

> **'...perhaps less obvious, yet not so less serious are the failures of coordination between transport operators and public works department or other road building agencies.'**

The paper subsequently states that danger in over regulation of urban transport services by regulatory agencies are indeed evident and, intermediate personal transport services tend to suffer particularly from inflexible regulations. This is aptly supported by Ocampo (1982:26) who has this to say as regards intermediate modes of transport:

> **'... there have been questions as to whether they are not socially beneficial and should be retained with some modification in their vehicles, their organization and operations, and their roles- and integration into the urban transport systems that the city proposes to modernize.'**

Havel (1975:222) commenting on the role of management on the improvement of transportation network states that:

> **'...because land use fundamentally inter-relates with the kind of transport system which is operable, management will be required to provide expertise and judgement as an aid to formulating the broader land use and car access policies of the relevant political authorities.'**

On the importance of addressing the problems of management and operations the World Bank (1975) gave a summary of 'Management improvement and coordination as follows.

> **'...improvement in efficiency of transport undertakings and their coordination are heavily dependent on better management standards of public transport service in terms of speed, comfort and fares need to be tailored more closely to income levels. The poorer the travellers, the greater the importance of the level of fares relative to the time and comfort. But enforcement of low levels by regulatory authorities is not, itself, generally conducive to efficiency. The consequent lack of financial resources, often lead to obsolete vehicles and inadequate maintenance, leading to high rates of breakdown and or service.**

On the issue of utilizing the available resources Aduwo and Obudho (1992:121) conclude that:

'... transportation system planning, operation and management approaches, therefore should aim at obtaining the best possible utilization of resources or basic facilities already available such as matatu.'

Faulks (1962:116), on organization of public transport service mode states that:

'... an organizational structure must be given up in such a way that the undertaking is able to conduct its affairs with maximum efficiency and the arrangements which are made are implemented by size... as the system expands so does its administration.'

Smark (1972:15) argues that:

'...nothing much has been done to improve mass transportation over either short terms or long term...management is the key ingredient in much of mass transportation.'

This is supported by Aduwo and Obudho (1992) who state that:

'....priority should be given to strengthening the exiting transport institutions such as matatus, using low cost measures such as traffic management and road improvement; maintenance and improvement of public transport particularly bus and minibus service....'

2.4 Operations of Paratransit in Africa

A properly laid out and operated bus/matatu system requires an adequate design of all its principal components which include: the route network, the vehicles and operations.

In Africa the trend has been for a large bus company to be supplemented by an informal system of minibuses and/ or private cars which provide a more accessible services (particularly to the peripheral low income areas). However in the majority of towns in Africa this informal system is the only mode of public transport available. Therefore behind this shift from monopoly of provision of public transport to a mixed system are two factors- experience has shown that large bus companies don't benefit from economies of scale as had previously been believed and for various political and administrative reasons, public bus companies are costly to run.

In Kinshasha, Zaire the informal transport vehicles are commonly known as *fulas- fulas* and *kimalusmalus*. They are privately owned and rented out on a daily basis. The works such that in the morning, the vehicle is hired by the driver and a team of conductors, who pay a fixed sum to the owner in the evening. The surplus is shared out between the driver and conductors. There is therefore a

tendency to overload and over speed to make more money. However this vehicles remain indispensable for the functioning of the city of Kinshasha.

In Dar es salaam, Tanzania, between the period 1972 to 1974 there emerged an informal public transport system locally known as *sumni- sumni* that were to operate to supplement the limited bus company that was existing. However these were poorly maintained and serviced vehicles that were dangerously driven and consequently banned in 1975. However due to public transport shortage, private vehicles were permitted to operate in compliance with new regulations and rules which included; an acceptable standard of mechanical fixtures and a licence to operate on stipulated routes. A fleet of informal public transport popularly known as *dala dala* emerged. They are fast and more expensive to passengers but continue to attract passengers. In Dakar, Senegal besides the publicly owned bus transport company, there are other legalized privately owned vehicles (minibuses). In Nigeria, just like in Kenya the informal mode of transport dominates transport in major urban centres and in many cases it is the only mode available.

The informal sector concept is defined clearly by internal labour of organization (1972:2) as: **a way of doing things characterized by easy of entry, reliance on indigenous resources, family ownership of enterprises;small scale of operation; labour intensive and adapted technology; skills acquired outside the formal school system; and unregulated and competitive markets.**

In conclusion, in addressing the management and operation of public transportation services, Nakuru is chosen as a case study.

2.5 Definition of operational terms

2.5. 1 Pubic Transport

Public transport would be defined as an organized means of travel intended for general public use at a fee for travelling from one location to another. It also refers to the facilities and service prepared for use by a third party and are use by large number of customers, collectively or separately.

Here a bulk of people is conveyed from location (origin) to another location (destination). The vehicles used are normally registered as public service vehicles (P.S.V.s). Those who use public transport vehicles may be refereed to as patrons, passengers or commuters.

2.5.2 Network

This refers to the geometric pattern layout of the transport system, or the location of the routes or a set of geographic locations interconnected in a system by a number of routes. The network may be radial, or rectangular in shape.

2.5.3 Efficiency

This refers to the rate of success of any operating process or system or the quality the entity whose productivity is under review. It is used to refer to the rate at which the public transport vehicles have succeeded in promoting the level of accessibility or mobility of Nakuru residents.

2.5.4 Commuters

These are people who travel regularly between two locations (like, between work place and residential place). A commuter once he/she defines his/her origin-destination pattern, commits resources, money (fare), and time expects the trip to be successfully completed. A trip is efficient or successful if what he/she gets as a service matches expenditure on such service.

2.5.5 Quality of service

This refers to the level of efficiency and productivity of a systems' process. However there are no clear cut measures of level of service since both commuters and operators have their different assessment of quality of service. The best assessors of quality of service are the users/commuters who among themselves have different measure of quality of service depending on tastes and preferences,

The attributes of quality of service are associated with the extent to which services of the system are considered desirable from the users point of view. These attributes include among others the frequency of service, proximity of service, convenience getting to and from the vehicle; comfort riding; avoidance of transfers and distance between commuter and the system. Comfort refers to the ease with which travelling takes place once the commuter is in the vehicle. This can be gauged from amount of privacy, physical stress and ambient congeniality. Privacy is measured by amount of floor space the commuter is allocated. Other attributes will also include; the reliability of the system; it availability for service for any other service and at any time needed; and its general safety records.

2.5.6 *Matatu*

This is an intermediate form of motorized public road transport falling between taxis and the conventional bus. The word *matatu* is derive from the local term Mang'otore Matatu which means 'thirty cents', the standard fare which matatu charged when they started operating in the 1950s'. The carrying capacity of these matatus ranges from 8 to 25 people when seated. This is the dominant mode of public road transport in Nakuru Municipality.

2.5.7 Nyayo Bus Services (N.B.S)

This is a mode of public road transport started by the government in 1986 to complement the services of already a existing public transport vehicles initially In Nairobi and later throughout the country. It came under the management of state corporation in 1988 under the umbrella of National Youth Service (N.Y.S) However the corporation has incurred huge loses that it has been declared insolvent and therefore its role in public transportation is almost extinct in many rural and urban centres (Nakuru Municipality included).

2.5.8 Transport modes

This refers to the various types or means of movement. This include both motorized and non-motorized modes. Among he motorized modes of transport are private and public transport vehicles. The Non-motorized modes include bicycles, walking and handcarts among others.

2.5.9 Service offer

This is concerned with the location of routes, stops, terminals and transfers to offer the best possible coverage of the area.

2.5.10 Operation of public transport service

This refers to transforming a particular service offer into a safe and reliable run of buses/matatu within the service network. The principal objective of this component is to improve reliability and punctuality and ensure that passengers catch their connection to other transit modes.

2.5.11 Passenger Service

This is aimed at facilitating and encouraging the use of public transportation. It includes such components as attractive and cost effective fares, comfortable and sheltered bus stops, comfortable ride, comfortable and clean seats, clean vehicles, shorter travelling times, friendly operators, etc.

2.5.12 Organization of Public Transport

The organization framework of bus/matatu operation in an urban area affects the productivity and overall operation of the system and determines the level of services provided to the travelling public. The organization includes among others supervising and financing structure, organization of the operating agencies, the form of ownership of operators, the coordination between the various elements of public transport that operate in the area.

2.5.13 **Management**

This refers to the organization of the resources available (people, and capital, land, equipment etc) to achieve certain set objectives within a certain plan period.

2.5.14 **Central Business District (C.B.D)**

This refers to central area of Nakuru Municipality where there is concentration of employment, commercial, services and administrative centres.

2.5.15 **Trunk Road**

This is a highway which constitute part of the national system of routes for through traffic. An example is the Mombasa- Nairobi road. In this study a road is any length of a highway or any other road to which the public have access and includes bridges over which a road passes.

2.5.16 **Highway**

This is way over which the public have the right to pass and repass. A carriage is a highway or part of the highway over which the public have right of way for vehicles. A street includes any highway and any road, lane, footpath square, alley or passage whether thoroughfare or not. A general prerequisite for a street is that there should be a succession of houses or buildings or at least one side.

2.5.17 **Land use**

This is the spatial distribution of city functions- residential areas, commercial areas, retail business, and the spaces set for governmental, istitutional and leisure functions.

2.5.18 **Trip**

This is a one way movement by a person, usually assumed to be over 5 years old, from one place to another, during or part of which journey some form of mechanically propelled transport is used.

CHAPTER THREE: BACKGROUND OF THE STUDY AREA

3.1 Location

Nakuru town is located in the expansive Rift Valley Province. It is the provincial headquarters of Rift Valley province. It is the district headquarters of Nakuru district and also the headquarters of Nakuru county council. The town is located approximately 160 km North-West of Nairobi.

Like most urban centres, it owes its origin to the colonial period and settlement. It started as a service centre for colonial administration. By proclamation in 1904, it was declared a township, a status that enabled the administration to levy rates and taxes on buildings and other activities for Municipal purposes. It was upgraded to a municipality in 1929 which placed it under a municipal board whereas its boundaries were vastly extended.

The town is landlocked between Menengai Crater to the North and Lake Nakuru to the South. The town has at an average altitude of 1859m while Menengai crater is at an altitude of 2776m above sea level. Many geologists (both international and national) have studied the geology of town and Rift Valley as a whole. Seismic tests have been done in Nakuru town and its hinterland.

The position of the town in the centre of Rift Valley makes the seismic conditions of the town very unstable for the area may be subjected to earthquakes any time. Menengai Crater although extinct is still seismically unstable and may affect the town incase of future volcanic eruptions. Rainwater falling on the crater slopes, collects under the loose surface in underground natural storage and this process may lead to landslides. Indeed numerous fissures/cracks are known to have split the ground west of town.

As a result Nakuru is termed a zone of minor seismicity with weak ground, in which earthquakes of shallow focus occur in a limited scale. Due to seismic instability of the underlying rock, tall buildings (more than four storey) are prohibited in the town. Therefore the town can

only expand horizontal which increase the journey lengths and times. This calls for and effective and efficient public transport to provide commuter services to those who need them.

It is mainly underlain by an underground layer of tariff and volcanic substances dominated by volcanic loam and sandy soils on the surface. The town receives an annual rainfall of 890m which increases westwards where most of the raw materials for the agrobased industries in the town are grown.

3.2 **Population**

According to the 1989 population census, the town had a population of 163927 people. The spatial distribution of these people is as shown in the table 3.1. It is important to note that the figures are highly aggregated and no statistics on population per administrative ward could be obtained. Therefore these statistics have been used with those the 1979 population census complementary as the latter gives statistics on administrative ward basis which are helpful for this study.

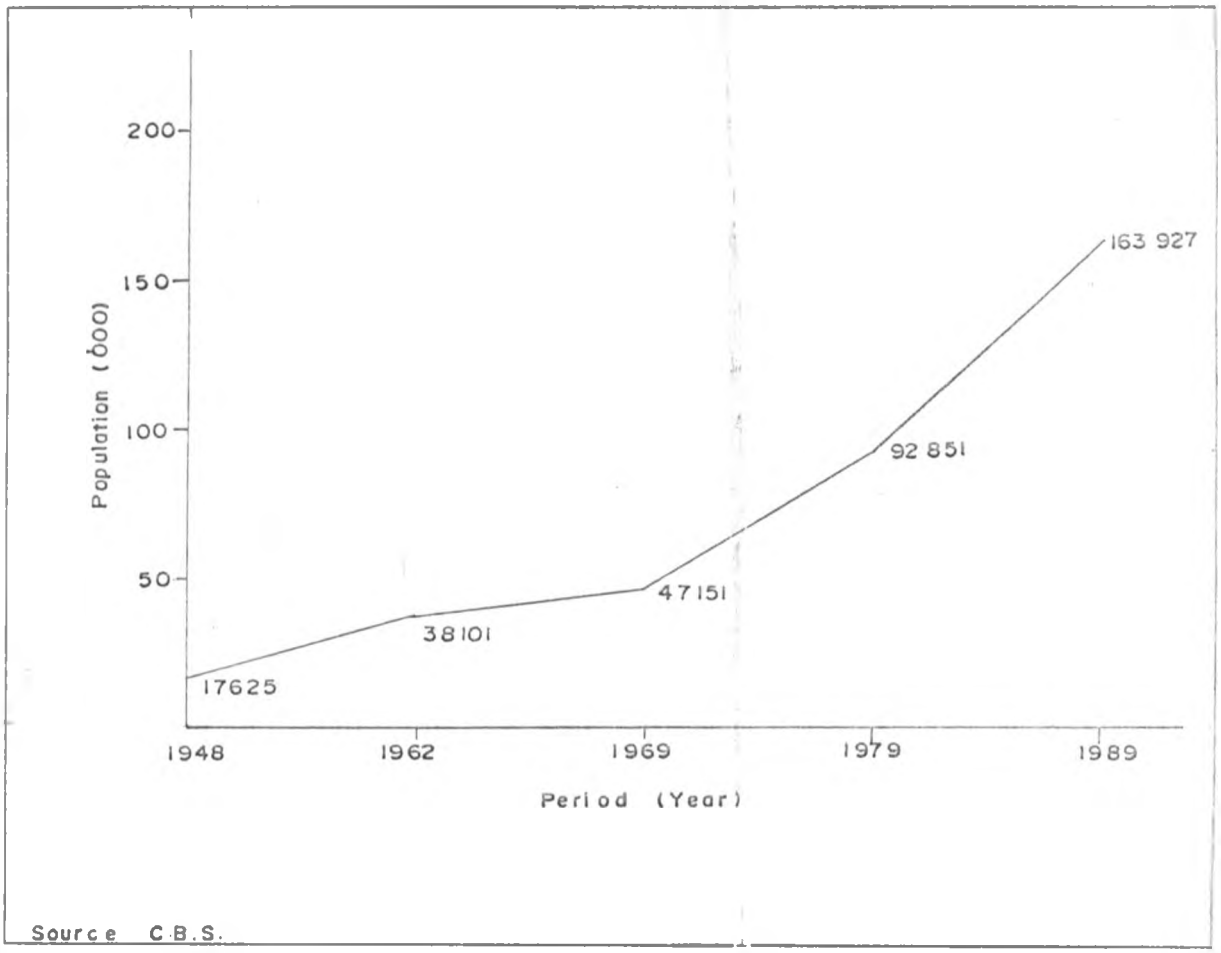
Table 3.1 **Population Distribution Per Enumeration Area**

Enumeration A	Male	Female	Total	No of HIH	km^2	*Density*
Central	25159	24142	49301	13595	14	*3522*
West	12366	10460	22826	5853	12	*1902*
Lanet	16117	13980	30097	8118	45	*669*
Baruku	34182	27118	61300	19050	37	*1657*
Lake Nakuru	335	123	458	125	158	*3*
Municipality	*88159*	*75823*	*163982*	*46741*	*266*	*7753*

Source:- Kenya Census (1989) Central Bureau of Statistics (CBS)

As can be seen from the table, the largest population is concentrated on the East-West axis of the town as the population densities in the Central(3522), West(1902), and

Figure 3.1 **Population Growth Trends in Nakuru Town**



As can be seen from the figure the population of Nakuru has been steadily/rapidly increasing while the corresponding infrastructural services have not been expanding as has been and will been shown. The primary courses of urban population growth in the town are; natural population growth, rural urban migration and boundary expansion. Nakuru has a varied economic base with manufacturing, commercial and servicec industries which attract the rural mass who seek better lives in the town. Nakuru's areal expansion has also been phenomenal from 32Km2 in 1969 to 266Km2 in 1996.

This expansion brings the rural population under the municipal jurisdiction thus contributing to the town's population. This also exerts greater impact on the municipal

infrastructural services like water,sewerage,housing,and public transportation among many others.

According to 1979 population census Nakuru had 16 administrative wards with some selected wards shown in the table 3.3. This statistics have used in conjunction with the 1989 population census in this study for analysis purposes. This is because it is the most comprehensive in terms of providing information on administrative basis.

Table 3.3 **Population distribution by Ward in 1979**

AdministrativeArea (	Total	Household	Area (km^2)	Density
Nakuru West	15206	4510	21	697
Hospital Ward	8158	1426	11	731
Langa Langa	2436	629	0	3582
Central	3513	787	1	3377
Shabab	4188	935	1	4188
Viwandani	2068	462	2	940
Biashara	4189	940	1	2685
Nakuru East	9759	2340	24	403
Municipality	92857	23257	78	1184

Source: Central Bureau of Statistics, 1979.

This information is used to project the population per ward as of 1996 especially for Hospital, Langa langa, Shabab, and Nakuru East to illustrate the functioanal relationship between population distribution/ density and the distribution of public transport services. The projections computed using 7% per annum are as follows 2870, 13860, 16206, and 1574 respectively.

3.3 School Population

This category of the population is important since these are potential trip makers. The school attendance for both sexes within the municipality is as table 3.4 shows.

Table 3.4 **School Attendance by Sex in Nakuru Town**

Age(years)	At School	Left School
6-9	12,064	256
10-14	15,425	966
15-19	9573	7442
20-24	2412	19738
25-29	449	18867
30-34	270	11,306
35-39	177	775
40-44	124	4710
45-49	75	2878
50-54	41	1776
55-59	26	793
60+	36	841

Source:Kenya Population Census (1989) Volume II

Therefore roughly 25 percent of the population were attending school at the time of the census. Therefore assuming the population of the town is 300,000 people then over 75000 of the people are attending school today. This is a sizeable portion of the population who are potential trip makers. This is indicative of the magnitude of the traffic generated by those who are attending school assuming that majority of them school within the town.

3.4 **Economic Base**

Nakuru is the fourth largest town in Kenya both in population and industry. The town is well linked with national transportation system. The main international trunk road linking Nairobi and Kampala passes through the town and infact cuts the almost into two. Nakuru acts as a terminal centre for the railway line. The railway line from Nairobi splits into two one that goes to Malaba and finally to Uganda. Nakuru with its strategic location has grown to be a

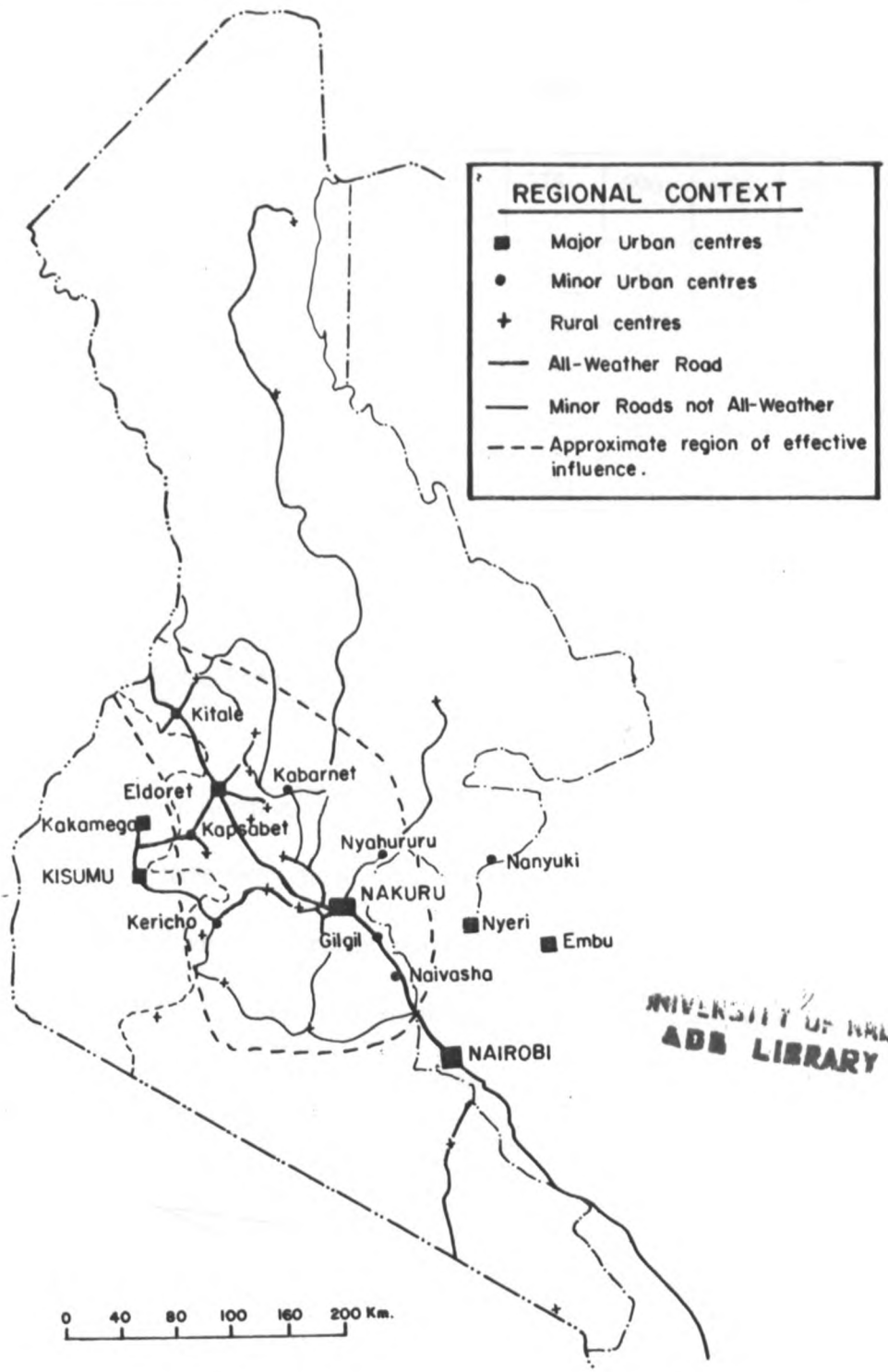
commercial and industrial centre. It has a broad based economic structure with strong sectors in manufacturing, agricultural processing, transport and communication, commercial and tourism among others. Therefore it serves a wide region as;

(1) a seat of various farming cooperatives and service industries like Kenya Cooperative Creameries (KCC), Pyrethrum Board of Kenya. etc.

(2) a manufacturing centre with such industries like Union Carbide Batteries, Nakuru Mattresses etc.

(3) a node of communication and transportation.

The table 3.5 shows the wage employment by industry in Nakuru Municipality.



MAP 3.1

Table 3.5 **Wage Employment by Industry in Nakuru Town**

Industry	1988	1988	1989	1990	1993	1994
Agriculture/Forestry	375	696	676	704	851	470
Mining & Quarrying	36	150	54	35		14
Manufacture	5952	6013	5949	6206	6573	6962
Electrical and water	1051	1116	1003	1143	1141	1069
Construction	2176	2597	2237	2160	1962	2136
Wholesale and retail trades,restaurants and	3879	3447	3480	3658	4275	4610
Transport and Communication	1236	1020	1137	1089	1110	1234
Finance,insurance,real estate and business s	1045	1016	1143	1191	1521	1617
Community,Social and personal services	8673	8916	8587	8652	9344	992
Total	2442	24971	24266	24838	26777	28037

Source:Statistical Abstract(CBS):1995

As the table shows there is an increasing trend in wage employment sector for the past 8 years. It shows that 17 percent of total population are employed in the wage sector. Assuming that the growth in economy then an increase in number of those employed in the wage sector can be assumed to have taken place. These are potential trip makers who are employed in time specific jobs, that is reporting at eight in the morning and there need for an effective and efficient public transport system as a portion of them use it.

However the informal sector activities have been ignored in this table which account for over 50 percent of the total employment outside rural small scale agriculture and pastoralism activities(Economic Survey,1994). The Economic Survey(1995) reports that the growth in the informal sector expanded by 22.5 percent and therefore it is safe to assume that the informal sector accounts for over 50 percent of total employment in Nakuru town. To reach the centres of economic activities people either walk, ride bicycle, use private car or use public transport.

However given that majority of them cannot afford private car then the only options available are non-motorised and public transport. Given that this study is looking at public transport, then an efficient and effective public transport is needed. The table 3.6 shows the total wage employment in Nakuru Municipality for 10 years between 1985 to 1994.

Table 3.6 Total wage employment

Year	1985	1986	1987	1988	1990
Employee	21914	23370	24423	24871	24368

Source:Statistical Abstract,CBS(1994)

The figures indicate a steady increase in the number of people employed in the wage sector apart from the year 1989. This information is important as it indicates the potential trip makers who can either use public transport,private car,bicycle,or walk to their destinations.

The Local Authorities in Kenya have been accused of offering poor services to their residents. They have further been accused of collecting service charge and other monies from the residents without offering any services. The Local authorities on their part have blamed poor revenue base unmatched with high population growth for the myriad of problems facing them. Table 3.7 shows the earnings of the municipality for the last five years in K£'000. This information is important as it helps planners to know the capacity of the Local Authority to undertake development projects.

Table 3.7 **Earnings of Nakuru Municipality (K£'000)**

Year	1990	1991	1992	1993	1994
Earnings	46382.7	48849.6	52936.5	56093.0	83746.5

Source: Central Bureau of Statistics.

The Lake Nakuru National park serves as a major recreational centre for both local, national and international tourists. It is therefore a major foreign exchange earner. This is indicated by the number of people who visited the park for the period 1990 to 1994 as shown in table 3.8

Table 3.8 **Number of Visitors to Nakuru National Park**

Year	Number of Visitors
1990	174200
1991	174400
1992	139800
1993	178600
1994	164000*

*provisional
Source:Economic Survey,1995

The table indicates that there are roughly 200,000 tourists who visit the park annually. This generates a substantial amount of revenue for the government and the local community. people benefit in terms of employment. Apparently the road to the National Park is also partly used by the public transport vehicles especially the ones plying the Lake View route. There is therefore need to improve this road. This is because this road is the gate way to the park famous worldwide for the flamingoes.

Therefore Lake Nakuru National Park is both a constraint and potential resource for Nakuru town residents and the country at large.

3.5 Land Use Patterns

It is one of the guiding principles of the study of this nature that demand for movement is dependent on the type of land use and activities that are found in the area, on their intensity, and on the pattern of their location.

There are basically three models used to describe the landuse patterns in an urban area; The central place theory, the multi nuclei theory and the sector theory.

There are two physical features that influence the growth of Nakuru town. These are the Menengai Crater to the North and Lake Nakuru to the South. The town's easiest directions for expansion are towards the east and west. Expansion towards the west means bringing fertile agricultural land under urban development. The steep slopes of Menengai crater create a natural constraint to expansion as investment for provision of basic services like sewers, roads, etc. are strongly affected by difficult terrain.

The Lake Nakuru national park is another constraint to human settlement to the south. This park offers an excellent ecosystem but due to human pressure its impact as a home offering biodiversity has severely been affected.

However the two physical features which act as assets to the town because they offer excellent recreational grounds for the community and the nation at large. Indeed every year a total of 200,000 tourists visit the Network park every year to watch the game which includes the flamingoes, buffaloes, gazelles and waterbucks among others.

3.5.1 Commercial Area

The commercial enterprises of the Nakuru Town is concentrated in a small area. This is where retail and business offices trade, banks and financial business offices as well as government offices are located. The major shopping centre is clearly defined along Kenyatta Avenue and adjacent streets and lanes. This extends to the west where the industrial area is

located but only along the main avenue. To the south, the main commercial area does not go beyond the Odinga Avenue.

Nakuru buildings do not show the popular characteristics of high rise as with other towns. Most buildings are restricted to four storeys due to the nature of the geology of Nakuru. This therefore implies lateral expansion as opposed to vertical expansion hence different land use activities are likely to be located further and further away therefore increasing the necessity to travel long distances.

The main problem in the central business district (CBD) of the town is parking and access. There is an immediate need therefore to establish better accessibility in the town centre. There is overcrowding during peak hours caused by a mixture of local business oriented traffic and through traffic (inter regional traffic). All the traffic lights in the town are not functioning. There is also the problem of too many access points to and from the main highway.

3.5.2 **Residential Area**

Nakuru's residential area is scattered over a large area. Some estates locate next to the commercial area while others locate even 10km away. Unplanned settlements account for 70% of the total population (Syagga and Malombe, 1995:50).

To the East of the town is free area, an estate next to Nairobi-Nakuru highway and mainly occupied by low-income earners. Next to Free Area is Lanet Centre a periurban centre which is growing rapidly. Section 58 is a low density residential estate next to Free Area. The estate is isolated from the rest of the town and residents rely on the public transport vehicles that serve Free Area residents. These vehicles don not ply through the estate and residents have to walk to the Nairobi-Nakuru highway to pick vehicles.To the North at the foot of Menengai crater is Milimani estate. This is a low density residential estate and most houses are owner occupied.Accessibility in terms of public transport is not a major factor because most of the

residents have private vehicles. To the North West of the town there is London estate which is medium to high density residential estate.

To the south the residential area is bounded by the Lake Nakuru National Park. A number of residential neighbourhoods have been built among them Freehold, Lake view, Race course, Langa Langa, Bondeni, Pangani etc. Race Course and Freehold are classified as middle income residential states while Langa Langa and Lake View and the others are classified as high density (low income) residential estates. To the west of the town, there is industrial area with pockets of residential areas. These residential estates include Nakuru West estate (Kengolds, Shabab etc.) which is a low density residential estate. Within these large residential areas, estates of low medium and high density average without a clear pattern.

3.5.3 **Industrial Area**

The main industrial area is located on the western and North Western part of the town. However recently major industries have been located on the North-Eastern part of the town. Most of the industrial land is occupied by manufacturing and repairing industries which provide primary employment in the town. These are small, medium and large scale industries on the town. The large and medium scale industries are located on the North-Western part of the town as indicated earlier while the small scale industries are located south of the major industrial area. Several small scale industries are located South of the major industrial area. Several small scale industries mainly repairs, furniture and fixtures fabrications are located around the town centre.

By 1979 there were 54 manufacturing establishments with five or more operatives employing 4342 people. According to 1995 statistical abstract the total workforce in the manufacturing sector was 6962 (1994). The industrial area is adequately served by both road and railway sidings providing easy means of communication, power and water services. However as can be see from the land use map the industries are located on the Northern side of International

Trunk road which the residential areas are located on the Southern part. This causes a big problem when pedestrians are crossing and accidents have known to occur. Similarly this is an area where heavy duty vehicles ply when delivering raw and manufactured products. This interferes with the smooth flow of traffic on the highway.

Majority of the manufacturing industries are agrobased. They include grain milling, pyrethrum processing, milk processing, baking and soap, and edible oil processing. The largest non agricultural manufacture is union carbide batteries factory.

3.5.5 Recreational Areas

The recreational facilities are mainly concentrated in the town centre. They include the Afraha Stadium, the Arboretum and Rift Valley Sports club, among others. The show ground is located in the North of the town as indicated in the land use map while the Golf Course is located on the slopes of Menengai Crater. The Lake Nakuru is home to thousands if flamingoes. It is within Lake Nakuru National Park which is a major recreational facility for both local and international tourists. This can be appreciated by looking at the number of tourists visiting the park and over 800,000 tourists visited the park during the period 1990/94. Therefore it is safe to assume that over a million tourists have visited the park in the last seven years. This is a substantial number of people who require good services like transport services. Therefore the lake generates substantial revenue for the central government and the local community through employment and provision of tertiary services.

As indicated earlier the park covers a total of 158 km^2 while the whole town covers an area of 266km^2. Therefore the park covers almost 60% of the total area of the municipality.

The classification of land is categorised into six land use categories as table 3.9 shows.

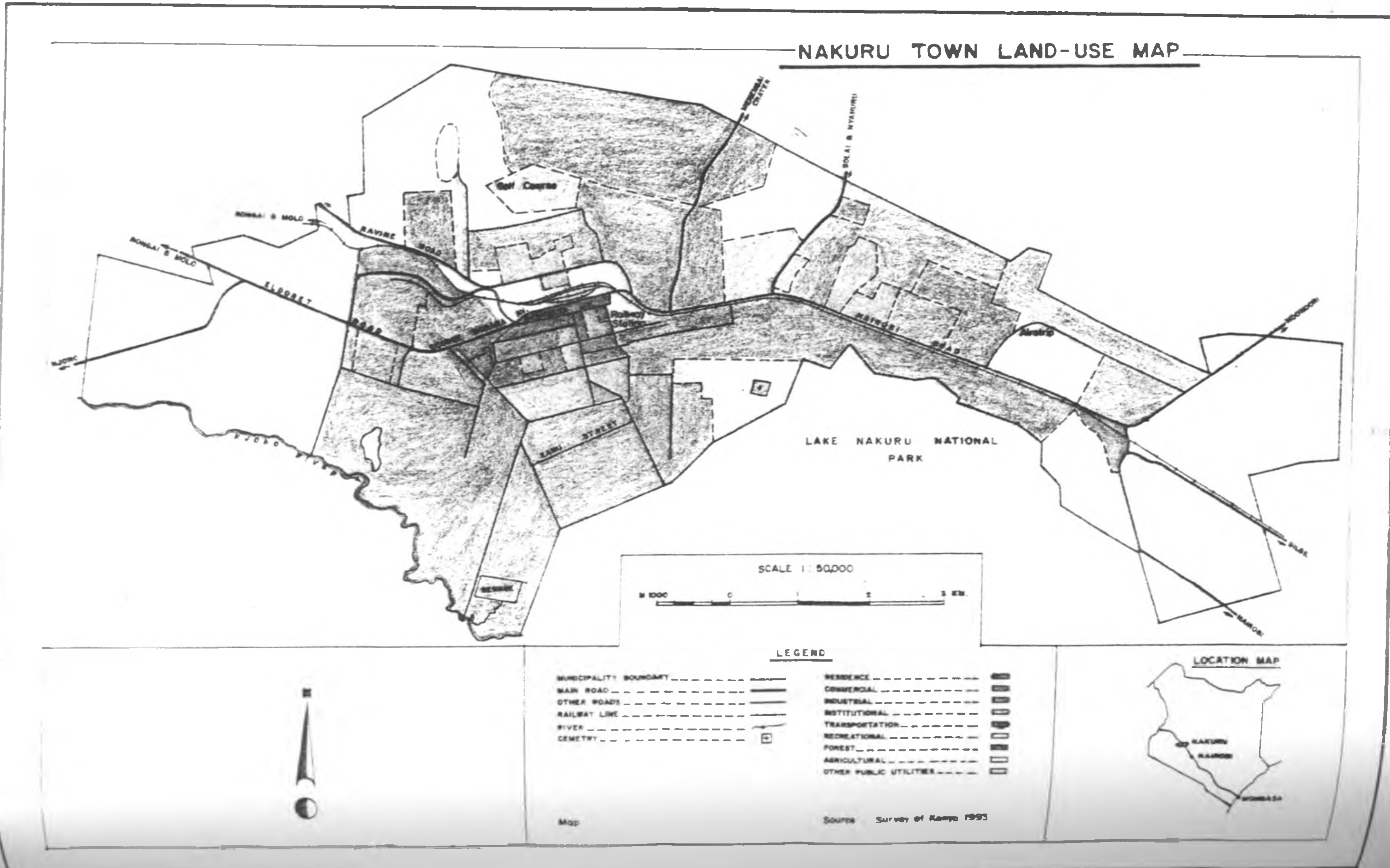
Table 3.9 **Proposed Physical Development Plan of Nakuru Town**

Land Classification	Area (km2)	Proportion (%)
Residential Area	25.5	35.1
Industrial Area	7.9	10.9
Open Space	11.9	16.5
Public Purpose land	15.1	20.9
Commercial Area	1.4	1.9
Utility purpose Land	2.9	4.0
Others	7.8	10.7
Total	72.6	100.0

Source: Municipal Council of Nakuru.

The table shows that 16.5 percent is allocated to open spaces which mainly contain the transportation channels/corridors mainly the primary, secondary,local distributors and access roads and the parking facilities.

The study observed that some roads especially in old residential areas like Bondeni are too narrow and given that some are used by public transport then there is need to either expand them or find alternative routes for them (matatus). The table also reveals that 35.1 percent of the land has been earmarked for residential development and this is mainly in the periphery which is therefore expected to increase journey lengths to centres of economic activities and therefore the need for an effective and efficient public transport system. However it is noteworthy to know that Nakuru town has been operating without any legal structure plan since 1974.


NAKURU TOWN LAND-USE MAP
ELDORET ROAD
RAVINE ROAD
NAIROBI ROAD
Golf Course
Railway Station
Airstrip
LAKE NAKURU NATIONAL PARK
SCALE 1 : 50,000
LEGEND
MUNICIPALITY BOUNDARY
MAIN ROAD
OTHER ROADS
RAILWAY LINE
RIVER
CEMETRY
RESIDENCE
COMMERCIAL
INDUSTRIAL
INSTITUTIONAL
TRANSPORTATION
RECREATIONAL
FOREST
AGRICULTURAL
OTHER PUBLIC UTILITIES
Source Survey of Kenya 1993
LOCATION MAP
NAKURU
NAIROBI
MOMBASA

CHAPTER FOUR : TRANSPORTATION IN NAKURU

4.1 Overview

Transportation is as old as mankind. It is an essential system needed by man to move from one place to another in order to reach the various scattered resources. Lichfield (1981) has defined transportation as the movement of goods and people from one place to another where such movement has a purpose. Therefore transportation is a means and not an end.

The quality of life in the urban settlements and the prosperity of urban economy are highly dependent on efficient transport system, among other things. An efficient transport system being affordable to all, time efficient, and safe (Mairura et al, 1994). A transportation System can be defined to include:

(1) the channels through which movement takes place. this includes road, air, water among others. **(2)** the means of propulsion. This includes among others, private cars, walking, riding, and public transportation. In Nakuru the dominant channel of communication is the road network. The means of propulsion or mode of transport in Nakuru town include.

(i) Walking (ii) Riding bicycles (iii) Public transport (iv) private car. Due to the poor pedestrian and bicycle facilities public transport and private car dominates traffic in the town as research undertaken by Uniconsult (1993) found out.

A survey carried out on the various modes of transportation in 1993 on particular roads got the following results as shown in table 4.1.

Table 4.1 **Vehicular Traffic**

Location	Cars	L.G.V	Matatus	Buses	A.D.T
Migori Road	1306	616	1323	136	3411
Mariakani/Wamb	581	438	1361	166	2546
Shuleni Road	519	384	914	154	1971
Ronald Ngala Road	355	168	26	32	581
Printing House Road	381	1583	91	581	3695
Total	3142	3189	3715	1069	12204

L.G.V: Light Goods Vehicles.
A.D.T: Average Daily Traffic

Source: Uniconsult, 1993.

The data shows that 32 percent of the total motorised daily traffic in the town is from the public transport vehicles (matatus). It is important to note that the survey was for intra urban traffic. Therefore matatu forms the bedrock of motorised traffic in Nakuru town and hence the need to plan for it. The results in table also indicate that 25.7 percent of the traffic was by private car which calls for improvement of the current public transport system to entice those who use private car. This would therefore avoid traffic congestion especially as the level of motorization increases. At the same time pedestrian and cycle traffic counts were done and the results are indicated in table 4.2.

Table 4.2 **Pedestrian and Cycle Traffic Count**

Location	D.P.T	M.H.P.F	D.C.T	D.H.T
Migori Road	*8644	1036	1895	314
Wamba/Mariakani	3630	510	1000	27
Shuleni Road	7810	900	1266	24
Ronald Ngara Road	8031*	1263*	653	24
Printing House Road	1690	190	736	26
Gilani	5460	1330	949	46
Total	35265	5229	6499	461

D.P.T: Daily Pedestrian Traffic.
M.H.P.F: Maximum Hourly Pedestrian Flow.
D.C.T: Daily Cycle Traffic.
D.H.T: Daily Handcart Traffic.
*Traffic Survey was done during school holidays. Pedestrian traffic is higher during school days.

Source: Uniconsult 1993.

The table shows that 83.5 percent of daily Non Motorized traffic is generated by pedestrian. This shows that pedestrianisation and public mode of transport dominate the traffic of Nakuru town and therefore the need to plan for effective operation of these two systems. This might be in the form of footways and footpaths to increase the safety of the pedestrians and other road users. This is because public transport and pedestrianisation sometimes complement each other. The results in the table indicate that 15.4 percent of non motorized traffic is by the bicycle. This therefore calls for planning of cycle lanes as our roads don't cater for the bicycles and also motorists don't respect the cyclists resulting in numerous accidents.

4.2 Public Transportation in Nakuru

Public transportation in the urban areas is a social service that is indispensable to all groups, and is used by people from all walks of life and therefore its users demand a lot from its services. Unlike private transport, public transportation has several advantages including, employs many people, less environmentally hazardous, its operational costs are low, consumes less space, and does not need much parking space. Mazingira (1982) in its study found that 75% of Nairobi residents use public transportation (buses and matatus) Mairura (et al, 1994) argues that 90% of personal mobility in Nairobi is provided by public transportation and walking. The various modes of public transportation in Kenya include:

(i) intermediate (*matatus*)

(ii) public for hire transport like taxis

(iii) Public common carrier.

In 1956, the Rift Valley Transport Company started its operations in Nakuru. East African Road Services took over in 1963 and commenced with three buses covering the whole of town. Upto 1970, the bus services faced no competition as they operated under a franchise which protected them from other operators. The population of Nakuru was by then approximately 47000 people (Kenya Census, 1969). By 1974 enough revenue was being realised but the 1973 presidential decree that allowed matatus to operate in all areas including urban centres meant East African road Services no longer had monopoly in provision of public transport services in Nakuru town and soon they wound up their operations due to among others competition, lack of adequate trained personnel leading to poor scheduling of bus operations and accounting ultimately leading loss of revenue. In 1989 the Nyayo Bus Corporation was established by the government to alleviate public transport demand in Nairobi

but the services were later extended to other major urban centres like Mombasa, Kisumu and Nakuru. However due to mismanagement of the corporation, its services have ground to a halt in majority of major urban centres and can be treated as an insignificant entity in public transportation especially in Nakuru.

In the late 1970`s Nakuru Transport Company (NATCO) was formed. It provided services to Nakuru residents upto 1987 when it collapsed to poor management of operations and services and embezzlement of funds.This has left matatus as the dominant/only mode of public transport in Nakuru town.

4.2.1 History of Matatus Service

The origin of the word `Matatu`, is a local dialect phrase `Mang'otore matatu` which translated means thirty cents, which used to be the standard flat fare charged by the early operators. This service emerged in the 1950`s as a spontaneous generations of an informal transport network in a situation where formal public transport services were inadequate.

In the 1960`s vehicles operating matatus services were always under strict police check as they were regarded as private taxis (Kapila et al, 1982)

In 1973 by presidential decree, matatus service was declared a legal form of public transport and allowed to carry passengers without necessarily having special licences to do so. It was however emphasized that the existing insurance and Traffic regulations had to be complied with. However in 1984 the Traffic Act was amended and all matatus were required to have a licence (public transport vehicle stickers) for them to operate as public transport vehicles. Besides the vehicles must have a road licence. However majority of matatus do not have fully insured public transport vehicle stickers and others have either expired road licence or do not have any at all. Despite the above shortcomings matatus play a major role in alleviating transport problems in many of our major urban areas. It is because of this that today that the government

has recognized the important role played by matatus especially in providing door to door services. The number of matatus in major urban centres of Kenya (Nakuru included) has continued to increase and in towns like Nakuru, Eldoret, and Kisumu they are the dominant mode of public transport. This increase can be attributed to the fact that whereas in the past matatus were operated by their owners as drivers, today many of the owners are people engaged in other sectors of the economy like civil servants, business persons, lawyers, engineers among others. This will be shown from the analysis of matatu operations in the chapter six. Another interesting phenomena is that initially matatus were allegedly owned by poor people and thus were seen as vehicles of increasing income and employment among the disadvantaged members of our society. However today the converse is true as will be seen in the next chapter. In the early 1980's many matatus associations were formed to try and improve the battered image of the matatus. Among the associations that were formed include the matatu vehicle owners Association (MVOA) and Matatu Association of Kenya (MAK). These were two rival associations each purporting to speak for matatu operators. They formed branches all over the country Nakuru among them. Among the things these Associations set out to do included: to restore order and discipline among operators; to represent matatu operators/owners as a united body; to establish cordial relationship between matatu operators and authorities concerned with public transport; encourage insurance cover for all matatus; lobby for matatu terminals; eradicate 'manambas (touts) and regulate route allocation. They held seminars for operators on operation and management of matatus. They also formed a 'General rule of Conduct' for the operators which were however not backed by policing powers hence these organizations remained toothless bulldogs in maintaining order and discipline among matatu operators.

On 2nd December 1988 all these associations were banned for alleged exploitation and gross inefficiency. Since them matatus are privately owned and operated. However operators on specific routes form small associations and employ touts to man the routes and protect these

operators from pirates. However recently there has been allegation that these small associations have been so powerful and monopolistic that new entrants have to pay prohibitive fee. This acts as a deterrent to would be new operators and hence decrease competition healthy for improved services. Another allegation is that touts have become so powerful that the rightful owners of matatu do not actually own them because everything is dictated by these touts.

In the 1980's the government deployed KANU youth

to instill order and control operations of matatus especially in the terminal facilities. These youth also levy some fee from matatu operators for serices rendered especially in Nakuru town.

4.3. **Transportation Network of Nakuru**

The railway network in Nakuru town that serves the local interests only goes to the industrial area. The main transportation network in Nakuru town as in many other major towns in Kenya is road network. The efficieency of urban transport system is determined by the type of transport layout which can either be:

(i) Radial layout

(ii) Grid iron layout

(iii) Linear layout

In the radial layout, road there is one man centre and roads emerge from it. This type of road system favours public transportation along the major corridors. Major employment activities tend to locate at the centre because of good accessibility. It results in a compact system and therefore provision of services is cost effective. However the main disadvantage of this system is congestion at the centre.

In the grid iron road system the roads are perpendicular to each other. Population is sparsely populated and there is no major centre. The most appropriate transport is private car transport while public transport is not effective.

In the linear road system the town grows along the road and provision of services is very expensive. There is also a mixture of local internal and external traffic leading to traffic congestion. The road network of Nakuru town exhibits a mixture of characteristics of the mentioned systems.

The road network of Nakuru consists of tarmac roads, gravel and earth roads. Majority of the roads within the central business district are tarmacked but those in the residential areas especially in newly settled areas like Free Area, Rhoda, Mwariki and Kaptembwa are earth roads which become impassable during rainy season(Uniconsult,1993).

The international trunk road which is a two lane dual carriage way passes through the town. The rest of the roads are two lanes single carriage way. The traffic lights in the town are not working. There is very little correction between different estates or estates to the industrial area. Without one having to pass through the town centre.

The road network is not adequate especially in the newly settled areas of the town. The main problems as observed by the authority in as far as road network is concerned are:

(i) traffic congestion especially on the international highway due to mixing of through traffic with the local traffic. This particularly in the peak period.

(ii) there are no ring roads to circumvent going through the central business district of the town even when one does not want to go there.

(iii) the roads and the terminal facilities are poorly maintained. Majority of the roads in the town centre have gaping pot holes while drainage is very poor resulting in looding of roads. The roads in the residential areas are mainly earth gravel and earth roads which become impassable during the rainy seasons. The terminal facilities are also in pathetic conditions and matatu operators are forced to have labour to maintain the parks. There are no pedestrian or cyclist ways and hence the road network is designed in such a way that it is unfriendly to pedestrians and cyclists.

Majority of the roads have no designated bus stops and shelters for commuters. Traffic management is also lacking or inadequate. The inter urban and intra urban public transport vehicles have been allocated the same place for parking purposes. In 1993 a survey done to calculate the demand and usage of various bus/matatu terminal had the following results as shown in the table 4.3.

Table 4.3 **Demand and Usage of Bus/Matatu terminals**

		Location	Location	Location	Location
		1	2	3A	3B
Matatu	IN	443	330	616	413
	OUT	752	240	439	587
Buses	IN	-	67	-	-
	OUT	-	-	-	69

Source: Uniconsult, 1993.

The table indicate that matatus are the majority in the town and therefore should not be dismissed/ disregarded when planning for public transportation in Nakuru town. There are no clear cut entries or exit into the park. Except for buses which have a clear cut exit and entry the matatus have no fixed pattern of movement. According to Uniconsult (1993: 214) there is high congestion of all matatu parks in the municipality.

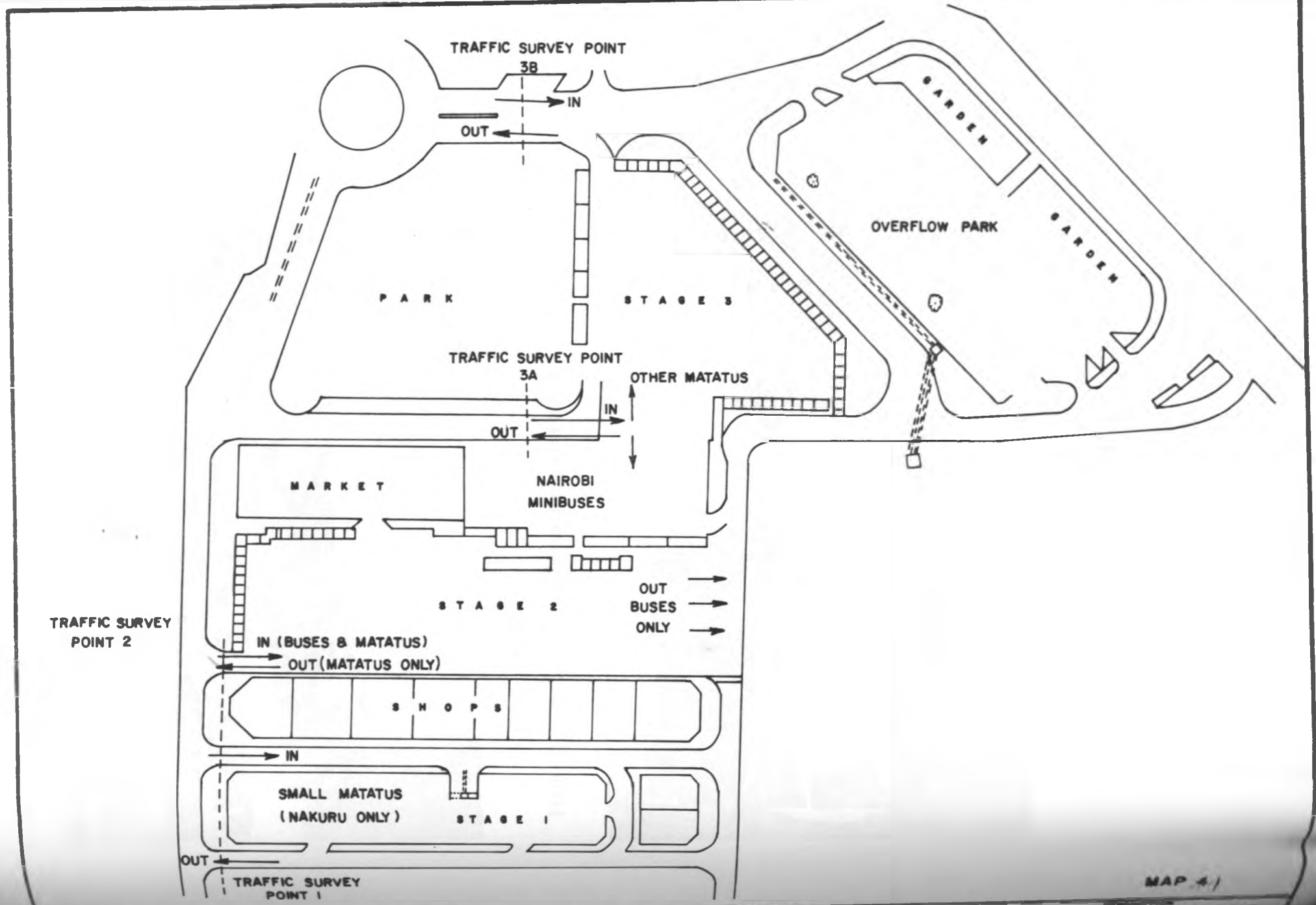
The above table shows the movement of buses/matatus within the parks and in addition to the movement data a survey of parking demand for the same termini was carried out by the same study group and the results are as indicated in the table 4.4.

Table 4.4 **Parking Demand For Public Transport in Nakuru Town**

		Terminus 1	Terminus 2	Terminus 3A	Terminus 3B	Total
Park	Buses	-	13	8	9	30
Demand	Matatus	60	71	65	72	268
Average	Buses	-	7	3	4	14
Demand	Matatus	37	43	50	57	187

Source: Uniconsult, 1993.

The table shows that the average demand for bus/matatu termini is 93 percent in the case of matatus which is an indication of the dominant role the matatus play in the provision of public transport services within the municipality. Therefore there is need to provide more terminal facilities especially on the Shabab route where the vehicles park on the streets as plate 4.1 shows. This has encouraged the emergency of 'pirates' on this route who block other road users especially along the busy Kenyatta Avenue as plate 4.2 shows thus causing traffic problems within the town thus calling for proper Traffic management.


TRAFFIC SURVEY POINT
3B
IN
OUT
GARDEN
OVERFLOW PARK
GARDEN
PARK
STAGE 3
TRAFFIC SURVEY POINT
3A
OTHER MATATUS
IN
OUT
MARKET
NAIROBI
MINIBUSES
STAGE 2
OUT
BUSES
ONLY
TRAFFIC SURVEY
POINT 2
IN (BUSES & MATATUS)
OUT (MATATUS ONLY)
SHOPS
IN
SMALL MATATUS
(NAKURU ONLY)
STAGE 1
OUT
TRAFFIC SURVEY
POINT 1

MAP 4.1

Plate 4.1 Inadequate Terminal Facilities

Plate 4.2 Operators Picking Passengers on the Street

CHAPTER FIVE: Socio-economic, Travel Patterns and Chacteristics of Households

5.1 Overview

This chapter deals with the analysis of the both the primary and secondary date collected during the study. The variables that were analyzed include socio-economic characteristics, travelling patterns of the households. This was to enable the study get overall information from the sampled residents regardless of which mode of transportation they use.

5.2 Socio-economic characteristics

The factors that have been found to exert the greatest influence on the number of journeys made by a house hold are its structure -total number of people in a household, number employed(or dependants), distance between place of residence and work place, and the mode available. Therefore the household is regarded as the most important unit in estimating and analyzing the trip generation and attractions.

5.2.1 Place of Residence

The place where somebody resides in relation to other land use activities sometimes determines whether, how he/she travels and which route to follow. Therefore for purposes of analysis households are categorised according to where they live as can be seen from the table 5.1.

Table 5.1 **Place of Residence**

Residence	Number	Percentage(%)
Langa Langa	18	20.0
Race Course	15	16.7
Mwariki	17	18.9
Shabab	20	22.2
Rhoda	20	22.2
Total	90	100.0

Source:Field Survey,1996.

As was observed earlier Shabab, Race Course are categorised as middle to low density residential areas, while Langa Langa, Mwariki, and Rhoda are categorised as high to middle density residential areas. Therefore 38.9 per cent of the respondents reside in low density residential areas while 61.1 per cent stay in the high density residential areas.

5.2.2 **Household Size**

The number and size of a household has an impact on the demand for urban services like housing, water and sanitation, public transport, among others. Table 5.2 shows the household sizes as in indicated by the respondents.

Table 5.2 **Household Size**

Household Size	Number	Percentage(%)
1 to 3	22	24.4
4 to 5	36	40.0
5+	32	35.6
Total	90	100.0

Source:Field Survey,1996.

The table shows that approximately 76% of the respondents have households greater than four people, with an average household size of 4.1 people. This

information is important in determining the potential trip makers in a family. Therefore a greater number of small households is likely to be formed in the future in line with the national socio-economic trends which will intensify the scale of needs for urban services, for example, housing, public transportation, water and sanitation among many others.

56.7% of the respondents were males while 43.3% were females. The emphasis was on the head of the household who actually makes major decisions that affect the mode of transport and travel habits of members of the household.

5.2.3 **Occupation**

Over 55% of the respondents are employed in informal sector while only 26% are employed in formal sector as shown in the table 5.3.

Table 5.3 **Respondents Occupation**

Occupation	Number(n)	Percentage(%)
Employed(formal)	23	25.5
Employed(informal)	26	28.9
Self-employed	24	26.7
Unemployed	17	18.9
Total	90	100.0

Source:Field Survey,1996.

The table also indicates that 18.9% of the respondents are unemployed .These are mainly school children ,college students and school leavers. This is a reflection of the national figures where the majority(over 50%) of the people are employed in the informal sector(economic survey 1996). The trend is likely to continue as the government policy is to encourage informal sector economic activities as a catalyst in the process of making Kenya a Newly Industrialised Country(NIC).

5.2.4 **Educational Levels**

There is high literacy levels among the respondents as the table 5.4 shows.

Table 5.4 **Educational levels**

Educational level	Number(n)	Percentage(%)
Primary	23	25.6
Secondary	39	43.3
Post Secondary	28	31.1
Total	90	100.0

Source:Field Survey,1996.

The table shows that 25.6% of the respondents have reached primary school level, 43.3% secondary level, while 31.1% have gone past the secondary level. These figures show high literacy levels among the respondents which compares with the those in population census (1989). Therefore the respondents are expected to make rational decisions when choosing the mode of transport to take also whether to take a trip.

5.2.5 **House Ownership**

Over 82% of the respondents are tenants as indicated in the table 5.5. Therefore they population could be presumed to be highly mobile in terms of residential location which affect the public transport patronage.

Table 5.5 House ownership status

Rented	Number	Percentage(%)
Yes	74	82.2
No	16	17.8
Total	90	100.0

Source: Field Survey, 1996.

The results indicate a population that spends part of their income on housing which affect the patronage of public transport, since some would not consider it essential. However as distance between the peripheral residential areas and centres of employment opportunities increase public transport becomes essential and this is the case in Nakuru town.

Housing is an essential need and a human right and therefore a household is expected to spend a sizeable part of its income for it. The cost of renting a house will determine whether the household will patronise public transport or not. Table 5.6 shows the expenditure on house of the household.

Table 5.6 Expenditure on House Rent

Amount(Ksh)	Number	Percentage(%)
100 to 500	21	23.3
600 to 1000	20	22.2
1100 to 1500	16	17.8
1600 to 2000	17	18.9
Over 2000	16	17.8
Total	90	100.0

Source: Field Survey, 1996

The results show that 54.5% of the respondents over Ksh 1000.00 on house rent. Assuming that they spend 20% of their income on housing then 54.5% of the respondents earn more than Ksh 5000.00 per month while 45.5% earn less Ksh 5000.00 per month. This indirect way of calculating the income was adopted because majority of the respondents were not willing to divulge information on their income and even those who did gave misleading amounts.

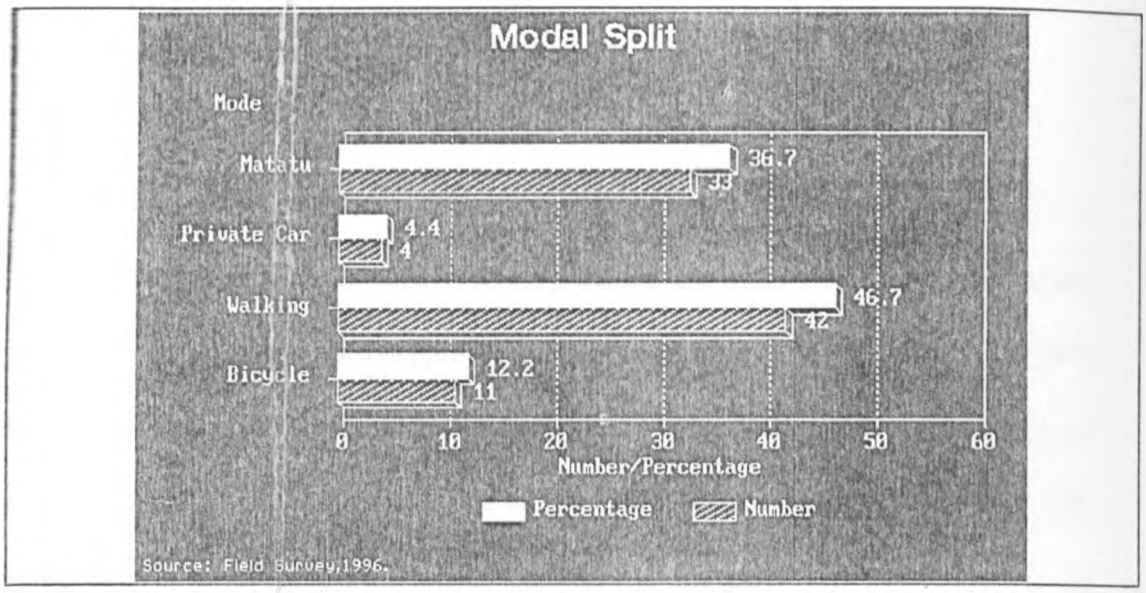
5.3 Travel patterns and characteristics.

This section deals with the trip generations and attractions, the trip distribution, trip assignment. A potential trip maker has to make several decisions before making a trip some of which include; whether, how, when, and where to the trip. This section has dealt with all the above aspects of the trip. The decision to make a trip arises from man's social and economic needs and because all activities cannot be located in the same spatial space the need to travel arises.

5.3.1 Modal Split

The modal split for Nakuru town is as indicated in figure 5.1. The results indicate that 46.7% of the respondents walk to their destinations, 36.7% use public means of transport, 12.2% use bicycle while only 4.4% use private car. Therefore over 80% of the respondents either walk or use public mode of transport to travel to their destinations.

Figure 5.1 Modal split



This is because majority of people cannot afford private transport and are expected to continue relying on public transport. As can be seen car ownership is quite low (4.4%) but this is expected to change with time and will continue to grow in future to reflect increasing levels of affluence and demand for travel that it brings. The non-motorised mode, for example, the bicycle, plays a significant part in transportation (12.2%) and this augurs well with the aspirations of planners to plan for an environmentally friendly transport system.

To determine the demand for public transport, several aspects were examined among them the frequency of trip making per month by the respondents and the results are shown in table 5.7.

Table 5.7 Matatu ridership per month.

Frequency of Trip making	Number	Percentage(%)
Less than 10	2	6.1
10 to 20	7	21.2
21 to 30	24	72.7
Total	33	100.0

Source:Field Survey,1996.

The table shows that 72.7% depend wholly on public transport for travelling. This implies that 26.7% depend entirely on public transport for making trips and therefore are captives of public mode of transport.

5.3.2 Origin - Destination of Trips

The majority of the trips 75.8% by matatu are made during the peak hours period(6am to 9am and 4pm to 8pm) especially on weekdays. Therefore it is expected there is one directional flow of traffic during this period. This one directional flow of traffic is due to the urban structure of the town where economic activities are concentrated at the centre and residential areas at the periphery. The majority of journeys begin or end at home and these constitute the primary trips as table 5.8.

Table 5.8 Origin - Destination of Trips

Origin-Destination	Number	Percentage(%)
Residential-Town centre	70	77.8
Residential-Industrial	14	15.5
Residential-Outside town	6	6.7
Total	90	100.0

Source:Field Survey,1996.

The table shows that 78% of the trips are made to the CBD, 15.5% to the while 6.7% are made outside the town. Combining this information with that of peak hour traffic, then as the size of the town (economy, population and areal size) grows there will greater traffic congestion in the CBD and hence need to encourage public transport, and non-motorised modes. This can only happen by improving the service levels of the public transport vehicles. In this particular study the service levels

comprise three main elements; the density of the route network, frequency of services, and the period of operation.

5..3.3 Purpose of Trip Making

As earlier indicated, man makes journeys to satisfy certain needs and aspirations which range from cultural, economic to social. Table 5.9 indicates the respondents reasons for making the journey on weekdays.

Table 5.9 Trip purpose on Weekdays

Trip purpose	Number	Percentage(%)
Work	70	77.8
School	9	10.0
Market	4	4.4
Recreation	5	5.6
Others	2	2.2
Total	90	100.0

Source:Field Survey,1996.

As can be seen from the table 78% of the trips made by the respondents on weekdays have destinations to work places while 10% of the trips are made to school. These two form the core of the trips made and therefore it is important to take into consideration especially where the activities are located in view of public transportation routes.

On the other hand 49% of the trips made during the weekends are for recreation purposes as shown in the table 5.10

Table 5.10 **Trip Purpose on Weekends**

Trip Purpose	Number	Percentage(%)
Work	26	28.9
School	7	7.8
Market	6	6.6
Recreation	44	48.9
Others	7	7.8
Total	90	100.0

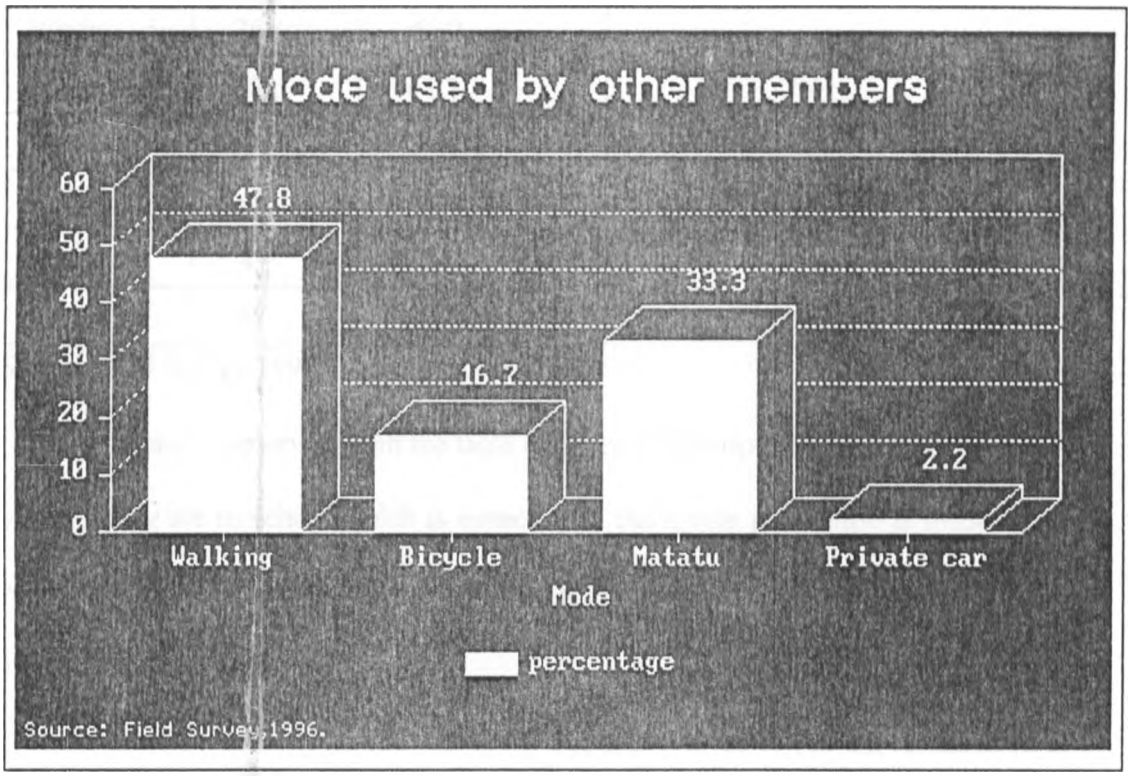
Source:Field Survey,1996.

As can be seen from the table a sizeable number of the respondents (28.9%) work on weekends especially the self-employed. Recreation as expected is the main activity on weekends. This includes trips to visit friends, worshipping, public parks etc. As the level of affluence increases, recreation will become an increasingly important part of peoples lifestyle. This therefore calls for a well functioning public transport as majority of people will continue to depend on it.

5.3.4 **Travelling patterns and characteristics of other members**

As indicated earlier only 4% of the households have access to private car and for them, if trips are made in the different directions at the same time only a few members will have access to it. Figure 5.2 shows proportion of trips made the other members of the household using different modes.

Figure 5.2 Modal Split (other members of household)



The results show that 47.8% of other members of the household walk, 16.7% ride, 33.3% use matatu/public transport while only 2.2% use private car. Majority of schools and shops are located within a walking distance of the residential areas as the land use map show.

The study on examination of purpose of such trips (by other members of the family on weekdays) revealed the results indicated in table 5.11.

Table 5.11 Purpose of Trip making on Weekdays

Purpose	Number	Percentage(%)
Work	36	40.0
School	37	41.1
Market	7	7.8
Recreation	6	6.7
Others	4	4.4
Total	90	100.0

Source:Field Survey,1996.

As can be observed from the table majority of the trips made by other members of the family are to school which is expected as the towns population is made up of young population. This results also that a sizeable number of members of the household work.

The major activity on the weekends was found to be recreation as indicated in table 5.12. This has implication on the planning because as the levels of affluence increase, people are likely to make more trips which will exert greater demand on the already existing transport system and facilities.

Table 5.12 Trip purpose on weekends.

Purpose	Number	Percentage(%)
Work	24	26.7
School	7	7.8
Market	11	12.2
Recreation	43	47.8
Others	5	5.5
Total	90	100.0

Source: Field Survey,1996.

As can be observed form the table almost half (47.8%) of the trips made on

weekends are for recreational purposes while also a sizeable number (26.7%) go to work especially on saturdays.

5.4 Respondent's opinions

The demand for use of transport mode arise out the decisions made by the travellers every day. Their choices may be constrained by other members of their household, rigid time of starting and stopping work, financial capacity, availability of transport facilities. One way of improving prediction of travels lies in obtaining a better understanding of the psychological mechanisms of choice and particular choice of which attributes of which of a transport system are perceived by individuals as important when making their trip choices. This section therefore deals with the opinion of the respondents on various aspects of public transport.

5.4.1 Overloading

Matatu operators(drivers and conductors) have been accused of many malpractice among the dangerous driving, overloading, insolence, among many others. The study therefore sought to know how the respondents feel about various Matatu practices.

The table 5.13 indicates the respondents opinion on overloading and whether it should be allowed or not.

Table 5.13 Opinion on overloading.

Opinion on overloading	Number	Percentage(%)
Not Allowed	82	91.1
Allowed	8	8.9
Total	90	100.0

Source: Field Survey,1996.

The results show that the respondents have a strong feeling against overloading. The major reasons why they thought overloading should not be allowed include; unsafe/dangerous and wears the vehicle down as indicated in table 5.14.

Table 5.14 Reasons against overloading

Reason	Number	Percentage(%)
Unsafe/Dangerous	74	82.2
Wears Vehicle down	10	11.1
Others	6	6.7
Total	90	100.0

Source: Field Survey.1996.

The results thus show that 82.2% of the respondents felt overloading should not be allowed because it is unsafe or dangerous.

5.4.2 Major Transport Problems Faced

The study also undertook to know the respondents perceived problems facing public transport in Nakuru town which are indicated in table 5.15.

Table 5.15 Major Problems Facing Public Transport

Problem	Number	Percentage(%)
Poor maintenance and operation	32	35.6
Poor road condition	31	34.4
Poor Traffic Management	9	10.0
Others	18	20.0
Total	90	100.0

Source: Field Survey, 1996.

As can be seen from the table 70% of the respondents were of the opinion that the major problems facing the public transportation system are poor road conditions especially in the residential areas where the roads are made of either murram or earth roads.

5.4.3 Solutions to Transport Problems

The respondents offered the following as some of the solutions to the problems facing public transportation as aforementioned as shown in table 5.16.

Table 5.16 **Solutions to Public Transport Problems**

Solution	Number	Percentage(%)
Regular maintenance and Servicing of vehicles	16	17.8
Proper management of operations	12	13.3
Regular road maintenance and extension	36	40.0
Proper Traffic management	8	8.9
Others	18	20.0
Total	90	100.0

Source: Field Survey, 1996.

The table shows that majority (40%) of the respondents were strongly for improvement of the road network which is in pathetic condition as the author saw during field survey.

The interviewees were also asked whether they would like any changes in the public transportation and 70% said yes while the rest said no.

A further examination of the respondents about their opinion on the Matatu operators (drivers and conductors) revealed that 61 % felt the operators are disciplined while 39% felt they are not as shown in table 5.17.

Table 5.17 Opinion on Matatu Operators.

Opinion	Number	Percentage(%)
Disciplined	55	61.1
Undisciplined	35	38.9
Total	90	100.0

Source: Field Survey,1996.

This indiscipline ranges from reckless driving,harassment of the commuters, and other road users. This is a characteristic that is common among many Matatu operators especially when they are craving to get more commuters so that they can get more money. This is especially common on Shabab route where matatus pick passengers from the street as plate 4.2 showed .

CHAPTER SIX: COMMUTER AND MATATU OPERATORS SURVEY AND ANALYSIS

6.1 Overview

Members of any community have a requirement for mobility and the function of public transport is two fold; to enable people without access to private transport to satisfy those economic and social needs which cannot be fulfilled within walking distance and to provide an alternative to the private car. This section deals with the operators (owners, drivers and conductors) of public transport in Nakuru and the commuters (those who patronise public transport) in Nakuru town. Part one deals with the commuter survey- socio-economic, travel patterns and characteristics and lastly the behavioral characteristics. Part two deals with the operators survey findings- socio-economic, operational characteristics, behavioral characteristics and the spatial distribution of matatus.

6.2 Commuter survey findings

This section deals with the socio-economic, travel patterns and characteristics and the behavioral characteristics of those patronise public transport.

6.2.1 Socio-economic characteristics

A total of 40 commuters were interviewed at various terminals. 62.5% of the respondents were males while 37.5% were females. Those interviewed indicated the following as their places of residence as shown in table 6.1.

Table 6.1 **Place of Residence**

Place of Residence	Number	Percentage(%)
Langa Langa	6	15.0
Race Course	2	5.0
Mwariki	3	7.5
Kwa Rhoda	5	12.5
Free Area & sec 58	15	37.5
Shabab	9	22.5
Total	40	100.0

Source : Field survey,1996.

The statistics show that 37.5% of the respondents stay in Free Area and Section 58. Emphasis was placed on this section because no household questionnaire was undertaken here. Studies done elsewhere have shown that most essential trips depend on the occupation of the person making the trip. Table 6.2 shows the occupations of the respondents.

Table 6.2 **Occupation**

Occupation	Number	Percentage(%)
Employed(formal)	19	47.5
Employed(informal)	12	30.0
Self-employed	4	10.0
Unemployed	5	12.5
Total	40	100.0

Source : Field Survey,1996

The table indicates that 47.5% of respondents are employed in the formal sector , 30% are employed in the informal sector , 10% are self employed while 12.5% are unemployed. Therefore 77.5% of trips made on public transport are made by

people employed in the formal and informal sectors. This could be attributed to the time when the respondents are supposed to report to work. There is therefore need to plan for proper operations and management of public transport system.

6.2.2 **Travel patterns and characteristics**

In any community there is demand for transport for work, leisure, education, shopping, and social activities. From the commuters' point the following should be achieved reduced journey times, increased journey speed, better passenger transfers, reduced waiting periods, better protection from weather, improved punctuality and reliability and ride comfort.

The origin and destination of journey of the respondents is shown in table 6.3.

Table 6.3 **Origin- Destination of Trips**

Origin-Destination	Number	Percentage(%)
Residence-CBD	33	82.5
Residence-industrial area	6	15.0
Residence-others	1	2.5
Total	40	100.0

Source: Field survey,1996

The table shows that 82.5% of all the journeys start from the residential area and end up in the town centre . This definitely has an impact on traffic congestion in the towns' centre. The results show that 15% of the journeys end up in the in industrial area. Only 2.5% of all the journeys have destination outside the municipality. The statistics indicate majority of the journeys terminate at the town centre and if the trend continues there will be acute traffic congestion at the CBD.

The statistics in table 6.4 shows that 80% of the trips are made to work,

10% to school, 10% to market centres. Given that 82.5% of the trips are made to the CBD as table 6.4 shows then the problem of traffic congestion is already being felt in the town.

Table 6.4 **Purpose of Trip Making on Weekdays**

Trip Purpose	Number	Purpose
Work	32	80.0
School	4	10.0
Market	4	10.0
Total	40	100.0

Source: Field Survey,1996.

52.5% of the respondents make on average 4 trips per week as shown in table 6.5.

Table 6.5 **Frequency of Trip Making Per Week**

Frequency	Number	Percentage(%)
1 to 2	5	12.5
3 to 5	21	52.5
over 5	13	35.0
Total	40	100.0

Source : Field survey,1996.

The assumption made above is that a trip indicates journey from and back home. This is to say when one chooses public means the same is used to travel back home.

The table shows that 52.5% of the respondents use public means more than three times a week, 12.5% not more than 2 times and 35% more than five times. This particular data is important in operation and management because it indicates the

intensity of use and thus is a guide to determination of number of vehicles to add to meet demand. Therefore there is effective demand for public transport in Nakuru town.

6.2.3 Behavioral characteristic of commuters

This section deals with the opinion of the commuters on various aspects of public transport.

Table 6.6 shows the statistics on the commuters' perceived problems facing public transport in Nakuru town.

Table 6.6 **Problems Facing Public Transport in Nakuru Town**

Problems	Number	Percentage(%)
Unreliable	17	42.5
Unroadworthy vehicles	12	30.0
Accidents	4	10.0
Insolent operators	7	17.5
Total	40	100.0

Source : Field Survey,1995/96.

42.5% of the respondents said Matatus are unreliable. They are not there when wants to travel. They also take too long as they wait for passengers. They arrive almost all at once thus move in one direction at the same time. This makes them ineffective and inefficient. 30% indicated that the vehicles are unroadwothy, uncomfortable,etc. This can be seen in plate 6:1 which shows some poorly maintained vehicles. Thus if operators hope to increase ridership they must maintain their vehicles. 17.5% of the respondents said that the operators are insolent/rude to commuters. Only 10% of the respondents said matatus are prone to accidents. There the public transport in Nakuru town is safe which is good for improving passenger service and confidence in the

mode.

Every perceived problem must have a perceived cause. Table 6.7 shows the commuters perceived causes of public transport.

Table 6.7 **Perceived Causes of Public Transport**

Cause of Problem	Number	Percentage(%)
Poor maintenance and servicing	11	27.5
Poor operation and management practices	12	30.0
Poor road conditions	11	27.5
Flouting of traffic rules	6	15.0
Total	40	100.0

Source: Field Survey,1995/96.

The table shows that 27.5% of the respondents indicated that poor servicing and maintenance of vehicles is to blame for public transport problems, 30% said poor operation and management practices, 27.5% indicated poor road conditions and 15% attributed it to operators flouting traffic rules.

Matatu operators have often been accused of using insolent language to the commuters. In Nakuru town 65% of the commuters reported that the public transport operators (drivers and conductors) are disciplined while 35% reported they (operators) are undisciplined. Therefore the respondents felt that there should be an association to deal with this problem and at the same time commuters should form an association to sensitise others on their rights.

52.5% of the commuters were of the opinion that touts should improve while 47.5% said that they should be banned. The former matatu associations had intended to get rid of touts for harassing commuters and also giving the industry bad name.

90% of the respondents were of the opinion that overloading is bad because an overloaded vehicle can easily cause an accident and also is uncomfortable.

62.5% were of the opinion that unroadworthy vehicles should be confiscated because even when they are nabbed they still find their back onto the road. 37.5% were of the opinion that the owners of such vehicle should be prosecuted and stiffer penalties imposed on them. Had there been an association records of such vehicles would be kept and this would help police to track down such vehicles.

52.5% of commuters were of the opinion that the parks should be regularly maintained. This is especially in areas that have paved roads. 47.5% were of the opinion that they should be provided with more bus parks and stops.

6.3 Matatu Operators survey findings

Public transport system should seek to achieve door-to-door journey times that are as short as possible. Its services should be frequent and reliable, environmentally acceptable and adaptable to change. This section deals with the following among others; the socio-economic characteristics of operators, operational characteristics and the spatial distribution of matatu route network.

6.3.1 Socio-economic characteristics of Operators

30% of the operators were between the ages 18 to 24 as table 6.8.

Table 6.8 **Respondents' Age**

Respondents Age	Number	Percentage(%)
18-24	12	30.0
25-34	14	35.0
35-44	12	30.0
45-55	2	5.0
Total	40	100.0

Source: Field Survey,1995/96.

The table indicates that 30% of the respondents are between the ages of 18 and 24. According to the traffic Act a Public transport vehicle driver must be 24 years old and have an experience of 4 years therefore 30% of the respondents don't qualify for driving. But most these were found to be driving. On the other hand 65% of the respondents between the ages of 18 to 34. Therefore most of the operators are young which is prevalent in the matatu industry all over the country. When age information is combined with experience of operators in public transport as indicated in Table 6.9 some conclusions can be made.

Table 6.9 **Experience in Public Transport**

Experience	Number	Percentage(%)
Less than 3 years	7	17.5
3 to 5 years	9	22.5
6+ years	24	60
Total	40	100

Source: Field Survey,1996.

The statistics therefore indicate that almost 40% of the operators don't qualify to drive if the Traffic Amendment Act can be strictly adhered to.

50% of the operators went up to primary school level as table 6.10.

Table 6.10 **Operators Level of Education**

Education Level	Number	Percentage(%)
Primary	21	52.5
Secondary	18	45.0
Post Secondary	1	2.5
Total	40	100.0

Source: Field Survey,1995/96

Therefore public transport plays a vital role in providing employment to the disadvantaged members of the society. The statistics also show that 47.5% have gone up to secondary level. This shows high literacy levels among operators contrary to the views had by the public. Therefore this people can participate in management seminars and also read journals.

82.5% are employed on part-time basis while 17.5% were employed on permanent basis. Those who indicated that they are employed on permanent basis were either the owners or their relatives. This aspect has an effect on operation and management of public transport. A driver/conductor may working today but not the following day. There was also prevalent incidents of drivers giving other drivers vehicles to hold for them as they do other businesses a practice traffic officers deployed. This also contravenes the Traffic Act.

In the public transport industry the principal elements of costs are; wages, repairs and maintenance, fuel and depreciation. Among the above, the greatest are wages and fuel. The wages are paid to drivers and conductors on a daily basis shown in

table 6.11.

Table 6.11 **Daily Wages of Drivers and Conductors**

	Amount(Ksh) per day	Number	Percentage
Driver	150	19	47.5
	200	21	52.5
	Total	40	100.0
Conductor	80	24	60.0
	100	16	40.0
	Total	40	100.0

Source: Field Survey,1995/96

The table shows that 47.5% of the drivers earn Ksh 150 per day while 52.5% earn Ksh 200 per day. From the table it can seen that 60% of the conductors earn Ksh 80 per day while 40% earn Ksh 100 per day. Therefore the monthly wages of drivers is Ksh 4500 to Ksh 6000 which is reasonably high given that it is not taxed.

6.3.2 **Operational characteristics**

This section deals with such characteristics like number of employees per vehicle, vehicle capacity, ownership, number of trips per day, fare levels, among others.

55% of the vehicles were operated by on one conductor and a driver, 42.5% two conductors and a driver while only 2.5% are operated by 3 conductors and a driver. Therefore matatu industry is labour intensive.

There was an impression that matatus are owned and operated by poor people but the statistics in table 6:12 prove otherwise.

Table 6.12 **Vehicle Ownership**

Vehicles	Number	Percentage(%)
1	17	42.5
2-3	15	37.5
4+	8	20.0
Total	40	100.0

Source: Field Survey,1995/96

The table shows that 57.5 of the operators(owners) own two or more vehicles. This therefore make the public transport system of Nakuru vulnerable to manipulation.

Ian Barwell(1979) in his cash flow analysis assumed the useful life of a matatu to be two years. However the data on table 6.13 shows the useful life of matatu to be much more.

Table 6.13 **Vehicle Age**

Age(in years)	Number	Percentage
Less or equal to 5	4	10.0
5-10	9	22.5
Equal or more than 11	27	67.5
Total	40	100.0

Source: Field Survey,1995/96.

Assuming the useful life of a matatu to be 8 years then 67.5% of the vehicles in Nakuru town have outlived their usefulness. Some the vehicles can be seen on plate 3 which show some old battered vehicles. Therefore the present public transport is unsustainable.

Mazigira(1982) found that operators prefer old vehicle to new ones and this seems to be case in Nakuru town as 85% of the vehicles were bought as old vehicles. This is significant in operation and management of public transport services in that care should be taken to regularly maintain such vehicles to avoid halting of services.

The traffic amendment act stipulates that a person shall not drive a public service vehicle for more than 8 hours in any period of 24 hours but all the operators

interviewed work for 12 or more hours and at the same time don't work in shifts. Therefore they are likely to be weary and exhausted which is not good for the safety of the commuters and other road users. To add onto to this the operators work seven days a week.

The number of trips operators make per day is a reflection of the effectiveness of the public transport to meet the demand for travel which is a derived demand. During the weekdays 62.5% of the operators make on average 6 trips a day as statistics in table 6.14 indicates.

Table 6.14 **Average Number of Trips Per Day on Weekdays**

Trips	Number	Percentage(%)
5	2	5.0
6	25	62.5
7+	13	32.5
Total	40	100.0

Source: Field Survey,1996

The results show that there is high demand for public transport during the weekdays especially from people reporting for work in the morning and going back home in the evenings. At the same time the high number of trips could be attributed to the short trip lengths as the town is compact. The average number of trips the operators make on weekends is 5 per day. This could be attributed to the trip purpose of trip makers. As was observed earlier most trips made on weekends are for recreation and therefore there is no hurry. Therefore walking to recreation centres and social activities is common. There is there need to plan for a mixed mode transport system. 57.5% of the vehicles have a capacity of 18 people while 42.5% have a capacity 25 people.

6.3.3 **Fares, Operational and Maintenance Costs**

Income may come from any of the three sources; passenger fares, public funds, or subsidiary commercial activities. The source of income depends on the ownership of the undertaking and the policies being pursued. A private operator must obtain all his income from fares unless he/she is recompensed for providing unremunerative services. For matatu operators in Nakuru town all income is derive from passenger fares and therefore the operators are at liberty to withdraw their services from unprofitable routes. All the routes charge Ksh 10 per journey. There is therefore no rationale which conforms with the conventional fare pricing structure which may be based on; distance, zone(s) and time. All the operators(drivers and conductors) don't take a fixed amount of money to the matatu owners. However based on the trips they make which is more or less known they have to take some known amount of money.

As stated earlier the principal elements of costs are wages, fuel, repairs and maintenance. In Nakuru town the daily operational costs of fuel are met by the operators(drivers and conductors). 70% of the operators take their vehicles to informal workshops for repair and at the same time 60% of the operators take the vehicles for servicing and maintenance only when they break down. The above statistics therefore paint a bad picture of the operational practices of the matatu operators thus rendering the current public transportation system unsustainable. Besides the fuel costs the operators pay the parking fee, route levy and KANU levy.

6.3.4 **Behavioral characteristics of Operators**

This section deals with operators view of the factors that affect their operations and how they think the problems in the system can be solved.

62.5% percent of the operators were of the view that the problems that bedevil public transport system can be attributed to poor road condition and inadequate terminal facilities as table 6.15 shows.

Table 6.15 **Operators Perceived Problems Facing Public Transport**

Problems	Number	Percentage(%)
Poor road condition	16	40.0
Insecure jobs	9	22.5
Police harassment	6	15.0
Inadequate terminal facilities	9	22.5
Total	40	100.0

Source: Field Survey,1996.

The problem of poor road condition is prevalent throughout the town but is acute in the new peripheral areas where there are no tarmacked roads. This has affected public transport operations in that matatus operate up to the periphery areas and thus increasing commuters access time and ultimately the journey time. The tarmacked roads are poorly maintained and hence are full of potholes which reduces the public transport journey speed and thus increasing journey times. The terminal facilities are also poorly maintained as plates 6.1 shows. There is therefore need to find solutions to increase accessibility. The operators were of the view that roads should be improved to improve the operations of public transport as statistics in table 6.16 shows.

Table 6.16 **Operators perceived solutions**

Likely solutions	Number	Percentage(%)
Roads improvement	18	45.0
Provide more terminal facilities	9	22.5
Matatu Association	13	32.5
Total	40	100

Source: Field Survey,1996.

Plate 6.1 **Poorly Maintained Matatu Terminal**

A further examination of the plate shows that private cars also park in the same place thus increasing congestion. The park also has no clearly marked entry or exit.

The statistics indicate that 67.5% of the operators were of the view that if the roads were improved and more terminal facilities were provided the level of services provided to commuters would improve. This is because some routes have inadequate terminal facilities like Shabab route.

32.5% of the operators felt that a matatu association would help solve the problems. This is because such a group would help to secure the terminal facilities for the

operators and also manage to get rid of the touts and other matatu ' operators ' who though they don't have matatus control and levy money.

Besides the above solution the operators felt that a couple of changes should be effected to the operations of public transport in Nakuru town some of which are indicated in table 6.17.

Table 6.17 **Changes Operators Wish Effected**

Changes	Number	Percentage(%)
Abolishing levies other than parking levy	13	32.5
Matatu organization	13	32.5
Segregate intra and inter public vehicles	14	35
Total	40	100

Source: Field Survey,1996.

The table indicates that 32.5% of the respondents were of the opinion that all levies other than the terminal facilities levy payable to the municipality. They complained that it is very difficult for a new operator to enter the market since the old operators have formed a cartel and use touts as their proxies to ask too much money from new entrants. This makes it difficult for the new entrants to operate. 32.5% of the respondents were of the opinion that a Matatu Association should be formed to streamline the operations. This would make sure that all operators get a fair deal in terms of earnings as currently those with new vehicles have an advantage over those with old ones since commuters prefer new vehicles. 35% of the operators were of the opinion that intra-urban public transport vehicles should have their own terminal facilities to ease congestion that is prevalent at the moment in all terminal facilities.

6.3.5 Spatial Distribution of Matatus

The matatu mode of public transport represents a system whose services are slightly subject to regulation by the central or local authority. They operate within their own standards, fare levels, and choose their own routes depending on a number of factors. No attempt has been made formally to even restrict their operations on specific routes. Table 6:18 shows the distribution of matatu by route, type and number throughout the town.

Table 6:18 **Distribution of Matatu Type in Nakuru town**

Zone/Route	Type of Matatu	Approximate Number
Shabab	Nissans	50
Rhoda/Kaptembwa	Mini-bus	10
Mwariki	Mini bus	15
Langa Langa	Nissans	35
Free Area/sec 58	Nissans	26
	Mini buses	5
Lake View	Converted pickups	25
London	Nissans	5
	Converted pickups	8
Total		179

Source: Field survey,1996

The table shows that Shabab, Langa Langa and Free Area have the highest number of Matatus operating there. This can be attributed to high population density, high incomes among some segment of the population and the shorter routes. A simple correlation coefficient of population density and number of Matatu on a specific route gives the results as indicated in table 6.19.

Table 6.19 **Relationship between Population Density and Matatu Distribution**

Admni. Ward	Population Density(km^2)	Number of Matatus
Hospital	2870	13
Langa Langa	13870	35
Nakuru East	1574	26
Shabab	16206	50

Source: Compiled by Study,1996.

The regression equation $y = A + Bx$ was computed and yielded the followin results $A = 15.37$

$B = 0.002$

$r = 0.871$

The results yield a correlation coefficient of 0.371 which indicates a strong functional relationship between population density and matatu distribution on the selected matatu routes. Such relationship could not be computed for all the routes because of lack of data on population densities especially in the new residential areas.

The statistics also indicate that the Nissans which are perceived to be more comfortable than the minibuses are mainly concentrated in the Shabab, Free area/ section 58 and Langa Langa which are mainly low to middle residential estates. Plate 6.1 shows the various vehicle types operating in Nakuru town. As the plate shows some of the vehicles are badly maintained. There seems to a relationship between vehicle type and distance of route from the town centre.

The areal coverage of matatu network in each commuter zone as a measure of the level of accessibility provided to commuters is an important element of determining

the effectiveness and efficiency of the system. The town was therefore divided into seven matatu user zones and the details of how this was done are in chapter one. The results of the measurement are in presented in table 6.20.

Table 6.20 **Accessibility indices and Density of Matatu Network**

Zone	Area(Km2)	Operational Matatu route	DS	Ca
London	4.24	3.6	0.85	0.38
Free/Sec58	8.83	4.5	0.51	0.36
Mwariki	4.00	6.3	0.40	0.45
Lake View	2.80	4.3	1.00	0.53
Langa/Race	1.90	4.3	1.18	0.57
Rhoda/Kapt	2.95	5.4	0.62	0.28
Shabab	1.00	2.2	2.20	0.85

Source: Field Survey,1996.

*Note Ds denotes the network's comprehensive accessibility by Km/Km^2.
Ca denotes the network's density of access.

The distances were measured from the periphery of the residential areas served by the particular matatu service through the residential area. Given that the maximum walking distance is 2.5 Km (bus and coach council, 1986) then all the routes are justified to have public transport services as table 6.21 shows the Matatu road network measured from the centre of the town. This is based on the assumption that an adult takes fifteen minutes a distance of 1.2 Km and there 2.5 Km would take half an hour beyond which one needs to rest before starting to do anything.

Table 6.21 **Matatu Route Network From the CBD**

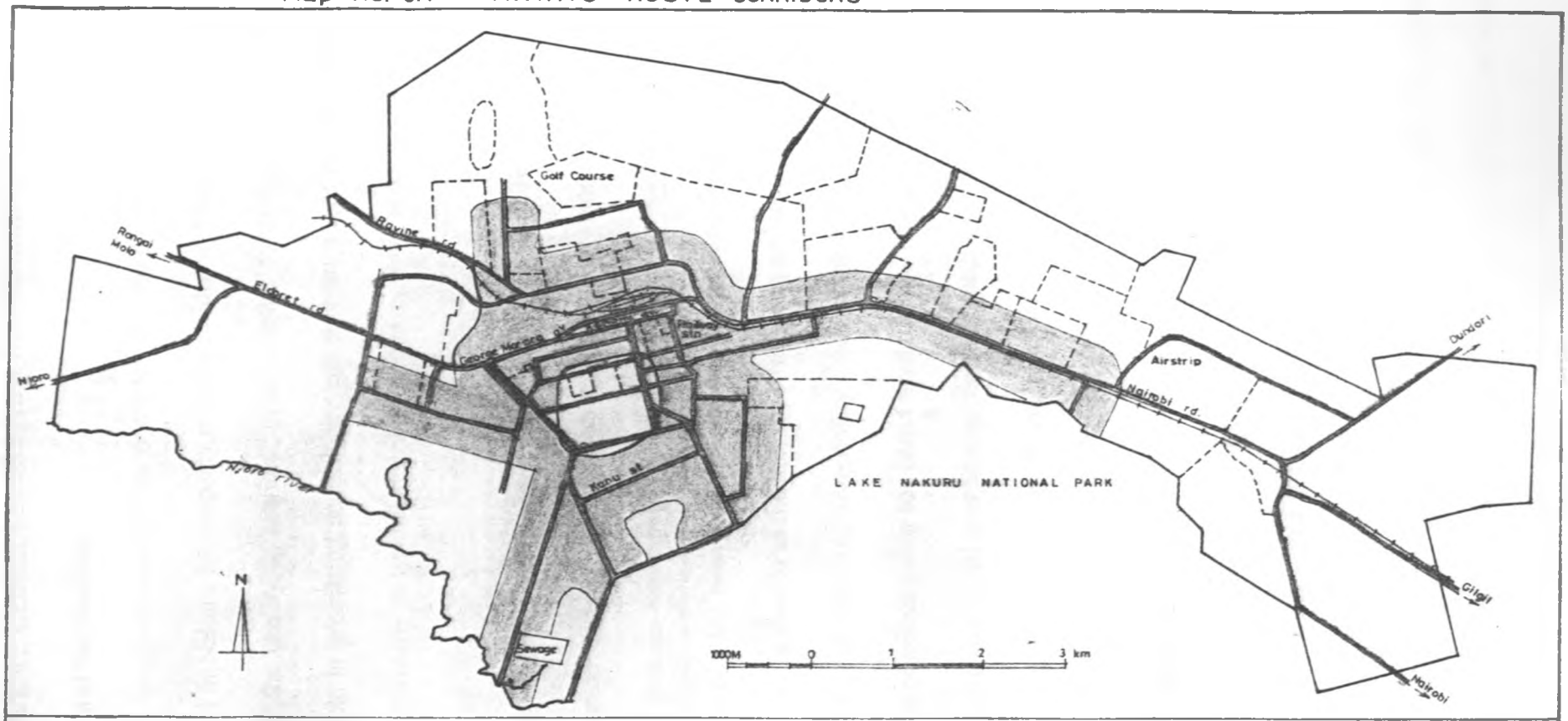
Commuter Zone	Legth of Route (Km)
Lake View	4.3
Langa Langa/ Race Truck	4.3
Mwariki	6.3
London	4.6
Free Area/ Section 58	5.5
Shabab	4.2
Rhoda and Kaptembwa	5.4
Total	34.6

Source: Field Survey,1996

Giannopoulos (1989) argues that for a town of population density of above, 5000 persons and above per Km^2 the operational public transport route should be 2.5 and for Nakuru town with average population density of 4000 persons per Km^2 and operational public transport route of 0.8 then we can assume that Nakuru is under served. According to Ginniappolus (1989) a reasonable bus/matatu network is the one, in which 70-75% of the population of urban area is within 400 m walking distance from the bus stop or matatu route. Therefore considering those within 400 of the matatu route to be conveniently accessible, the results in the show that Nakuru town is under served and hence a need for planning a comprehensive public transport.

Map 6.1 shows the spatial distribution of the matatu routes and also the areas that are within 400m of the matatu route. From the map the problem areas can easily be seen. This map is the basis of some of the recommendations in chapter seven.

Map No. 6.1 MATATU ROUTE CORRIDORS



LEGEND

- Nakuru road network
- Nakuru town Matatu route network
- Areas within 400m from Matatu route

Source: Survey of Kenya 1953

CHAPTER SEVEN : CONCLUSIONS AND RECOMMENDATIONS

7.1 Summary of the findings

The study sought to examine the operation and management aspects of matatu mode of transport in Nakuru Municipality,in order to identify their levels of efficiency and efficacy and the quality of services. In an attempt to understand its mode of operations, its role in promoting accessibility and mobility needs of the residents of Nakuru town particularly its spatial distribution and positive and negative attributes have been analyzed.

The study has tried to show that matatu is not only an integral part of overall urban transportation system in Nakuru but is the only mode of urban public transportation in Nakuru municipality. Through the historical development of public transport in Nakuru, it has been seen that conventional public transportation (standard bus) have failed leaving matatu as the only mode available and therefore matatu plays a key role in providing mobility and accessibility needs of the residents of Nakuru. The origin and growth of matatu mode has been traced to show how locally adapted means of public transport have evolved over time to meet the needs of the people. The matatu is seen by the study as a low-cost option provided to town planners that is of paramount importance in fast growing towns like Nakuru. Therefore, it would be of importance to understand the dynamics of the mode that have made them succeed where other conventional public transportation systems have failed. This would help towards evolving a strategy aimed at managing the existing infrastructure in order to achieve a more appropriate equilibrium between supply and demand and most importantly improve the quality of services. The study therefore, sees the matatu as part of the infrastructure that should be strengthened and institutionalized as they are

the only mode of public transport in other major towns like Kisumu and Eldoret beside Nakuru and in all towns in Kenya.

The role of matatus in generating income and employment to a large section of the people is appreciated by the government. The government also recognizes the important role they play in providing commuter services in major urban centres. However they are associated with dreadful accidents, illegal malpractice (ignoring traffic rules and regulations, bribery and harassment of commuters among many others). The reason is because their exponential growth is not matched with corresponding regulation and management so as to streamline their operations and ensure safely and comfort to commuters and other road users. The government has recognized there exists problems in matatu industry and hopes to address them but so far no comprehensive policy has been formulated to address these problems. The study has tried to show how some of the problems can be solved and hence matatus should not be seen as a problem but as a solution to the present public transportation problems where the needs for their services surpasses the problems they pose. Chapters Three and Four which described the urban pattern and transport systems prevailing in Nakuru show the important role played by matatus in meeting the mobility need and accessibility needs of Nakuru municipality residents. Chapter Four has traced the origin and growth of public transportation system in Nakuru and how the combined historical and contemporary forces have shaped the town's public transport problems and prospects. It has looked at public transport systems that have operated in Nakuru like Nakuru Transport Company (NATCO), Nyayo Bus services(NBS) among others. All these others have wound leaving matatus which have continued to grow in number but they are not enough to effectively meet the ever increasing demand as seen from their spatial distribution.

The extent to which matatu has emerged to provide the mobility and accessibility needs of the residents of Nakuru has been addressed through accessibility and spatial distribution in Chapter Five. The extent to which the matatu road network promotes accessibility has been measured to show and compute the distribution of road network in various zones. But since this is not necessarily related to the level of services provision, it was important to consider the actual distribution of matatu services and attempt to relate this with population distribution, distance covered and density of development in the zone. The results show that there is a strong relationship among these factors in influencing the distribution of matatu services in Nakuru. However it was seen that there is a strong functional relationship between population density and matatu distribution, that is there is a greater concentration of matatu services in areas of high population density and size.

7.2 Policy Implications of the Findings

This section deals with the policy implications of the findings some of which are listed below.

7.2.1 Need for More Public Transport Services

Although the policy of the government is to curb the rural urban migration (sessional paper No1. 1986), recent indications show that this effort has not been successful and currently the urban population is 20% percent of the total national population. This increase in population increases demand on urban services like public transportation. This is because majority of people either don't have a car or have access to one; they must walk or use public transport or become house bound. Furthermore public transport can benefit non-users as well as users. The study revealed that there is insufficient supply of public transport especially in the newly built residential areas like

Mwariki, Kwa Rhoda and Kaptembwa. Along with this increase in public transport services, there is need to introduce other modes of public transport services, like buses to compete with the matatus.

7.2.2 Rational Use and Expansion of Public Transport facilities

The study revealed that the terminal facilities within the municipality are inadequate. The study also revealed that the inter-urban and intraurban public transport vehicles share the same terminal facilities causing congestion. The study further revealed that private vehicles and public transport vehicles share same parking spaces leading to congestion and in majority of matatu routes there are no designated bus stops. The above findings point to the need for rational use and expansion of public transport facilities.

The inadequacies of Nakuru's urban passenger services can also be accounted for by other factors among them the concentration of activities at the CBD which ensures that most trips are made to the CBD.

There are also inadequate resources to repair and extend the Nakuru town's road network and to provide other modern urban transportation facilities and the street layout and road space is inadequate. There is therefore need for planners and policy makers to know that for public transport systems to operate to provide the services required, a favourable environment must be provided.

7.2.3 Need to Streamline Operations of Public Transport Vehicles.

The growth of number of matatus has been rapid. The important role played by matatus in providing public transport services is recognized by the government. However matatus are associated with illegal malpractice bribery, ignoring traffic rules

and regulations, harassment of commuters among others. The reason is because their exponential growth has not been matched with corresponding regulation and management so as to streamline their operations and ensure safety and comfort to commuters and other road users

7.3 Recommendations

This section is divided into two parts: the general and specific recommendations. That include factors although external to public transport system, directly or indirectly influence its performance and general functioning of the whole urban fabric. The section deals with specific recommendations aimed at correcting the inadequacies of the public transport system.

7.3.1 General Recommendations

There should be a deliberate effort to deconcentrate the CBD. The relocation of employment and other activities from the CBD to the outskirts need to be given practical consideration to attract traffic flow to other zones other than the CBD. Therefore the trip patterns should be changed to ensure that people do not have to cover long distances and spend a substantial amount of their income commuting to the CBD for services that can easily be provided in the residential areas. There is also need to utilize the spaces between the peripheral residential areas and the CBD. A look at the Nakuru land use map reveals that there is a lot of land under agricultural use between these two areas (CBD and residential areas). A process of careful infilling without compromising on land use planning standards and environmental aspects should be embarked on to produce a more compact town form. A more compact town's form would ensure/enhance accessibility to the road network and public transport services.

This would inevitable increase the areal coverage of the town's public transport road network by increasing the network's density of access. The results of the measurement of the areal coverage of the matatu road network presented in chapter five shows that there is a wide differences in users access to the operational routes in different towns. This is partly because of the existing wide spaces in some zones. Studies done elsewhere show that high density and centralization of appear to be key factors that determine the viability of public transport and thus making a town/city less automobile dependent (Newman et al, 1989:51). Therefore future efforts should therefore be geared towards filling the large open spaces through construction of residential estates. There is also need to locate new public transport routes within easy walking distance.

The present street layout and road space in Nakuru town is inadequate. The MCN should embark on a road rehabilitation and extension programme which should not just be concerned with the town centre traffic situation but the entire town road network. Virtually all the residential estates are served with earth roads which are impassable during the rainy season as the drainage system does not work. The few tarmac roads in some residential areas have degenerated due to lack of adequate maintenance. The terminal facilities should be rehabilitated because most of them are in pathetic condition as indicated in the earlier chapters. The MCN should for instance construct ring roads and more cross-roads linking various population centre. Ring roads which do not pass through the town centre should be constructed to ensure that through traffic do not necessary have to pass through the CBD.

7.3.2 **Traffic Management, Regulation and Safety Measures**

One of the most important objective of public transport planning is to ensure a satisfactory circulation system with the transportation network. There is also need to

remember that traffic management policies for general traffic can create opportunities for matatus ,commuters and operators. To achieve this in Nakuru, certain management measures and structural changes are required. Traffic management services and regulations are short term measure which are capable of improving the transport outwork and facilitating efficient and safe flow of matatus, private vehicles, handcarts, pedestrians and cyclists. The following are therefore some proposed traffic management, regulation and safety measures.

The research revealed that majority of the people walk to their destinations and moreover every person is a pedestrian at one point of the journey. The study also revealed that a sizeable number of the people use bicycle mode of transport. Therefore pedestrian walkways, foot bridges and tracks for handcarts and bicycles should be constructed. This will increase the flow of traffic and also reduce accidents involving pedestrians, cyclist, handcarts and the vehicles. The MCN should separate the intra and inter urban public in the available terminal facilities by relocating them. This will reduce congestion at the terminal facilities while private vehicles should have their on parking bays and matatus on shabab route should be provided with a terminal facilities as they are currently parking on the street. causing obstructing to the motorists. The council should rehabilitate traffic lights system as it is not functioning. As the level of motorization increases the traffic lights would become more important in controlling traffic. The council should also rehabilitate and provided more round signs, and road markings to protect the pedestrian crossing the streets.

7.3.3 Future of *Matatu* Modes

The above recommendations point out that matatus are not responsible for the basic transportation problems in Nakuru. Instead they have continued to thrive where other conventional public transport systems have failed. They further increase the options available to the travelling public in view of demand for public transport services.

The study has showed that there is need to reorganize their operations and ensure they adhere to traffic rules and regulations through a tripartite cooperation of the police, operators and the MCN. The study therefore recommends the following measures to improve the level of services of matatus.

1. There is need to recognise that planning operation of public transport is a team effort and hence matatu operators should form an organization/association to protect their interests. This would enable them lobby for parking bays, and discipline errant members. The associations should keep records of all the operators (owners, drivers and conductors) and particulars of the vehicles to enable the police crack down on the traffic offenders. The associations should also do away with matatu touts/manambas who harass passengers and other matatu operators. Instead they should be replaced with fully employed route wardens to ensure smooth operation of the matatus on the specified routes.

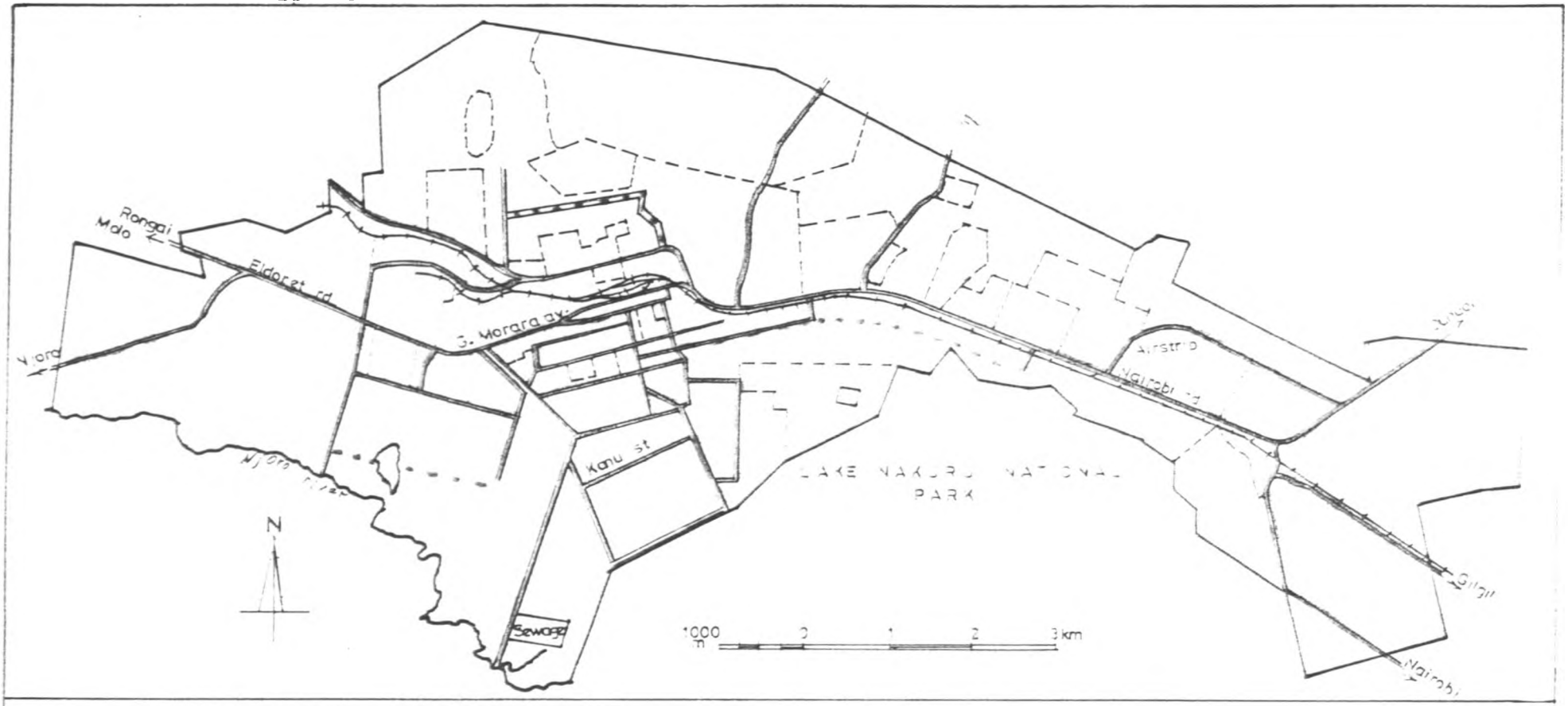
2. There is need for matatu operators to pool resources to raise their standards of living and therefore they (drivers, conductors, owners) should form a cooperative society that will assist members to secure loans for investments. This will in the long run improve their living standards and also those of their dependants. The Traffic (Amendment) Act 1984 stipulates that drivers of PSVs should not work for more than 14 hours in a day but the study revealed

that matatu drivers work longer periods than these. This traffic regulation should therefore be implemented to the letter.

3. Commuters should form lobby groups that will be responsible for protecting their interests. These interests would include protection against abrupt and unwarranted fare hikes, harassment excessive noise in the vehicles among many others. Such groups would publish pamphlets on commuter rights to sensitise the general public.

4. The matatu operators should redesign matatu routes to increase commuter convenience within the town without compromising on profitability of the routes. For example matatus operating on Free Area route could follow Oginga Odinga to serve section 58 residents more adequately and the head to Free Area estate. This would increase the accessibility of every dwelling to within 400m of matatu route. The London route matatus could follow Crescent road, Maragoli road and finally enter London estate. This would greatly capture a large section of the population in Hospital Ward who at the moment have no access to public transportation. The operators should organise their operations to form a circuit route such that while some approach London estate from Show ground road others would approach from Maragoli road as map 7.1 shows.

Map No. 7.1 PROPOSED REDESIGNED MATATU ROUTE NETWORK



LEGEND

- Road network
- Existing Matatu route
- Proposed new Matatu route

5 The government with the help of matatu operators should crack down on some unscrupulous people who demand fee from new entrants in the matatu industry. The traffic police should be more vigilant in cracking down on unroadworthy vehicles.

6 The MCN should play an effective role in the management and planning of public transportation. This should include establishing a Transport section dealing with formulation of policies and regulations on transport in Nakuru town. Therefore the needs of public transport should be planned along with those of otheressential services like water and sanitation. This is because public transport has a positive contribution to make to the life and well-being of urban areas.

In conlusion, it is clear that Nakuru cannot develop unless and untli transport particularly public transport is able to fulfil the function of moving people from between residence and work place, educational and other social destinations effectively and efficiently. If decisions by residents, town leaders, or government as to transport infrastructures and modes, they will continue to grow on their own in erratic and random manner. Transport will therefore continue to be reactive to perceived needs. If however bold proactive decisions are made in anticipation of growth as suggested in recommendations, public tranport can become one of the principal determinants of urban development.

7.4 Areas For Further Research

This section deals with those aspects that were never fully addressed and hence need critical analysis.

7.4.1 Matatu cooperative

There is need to determine the suitable sizes and membership of the proposed consolidated matatu cooperatives. This would help to determine the optimum sizes to avoid administrative and organizational problems.

7.4.2 Route Location for a bypass

The appropriate suitable corridor where the bypass should pass should be determined through research. The study revealed that a bypass was proposed between the Lake Nakuru National Park and the Town way back in the 1970's but the project was never implemented.

There is therefore need to undertake research to identify the suitable location given that the earlier location may have been overtaken by events.

7.4.3 **Analysis of Patterns of Pedestrian Movements in Town**

This will identify corridors of heavy pedestrian traffic movements. This will there identify areas where other traffic can be completely excluded other than pedestrian traffic. There is need to do research on the viability of the non-motorized modes of transport especially the bicycle which seems to popular in town.

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APPENDIX I

UNIVERSITY OF NAIROBI

DEPARTMENT OF URBAN AND REGIONAL PLANNING

HOUSEHOLD QUESTIONNAIRE

1. Questionnaire Number.....
2. Location/Estate.....
3. Respondents Name.....
4. Household Size.....
5. The table below shows household characteristics:

Name	Age	Sex	Relation to Head of HH	Occupation	Educ. Level	Post-Education Training

6. What is your income per month?
   (i) 500-1000 (ii) 1001-2000 (iii) 2001-3000
   (iv) 3001-4000 (v) 4001-5000 (vi) Over 5000

7. What mode of transport do you use to travel to town and back to your home?
   (i) Matatu/Public transport [ ]
   (ii) Private Car [ ]
   (iii) Walking [ ]
   (iv) Bicycle [ ]

8. How many times in a week do you travel with public (matatu) means of transport?
   (i) 1 to 2 [ ]
   (ii) 3 to 5 [ ]

9. At what time of the day did you make the trip
   (i) 6.00 A.M.-9.00 A.M. [ ] (ii) 12.00-2.00 P.M. [ ]
   (iii) 3.30 p.m.-7.00 p.m. [ ]

10. What was the purpose of the trip?
    (i) Work [ ] (ii) School [ ] (iii) Market []
    (iv) Others [ ]

11. (a) Where did it (the trip) start?
(b) Where did it end?

12. (a) What is the cost of one trip? Kshs.....
(b) Is the fare constant (same) throughout?
(i) Yes [ ] (ii) No [ ]

13. What mode of transport is most of the time by other members of the household?
(i) Public Transport [ ]
(ii) Private Car [ ]
(iii) Bicycle [ ]
(iv) Walking [ ]

14. What is the purpose of such trips?

	Weekdays	Weekends
School		
Recreation		
Market		
Work		

15. (a) Which is the safest and most comfortable way to travel in and around Nakuru.
(i) Matatu/Public transport..... [ ]
(ii) Private..... [ ]
(iii) Walking..... [ ]
(iv) Bicycle..... [ ]

(b) What are the reasons for your answer?
(I) .....
(ii) .....
(iii). .....

16. Is this dwelling rented?
(i) Yes [ ] (ii) No [ ]

17. If rented how much do you pay per month? Kshs.....

18. If not rented approximately how much would you pay per month if it were rented? Kshs.....

Behavioral survey

19. Do you think one standard vehicle for matatu is a good idea?
    (i) Yes [ ] (ii) No [ ]

20. Give reasons for your answer
    (i) .....
    (ii) .....
    (iii) .....

21. Which of the following do you think are important in a vehicle for a town matatu?
    (i) More space for passengers.....[ ]
    (ii) More space for luggage.....[ ]
    (iii) More comfortable seats.....[ ]
    (iv) Easier to get on and off the vehicle.....[ ]
    (v) More speed.....[ ]
    (vi) Easier to get to the back seat.....[ ]

22. (a) Do you think overloading should be allowed in public transport vehicles? (i) Yes [ ] (ii) No [ ]

    (b) Give reasons for your answer
    (i) .....
    (ii) .....

23. What do you think are the major problems facing public transport services in Nakuru
    (i) Lack of fixed time schedule.....[ ]

    (ii) Inadequate Vehicles.....[ ]

    (iii)Lack of inadequate designated bus stops.....[ ]

    (iv) Traffic congestion during rush hour..... .[ ]

    (v) Lack of other modes of public transport.....[ ]

    (vi) Exorbitant fares/transport costs.....[ ]

    (vii) Poorly maintained and serviced vehicles.....[ ]

    (viii) Frequent accidents.....[ ]
    (ix) Undisciplined operators (drivers, conductors, manambas).....[ ]
    (x) Poor road conditions and network .....[ ]

24. How should travelling by public transport vehicles be made safer and comfortable?

(i) Regular maintenance and serving of vehicles ..[ ]

(ii) Regular road maintenance and road improvement.[ ]
(ii) Conveniently placed bus stops.....[ ]

(iii) No overloading.....[ ]

(iv) No over speeding.....[ ]

25. (a) Have you been involved in matatu accident (within Nakuru Town)
(i) Yes [ ] (ii) No [ ]
(b) If Yes, when
(i) Less than 1 year ago ... [ ]
(ii) More than 3 years ago.....[ ]

26. (a) What kind of transport do you think should be encouraged?
(i) Public transportation.....[ ]

(ii) Private Car.....[ ]

(iii) Walking.....[ ]

(iv) Bicycle.....[ ]

(b) Give reasons for your answer?
(i) .....
(ii) .....
(iii).....

27. Would you like some other kind of public transportation started?
(i) Yes [ ] (ii) No [ ]

28. If Yes which one?
(i) Municipal buses..... [ ]
(ii) Other Buses .....[ ]

29. Would you like public transport vehicles (matatus) to use one lane (no other vehicle) during rush hour?
(i) Yes [ ] (ii) No [ ]

30. (a) Do you think matatus/public transport vehicles should follow the same route every day and keep time-tables?
(i) Yes [ ] (ii) No [ ]

(b) Give reasons for your answers

(i) .....

(ii) .....

(iii).....

32. What do you think of matatu drivers?
(i) Careless.....[ ]
(ii) Disciplined.....[ ]

33. What do you think of matatu conductors?
(i) Disciplined.....[ ]
(ii) Undisciplined.....[ ]

34. What do you think of manambas?
(i) Disciplined.....[ ]
(ii) Undisciplined.....[ ]

APPENDIX II

UNIVERSITY OF NAIROBI

DEPARTMENT OF URBAN AND REGIONAL PLANNING

Questionnaire for matatu operators (drivers, Conductors, manambas)

General Information

35. Date of Interview.....
36. Respondent's name.....
37. Place of interview/Location.....
38. Route Name/Number.....

Socio-Economic Characteristics.

39. What is your present place of residence / Estate?.....

40. Sex?
    (i) Male [ ] (ii) Female [ ]

41. What is your marital status
    (i) Married [ ]
    (ii) Single [ ]

42. What is your age?
    (i) 18 - 24.....[ ]
    (ii) 25 - 34.....[ ]
    (iii) 35 - 44.....[ ]
    (iv) 45 - 54.....[ ]
    (v) 55+..... [ ]

43. (a) What is your level of Education?
    (i) Primary..... [ ]
    (ii) Secondary.....[ ]

    (b) Any other form of training? (i) Yes [ ]
    (ii) No [ ]

    (c) If Yes Specify.....

<u>Occupation and Income</u>

44. What is your job in this vehicle?
    (i) Driver-Cum- Owner [ ]
    (ii) Driver.....[ ]
    (iii) Conductor.....[ ]
    (iv) Makanga(Tout).....[ ]

45. State the terms in which you are employed and paid?
(i) Full time..... [ ]
(ii) Part-Time..... [ ]

46. What is your working experience?..... Years.

47. How many of those have been in the public transport vehicles?.....years.

48. (a) Do you work on the same route every day?
(i) Yes [ ] (ii) No [ ]

(b) If no how do you carry out your operations?.....

49. Do you have In-Service training sessions?
(i) Yes [ ] (ii) No [ ]

50 (a) In what ways is the owner trying to motivate (encourage) you to work hard and enjoy your job?.....

(b) In what way does the owner take care of your welfare?

Fill the table below.

AVAILABILITY AND COMMENT					
NOS.	ITEM	YES	NO	GOOD	BAD
1	Health				
2.	Co-operative Society				
3.	Transport Home/House				
4.	Bonus				
5.	Housing/House Allowance				
6.	Over time				
7.	Leave Allowance				
8.	Leave (Holiday)				
9.	Lunch/Meals Allowance				

51. (a) Do you drive any other matatu besides this one?
(i) Yes [ ] (ii) No [ ]

52. (a) What is the monthly wage of drivers?
Kshs.....

53. (a) How many conductors work on this vehicles?.....
(b) What is their monthly wage monthly wage per person?
Kshs.....

Matatu Ownership

55. How many matatus does the owner have?.....

56. How many are owned jointly with others?.....

57. (a) Do you intend to stay in matatu business for the next 5 years
(i) Yes [ ] (ii) No [ ]

(b) Give reasons for your answer

58. How long have you been in matatu business?.....

59. Is this the first matatu you have operated?
(i) Yes [ ] (ii) No [ ]

60. How old is the vehicle?.....

61. Body type
(i) Converted pick-up [ ]
(ii) Mini bus ..... [ ]
(iii)Nissan ..... [ ]

62. (a) Do you have any other business?
(i) Yes [ ] (ii) No [ ]

(b) If Yes please specify .....

63. (a) How did you buy this car
(i) Cash [ ] (ii) Loan [ ]

(b) If through loan how much do you pay per month Kshs.

64. How much do you pay as insurance per year? Kshs.....

Matatu Operations

65. What is the passenger capacity of the vehicle?
(i) Seated [ ][(ii) Standing [ ]

66. What was the condition of vehicle when brought?
(i) New [ ] (ii) Old [ ]

67. Fill in the following table of daily routes and fares

	Weekdays	Weekends
Route		
Fares (kshs.)		

68. What is the average number of trips per week on
(i) Weekdays [ ] (ii)Weekends [ ]

69. What is the average travel time per trip to town and vice versa?
(i) Weekdays.....minutes (ii)weekends.... minutes

70. When do you start and finish your operations?

	WEEKDAY	WEEKENDS
Start		
End		

71. (a) Do you work in shifts?
(i) Yes [ ] [ii) No [ ]

71. (b) If Yes after how many hours? .....

72. (a) Do you pay a fixed sum of money to the owner every day?
(i) Yes [ ] (ii) No [ ]

(b) If Yes how much per day? kshs.....

(c) What happens if you do not reach the target?

73. Are there different fares for different types of passengers (e.g. children adult etc.)?
(i) Yes [ ] (ii) No [ ]

74. Do you have special fares?
(i) Yes [ ] (ii) No [ ]

75. (a) Who pays for the fuel lost?
(i) Owner (ii) Driver/Conductor.

(b) Who pays for the maintenance costs?
(i) Owner (ii) Driver/Conductor

76. (a) Where do you take the vehicle for servicing?
(i) Jua Kali garages [ ]
(ii) Formal Garages [ ]

(b) How often do you take the vehicle for servicing?.....

77. What is the cost of fuel per day? Kshs.....

78. Approximately how many kilometres do you cover in a day?. ...kms

79. (a) Do you make any other regular payments to enable you operate e.g. to terminal associations?
(i) Yes [ ] (ii) No [ ]
(b) If Yes how much per mont? Kshs.....

80. (a) Are you a member of any association?
(i) Yes [ ] (ii) No [ ]
(b) If yes what are the benefits?
(c) If no why?

Perceptions and attitudes on Policy Issues

81. (a) What do you consider to be the problems matatu operators (employees) have in their operation in Nakuru Town.
(i) .....
(ii) .....
(iii).....
(iv) .....

(b) Suggest possible solutions
(i).....
(ii).....
(iii).....

82. (a) What do you consider to be the problems facing public transport operators (owners) in Nakuru Town.
(i) .....
(ii) .....
(iii) .....

(b) Suggest possible solutions
.....

83. What changes would you like introduced in the public transportation system in Nakuru Town?
.....

84. What is your opinion concerning the following in so far as public transport operations and associated problems are concerned?

(i) Passengers/Public.....
(ii) Police.....
(iii)Owners of matatu.....
(iv) Other Road Users .....
(v) Municipal Council.....

85. (a) If this vehicle had to have regular mechanical inspections and allowed to carry a fixed number of passengers, how would it affect your operations?

(i) More Profit.....[ ]
(ii) Less profit.....[ ]
(iii) Cause operations to grind to a halt.....[ ]

(b) What are the reasons for your answer.

APPENDIX III

UNIVERSITY OF NAIROBI

DEPARTMENT OF URBAN & REGIONAL PLANNING

QUESTIONNAIRE FOR COMMUTERS

Questionnaire No. .....
Area/Bus stop No. .....
Respondents Name .....
Date of interview .....

81. Sex: (i) Male [ ] (ii) Female [ ]

82. Place of Residence/Estate .....

83. Occupation .....

84. Where do you mostly travel to? (especially on weekdays)
(i) Origin ..... (ii) Destination .....

85. Why do you usually make such trips? (main reasons only)
(i) .....
(ii) .....

86. What mode of transport do you use?
(i) Matatu/Public [ ]
(ii) Walk [ ]
(iii) Private Car [ ]
(iv) Bicycle [ ]
(v) Company Vehicle [ ]
(vi) Others (Specify) ..... [ ]

87. Approximately how many times in a week do you use public transport vehicles on this route?
(i) When travelling from your place of residence .....
(ii) When travelling back to your place of residence .....

88. (a) What problems do you associate with matatus/public transport vehicles on this route?
(i) .....
(ii) .....
(iii) .....

(b) What do you think are the likely causes?
(i) .....
(ii) .....
(iii) .....

(c) Suggest some possible solutions?
(i) .....
(ii) .....
(iii) .....

89. (a) Would you like some changes to be introduced in the public transport? (i) Yes [ ] (ii) No [ ]
(b) Give reasons for your answer
(i) .....
(ii) .....
(iii) .....
(c) What changes would you like to be introduced?
(i) .....
(ii) .....
(iii) .....

90. What do you think about Matatu/Public transport operators? (drivers, conductors)
(i) Disciplined [ ] (ii) Undisciplined [ ]

91. What is you opinion on matatu touts (manambas)?
(i) Should improve [ ] (ii) Banned [ ]

92. What is your opinion on:-
(i) Overloading
(ii) Music in matatu
(iii) Unroad worthy matatus
(iv) Bus parks and stops