.

PLANNING FOR MANAGEMENT OF INTRA –URBAN TRANSPORT MODES IN NAROK: A CASE STUDY OF TRAFFIC CONGESTION IN THE NAROK CBD

By

Kaylenah Rapemo

BES/004/3013

A PLANNING RESEARCH PROJECT SUBMITTED IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE DEGREE OF BACHELOR OF SCIENCE ENVIRONMENAL STUDIES (PLANNING AND NATURAL RESOURSCE MANAGEMENT)

MAASAI MARA UNIVERSITY

AUGUST 2017

.

DECLARATION

This planning research project is my original work and has not been presented for a degree in any other University.

Signature…… Date…….

Kaylenah Rapemo
(Candidate)

This planning research project has been submitted for examination with my approval as the University supervisor

Signature……. Date……..

Md. Mary Wambui

(Supervisor)

.

DEDICATION

I dedicate this project to my entire family . For believing in me and supporting me throughout this entire journey, your prayers have seen me this far.

Thank You!

.

ACKNOWLEDGEMENT

I extend my gratitude to the School of Tourism and Natural Resources for being ready to give a helping hand when needed.

I am particularly grateful to Md. Mary Mwangi who closely

guided the process as my supervisor through positive criticism . Each critic you gave me always raised the quality of my work.

I am deeply indebted to all my classmates Bsc. Environmental Science class of 2017 for the contribution and positive criticism. Above all I would like to thank the Almighty God for seeing me thus far through his Grace . I however remain responsible for any errors and omissions in this research project

.

ABSTRACT

One of the main pillars of Kenya's vision 2030 is anchored on infrastructure development and economic development .For this reason investment in the nation's infrastructure has been given a high priority to ensure the economy of the country grows.

Over the years, transport infrastructure has been a key player in determining the growth rate of urban towns in Kenya . However, the recent past has seen Narok town starting to face the problem of traffic congestion. The study area borders were limited from the Basabra – Nyawera road Junction to the Easy Coach Bus Stage. The study seeks to examine how poor planning of intra urban transport modes has played a major role in causing traffic congestion in Narok CBD. It does this by first of all investigating the existing traffic management system for Narok Town with a view of establishing its effectiveness in facilitating traffic movement along the highway. It then goes ahead to find out the traffic challenges experienced in the town , out of which traffic congestion is found to be the major challenge. It is at this point that the study sought to examine the factors behind this problem of traffic congestion in the town. The last chapter comes up with proposals to help reduce this problem of traffic congestion . All the contents of the study have been organized systematically into six chapters, namely: introduction; literature review ,methodology of the study; background to the study area; study findings; synthesis and recommendations. The study has been organized in six chapters starting from the introduction to the recommendations

The significance of the study has been captured in the urgent need to ease traffic congestion in Narok CBD.

.

Contents

.

.

CHAPTER 1: INTRODUCTION

BACKGROUND INFORMATION.

Transport facilities and services are one of the most vital and essential sectors for the survival of modern society and the growth of urban towns (Onokola 2001). Being an essential service for the growth of urban centers, transport services allows for the smooth flow of people, goods and services form one point to another with an urban setting. The transport sector provides a key to the understanding and operation of many other systems at different scales and therefore transport is considered as the epitome of complex relationships between social, economic and political activities and one of the main pillars in determining the level of economic development of an urban center (Buchannan, 1969; Hoyle and Smith, 1992).

In Kenya, urbanization is the result of concentration industrial, commercial, financial and administrative set up in various parts of the country. It is further accompanied by the developing transport systems in this regions. Kenya being part of the developing world, its urban areas are nodes for intersection often attracting emerging opportunities (Smith, 1996). Public transportation systems provide the most competent means of meeting the transport needs of the large urban populations. Public transport plays a vital role in the growing productivity of urban areas which in turn boosts the national economy (World Bank, 2001)

Being an economic, agricultural, commercial and social hub, Narok town has a rising demand of public transport systems to meet the needs of the residents. Currently the available systems are inadequately managed causing traffic congestion within the CBD a, raising a concern for the need of proper planning and management of intra –urban transport modes to accommodate the demand of transport services within the town . Currently the town is facing a problem in meeting the ever rising demand transport for public transport modes by road users. This has resulted to congestion and commotion in the CBD routes and terminals.

.

1.2 SIGNIFICANCE OF THE STUDY

- The findings of the study will provide a base for the establishment of an effective plan of transport facilities within Narok Town.
- The study aims to highlight the need for improved public transport facilities in Narok Town that can be emulated with neighboring towns in the region.
- A successful research on intra-urban modes within the Narok CBD will not only improve quality in the service provided by this modes but will also improve efficiency in management.

1.3 PROBLEM STATEMENT.

The growth of Narok Town in terms of size and density has been accompanied with diverse problems in the planning and management of its urban systems. One such problem has been inadequate provision of public transport services.

Narok town being located on the main Mai-Mahiu – Narok – Bomet highway, it has large numbers of both public, private and transit (Lorries and Trailers) passing by the town. This vehicles use the main highway passing through the town causing unnecessary traffic snarl up in the town.

Being a major hub of high agricultural production in the region , the largest urban town and administrative headquarters in the county , Narok's town economy has been growing at a very fast rate leading to the high influx of people in the town and increased construction of facilities to meet the ever growing population .

This situation has led to traffic commotion and congestion in the CBD routes and bus terminals as there are no enough modes and the available ones are not properly managed to meet the user's needs.

The level of intra-urban activities generated by the economic growth and population density of the town, with the highest percentage population not having personal vehicles, demands the support of a well-developed public transport system with the capacity to support the growth and development of the town's economy.

.

Some of the problems associated with planning for transport modes in Narok town are inadequate modes to accommodate the ever increasing demand of transport services. This has resulted in heavy congestion on the CBD routes, bus terminals and pick up points. There is also competition for passengers that takes place on the roads as the available transport modes (buses, Nissan 'matatus', taxis and motorbikes) share a common route and destination.

1.4 JUSTIFICATION

Development of intra-urban transport systems as part of infrastructure services is one of the fundamentals in Kenya's vision 2030. To achieve this, investments in this sector should be prioritized by ensuring it's among the main implemented projects under the economic pillar as this will not only ensure regional growth but also that of the whole nation as a whole.

Traffic congestion within the CBD routes, bus terminals and pick up point's road users accessing the CBD, or passing by Narok town leading to pollution, accidents, wastage of time and money.

Well planned transport infrastructure will ensure little to no commotion of the intra- urban transport modes in the town. Good roads within the town with smooth traffic flow and well designated parking & pick up terminals will reduce travel time, prevent accidents caused by traffic snarl up and encourage investment. At the same time, a well-planned and managed transport system will maximize economic efficiency of Narok Town, unlike the current inferior system that impedes economic growth.

The significance of the study lies in trying to identify the traffic problems experienced in Narok Town as a result of poor planning and management of intra-urban transport modes in Narok CBD with a view of coming up with possible solutions to the problems.

The findings of the project can be used by both the county and national governments as a basis for formulating policy frameworks and urban infrastructure plans to curb the traffic congestion in the town and the region as a whole.

.

1.5 OBJECTIVES

1.5.1 Main Objective

The main objective of this proposed study will be to analyze efficient management systems of intra-urban transport modes to curb traffic congestion in Narok Town.

1.5.2 Specific Objectives

i. To investigate the traffic management systems of intra-urban transport modes in Narok CBD.

ii. To find out the challenges faced in traffic management in Narok CBD.

iii. To examine causes of traffic congestion in Narok CBD.

iv. To propose possible solutions to the problem of traffic systems management within Narok CBD.

1.6 RESEARCH QUESTIONS

The research questions of this proposed study will be:-

i. What is the efficiency of the traffic management systems used in Narok town?

ii. What are the major challenges faced in management of intra-urban traffic modes within the CBD routes and bus terminals?

iii. What are the causes of traffic congestion and commotion within Narok CBD?

iv. What could be the possible solutions to traffic congestion management within Narok CBD?

v. What are the available intra-urban transport modes within Narok Town?

vi. Does the current design of road networks in the town play a role in traffic congestion in the town?

vii. What urban design measures can be in-cooperated in the traffic management systems to prevent traffic build up within the CBD?

viii. Does the local authority have measures put in place to manage intra-urban transport modes in the town?

.

1.7 SCOPE AND LIMITS

Narok town is the largest urban town in Narok County, in the south –western part of the country lying along the rift valley.

Administratively, the town serves as the county headquarters of Narok sub-county and the larger Narok County. The town also serves as a hub of several institutions including, several public primary schools, secondary schools, colleges and a university. Furthermore the presence of several social and economic amenities in the town play a major role to the huge influx of people and different transport modes within Narok town.

This study will focus on the most common intra- urban transport modes(buses, motorbikes, Nissan 'matatus', taxis, private vehicles and lorries) and the role they play in traffic congestion within the CBD routes and bus terminals.

Narok CBD has local, regional and national significance bearing in mind the role it plays as a critical agricultural, administrative and economic hub. This study will be carried out along the CBD routes and bus terminals, due to the significant role they play in traffic congestion in the Narok town CBD.

Geographically, the study will cover the major routes within the CBD and a 7km stretch of the Main Mahimahiu- Narok – Bomet Highway from Basabra Petrol station to the Maasai Mara University Junction.

1.8 DEFINITION OF TERMS.

Congestion

A situation in which a place is crowded with people or vehicles making it difficult to move around**.**

Traffic congestion

A condition on transport networks that occurs as use increases and is characterized by slower speeds, longer trip times, and increased vehicle queuing

.

Commotion

A sudden short period of noise, confusion and movement

Highway

A main road especially one connecting major towns or cities.

Road reserve

A legally defined area within which facilities such as roads, footpaths, and associated features are constructed for public transport.

Bus terminals

A station where transport vehicles load or unload passengers or goods.

Intra- urban

This are transport means used to move goods and people from one place to another within an urban setting**.**

Traffic management system

This are measures put in place in the planning, monitoring and control or influencing of traffic. It aims to maximize the effectiveness of the available infrastructure while ensuring safe and reliable state of operation**.**

.

CHAPTER 2

LITERATURE REVIEW.

URBANIZATION AND PUBLIC TRANSPORT.

Urbanization is the process where a parcel of persons collectively settle in an area eventually developing several institutes that include business and governing institutions in order to support themselves as a self-sustaining system. On the other hand, urbanization may result as a concentration of power and capital by some authorities in one area. According to the United Nations Population Fund, the level of urbanization is the percentage of the total population living in towns and cities while the rate of urbanization is the rate at which it grows. (UNFPA, 2007).

The recent past has seen the mushrooming and expansion of urban areas in developing countries. In the world today, more people live in and around urban areas as compared to rural areas (SOFA, 2002). This scenario explains why urbanization is sometimes referred to as a complex process of social transformations. Some of the main characteristics of urban areas include; densely populated settlements, non-agricultural activities, nuclear families, divisions of labor and occupational specialization, social class's extremes, social heterogeneity, social mobility and rapid cultural change.

The world population by the year 2002 was about 6.1 billion with a growth rate of 1.2% this is according to a study done by the United Nations in 2003.During this period, almost half of the world's population was urbanized. It was estimated that by the year 2008 more than half of the world's population will be found in urban areas. Further it is envisioned that 60% of the world's population will be urbanized by the year 2030. This trends can be attributed to a natural increase in the urban population due to high birth rates, reduced mortality rates that can be attributed to the ease in access to improved health care thus increasing life expectancy. Another main factor leading to this trend is rural to urban migration that is most prevalent in developing countries where the poor move to urban areas in search of greener pastures in terms of employment opportunities (Njoroge, 2009).

In the Kenyan context, urbanization is as a result of the concentration of large scale and small scale industrial, commercial, financial and administrative set up in various parts of the country. It's also

.

backed up by technological developed in the transport and communication industry not forgetting the cultural and reproductive role the different urban areas play (Mireri, 2000).

The pre- colonial period saw the British East African Company constructing the Mombasa – Uganda railway that foresaw the mushrooming of towns that further led to the growth of manufacturing industries thus promoting rural-urban migration. Nairobi being the central urban center of the colonial administration, eventually developed into a major industrial harbor. *I*n 1948, the colonial administration designed a master plan of a modern commercial center with a designated industrial area with a vast network of interlinking roads. (Anderson, 2001).

However after gaining independence, poor governance and poor implementation of policies led to a disorganization of the set master plan as social segregation towards the poor was practiced by the elite group in the society (Huchzermer, 2006 & 2011). Lack of policies on employment creation strategies further forced a large number of the youth to migrate to urban centers from the rural areas in search of employment. This led to a high influx of people in urban areas and with such an unplanned population came social problems among them being poor traffic command structure leading to traffic congestion in the central business districts (World Bank,2004).

The late 20th century and early 21st century saw a gap in the transport sector .This gap was created by the inability of motor vehicles to reach remote and inaccessible areas due to the nature of poor roads in those areas. However this gap has been addressed with the introduction of bicycles, motorcycles and tuk-tuks as part of intra-urban transport modes. This modes are preferable among road users in urban areas in Kenya as they are more affordable and can easily access areas that are inaccessible with motor vehicles (Nyaura & Ngugi, 2014).

Currently several attempts are being made with measures put in place to decongest urban centers but this measures have failed to see the light of day due to lack of clear guidelines from responsible authorities and poor policy implementations in the transport sector.

.

Major components of urban transportation systems design include:

a. **Pedestrian areas**

This are areas that are set aside for walking road users. Mostly pedestrian areas cover 10% of the total road space as sidewalks. Commonly this areas are dedicated entirely to pedestrians however, this areas also play a major role in servicing pedestrian's access to other transport modes and parking areas.

b. **Cycling areas**

This areas specifically designated for cycling road users with clearly marked lanes and reserved parking lots.

c. **Parking areas**

This refers to the amount of space dedicated to parking motorized modes of transport. There are two types; On-street parking

Off-street parking.

d. **Bus terminals**

Refer to the amount of space devoted for bus activities i.e. picking up and dropping of passengers.

e. Transit lanes

This are road lanes reserved for buses or long trucks either on a permanent or temporary (rush -hour) basis.

TRAFFIC CONGESTION MANAGEMENT.

Traffic congestion is a situation where the demand for road space and services exceeds supply. It's characterized by longer trip durations, increased vehicle queuing and slower speeds. Congestion is essentially a phenomenon that is linked to the difference between the roadway system performance expected by users and how the system actually performs. (Department of Transportation. US. 2005).

.

CAUSES OF TRAFFIC CONGESTION.

a. Vehicle Density.

Traffic congestion usually sets in when vehicular density exceeds road network capacity. This congestion scenario gets worse as more vehicles get to the spot than leaving the point. The kind of congestion caused by this modes can be categorized into two; *recurrent* and *non-recurrent* congestion. Recurrent congestion is caused by factors such as urbanization, population growth and increased private vehicle ownership. Recurrent congestion occurs mainly during peak hours and is characterized by vehicle snarl up, reduced travel speed and an increased commuting time. On the other hand, non-recurrent congestion is caused by random traffic incidents i.e. accidents, weather and work zones which slow down traffic movement. The randomness of non-recurrent congestion makes it so hard to predict its occurrence.

b. Urbanization

Urbanization leads to increased motorization in urban areas to meet the ever rising demand from the increased human population. Increased motorization without an adequate upgrade in road infrastructure and road services leads to traffic congestion.

c. **Dominance and overreliance on matatus.**

According to a World Bank study done on developing countries in Africa in 2009, revealed that matatus are the most preferred intra-urban transport modes among urban populations. However the low carrying capacity of 14 passengers per vehicle, has seen the proliferation of matatus in urban areas. This high number of matatus poses several problems including traffic congestion, air pollution and frequent road accidents.

d. Poor land use planning.

Improper land use planning in urban areas is mostly due to rapid urbanization. Allocation of residential areas far from workplaces leads to crisscrossing movements resulting to traffic problems. Additionally location of public facilities such as banks, malls, religious facilities and petrol stations attract an influx of vehicles leading to traffic snarl up caused by non-provision of adequate parking space.

.

Trading of goods along roads also causes traffic to slow down and exposing the traders to health risks due to air pollution, injuries and deaths through accidents that further worsen the traffic situation when they occur.

e. Road crashes and vehicle breakdowns.

In most developing countries, most vehicles that are imported into the country for use are used vehicles from developed countries. This vehicles demand a high level of maintenance that cannot be adequately met by their owners. Poor maintenance of this vehicles is further harnessed by the presence of few qualified mechanics leading to the sector being flooded by several illiterate mechanics and fake spare parts vendors. This situation leads to the constant breakdown and crashes causing a slowdown of traffic of the already narrow roads.

f. Low capacity of road networks and poor infrastructure.

Most developing countries in Africa have road networks that are not expansive enough to carry the potential traffic. The low capacity of the roads is caused by poor resource allocation during national budgeting. Some other countries are limited on expanding their road capacity due to harsh topography limiting road expansion. Low road capacity leads to competition for space leading to traffic congestion.

Poor physical condition of roads is also a major cause of traffic congestion. Some of this conditions are poor state of roads, narrow roads, collapsed roads and bridges, non-provision of road signs, inappropriately located bus stops, car parks, street lights among others affect the smooth flow of traffic hence leading to traffic congestion.

g. Security checks.

Due to the recent insecurity and terror threats from the Al Shabaab that have recently been experienced in Kenya, security has been heightened to reduce instances of attacks before they occur. Some of the measures that have been put in place to mitigate the occurrence of insecurity events include the setting up of security checks along major roads, and the entry and exit points of major urban towns in the country. The presence of this check points have caused reduced speed of vehicles around this areas causing a traffic congestion. The security checks have also led to the closing down of some roads thus leading to the diversion of traffic to other roads causing traffic congestion in the remaining routes.

.

h. ‘**VIP’ (Very Important Persons) movements.**

As it is a tradition in many African nations, when politicians and other senior government officials are using the road, the roads might be totally closed or other road users are temporarily barred from using the roads until the whole convoy containing ‘VIP’ dignitaries pass. For example in the Kenyan context when the president is using the road, most of the roads that he is designated to use are closed to other road users and traffic is diverted to other routes. This kind of movement and closure of major roads has a negative effect on traffic flow as it leads to traffic congestion.

i. Inadequate information on traffic flow.

Poor information to guide motorists and other road users on traffic flow leads to poor decision making on when to enter and exist certain lanes. This leads to sudden shifts that causes crashes that in turn lead to traffic congestion.

j. Narrow /few lanes

Most roads have very narrow or few lanes that cannot accommodate the ever increasing vehicle capacity in urban areas leading to traffic congestion.

k. Road construction activities.

Road construction activities such as repairs or expansions of lanes causes the diversion of traffic and a slowdown of traffic flow thus leading to traffic congestion.

l. Speed limits.

Low speed limits in built up and residential areas leads to traffic congestion in this areas.

m. Motorists’ indiscipline.

Many motorists have a tendency of violating traffic regulations and rules by parking in wrong places, repairing broken down vehicles in the middle of the road without considering other road users. Hawkers also sell their merchandise in traffic, while relating with their customers thus causing a slowdown of traffic flow. This activities collectively or individually lead to traffic congestion.

.

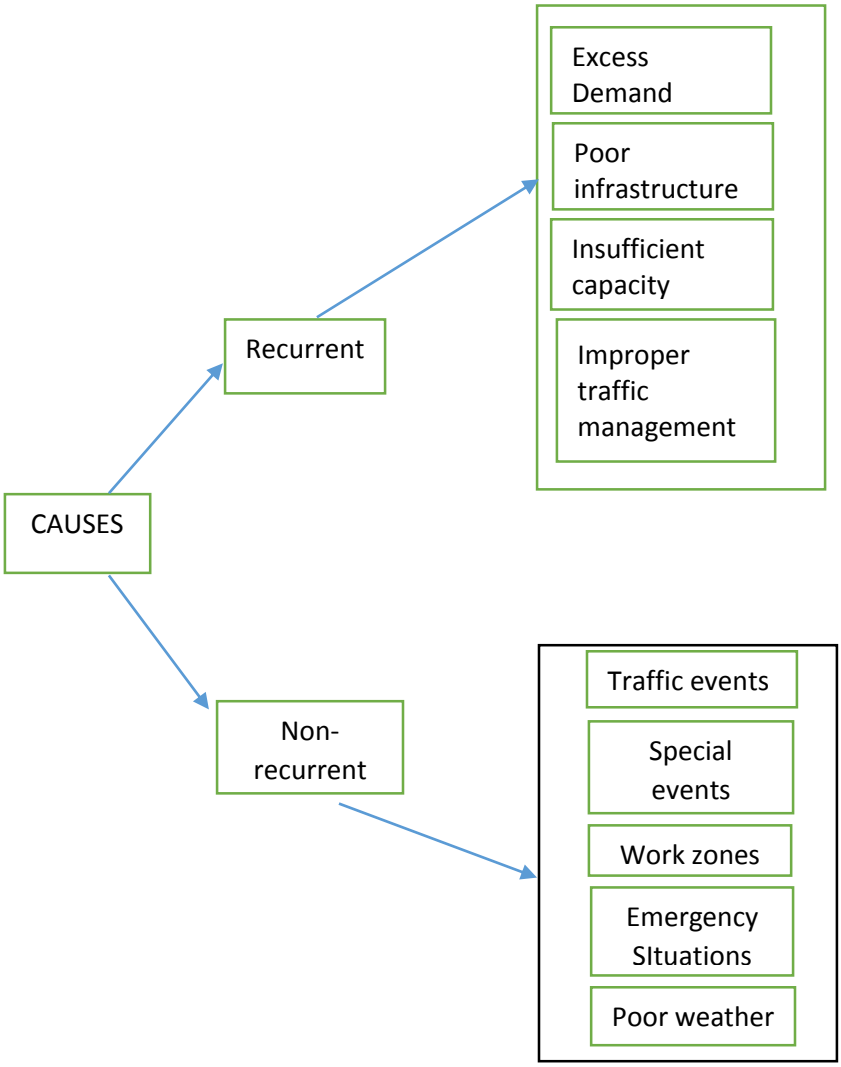


Fig 1; Causes of traffic congestion.

.

CONGESTION COSTS.

Traffic congestion costs are all expenses incurred as an effect of traffic congestion in urban areas. This costs can be categorized into three economic costs, infrastructure costs, health costs and environmental costs.

Economic costs.

Traffic congestion affects the Gross Domestic Product (GDP) of a country.

Some of the effects of traffic congestion include; productivity loss, change in accident frequency, increase in emissions release, increased vehicle maintenance cost and increases noise pollution. The result of this effects can be felt when business and residential homes are relocated to more friendly neighborhoods resulting in low valuation of lands and property around urban areas.

In the united states the costs of congestion can be valued by the following indicators, 87,606 crashes, 1200 deaths, 37,476 injuries and 482 million hours lost delayed travel time (sanders, 2015). According to a study conducted by Mabereola in 2012, commuters in Lagos spend an average of 40% of their income on transportation. In Kenya, the traffic cost of Nairobi's traffic jam rates at 37 billion shillings annually (McGregor 2014) while the annual congestion cost in Cairo, Egypt is estimated to be $8 billion, that is 4% of the country's GDP (World Bank, 2010). Some of the cities in Africa with the highest economic costs related to congestion are; Lagos-Nigeria, Kampala-Uganda, Nairobi-Kenya, Gaborone-Botswana; Lusaka-Zambia; Cairo, Egypt; Addis Ababa-Ethiopia.

Travel costs.

Traffic congestion has increases travel time to road users and increases costs of vehicle operations as well in terms of fuel and spare parts.

Operating costs.

Congestion inflicts additional costs to freight and service deliveries. Congestion causes delays in delivering time sensitive cargo and this in turn leads to additional costs of receiving and distributing the freight.

.

Cost on infrastructure.

Due to the high density of vehicles on a road with low capacity, congestion causes undue pressure on bridges along roads. With time this pressure causes the bridges to decay and also leaves potholes on the roads.

Global warming.

During traffic congestion a lot of exhaust emissions are released into the air. This emissions coming from the fossil fuels and the hydrocarbons powering the automotive release carbon monoxide which is the leading causative agent of ozone layer depletion. This in turn causes global warming.

Health costs.

Emissions released by automotive during traffic congestion are toxic to human health. Carbon monoxide causes chocking and respiratory inflammation. Other health risks involved with traffic congestion involve; high blood pressure, lead poisoning, tension and anxiety due to road rage.

URBAN TRAFFIC CONGESTION MANAGEMENT MEASURES.

While traffic congestion has been here with us since the birth of urbanization, there is no full solution to eradicate this menace from the urban areas as it is related to land use patterns and policies in the transport sector. Economically, reducing transport congestion is costly and hence the only viable way is to effectively minimize traffic congestion through appropriate management and mitigation measures (Hon, 2005). The most effective and efficient Congestion Mitigation Measures in cooperate the use of modern technology. Technology plays an important role in predicting demand and supply data that is used in planning for intra urban transportation. Technology also provides information on alternative routes in case of congestion, arrival and departure times of transport modes and aids in smooth traffic flow through intelligent traffic management. This system is referred to as Smart Transportation.

.

Smart transportation uses the following mitigation measure to manage congestion caused by intra – urban transport modes;

a) **Bicycle Sharing Systems.**

This is a service system in which bicycles are made available for shared use over a short period within an urban setting. This system integrates the use of a mobile application that indicates location of nearby bicycle stations and the number of bicycles in each station.

The promotion of the use of bicycles in place of motorized modes in urban areas not only reduces congestion but reduces pollution from vehicle exhaust while promoting a healthy lifestyle among city dwellers.

b) **Dynamic carpooling.**

Dynamic carpooling is a service that shares rides among different vehicles in an area within a short notice. This service makes use of GPS navigating services to provide the driver with route information, smartphone applications that enable a traveler to order for a ride from their current location, and social networks to establish accountability and trust between drivers and customers. Dynamic carpooling has the following benefits that have attributed to its success rate;

- Reduces travel distance leading to congestion mitigation, reduced emissions and infrastructure expenditure reduction.
- Promotes efficient use of transport infrastructure.
- Reduced transport cost due to lowered fuel usage.
- Covers areas not covered by public transport systems.

c) **Integrated transit hubs.**

Integrated Transport Hubs are fully serviced transport interchanges seamlessly linked to passenger pick up stations and adjoining commercial developments such as shopping malls. This hubs allow passengers to easily transfer from one commercial intra- urban transport mode to another. Integrated Transit Hubs also allow commuters the convenience of running several errands at a centralized area before catching up a connecting bus or train. A major advantage of this hubs is that they reduce travel time by saving on the time that would be used moving from one station to another. Additionally they reduce traffic congestion by reducing over dependence on private vehicles.

.

d) Improved Road design

Road network infrastructure can be designed to include cycling lanes, pedestrian paths, public vehicle lanes and heavy trucks lanes. This system promotes a walking a cycling culture hence reduces congestion caused through reduce dependence on vehicles. Having separate lanes for different modes of intra-urban transport enhances smooth flow of traffic and hence reduces travel time while saving on fuel cost.

e) Smart Parking.

Smart Parking combines technology and human innovation to reduce use of resources such as fuel, time and space to achieve faster, easier and denser parking. Smart parking optimizes space usage, improves efficiency of parking operations and aids in smooth traffic flow in urban areas.

f) Comprehensive traffic sensing system

This is a computerized system that makes use of video surveillance to monitor traffic on all roads in the urban area, control traffic direction through signal control. Further the system provides a flexible traffic data management and sharing.

g) Intelligent traffic incident evidence collector.

This is a form of E-police system that computerizes and collects real time evidence of traffic violations. Among the several benefits of this system includes: improved traffic safety, optimized traffic conditions and strengthened driver awareness and compliance to traffic laws.

h) Real time emergency command.

This is a unified emergency command platform that uses video conferencing system. It helps schedule rapid response of traffic police to traffic incidents.

.

POLICY AND LEGAL FRAMEWORK WITHIN THE TRANSPORT SECTOR

A policy is a set of principles, rules and guidelines formulated and adopted by a government or an organization to achieve long term goals. In Kenya policies are formulated by the government to promote development of different sectors within the county. The transport sector has several policies set in place to ensure the smooth running and management of this industry. Some of this policies include;

i. The transport sector policy
ii. Kenya vision 2030.
iii. Road subsector policy.

1) The Transport Sector Policy.

Drafted by the ministry of Transport between the years 2003 -2004, this policy recognizes that an efficient and effective transport system is an important requirement in facilitating national and legal integration, promoting trade, economic growth, poverty reduction and wealth creation.

This policy framework outlines the components of the transport sector in the country, namely;

i. Road transport
ii. Rail transport
iii. Maritime and waterways transport.
iv. Pipeline transport.
v. Air transport.
vi. Non-motorized transport.

Some of the issues the policy seeks to address are transport infrastructure planning, development and management in the transport sector, legal, institutional and regulatory framework and environmental considerations among others.

.

AIM:

To create an enabling framework to nurture development of a safe, efficient and affordable transport system, while leading in technological advancement.

OBJECTIVES

Some of the objectives of the transport sector policy include;

i. To integrate transport with national and regional socio-economic demands.
ii. To establish appropriate institutional systems for transport sector Management, coordination and regulation.
iii. To develop and maintain an integrated and coordinated transport infrastructure For efficient movement of passengers, freight and mail and support disaster Management efforts.
iv. To integrate transport in land use planning and management systems
v. to deliver efficient and effective sector operations to enhance national productivity.

POLICY PRINCIPLES

To ensure effectiveness of this policy, the following key policy principles need to be strictly observed during implementation phase;

i. User pays and polluter pays principles to facilitate economic efficiency, generation of sufficient revenues to support development, operation and maintenance of transport infrastructure and services, eliminate distortions user choice of transport modes, eliminate to the extent possible externalities in production and consumption e.g. pollution and congestion.
ii. Clarification of the roles of the central and local governments, statutory bodies, nongovernmental bodies, and the private sector in the delivery and management of transport infrastructure and services.
iii. Financing of economic infrastructure through user charging or cost recovery from direct users.
iv. Stakeholder consultation in setting of tariffs and other prices.

.

v. Institutionalization of Regulatory Impact Analysis to enable assessment of regulatory proposals
vi. Financing social and strategic infrastructure through subsidization on a declining basis over time.

CHALLENGES FACING THE TRANSPORT SECTOR.

The policies points out some of the outstanding challenges facing this sector as;

i. Inappropriate Modal Split
ii. Unexploited Regional Role of the Transport System
iii. Poor Quality of Transport Services
iv. Transport System Not Fully Integrated
v. Urban Environmental Pollution
vi. Institutional Deficiencies
vii. Lack of a Vision for the Transport Sector
viii. Lack of an Urban Transport Policy

2) Kenya Vision 2030

AIM: This policy framework's main aim is to guide on socio- economic development in the country. The policy framework was launched in the year 2008 to act as driving force towards structural reform between the years 2003- 2007. The policy aims at raising the country to a middle class economy by the year 2030.

The Vision 2030 is sustained on three main pillars; Economic, social and political. This pillars are secured on the following nitty-gritties; continuity in government reforms , enhanced equity, macro – economic stability, equal opportunities for poor , infrastructure, energy, science, technology and innovation, land reforms , human resource development security and public sector reforms.

.

Infrastructure

Vision 2030 **seeks** to develop a country that is firmly interrelated railways, through a good network of roads, railways, marine ports, airports, waterways and telecommunications. A country where water and modern sanitation.

Science, Technology and Innovation

Kenya Vision 2030 recommends intensified application of science and technology into different sectors including transport to raise productivity and efficiency levels across its three main pillars. It recognizes the important role played by research in speeding up economic development. According to this policy framework, the government is expected to create more opportunities and provide resources for scientific research, technology capabilities and innovation within the workforce.

Public Workforce.

A well-organized public sector will be one major foundation of the policy framework. The country will build a public service sector is citizen oriented. The policy proposes that the government should intensify efforts to bring about change in the public service to one that values transparency, equity, fairness and accountability to citizens. Reforms in this sector will promote strategic planning in the government, continuous improvement and stakeholder engagement.

3) Roads Sub-Sector Policy.

This policy was passed by parliament as Sessional Paper No.1 of 2006 on The Development and Management of the Roads Sub-Sector for sustainable Economic Growth and published by the Ministry of Roads.

The policy recognizes sustainable growth and economic recovery as the mechanism by which the lives of Kenyans will be improved and the indicators identified in the Millennium Development Goals achieved.

A well planned and functioning transport system is a key driver towards the country's economic growth. In Kenya, road transport sector is the most common mode of transport. The road network

.

is currently not in a preferable condition that is required of it to play its role in promoting economic growth.

The current poor state of our roads is a result of many years of insufficient financing and maintenance. Financial and administrative needs of the roads in the country have increased steadily over the years and as a result they have outgrown the framework in which the sector is currently managed.

.

CHAPTER 3: METHODOLOGY

STUDY POPULATION.

The main target population in the area of study can be divided into the following sub groups; vehicle owners, public vehicle operators, motorcyclists and pedestrians. Samples of the study population was determined by use of the formula below.

$n_o = N/1 + N(e)^2$

Where,

n_o = sample size

N = Total Population

e = Margin of error

SAMPLING TECHNIQUES.

This research used random stratified sampling in order to collect data from all population sub groups related to the study in Narok central business district. The samples were selected based on time and points of high traffic congestion and traffic conflict. This is to allow respondents ample time to answer questions. Randomness in data collection ensured reliability and accuracy of the data collected.

DATA COLLECTION.

The study made use of both primary and secondary data sources. Both quantitative and qualitative techniques will be implemented in data collection.

.

Secondary Data.

Secondary data will be obtained mainly through literature review of journals, E-books, scholarly articles, and magazines. Other sources of secondary data will include Narok town plan, case studies, aerial photographs and maps. Only relevant information associated with the study will be analyzed.

Primary Data.

Primary data will be collected from the field through the following techniques;

a) **Questionnaires**

   The study made use of both open ended and structured questionnaires to collect data from respondents.

b) **Observation**

   The research employed the use of observation to identify and record phenomena relevant to the study and characteristics of the subjects of study. Some of the data that was collected using this technique involve challenges faced transport modes within the study area, road user's behavior, intra – urban transport modes and points of traffic conflict.

c) **Interviews**

   This study involved face to face interaction with the respondents on both an individual and group setting. This technique came in handy to collect data that was not captured through observation and questionnaires. The respondents include; motor cyclists, pedestrians, commuters, truck drivers, 'matatu' and taxi drivers and traffic police.

d) **Photography and mapping**

   Photographs were used to capture the transport infrastructure and the traffic situation at the areas of conflict. The study maped out the area of study to point out the areas of traffic congestion.

.

DATA ANALYSIS.

The research used Microsoft Excel to analyze and document the findings from the data collected. Graphs, charts diagrams, maps and tables will be used where applicable.

LIMITATIONS.

Some of the limitations that were faced during data collection include;

- Time barrier.
- Harsh climatic conditions.
- Language barrier.
- Financial constraints

.

CHAPTER 4 : STUDY AREA

4.1 INTRODUCTION

This chapter describes the location of the study area and its relation in the regional and national context while showing the interlinkages with the wider Narok County.

4.2 HISTORICAL BACKGROUND OF NAROK TOWN.

In 1907 the colonial government awarded 30,000 acres of Maasai land to a white settler. This land lay within the boundaries of the southern Maasai reserve that was established through a treaty with the colonial government in 1904. In 1904 the colonial government bargained for settlers to be allowed in the northern Maasai reserve in exchange the locals were allowed to expand the boundaries of the southern border. Maasai elders agreed to the move under certain terms, that the current Narok town and the Mau Narok will remain as part of the reserve. The land was referred to as the promised land in the colonial government documents to mean the land that was promised to the Maasai People. The second Maasai agreement was signed in 1911 in reference to the official maps that that did not acknowledge the presence of a northern border. There was a delay that bought him for a white settler to choose the best land for himself .in 1913 the colonial court rejected a petition of the Maasai community on claims that part of their land was grabbed by a white settler. The government used intimidation and manipulation to stop the Maasai elders from taking the court case to the court of appeal (MERC,2017).

It didn't take long before Maasai villages were removed to pave way for construction of the white settler's settlement. The community made attempts to report the situation to the colonial administration however r the government reacted by releasing police to contain the Maasai resistance. However the locals were defiant to this move and they continued grazing their animals in the settlers farms. They further defied the order to move their houses. The colonial government reacted to this defiance by making arrests, shooting of trespassers, forceful evictions, jailing and prosecutions. However this did not stop the Maasai from fighting for their land. Maasai elders launched a campaign to return their people to the land they were promised in 1904 but was taken away from them forcefully.

.

During this period the white settlers set up structures in the current local of Narok town where they started as a small trading center and a church. After independence the white settlers left and asked the government to sell the land back to its original land owners through the Settlement Fund Trustees. However in no land was given back to the native owners, the Maasai part of it was held back by the government and later sold as municipal plots around Narok town.

4.3 INTRA URBAN TRANSPORT MODES.

Intra urban transport modes in Narok can be classified into the following components, matatus, taxis, private vehicles and motor cycles.

Private vehicles are exclusively reserved for the middle- and

Upper-income groups because of the high cost of purchase and maintenance. Matatus in the town ferry commuters from the CBD to Total Estate and T.M. Matatus are the cheapest means of intra urban transport in the town due to their cheap fares. However matatus are facing a stiff competition from motor cycles due to the ability of motor cycles to cover a wide area, acessibity to areas are out of matatu operating zones and efficiency in travel time. On the other hand, taxis offer regular services with better frequencies hand the other modes and commuter comfort is assured despite the weather conditions available. Although their fares are quite high, taxis are the most preferred means of intra urban transport among the middle class and the wealthy due to their ability to offer a quick means of transportation and ability to access outlying areas in the town (Aduwo, 1990)

4.4 Physical attributes of Narok town

Narok town lies in the south western part of the country. Situated in the rift valley at an altitude of 1827m above sea level, the town boasts of a warm and temperate climate with an average temperature of 17^0 C and about 177mm of rainfall annually. March is the warmest month of the year with an average temperature of 18.5 °C. July is the coldest month, with temperatures averaging 15.5 °C. The driest month is July while the wettest month is April.

.

Table 1: weather averages in Narok Town

	January	February	March	April	May	June	July	August	September	October	November	December
Avg. Temperature (°C)	17.6	18	18.5	18.3	17.3	15.9	15.5	15.9	16.7	17.4	17.2	17.4
Min. Temperature (°C)	9.2	9.5	10.1	10.6	10.2	8.8	8.4	8.6	8.8	9.3	9.4	9.4
Max. Temperature (°C)	26	26.5	26.9	26.1	24.5	23	22.7	23.2	24.7	25.6	25.1	25.4
Avg. Temperature (°F)	63.7	64.4	65.3	64.9	63.1	60.6	59.9	60.6	62.1	63.3	63.0	63.3
Min. Temperature (°F)	48.6	49.1	50.2	51.1	50.4	47.8	47.1	47.5	47.8	48.7	48.9	48.9
Max. Temperature (°F)	78.8	79.7	80.4	79.0	76.1	73.4	72.9	73.8	76.5	78.1	77.2	77.7
Precipitation / Rainfall (mm)	70	68	91	154	101	36	22	24	27	32	68	78

.

The main road in Narok town is the Mahimahiu – Narok – Kalong Highway that passes through the CBD OF Narok town. This part of the road plays a major role in connecting with other roads that go through the town. This road is used by all the intra urban transport modes. Other roads in the town include the Nyawera Basabra road that serves an s a bypass from the main highway to town. The Nyawera road is mostly used by motor cycles and private vehicles. Other vehicles in the town include the main road running from the Hass petrol station junction to the county headquarters.

Due to the growth of the town over the years, the volume of people have increased, but the transport infrastructure hasn't changed. Intra urban transport modes have increased and are competing with each other however due to poor infrastructure and poor planning, this situation has led to traffic congestion in certain points within the CBD.

4.5 ONGOING PROJECTS

The county government of Narok through the ministry of Public works and transport has implemented construction of the Nyawera – Basabra Road that serves as a bypass from the main highway. Other road construction repairs are going on the road from Hass petrol station to Naivas supermarket after destruction by floods.

.

Fig 1 : Nyawera Basabra Road Under Construction

Source : Narok County Government

Rehabilitation of this roads has the following economic benefits:

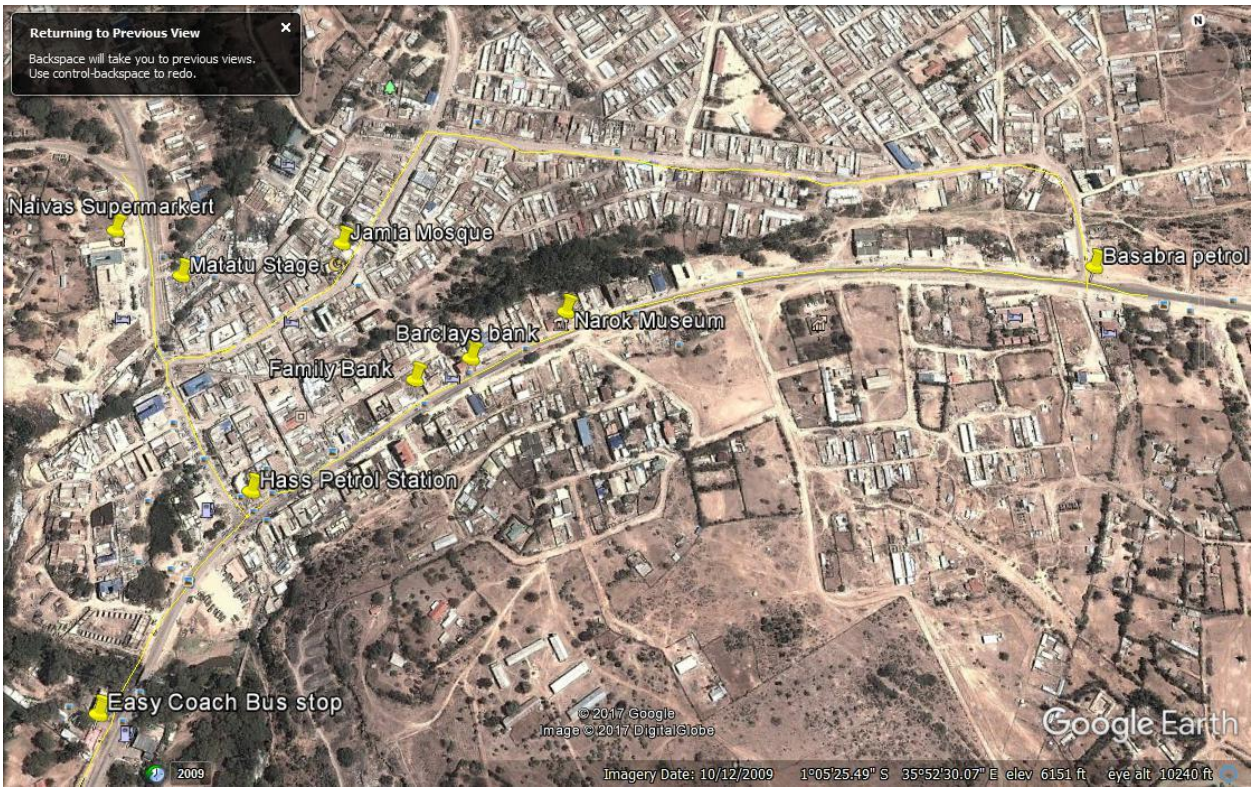
- Reduction of frequency and intensity of accidents.
- Minimized operation costs.
- Time saving between trips
- Improved discipline among transport modes operators
- Increased economic development of the town due to improved accessibility of Areas that were previously inaccessible by certain modes of transport.
- Increased accessibility to social services within the CBD.

.

4.6 LOCATION OF THE STUDY AREA.

The figure below shows the locational context of the study area at the national, regional and local level.

Fig 2: Location of major roads used by intra urban transport modes.



Source : Google Earth ,2017

.

CHAPTER 5: STUDY FINDINGS

5.1 Introduction

This chapter analyses the study's findings in form of charts , graphs and photographs.

5.2 TRAFFIC MANAGEMENT SYSTEMS IN NAROK TOWN CBD.

Worldwide, governments and regulatory authorities face the challenge of ensuring a well-managed balance of these factors, and a roadworthy and environment-friendly vehicle population is the outcome of a good traffic management system. Regulated vehicle registrations and licensing systems for the private, public or commercial use of vehicles ensure the fitness of all motorized road participants. (sgs, 2017). The effective implementation of any transport system is highly determined by the existing management systems at the particular time.

The different components used to manage traffic in urban areas include: pedestrian sidewalks, road markings, bus stops, traffic police, traffic lights, roundabouts, fly overs and roundabouts.

However the study revealed that among the above named components, Narok Town only makes use of four components that is: traffic police, road markings, and bus stops.

5.2.1 Bus stop/ matatus stage

There is one designated bus stage opposite Naivas Supermarket. This supposed to be the official point of picking up and dropping passengers aboard busses and matatus. However matatus are using the exit of shell petrol station and Hass petrol station to pick and drop passengers thus inconveniencing traffic flow along that part of the road. Buses passing through Narok while on transits stop opposite Kenol petrol station and this causes an interruption in traffic flow along that sector of the road further there is no designated stage for motorcycles leading to a completion for passengers at the bus stops and this leads to traffic congestion at this points in the CBD. The illegal picking up and dropping of passengers by motor cycles and matatus at undesignated points the CBD also plays a major role in causing congestion.

.

Plate 1: Matatus and motorcycles picking passengers along the road

.

Source: field study

.

5.2.2 Road markings

Some of the roads have markings indicating one way flow and presence of bumps. The roads also have kerbs that create a border between pedestrian sideways and the main roads. However the roads don't have clear signage to indicate the direction of turns at the T junction. There are no clearly indicated crossing points in the CBD. There are few signage of speed limits on the different roads. Road markings are useful in reducing conflicts among road users.

5.2.3 Pedestrian walkways

Pedestrian sidewalks are provided in some parts of the roads. However in some areas motorcycles and carts are parked on the sidewalks hence disrupting flow of passengers forcing them to use the road. This not only compromises on the safety of pedestrians but also sows down traffic flow. There are no zebra crossings in the entire CBD area. This has caused pedestrians to cross the road at any point that's near their destination. Lack of zebra crossing in the town has led to increased conflict between pedestrians and motorists.

Plate 3: Pedestrian sidewalks

Source: field study

.

5.2.3 Road Junctions.

The town has no roundabouts at the road intersections, however there are 2 T junctions on the section of the main highway that intersects the CBD. This junctions are at Basabra – Nyawera Road Intersection and the Hass Petrol Station Junction. Within the CBD there are other several T junctions where slip roads join the main roads. The study found out that this t- junctions have attracted illegal stopping points for motorcycles as they wait to pick up passengers.

Plate 4: road junctions

Source: field study

5.3 challenges facing traffic management of intra urban transport modes in Narok CBD.

The study identified several challenges faced by intra urban transport modes in the study area. This challenges included traffic congestion, increased travel time, lack of proper transport infrastructure, pedestrian-motorist conflicts as well as air and noise pollution.

.

5.3.1 Conflict between non-motorized and motorized transport modes.

The study recorded frequent cases of conflict between motorized and non-motorized transport modes along the major roads within the town. This conflicts mainly arise due to poor road behavior among road users where all parties felt they had the right of way. Another cause of conflict is lack of proper infrastructure i.e. walking lanes and cycling lanes, this led to conflict on the roads as each modes strives to compete for rite of passage. This not only compromises on the Safety of other road users but also slows down traffic flow thus causing traffic snarl up.

5.3.2 Pollution

Narok CBD faces pollution from motorized transport modes that emit petrol and diesel fumes due to the growing traffic volume in the town. If not properly controlled Emission of diesel and petrol fumes along the, has this pollutants will have adverse effects on human health and may lead to long term environmental degradation.

5.4 Causes of traffic congestion in Narok CBD.

Based on data collected during the study, the following were identified as causes of traffic congestion along major roads in Narok CBD:

5.4.1 Uncoordinated traffic control in road junctions.

The absence of traffic lights and traffic police has led to motorists scrambling for rite of passage causing confusion to other road users and this situation has led to traffic congestion mostly at junctions during peak hours.

5.4.2 Poor etiquette among road users

Most of the road users do not observe traffic rules attributing to the fact that there are no traffic police in sight. This leads to conflict among motorists and other

Road users with a resultant reduction in overall flow of traffic along the roads. Illegal changing of lanes by motorcycles and vehicles making illegal turns in the middle of the road causes confusion and slows down flow of traffic leading to congestion.

During the interviews conducted, it was discovered that motor cyclists riders complained of harassment from drivers of matatus and private vehicles. On the other hand Matatu and taxi drivers complained of motorcycle riders changing lanes without indication causing confusion.

.

5.4.3 Poor management of on street parking

Absence of designated parking lots in the town has led to on street parking of vehicles, motor cycles and trucks. On street parking in the town is poorly managed as motorists strive to get parking they are forced to stop or slow down in the middle of the road while allowing other vehicles on the parking lots to exceed. This not only reduced flow of traffic but also causes conflict among motorists.

The study also found out that there was no clear designated parking lot of Lorries and hence most of the Lorries were parked along the curb of streets. This practice not only reduced space on the already narrow roads, but also caused traffic congestion when the Lorries were turning.

5.4.4 Lack of proper transport infrastructure.

Lack of sidewalks and cycling lanes in the CBD has made passengers, cyclists, and handcart pullers to use the same lanes as motorists. This has not only caused traffic congestion , but also led conflict with other transport modes . This situation has also compromised on the safety of other road users.

5.4.5 Inadequate traffic management systems.

The town lacks a traffic management system to control the flow of traffic in the town. With the increased rate of vehicle and motor vehicle ownership due to reduced cost of purchase and better income rates, inadequate management of this transport modes causes congestion on the roads.

.

CHAPTER 6: CONCLUSIONS AND RECCOMEDATIONS.

6.1 Introduction

This chapter concludes on the study's findings while recommending on possible solutions on the traffic problems caused by poor planning of intra urban transport modes.

6.2 Conclusions

From the findings of the study, it is clear that traffic congestion experienced in Narok town CBD is a resultant effect of planning of intra urban transport modes and poor transport infrastructure in the town. A viable solution to this problem is establishing a clear understanding of the factors that lead solution to this problem is only possible through clear understanding of the factors Contributing to it. This has been clearly elaborated in the previous chapters.

Though eliminating traffic congestion completely is not possible, proper planning for intra urban transport modes and establishment of proper management systems can be used to control the flow of traffic in the town before it gets to an unmanageable point.

Some of the recommendations suggested below are short term while others are long term.

6.3 Recommendations

The study identified some viable solutions to the problem of traffic congestion in Narok town as outlined in the table below

PROBLEMS	RECCOMEDATIONS
Poor traffic control on road junctions	• In cooperate technology in traffic management systems. • Place traffic lights for signal control
Mixing of through traffic with inure urban traffic	Divert through traffic from the cod by construction of a bypass road.
Inadequate road markings	Place road markings and signs where they are missing.
Poor etiquette among road users	Promote public awareness campaigns

.

	Strengthen enforcement of traffic rules using traffic police.
On street parking	Discourage on-street parking by allocating parking lots in the cod.
Inadequate non-motorized transport infrastructure	Provide cyclists lanes, sidewalks for pedestrians, zebra crossings and overpass foot bridges.

.

APPENDICES

REFERENCES

1. Ngai P., Kumasi (2004), **Techniques in research design, data collection and analysis**: ***A training manual,*** Nairobi: UNCRD, Africa office

2.. Rodrigue P. (1998-2009), **Road Transportation:** *Dept. of Global Studies & Geography*, Hofstra University, New York

3.. Rodrigue P. (1998-2009), **Urban Land Use and Transportation:** *Dept. of Global Studies & Geography*, Hofstra University, New York

4. Japan International Cooperation Agency (JICA) (2004), **Master Plan for UrbanTransport in the Nairobi Metropolitan Area.**

5. The Urban Mobility Report (UMR), (2009).

6. Kenya, Republic of (2004), **the Integrated National Transport Policy: *Moving a Working* Nation** Volumes I, II and III. Nairobi: The Government Printer

.

7.World Bank. (2009). Cited in Pabst. M. (2014)Good Governance Africa. gga.com

8. World Bank. (2010). Cited in "G worst Commuter Cities – Africa-"allAfrica. allafrica.com.

9. This is Africa. (2014). "Nairobi City Traffic jam Costs Kenya 37 billion shillings amnelly-"A report on August 28, 2014. thisisafrica.me

10. Sanders.(2015). IRF Congestion in work zones Webinar. Barriersystemsmic.com.

11. http://digitalcommons.unl.edu/usdot/50/

12.http://documents.worldbank.org/curated/en/650141468248419267/pdf/718450ESW0Whit0ing0Annexes00PUBLIC0.pdf

13. http://www.maasaierc.org/history-of-mau-narok

.

MAASAI MARA UNIVERSITY

DEPARTMENT OF ENVIRONMENTAL SCIENCE , AGRICULTURE AND FORESTRY

PLANNING RESEARCH PROJECT

PLANNING FOR MANAGEMENT OF INTRA –URBAN TRANSPORT MODES IN NAROK: A CASE STUDY OF TRAFFIC CONGESTION IN THE NAROK CBD.

Declaration: This is a research exercise which is part of training offered in Bsc . Environmental Studies

The information obtained is purely confidential and will be used for academic purposes only.

QUESTIONNAIRE FOR PUBLIC VEHICLE OPERATOR

Name of interviewer: Kaylenah Rapemo

Questionnaire No……Date……

Locality…….

Section I: Background Information

1. Name (Optional)…….....……

2. (a) Apart from Uhuru highway do you have alternative route to your destination?

1. Yes (specify)…… 2. No

(b) If yes, why do you avoid it?

……

3. In your own view what do you think causes traffic congestion in Narok CBD? (Tick)

a. Uncoordinated traffic control
b. Offensive driving.
c. Mix of through traffic with city traffic
d. Inadequacy of transportation facilities (traffic lights, zebra crossings, bus stops, etc)

.

e. Others (specify)

4. Does the following road users affect your easy movement along major roads in Narok CBD?

Road user	**In what way?**
Public vehicles	
Motorcyclists	
Private vehicles	
Pedestrians	
Hand cart pullers	
OTHER	

5.What would you recommend to reduce traffic congestion ?

(a).....

(b).....

(c).....

THANK YOU!

.

MAASAI MARA UNIVERSITY

DEPARTMENT OF ENVIRONMENTAL SCIENCE , AGRICULTURE AND FORESTRY

PLANNING RESEARCH PROJECT

PLANNING FOR MANAGEMENT OF INTRA –URBAN TRANSPORT MODES IN NAROK: A CASE STUDY OF TRAFFIC CONGESTION IN THE NAROK CBD.

Declaration: This is a research exercise which is part of training offered in Bsc . Environmental Studies

PEDESTRIAN QUESTIONARE

Name of interviewer: Kaylenah Rapemo

Questionnaire No……Date……

Locality……..

Section I: Background Information

1. Name (Optional)…….....……

2. Age……..

3. Gender

Male . Female

4. Occupation……..

Section II: Trip Details

5. Where are you coming from?……

6. Where are you going?……

.

7. What is your main reason for travel?

Work . School

Leisure/social . Shopping

8. (a) Do you always feel comfortable while you are crossing the road?

1. Yes 2. No.

9. In your own view what do you think causes of traffic congestion along Uhuru highway? (Please tick)

Uncoordinated traffic control

Offensive driving

Mix of through traffic with town traffic

Inadequacy of transportation facilities (traffic lights, pedestrian crossings)

Others (specify)

10. What would you recommend to reduce traffic congestion problems ?

(a)……

……..

(b)……

……

(c)……

……..

Thank you!

.

MAASAI MARA UNIVERSITY

DEPARTMENT OF ENVIRONMENTAL SCIENCE , AGRICULTURE AND FORESTRY

PLANNING RESEARCH PROJECT

PLANNING FOR MANAGEMENT OF INTRA –URBAN TRANSPORT MODES IN NAROK: A CASE STUDY OF TRAFFIC CONGESTION IN THE NAROK CBD.

Declaration: The information obtained is purely confidential and will be used for academic purposes only.

INTERVIEW SCHEDULE – NAROK COUNTY OFFICES DEPARTMENT OF PUBLIC WORKS AND TRANSPORT .

Name of interviewer: Kaylenah Rapemo

Date……

1. How do manage vehicular traffic in Narok CBD?
2. What are some of the problems encountered in enforcing the rules and regulations under the above measures?
3. What are the factors contributing to traffic congestion in Narok CBD?
4. What method do you use to collect traffic data?
5. Is road capacity adequate to meet the current traffic in Narok CBD?
6. Who should be the key player(s) in reducing traffic problems in Narok CBD?
7. What could be done to reduce traffic congestion problems In Narok CBD?

Thank You!