

**THE EFFECT OF ROAD INFRASTRUCTURAL IMPROVEMENT ON  
PERFORMANCE OF THE MATATU INDUSTRY IN KENYA. A CASE STUDY OF  
THIKA SUPER-HIGHWAY**

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department in partial fulfillment of the requirements for the award of the degree of  
Masters of Business Administration of Kenyatta University**

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## DECLARATION

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

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This research project is submitted for examination to Kenyatta University with my approval as the candidate's supervisor.

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## **DEDICATION**

I dedicate this research project to my wife Teresa and daughter Ann for the love, moral and financial support and prayers during the time of writing the research project. I owe a great debt of gratitude to them.

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May the Almighty God bless you all!

## ABSTRACT

The Thika road is in the northeast of the Nairobi Metropolitan Region. The road extends from Nairobi City Center to Thika Town. The road is one of Kenya's flagship projects. The trunk road currently acts as a main cargo route and is an important metropolitan, regional and international transit link and is classified as international trunk road A2. This road originates in Nairobi City Center and extends to Moyale, Ethiopia. This road also acts as a main feeder road for various satellite towns and economic hubs that lie along and near the corridor, including Ruaraka, Kasarani, Kiambu Town, Githurai, Ruiru, Juja and Thika (KARA, 2012). The Kenyan government, Chinese government and the African Development Bank funded this project and is expected to contribute and enhance transport services and urban mobility in the Nairobi Metropolitan Area by reducing general transport costs, improving accessibility to public transportation. In addition the project is expected to promote private sector participation in the management and operation of road infrastructure in Kenya. Thika road accommodates many Matatu routes that have been licensed by the Transport Licensing Board (TLB) among them; route 145, 44, 100, 102, 120, 146, 17 B, 25, 11, 45, 46, and 237. Each route has the main SACCO which, as mandated by the transport licensing board is responsible for managing the affairs of the route. It is one of the busiest roads in East and Central Africa with a day capacity of over 60,000 vehicles, both public service vehicles as well as the private vehicles. There have been increasing concerns on the road safety measures that have been put on this road, given that road signs vandalism is on the rise, poorly managed SACCOs, the number of road accidents have been rising as well. The costs of fuel have been regulated at high levels by the energy regulatory commission (ERC). The number of police crackdowns has been accelerated on this road and police bribery is rampant. The street lights hardly work at night. This study sought to find out whether the improvement of this super-highway will have any significant gain on the Matatu industry's performance. Descriptive research design was used in the methodology. Target population will be Matatu drivers, conductors and Matatu owners who are members of the SACCOs plying the Thika super highway. For convenience of the study the researcher selected four routes namely; Thika (237), Githurai (45), Kasarani (17B) and Kahawa west (44) routes. Simple random sampling methods was used to draw a sample of 500 respondents from the selected routes. Data was collected mainly using questionnaires that was administered to PSV owners who are members of the four routes main SACCOs, while interview schedules was administered to operators in the selected routes in the super highway. Quantitative data was analyzed using SPSS statistical package. This aided in generating descriptive statistic such as percentages and measures of central tendency. These was presented using simple descriptive statistics such as tables, graphs, charts, figures and cross tabulations. MS-Excel will be used to generate the descriptive statistics and to establish the relation between the dependent, independent and intervening variables of the study. Qualitative data was organized into themes and categories pertinent to the study, from which the researcher closely evaluated the usefulness of the information in answering the research questions.

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## **ABBREVIATIONS AND ACRONYMS**

KARA	-	Kenya Alliance of Resident Association
SPSS	-	Statistical Package for the Social Sciences
KENHA	-	Kenya National Highway Authority
KURA	-	Kenya Urban Roads Authority
SRSM	-	Simple Random Sampling Method
TLB	-	Transport Licensing Board
ERC	-	Energy Regulatory Commission
MOA	-	Matatu Owners Associations
MWA	-	Matatu Welfare Associations
SACCO	-	Saving and Credit Cooperative
AfDB	-	Africa Development Bank
PSV	-	Passengers Service Vehicle
TLB	-	Transport Licensing Board
KWS	-	Kenya Wild Life Service

## **OPERATIONAL DEFINITION OF TERMS**

- Matatu - Passenger service vehicle operated for commercial purposes.
- Mungiki - Terror gangs that extort dwellers and public transport vehicles.
- Nissan - A fourteen (14) seat van of the Toyota and Nissan models.
- Mango-tore - A kikuyu language term meaning cents.
- Development - It refers to the changes in the level of functioning. It is the gradual accumulation of relatively permanent age related changes involving intensity and complexity of functioning

## CHAPTER ONE: INTRODUCTION

This chapter will carry the background of the study, statement of the problem, objectives of the study, research questions, significance of the study, limitations and delimitations, theoretical framework, conceptual framework and operational definition of terms.

### 1.1. Background of the Study

Road infrastructure has been the responsibility of National governments as well as county governments in some countries. Road construction and maintenance is funded by the government using funds taxes. Most governments also have adopted the system of giving the construction work to private concessionaires who build the roads and must recover the investment funds through a tolling system. They run the tolling system for a number of years say ten to twenty years until they recover the agreed value of money invested (Austin, 2007). In the United States of America the federal government funds roads classified as national trunk roads while the rest of the roads are the responsibility of the county governments. It has been agreed that countries that achieve steady economic growth must have sizeable investments in infrastructure. Examples of such countries include Japan, U.S.A, United Kingdom, Germany, china, South Africa among others (Raissudin et al, 2007)

The African development bank (AfDB) and the Chinese development bank have been funding most of road infrastructure projects in Africa. They have funded these projects in countries such as Kenya, Ethiopia, South Sudan, Sudan, and South Africa among other countries. These countries of Africa have formed regional blocks which marks the international routes which every country must complete the construction work (ADB, 2002). Some countries have been progressing with regard to road infrastructure development. These countries include Uganda, South Africa, Ghana, Nigeria, Egypt, and Tanzania. The republic of Kenya have been lagging behind in infrastructure development although in the last ten years the government have been upbeat in these work and have tarmac thousands of Kilometers to international standards.

In Kenya it is the responsibility of the national government to develop and maintain all national marked trunk roads .The government of Kenya constructs this roads through it various bodies such as the Kenya urban roads authority (KURA), the Kenya rural roads authority (KeRA), the Kenya national highways authority (KeNHA). Each authority has its network of roads which it

must maintain and or rehabilitate. Other arms of government have the responsibility of maintaining some roads such as the Kenya wild life service (KWS) and the county councils (PCI, 2011). Under the new constitution the county councils are to be run by the count governments and the mandate of building and maintaining these roads have also been transferred.

The Kenya government still lags behind schedule. Some of the roads that have been ear marked are yet to be made passable while most the road network especially in the rural areas is still of temporary nature. A lot of resources have to be pooled to undertake road construction in Kenya if the country is truly to achieve the much anticipated vision 2030 (Muhu 2012)

### **1.1.1. Infrastructure improvement in Kenya**

Road Infrastructure is a key driver to development of Nations. The Kenya Vision 2030 envisions a country firmly interconnected through a network of roads, railways, ports, airports, water ways and telecommunications as well as adequately provided with energy.

Road transport is the predominant mode of transport and carries about 93% of all cargo and passenger traffic in the country. Kenya's road network has been established to be 160,886 km long. About 61,936km of these roads are classified while the remaining 98,950km are not classified.

Responsibility for the management of the road network falls under the Ministry of Roads and implemented through Kenya National Highways Authority (KeNHA), Kenya Rural Roads Authority (KeRRA), Kenya Urban Roads Authority (KURA) and Kenya Wildlife Service (KWS)( ministry of infrastructure 2011).

### **1.1.2. Matatu Industry.**

Matatu entry in public transport in Kenya can be dated to the mid-1950s, when they started operating in Nairobi and were considered an illegal commercial entity. The matatus faced harassment from the Nairobi City Authorities and the Kenya Bus Service, a major transport monopoly in Nairobi. It had to take a presidential intervention for the matatu to break in the transport niche that was the domain of a multi-national company working in collaboration with the local civic authority. since then the Matatu industry has grown to take full control of the public transport system in kenya (Kwenji, 2013).the governemt has tried to stream line the sector by introducing very stringent regulations such as the famous michuki laws, the traffic amendment act of 2012 and the operations of the members through SACCOS.

The sector has had other challenges such as the illegal gangs menace and the deep rooted corruption that deny the operators funds to further the sector.

### **1.1.3. Matatu Operators and the Super Highway**

The Thika Super Highway has been a key infrastructure project by the Government of Kenya and other development partners such as the Chinese Government and the African development bank. This project is a key pillar to achieving vision 2030. It is one of the busiest roads in East and Central Africa.

The construction of this road began in 2007 and will be expected to end in 2009. This road will be expected to fully open up this section of Nairobi county as well as the other counties where the road touches such as Kiambu County. Land value and house projects value near the road are expected to rise. The road will be also expected to accommodate more vehicles and reduce the travel time from Thika to Nairobi (PCI, 2011).

The road has also attracted very many Matatus on the routes that use this road such as Kahawa West, Thika town, Mwiki, Githurai, Ruiru, Baba Ndogo just to mention but a few. Many commuters have confessed that the travel time to their destinations have indeed reduced with the completion of this road. This road has however been a centre of controversy over the increasing numbers of accidents such as along the Safari Park Hotel area and Ruiru-Kihunguro area. The traffic police have also increased their crack downs on un-roadworthy vehicles which have had serious negative effect on the operations of the Matatus on this road (Muhu, 2013).

The traffic act has been amended to include new fines on traffic offenders and these fines are extremely high as confessed by the Matatu operators. They have even gone on strike on several occasions to agitate for total scraping of these hefty fines. The traffic police and the national assembly have been adamant and insist that these rules are meant to tame this otherwise unruly sector. The energy regulatory commission that is mandated to regulate pump prices have also been on the spot for having set very high pump prices that the sector members complain are too high necessitating a rise in commuter fares(Daily nation, 2012).

This research wants to find out whether this road will have any significant improvements in the operations of the sector as far as profitability is concerned, the operators relations with the traffic police, the road effects on commuters travel time and cost of travel, and the effects extortionists groupings such as Mungiki and other illegal gangs.

## **1.2. Performance of Matatu Industry**

The Matatu industry in Kenya dates back in the pre colonial period. It was informal sector and most entrepreneurs had only one Matatu which they used to carry passengers. There were other multinational companies which run at the time such as the Kenya bus service. The maattu industry have seen through hard times where the government have come up with very severe legislations such as the famous michuki rules, the amended traffic rules of 2012 and the Kenya transport policy. The Kenya transport policy proposes the banning of 14 seat Nissan Matatus. The Kenya government is on the other hand urging the operators to upgrade with 25 seats and above minibuses. This is an attempt to reduce the traffic jams witnessed in Nairobi in the last few years (Graeff, 2012).

The performance of the matatu industry may be looked at through the growth indicators. These indicators could be the number of new Matatus that enter the designated routes, the profitability of the sector, the lifespan of the Matatus, the number of jobs the sector creates every year, the growth of the Matatu SACCOs and the lawlessness in the sector ( Chitere, 2004).

### **1.2.1. Profitability of the Matatu Sector**

Matatu sector used to be the preserve of the old guards in the industry. However in 2004 when the famous Michuki rules were introduced, many professionals thought that the rules would stream line the sector and very many minibuses were bought. Within few years the rules were no longer in operation and the sectors performance had dragged behind again. The rules were thought that they would deal with the illegal gangs menace and eliminate corruption.

It is believed that the operators break even within a period of three to four years and that the Nissan Matatus have a lifespan of five to six years depending on maintenance. The main cost items incurred by the operators are; fuel costs, tire replacement, spraying costs, general maintenance costs of bulbs, engine oil (service), and bushes bearings interior repairs among others. The owners frequent themselves to garages because of the recklessness of their drivers (Otundi, 1999).

It has been suggested that the operators (drivers and conductors) should be employed on a permanent basis. This is believed that would cut costs because if the workers are employed on

the temporary basis they are likely to embezzle funds on a regular basis and this would disadvantage the sectors' growth.

### **1.2.2. Corruption**

The issue of corruption has been recognized as a thorny one. Every year the owners loose over 2 billion shillings to corruption. The operators hardly observe the law and in return bribe the police officers. The government has thus been loosing a lot of revenues. The owners equally have been loosing money that would be used to fund the repairs of their vehicles. Police officers threaten the operators that should they not comply with their demands, they (police) would go ahead and charge the drivers and conductors of very hefty fines. The operators' hands have been tied as a result and in most cases they comply with police officers demands. If they do not comply they are likely to be victimized and these may get the operators out of business (Madcowa, 2012).

### **1.2.3. Energy regulatory commission**

It has been mandated to oversee the pricing of petroleum products in Kenya. These products include diesel, petrol and paraffin among others. The pump prices have been the highest since Kenya got independent. These prices are said to be influenced by the currency exchange rates (strength of shilling) and the price of crude oil in the international market. It has been argued that the fuel prices in Kenya are high partly because of the inefficiencies of the oil refinery in Kipevu Kenya. The operators have thus been incurring high costs of fuel and this is believed to be slowing down the growth of the 14 seat Nissans. The government of Kenya has seen banned this Nissans from operating. It is thus argued that the 25 seat minibuses are likely to be profitable due to economies of scale (kwenji, 2013).

### **1.2.4. SACCOs**

The operation of matatus has been reorganized since the introduction of Michuki laws. Matatus are required to operate through SACCOs. The routes are licensed by the Transport licensing board to Members of a registered SACCO. The government believes that this attempt would help stream line the operations of the sector and increase accountability. There are thus very many SACCOs in Kenya today and the operators are pooling resources to upgrade their matatus from the 14 seat nissans to the minibuses and buses. This was part of the Kenya transport policy.

Many people believe that the introduction of SACCOs to manage the affairs of the sector will assist in the growth process and that by the time the nissans matatus are completely faced out the transport sector will have revolutionized and Kenyans would be seeing international bus companies taking over this sector. The bigger buses are said to be cost effective and can transfer the benefits to customers and would eventually reduce fare (Graeff, 2012).

**1.2.5. Illegal gangs.**

There are many degazeted illegal gangs in Kenya including Mungiki, kamjesh, jeshi la mzee, bagdad squad, china squad among others. These are extortionist groups that rape the sector of their funds. Terminuses are controlled by these groups and the owners and operators must pay for the passengers to board their Matatus at theses terminus. In most of the routes the operators must part away with between 200sh to 500 sh. every day ( Khamis, 2006). This increases the cost of operations that the operators incur on a day to day basis

Daily operators’ costs of running a Matatu

Daily Cost of running a matatu	Fuel	(50%)
	Wages for driver and conductor	(25%)
	Daily wear and tear	(2.5%)
	Corruption	(15%)
	Illegal gangs	(7.5%)

Source: (Khamis, 2006)

**1.3. Statement of the Problem**

Nyakweba et al, (1999) looked at the attitude towards tax practices on small scale public transporters (Matatu). They concentrated on the Nairobi region. They found out that the Matatu operators were not willing to disclose their income to government agents for tax purposes. Matatu operators thought that they already pay their taxes through the licenses fees they pay to the government. They were not willing to disclose their monthly income for tax purposes

because the operators already feels that they are overtaxed on fuel and other fees introduced in the sector.

Chitere et al, (2004) investigated the performance of owners, workers and their associations and potential for improvement. In his publication titled matatu industry in Kenya; they concluded that the Matatu sector needs to be stream lined by the introduction of legislation and a transport policy. They argued that the sector was run informally leading to the lawlessness experienced. Tough legislation should be introduced to protect the interest of commuters who suffer in the hands of reckless drivers. They argued that should the industry be streamlined it may be profitable and would attract professionals. The government of kenya have introduced tough traffic laws which is now hurting the industry.

Kwenji, (2013) stated that the matatu industry is for a major overhaul. She studied the impact of the new legislations and transport policy on the Matatu industry. She recommends the implementation of the new traffic rules as they would streamline the sector especially by reducing road carnage.

Muhu, (2012) looked at the factors affecting the success of public private partnership (ppp).she based her case study on Thika superhighway. In her study she recommended that there should be more of public private partnerships to accelerate the rate of infrastructure development in kenya. The rate of development can not be left in the hands of the government alone as governments have other obligations to fulfill such as security.

Wakuru,(2006) investigated the road transporters vulnerability to illegal gangs and corruption. His study found out that the Matatu operators are victims of illegal gangs and massive corruption especially in urban dwellings. Wasike, (2001) looked at the role of road infrastructure development in the growth of the economy. His study concurred that development of infrastructure lays the foundation to development of the economy due to the multiplier effects

The above research work concentrates about the Matatu sector or the road infrastructure in kenya. While the research work may be useful to provide valuable information on the performance of the sector as well as infrastructure development, there lacks a research on the

effects of infrastructure development on the performance of the Matatu sector, which this study seeks to find out.

#### **1.4. Objectives of the Study.**

##### **1.4.1. General objective.**

The study aims to find out the effects of road infrastructural improvements on the performance of Matatu industry in Kenya.

##### **1.4.2. Specific objectives.**

- i. To assess whether the quality of construction materials will improve the performance of the Matatu industry.
- ii. To find out whether the drainage systems on the road will contribute towards improving the performance of the Matatu sector
- iii. To establish whether the lighting systems and road signs will enhance the sector's performance.
- iv. To unearth whether the increased number of lanes have any positive correlation with the sector's performance.

#### **1.5. Research Questions**

- i. Does the quality of construction materials improve the performance of the Matatu sector?
- ii. Will the drainage systems on the road help to improve the performance of the Matatu industry?
- iii. Will the lighting systems and road signs assist in the improvement of Matatu sector's performance?
- iv. Could the increased number of lanes have any correlation with the sector's performance?

#### **1.6. Significance of the Study**

The study will provide very vital financial information on the extent to which the Matatu sector may be profitable once a good infrastructure is in place. Thus the study will provide crucial revenue and cost data that may be analyzed to determine the effects of infrastructural

improvements of roads in Kenya on the Matatu sector's performance. The researcher hopes that the research will provide tangible conclusions on the correlation between infrastructural improvements and Matatu industry's performance.

The study will assist policy makers and legislators in weighing the effects of use of quality materials and workmanship when constructing highways as well as the effects of construction of standard lanes roads with modern durable drainage systems on the sector performance. The study will also seek to find out on the need to have properly marked roads with pedestrian walkways and well maintained signs that provide crucial direction and usage of the highway.

This information will assist the government in fast tracking other major infrastructure projects in the country.

### **1.7. Limitations and Delimitations of the Study.**

The researcher will cater for all the expenses incurred in his studies despite the usual financial constraints. The expenses include; transport costs, cost for typesetting and printing, photocopying questionnaires, and other miscellaneous expenditures. The researcher will rely on his salary in meeting these expenses.

The researcher will have no control over the nature of responses given by the respondents. Lack of control over these responses therefore forms part of the limitation in the context of authenticity of the current study. The researcher will try to structure the questionnaires in a manner to eliminate respondents' bias as much as possible.

The study will require a lot of time which is limited to the researcher since he is working and at the same time studying as he does the research. The researcher however intends to seek leave to facilitate the collection of data needed for this research.

The findings of the study may not be used on any other road in the country but only in Thika Super Highway.

### **1.8. Assumptions of the Study.**

The researcher expected that all the respondents would cooperate and provide reliable responses.

### **1.9. Scope of the Study.**

This study will be conducted along the Thika super highway. This highway is located north east of Nairobi city, the capital of Kenya. There are numerous public service vehicle routes as licensed by Transport licensing board. Some of these routes include 145, 44, 100, 102, 120, 146, 17 B, 25, 11, 45, 46, and 237. The study will gather vital information from the stakeholders involved in this sector. Some of these stakeholders include; the Matatu associations, the Matatu SACCOs, Matatu owners, the government, Matatu drivers and conductors and any other interested party as may be revealed in the course of the study.

The study will also rely on the existing legislation governing the sector such as Kenya transport policy, ministry of infrastructure relevant documentaries and any other relevant research material that concerns this vital sector.

## **CHAPTER TWO: LITERATURE REVIEW**

This chapter contains the theoretical review, empirical review, conceptual frame work and the research gaps.

### **2.1. Theoretical Review.**

#### **2.1.1. Theory of Hard and Soft transport measures.**

This study will be based on the theory of Hard and Soft Transport Policy Measures (HSTPM) by Jochen Richter, Margareta Friman and Tommy Gärling, (2010). This trio found out that, in order to abate problems resulting from increased car use, hard transport policy measures have been introduced such as improvements of infrastructure for and management of public transport services, increased costs for car use, and prohibition or rationing of car use. These measures often meet with public disapproval, are politically infeasible, and may alone be insufficient. As a consequence, alternative soft transport policy measures have been developed to motivate individuals to voluntarily reduce car use. The paper reviews evaluations of the effectiveness of such measures implemented in Australia, Austria, Germany, Japan, Netherlands, Sweden, UK, and USA. The review shows that in general soft transport policy measures are effective. However, a variety of the results makes it difficult to tell why the measures are effective.

Soft transport policy measures involves workplace travel plans which are measures primarily aimed at encouraging and enabling employees to travel to work more sustainably; School travel plans which are introduced at schools to encourage and enable children to travel more sustainably; Personalized travel planning where individuals are offered personalized information to encourage and enable them to travel more sustainably; Public transport information and marketing which includes advertising campaigns, the provision of accessible information and simplified ticketing schemes; Travel awareness campaigns which involve a wide range of media aimed at improving general public awareness; Car clubs where individuals are encouraged to join a club that gives them access to a number of cars parked in their neighborhood, where they pay when they use the cars; Car sharing schemes (car pooling/ride sharing) where individuals are encouraged to share their private vehicles; Tele-working where employers encourage employees to work from home; Teleconferencing where telecommunications are used to facilitate contacts that would otherwise have involved business travel, and; Home shopping whereby customers

place orders electronically and purchase goods which are then delivered to **them**. Möser and Bamberg (2008) observes that the first five types are the most frequently implemented in the last decade. This is evidenced by Japan whereby mobility management is referred to as Travel Feedback Programs (TFP).

Soft transport policy measures also referred to as voluntary change measures, psychological and behavioural strategies or mobility management tools endeavors to motivating individuals to voluntarily switch their car travel patterns to more sustainable travel modes. These measures target reducing car use as well as improving more sustainable modes by providing customized information, incentives, and customized feedback (Cairns et al, 2008).

The above theory as proposed by Richter et al (2010) have been found relevant for it is in tandem with the government and stakeholder intentions of decongesting the superhighway. The government has attempted the hard policy measures such as road expansion to accommodate more vehicles and thereby attempt to eliminate the traffic jams experienced in this section of Nairobi.

These measures may surprisingly work. However, the government needs to borrow a leaf from this theory and introduce soft policy measures aimed at regulating the level of car use by the commuters. The measures would also regulate the extent of travel by employees by campaigning for the use of techniques such as teleconferencing, tele-working, personalized travel planning, school travel plans and workplace travel plans. These measures have been found to work in places such as Austria, Australia, UK, Japan and USA. In this places there more cars than are in Kenya. It is the researcher's believe that the government should employ these measures to reduce the congestion in public roads in Kenya.

### **2.1.2. Road Infrastructure and Regional Development Theory.**

Valerija botric, jelena sisinacki and Lorena Skuflic assert that investment in transport infrastructure has a positive impact on a regional development. The Theory suggests that interaction between infrastructure and regional development can be classified as; Infrastructure follows regional development, Importance of infrastructure development as an inductor of the

regional development, balanced development, which equally emphasizes the role of infrastructure and economic growth in the region.

While it is quite easy to determine direct benefits in term of reduced travel time, reduced vehicle operating costs as well as increased transport safety, contribution to the society (regional) development as a whole i.e. evaluation methods, are subject to certain discussions. Through its development strategies, the Republic of Croatia is supporting thesis that infrastructure network is prerequisite to the regional development.

In that context, intensive investments in the highway programme are elaborated with the expected positive effects on the regional development. Building of the so called Croatian highway that should improve transport connections within the County of Istria was selected to determine weather or not there is a justification for such a belief. It was expected that positive effects of the infrastructure development was to be proven by the selected indicators, which confirmed that infrastructure can be considered as an inductor of the regional development in Croatian case.

### **2.1.3. The Role of Economic and Social Infrastructure in Economic Development: A Global View.**

Dr. K.A. Familoni observed that Infrastructures are basic essential services that should be put in place to enable development to occur. Socio-economic development can be facilitated and accelerated by the presence of social and economic infrastructures. If these facilities and services are not in place, development will be very difficult and in fact can be likened to a very scarce commodity which can only be secured at a very high price and cost. The development and provision of infrastructures has been the subject of much theoretical analysis and empirical studies.

The theory asserts that Public infrastructure does three things: It provides services that are part of the consumption bundle of residents; Large-scale expenditures for public works increase aggregate demand and provide short-run stimulus to the economy; and It serves as an input into private sector production, thus augmenting output and productivity.

The provision of economic infrastructure can expand the productive capacity of the economy by increasing the quantity and quality of such infrastructure. The transformation curve or the production possibility frontier or curve would shift with the expansion of the economic infrastructural base, thereby accelerating the rate of economic growth and enhancing the pace of socio-economic development. Improvements in maintenance would enhance the quality of existing infrastructure. The development of such gigantic projects as railways, road, transport, telecommunications, gas, electricity, irrigation works, et cetera “entails large investments which are beyond the capacity of private enterprises” in LDCs. Beyond that, their privatization for enhanced performance and accelerated growth has not met with a high degree of success in most LDCs. Consortia buying the SOEs, such as NITEL in the telecommunications sector in Nigeria, have not found it easy to raise the funds to buy the majority ownership shares.

If they cannot buy majority shares into existing SOEs, it is needless to say that they cannot muster the resources necessary to compete with the existing government-owned parastatals. It is such competition really that can ensure an effective deregulation of the economy, with the dividends of such deregulation accruing to the citizens or masses of such countries. Otherwise, mere ownership changes cannot bring about the necessary panacea and relief to such economies. If maladministration and mismanagement are the problems of the SOEs, it is therefore prudent to allow management contractors, with some equity ownership to make them stakeholders, to run them for government or lease them for specific negotiated periods. Better management of economic infrastructure would have positive output, income and employment effects on the economy. Moreover, it will impact directly on the poor, thus reducing poverty. Greater supply elasticity of goods and lower production costs of DPAs should have an anti-inflationary effect. With domestic price levels falling, such an economy’s export competitiveness in international trade will ensure an improved balance of trade, balance of payments, and less foreign debt burden.

Social infrastructure has enormous externalities. Education and health are social goods in which social marginal productivity (SMP) exceeds private marginal productivity (PMP). Therefore, private investment capital in such social infrastructure is likely to fall far short of what is needed. In that case, it is imperative for the state to provide the finance and other complementary

resources for the take-off of such social infrastructural projects. The state does not necessarily have to operate or manage a social infrastructure, but it is necessary for the state to provide guidelines for and monitor its operation.

Education is a very important source of economic growth as the Denison study shows. Even though education may be a social investment, it is also an economic investment since it enhances the stock of human capital. Denison's conclusions on the economic contribution of education may be summarized in his own words:

From 1929 to 1957 the amount of education the average worker had received was increasing almost 2 percent a year, and this was raising the average quality of labour by 0.97 percent a year, and contributing 0.67 percentage point to the growth rate of real national income. Thus, it was the source of 23 percent of the growth of total real national income and 42 percent of the growth of real national income per person employed. Despite the controversies surrounding the contribution of human resource development to economic growth, it is clear that "programs of human resource development must be designed to provide the knowledge, the skills, and the incentives required by a productive economy". Human resource development may be a more realistic and reliable indicator of modernization or development than any other single measure. It is one of the necessary conditions for all kinds of growth – social, political, cultural or economic".

Thus, economic development is not possible without education and investment in human capital which is highly productive.

The researcher has anchored his research on hard and soft transport theory. It is the researcher believe that the construction of the superhighway was meant to assist the government decongest the Nairobi region as well as assist the Matatu industry and all users of this road to improve their returns.

The researcher however advises the government to implement the soft transport policies as they would too realize greater levels of decongesting the superhighway. It is worth noting that the superhighway will not expand any more and the users of the road are increasing in number every day. The government should therefore try to introduce the soft transport policies as the would go along way in reducing the level of road users and this would go along way in achieving vision 2030 goals.

## **2.2. Empirical Review.**

### **2.2.1. Road surface markings.**

Road surface marking is any kind of device or material that is used on a road surface in order to convey official information. They can also be applied in other facilities used by vehicles to mark parking spaces or designate areas for other uses.

Road surface markings are used on paved roadways to provide guidance and information to drivers and pedestrians. Uniformity of the markings is an important factor in minimizing confusion and uncertainty about their meaning, and efforts exist to standardize such markings across borders. However, countries and areas categorize and specify road surface markings in different ways (Natarajan et al, 2005).

Road surface markings are either; mechanical, non-mechanical, or temporary. They can be used to delineate traffic lanes, inform motorists and/or pedestrians and also serve as noise generators if run across a road, or they can attempt to awaken a sleeping driver when installed on the sides of a road. Road surface marking can also indicate regulation for parking and stopping.

There is continuous effort to improve the road marking system, and technological breakthroughs include adding retro-reflectivity, increasing longevity, and lowering installation cost (Austin, 2007).

Road centre lines usage dates back in 1911 in the United States when people started advocating for the use of the centre lines to mark roads and thereby divide opposite traffic in a clear manner. By the use of centre lines, the people thought that it would help eliminate accidents which were prevalent in those days. However the government would hear none of this and people ended up marking the road by their own funds. This people were later to be honored by U.s government later after they were long dead (bekians, 2011).

Road line marks were used of different colours such as white and yellow. In the U.S. the white colour was used as the standard lanes colour to separate opposite traffic but was later change. In 1950 the U.s government adopted the standard yellow colour to separate opposite traffic.

Kenya adopts the international road marks standards and uses the yellow colour to seperate opposite traffic while the white colour is used to marks lanes of traffic heading the same

direction. These marks have been wonderfully laid on the thika superhighway and other highways in Kenya. Today road markings are used to convey a range of information including helping driver navigate properly, safety issues as well as law enforcement issues (Hunter, 2000).

According to Phillip, (2001) the following are the types of road marks: Rumble strips, it can be a series of simple troughs (typically 1 cm deep and 10 cm wide) that is ground out of the asphalt; Reflective markers, they are also referred to as raised pavement markers, road studs. They are typically more visible at night and in inclement weather than standard road marking lines; Paint, it is usually applied right after the road has been paved. Paint is run through a series of hoses under air pressure and applied to the roadway surface along with the application of glass beads for retro-reflectivity. After application, the paint will dry fairly quickly; Thermoplastic, One of the most commonly used road marking and is based on its balance between cost and performance longevity, the thermoplastic binder systems are generally based on one of the three core chemistries: hydrocarbons rosin esters or maleic modified rosin esters (MMRE); Plastic, Commonly referred to as tape or cold plastic, this product is heavy-grade material with reflective beads embedded in the plastic. It is commonly used to mark cross walks, stop bars, and traffic guidance such as turn lanes, HOV lanes, train crossings, pedestrian crossings, taxi crossings, bus lanes, and bike lanes; and Epoxy, Epoxy has been in use since the late 1970s and has gained popularity over the 1990s as the technology has become more affordable and reliable.

#### Meaning of lanes

Lanes are different and have equally different meanings (Raissudin et al, 2000).for example; a double yellow line next to the kerb means that no parking is allowed at any time, a single yellow line is used in conjunction with signs to denote that parking is restricted at certain times, double and single red lines mean that stopping is not allowed at any time or between certain times respectively, a double solid white line indicates that the line may not be crossed; overtaking is permitted if it can be performed safely without crossing the line, solid lines can be crossed in certain specific conditions (entering premises, overtaking a stationary vehicle, overtaking a vehicle, pedal cycle or horse travelling at less than 10 mph, or when directed to do so by a police officer), a solid white line with a broken white line parallel to it indicates that crossing the line is allowed for traffic in one direction that is the side closest to the broken line and definitely not

the other, solid yellow line alone: means passing prohibited from either lane, and is used on very tight curves and tunnels, solid yellow besides solid white: means no entry permitted from the lane the stripe is next to, but passing is permitted with caution, solid yellow beside broken white: passing is permitted from the side with the broken white line, but not from the side with the yellow line.

### **2.2.2. Road Drainage Systems.**

Highway drainage may be defined as the process of interception and removal of water from over, under and the vicinity of the road surface. Road drainage is very important for safe and efficient design of the road way and hence is an essential part of highway design and construction. A part of rainwater falling on road surface and adjoining area is lost by evaporation and percolation. The remaining water known as surface water, either remains on the surface of the road and adjoining area, or flows away from it, depending upon the topography and general slope of the area. Removal and diversion of this surface water from highway and adjoining land is known as surface drainage (Phillip, 2001). Due to percolation, if water table does not rise near of the road sub-grade, it does not create any problem as it does not affect the road sub-grade. If water table rises to the vicinity of road sub-grade, it requires to be lowered as it will definitely affect road sub-grade. Measures adopted to lower the subsoil water table are called sub surface drainage. Some of the retained water which cannot be drained off by normal methods of drainage is called held water and special measures have to be taken either to drain it off or keep it low so that it may not affect the road sub-grade (Nataraja et al, 2005).

#### **Effects of Improper Drainage**

According to hunter (2005) the effects of improper drainage are: causes of road failure if there is improper drainage. Improper drainage of the road causes destruction in the following ways; Road surface if made of soil, gravel or water bound macadam, it will become soft and losses strength, the road sub-grade may be softened and the bearing capacity reduced, the variation in moisture content on expensive soils causes variation in the volume of sub-grade and thus causes failure of roads, failure of formation slopes is also attributed to poor drainage, if rain water is not properly drained and allowed to flow along the road side for long distances, slip and land slides may

occur, causing road failures, erosion of side slopes, side drains, and formation of gullies may result if proper drainage conditions are not maintained, flexible pavement's failure by formation of waves and corrugations is due to poor drainage, continuous contact of water, with bituminous pavements causes failures due to stripping of bitumen from aggregates like loosening or detachment of some of the bituminous pavement layers and formation of pot holes, rigid pavement's prime cause of failure is by mud pumping which occurs due to water in fine sub-grade soil, excess moisture causes increase in weight and thus increase in stress and simultaneous reduction in strength of the soil mass. This main reason of failure of earth slopes and embankment foundation, erosion of soil from the top of un-surfaced roads and embankment slopes is also due to surface water.

#### Highway Drainage Requirements

(PCI, 2011) observes the following drainage requirements for highways; Surface water should not be allowed to remain standing by the road pavement and shoulders. Measures should be taken to drain off this water, immediately; the surface rain water from the adjoining area should not be allowed to come towards the road surface. For this, general slope of the ground adjoining road should be made sloping away from the road. This objective can be achieved by aligning road on ridge. Side drains should be of sufficient capacity and having sufficient longitudinal slope so that it may drain all the collected surface water efficiently. Surface water that flows across the road pavement may not develop cross ruts and/or erosions on road surface and shoulders. Therefore high embankment slopes should be protected either by turfing or pitching. Seepage water and other capillary waters should be drained off by suitable underground drainage system. Maximum level of under ground water table should be maintained well below the sub-grade level of the road. Under ground water table should remain at least 1 m to 2 m below the road sub-grade and in water logged areas, special measures should be taken to keep down the harmful salts.

Road drainage systems are intended to remove water from the surface of the highways to provide safe passage of motor vehicles and to prevent the damage of roads (Bekians, 2011). Many roads have drainage systems which are inspected and maintained on a regular basis and are cleared or

repaired depending on the: Type of road , importance of the drain to preventing the road or properties from being flooded or ice forming on the road in winter; and available funding.

### Maintenance of Roadside Gullies

Keeping gullies clean and fully operational is the responsibility of the County Council. Blocked and damaged roadside drains, known as gullies, can cause a hazard to highway users, particularly during periods of heavy rain (Mireri, 2000).

The Council's approach to highway flooding should be both proactive and reactive maintenance: Highway gullies are programmed for regular cleaning once a year and their proper functioning checked. This cleaning can also involve water pressure jetting to clear associated pipe work; for example, gullies reported as blocked throughout the year will be logged and left until the normal annual visit unless they are causing a health and safety issue; gullies reported with missing/broken grates will be added to our programme for maintenance of non-urgent works unless they are causing a danger to the public, in such cases they will be dealt with as soon as practicable; and the Council maintains a database of reported trouble spots where problems reported either by members of the public or by council operatives is kept. These problems are prioritized in accordance with a standard procedure until investigative and remedial works are able to be carried out when maintenance budgets permit.

(Muhu, 2012) observes that it must be remembered that problems can occur even when drainage provisions are clean and well maintained, for example as a result of: Exceptional rainfall, a road being in a low lying area, changes in 'run off' from adjoining land, rivers overflowing; and material carried into drains by floods.

### Different types of Drainage Features

The table below describes the different types of drainage that is used on the highway.

**Table 1: Different type of drainage features**

<b>Drainage feature</b>	<b>Description</b>
<b>Road gullies and grills</b>	Drainage gratings at the edges of the road. Connect either to highway drainage, which is maintained by the County Council or, in urban areas, public sewers which are the responsibility of the local water company.
<b>Soakaways</b>	Water flows from gullies into the soak away. This is a large underground chamber usually found in more rural areas where sewers are not present. Water collects and later gradually soaks through holes onto the surrounding ground . it may stream roadside ditches.
<b>Catchpits</b>	A manhole on a drainage system with a sump; i.e. the bottom of it is lower than the pipes which go in and out of it. This allows sediment in the water to settle out, helping to keep the pipes clear. Catchpit sumps are emptied before they fill up so that they continue to be effective.
<b>Grips</b>	Some rural roads have channels (grips) cut across verges to let water off the road. These are maintained on the same priority basis as road gullies by the County Council.
<b>Culverts</b>	Pipes and stone culverts carry streams under roads. These are cleared of blockages as required by the County Council.
<b>Roadside</b>	These are the responsibility of the land owners on each side of the ditch, not the

Source :( Mireri, 2000)

Advantages of drainage systems include; Easy access of roads, cost of maintenance, road markings longevity and reduced accidents

### **2.2.3. Road Lighting.**

Lighting is needed to provide a road which is safe for people to use and which is also perceived to be safe. Road sections which are not well lit have high chances of road accidents at night.

Studies have shown that most of fatal accidents occur at night on poorly lit road sections. Schreuder, (2008) states that on urban main roads, with mainly a traffic function, a reduction in accidents involving injuries of approximately 30% can be expected at night following an improvement in the lighting from very bad to good.

Austin, (2007) on the other hand found out that there was a 43% reduction in night-time accidents. It was also discovered that the effectiveness of lighting in preventing accidents depended on its illuminance, and that the brighter the lighting, the better it is at preventing accidents. However it did not define an upper limit to brightness beyond which further brightening would have no, or a negative, effect.'

it is also suggested that a large proportion of night-time accidents occur on un-lit road sections and that there are indications that the average injury severity and the proportion of accidents at bends is somewhat greater on unlit road sections(Hunter, 2000).

There is evidence that in Kenya accidents occur more frequently at night .the government is in the process of prohibiting night long distance public travel by Bus companies heading to between Mombasa Nairobi and Kisumu and outside Kenya. It may be largely blamed that accidents occur at night due to poor visibility of Kenyan roads. Most sections of highways are completely unlit (PCI, 2011).

The presence of lighting not only reduces the risk of traffic accidents, but also their severity. Surveys have shown that the public are in favour of street lighting as a way of improving road safety and that, if anything, it needs to be improved in some areas.

There are economic and environmental reasons why some organisations may wish to reduce the amount of lighting. However there are safety reasons why lighting needs to be available (Wasike, 2001).

In some locations, a reduction in lighting quality may not increase the risk of an accident. However, there is the danger that an unconsidered removal or reduction in quality could actually increase accidents and their severity.

Therefore, when considering removal or dimming of lights, location based traffic and accident evidence should be assessed. Accident rates should be monitored to ensure that sacrificing the

quality of lighting does not unduly increase the risk. Increases in risk may ultimately lead to lives being lost ( Schreuder, 2008).

The aim is to understand the way vision and visual performance are affected by changes in the spectral composition and level of lighting when performing the visual tasks typical of residential roads at night.

Recent advances in lighting technology and our understanding of mesopic vision could make it possible to improve specification of the spectral power distribution (SPD) and spatial distribution of lighting to achieve reductions in illuminance, and hence a reduction in energy consumption, whilst maintaining the same level of benefits.

Lighting is needed to provide a road which is safe for people to use and which is also perceived to be safe. There are no previous studies that have critically analyzed the visual tasks of pedestrians. Previous reviews suggested that tasks associated with safe movement are performance based example being the detection of pavement obstacles, and may otherwise be a trip hazard. The detection and recognition of other people, at a distance sufficient to take avoiding action is necessary. Tasks associated with fear of crime are perception based, including evaluations of brightness ( Natarajan, 2005). The evaluation of pedestrians' important visual tasks will let us identify how critical details of these tasks (size, contrast) are affected by light source SPD.

The recent development of LED light sources suitable for use in exterior environments should eventually offer better efficacy than conventional light sources and furthermore arrays of LEDs give the opportunity for tuning the SPD to better match mesopic vision. There are no previous studies of how this spatial distribution of light impacts on the visual performance and perceptions of pedestrians.

According to Schreuder, (2008) the types of road lights include; Gas, From around 1816, American cities started to install gas-operated streetlights. Baltimore was the first American city to switch to gas street lighting. While gas is a step forward from candlelight, it still requires the services of lamp lighters which would light the lamps at dusk. Electric, the Brush Electric Company of Cleveland in Ohio did installed the first electric streetlight in 1880 in Wabash, Indiana. The project was deemed a success, and the company received the commission to install several more electric streetlights. Incandescent & Fluorescent, in the 1930 and 1940s, America

welcomed incandescent and fluorescent streetlights. Incandescent streetlights were initially popular, although it became apparent that they were not the most efficient form of lighting. Incandescent streetlights had a shorter lifespan than fluorescent lamps, which required less maintenance and were a more reliable source of light. In recent years, Light Emitting Diodes (LEDs) are energy efficient and cost effective alternatives for street lighting.

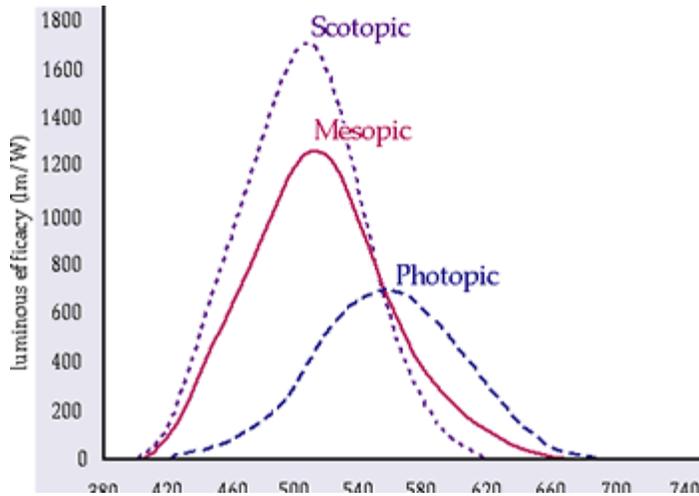
Mercury Vapor, during the 1950s, the Mercury Vapor streetlight became widespread throughout the United States. Its light was blue-green at first, until technological advances produced a white light. It was longer lasting than fluorescent streetlights and hardy in extreme cold. The drawback was that over time, the Mercury Vapor streetlight did produce diminished lighting (lumen depreciation) but has since continued to use the very same amount of wattage. The EPA Act 2005 basically prohibited the manufacture or importation of Mercury Vapor streetlights, for environmental reasons. HPS, High Pressure Sodium (HPS) streetlights were a product of the 1970s and remain in use. They cast amber light and are long lasting. An early problem was a "cycle" phenomenon, whereby these lamps could turn off and then turn back on, a problem that has since been resolved with the arrival of non-cycle HPS streetlights and Solar, in 2009, Eco Alternative Solutions, LLC offered a 90-day trial of the Integrated Solar Series (ISS) to cities in America. ISS is a solar-powered streetlight system that is projected to reap both energy and monetary savings. The system utilizes Mono Crystalline solar power to collect energy that is stored and converted in sealed, lead acid maintenance free batteries. The process produces approximately eight to 12 hours of street lighting.

## Roadway Lighting

### The Roadway as a System

What will be the future of roadway lighting? Certainly, it's reasonable to suppose that we will have roadway lighting with us for as long as we will have roads. Roadway lighting consumes 14 billion kWh annually in the United States. Street lighting provide for visibility by illuminating objects and/or potential hazards in and along the roadway, it can also serve as a tool in economic development. Many historic downtowns are using decorative street lighting with historic character, for example, as part of overall renovations designed to bring both drivers and pedestrians, and their wallets, into these areas to patronize shops, restaurants and theaters.

Figure 1: Lighting levels



*At low (mesopic and scotopic) light levels, peripheral vision is more sensitive to shorter-wavelength ("bluer") light.*

*Shown above are the photopic and scotopic luminous efficacy functions, and a mesopic function for one light level.*

*Source (Austin, 2007).*

But visibility and safety are still among the primary reasons to have street and roadway lighting. Most roadway lighting in the United States uses high intensity discharge (HID) light sources: high pressure sodium (HPS) and metal halide (MH). HPS lamps are known for their high lumen ratings and their yellowish tint; M-H lamps produce few lumens than H.P.S. and have a whiter appearance. But lumen ratings don't really tell the user everything about the potential visibility. Recent research has shown that at low (called "mesopic") light levels, like those typically specified on roadways at night, the spectral (color) sensitivity of our peripheral vision shifts toward shorter wavelengths ("bluer" light) and because of this shift, response times to objects in the periphery can be shorter under MH lamps than under HPS lamps, despite the lower lumen rating of MH. For non-peripheral tasks, like reading roadway signs, this advantage is not present (Austin, 2007).

It is worth noting too that in the future, manufacturers might optimize the color of HID and other light sources, such as fluorescent lamps, to more efficiently match the spectral response of the peripheral visual system at low light levels.

#### **2.2.4. Road bridges.**

Road bridges are structural objects that are meant to facilitate the movement of vehicles which are either getting into the highway or diverging from the highway. Some of the road bridges are meant to facilitate the road overcome a depression or a river. They dug some feet high to avoid the road it-self getting a depression. Some road bridges are meant to facilitate pedestrians cross the road without inconveniencing the oncoming motorists. They are known reduce the level of accidents when they are mounted on pedestrians crossing points (Phillip 2001).

##### Types of road bridges

There are several types of road bridges example, the Arch bridge, the bow-string arch bridge, cable-string arch bridge, the continuous span girder bridge, the moon bridge among others.

The super highway was intended to have 18 foot bridges for pedestrian s crossing and several other bridges connecting the highway with other feeder roads. These bridges are in places such as the Ruiru Kihunguro area, the All-sopps area, the Ruaraka breweries area and Juja town area among other areas

Quality of materials that are used for road construction matters very much with regard to the lifespan of the road. Road construction requires sand, ballast and cement. When mixed they form gravel which is then mixed with the bitumen. The bitumen is heated first and then mixed with gravel (Bekians, 2011).

#### **2.2.5. Quality of materials used in road construction.**

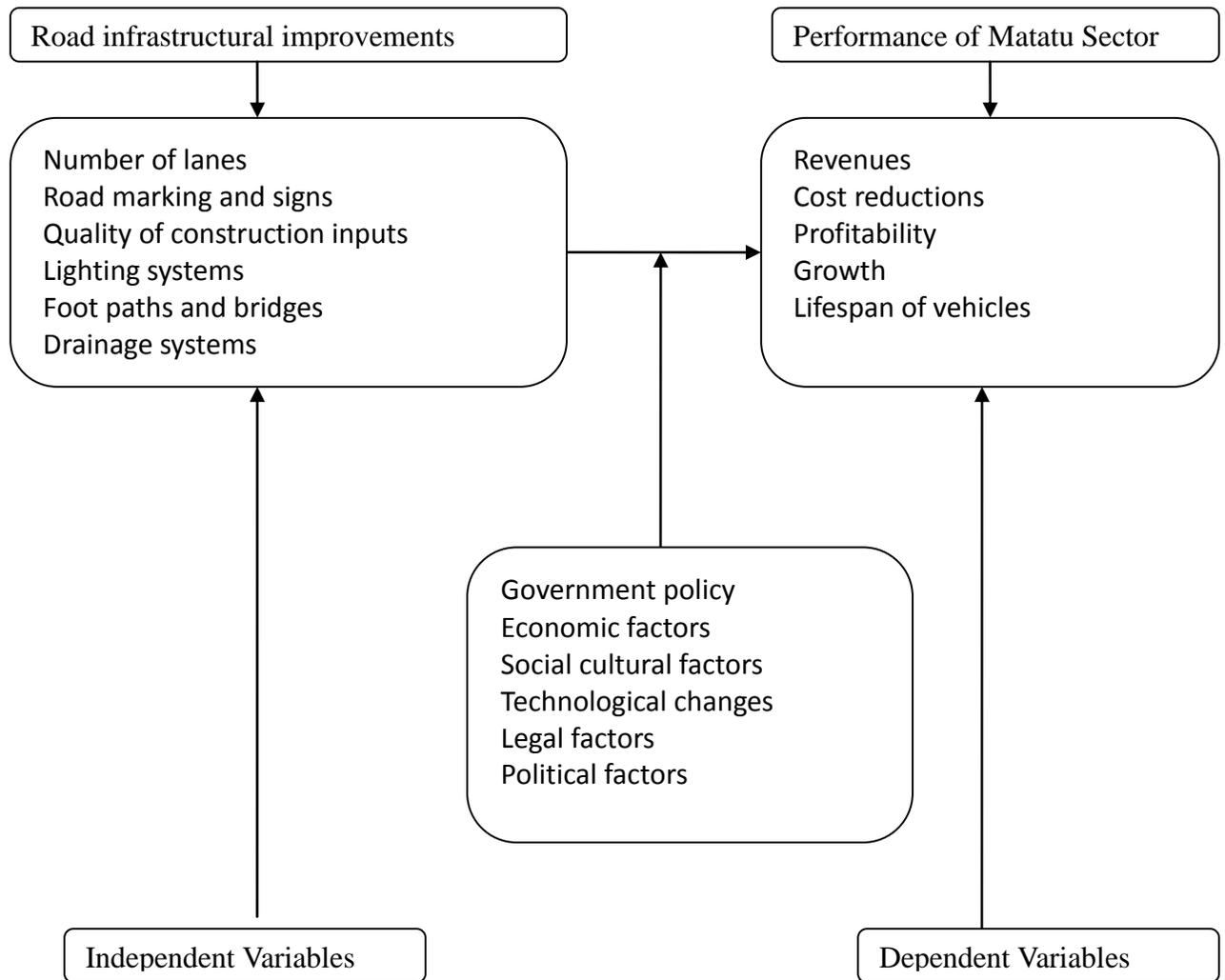
The quality of the pavement will depend on the quantity of gravel and bitumen as well as the ratio of mixing them. When a pavement is to be used by long range Lorries it must be built for that purpose and would require a bigger chunk of gravel mixed with bitumen (Robert, 2005). This would withstand the weight of the Lorries and may not cave in. However if the pavement is shallow, then it will quickly cave in and may need repair too frequently. Different sections of the road network need differing quality of materials. When on very steep sections, there is usually very tense friction between the vehicles and the roads and high quality material are required.

### **2.3. Research Gaps.**

Thika super highway has been one of the unique highways in East and central Africa. There have been several studies done on road infrastructure improvements in Kenya such as the factors affecting the success of public private partnership (PPP) by Muhu (2012), A majority of the research however concentrates on the Matatu industry such as the attitude towards tax practices on small scale public transporters (Matatu) (Nyakweba et al, 1999), the performance of owners, workers and their associations and potential for improvement (Chitere et al, 2004),and more recently the matatu industry is for a major overhaul (Kwenji, 2013).However, there have been no study done on the role of road infrastructural improvements on the performance of the Matatu industry. The researcher will therefore try to explore this area of research given that there is not enough research work done on the subject. This research will therefore lay the foundation for further future research on the subject area.

### **2.4. Conceptual Framework.**

Figure 2: Conceptual framework



(Source: Researcher 2013)

Road infrastructural improvement involves drainage system construction and lanes marking. When the roads are improvement the Matatu sector is likely to perform better in terms of the profits, revenues and cost reductions. However this performance may be influenced by the intervening variables such as the legal factors, political interference as well as economic conditions prevailing at the time. The technological improvements especially on vehicles manufacture could also influence performance of the matatus.

## **CHAPTER THREE: RESEARCH METHODOLOGY**

This chapter will therefore focus on the research design, location of the study, population of the study, sampling techniques and the sample size, instrumentation, data collection procedures, reliability, validity, ethical considerations and finally the data analysis methods.

### **3.1. Research Design.**

The researcher used survey design where samples were selected from the operators who are members of the SACCOs plying the selected routes, and their performance was generalized. The survey method collected data information from owners, drivers and conductors and SACCO administrators who ply the routes managed by the four selected SACCOs which were mainly done by selecting samples of individuals from the operators' population in those routes. Gay (1995) asserts that, survey design may be used to assess cause and effects of events. The design is found suitable for the study because it enabled the researcher to collect facts and views from diverse categories of respondents. The gathered data was then summarized and interpreted for the purposes of clarification (Orodho, 2005).

### **3.2. Location of the Study.**

The study was conducted on the Thika Super highway and its environs. This region covers North East of Nairobi county and parts of Kiambu county of Kenya. It focused on the Matatu drivers, conductors, Matatu owners, traffic police, SACCO administrators, and Matatu welfare association members. The selection of the zone for the study was pivoted by the fact that it is the researcher's commuting route. This enhanced better management of the study. Secondly, performance in this route has been of great concern to the researcher, the stake holders and government at large. These factors made Thika super highway a suitable area for the study.

### **3.3. Population of the Study.**

Thika superhighway has over 60,000 vehicles of which public service vehicles account for about 30% (Daily Nation, 2012). Respondents to the study included among others Matatu drivers, conductors, Matatu owners, SACCO administrators, and Matatu welfare association member.

**Table 1 : Population of the study**

<b>Category of PSVs on Thika Superhighway</b>	<b>Approximate Population</b>	<b>Sample to be used</b>
i)TukTuk	170	25
ii)Motor Cycles	3770	100
iii)Nissan Matatus	5450	105
iv)Toyota Sharks ‘Nissan’	7550	195
v)Mini-buses	900	60
vi)Buses	260	15
<b>TOTAL</b>	<b>18,000</b>	<b>500</b>

Source: *Traffic Department, Ruaraka Hi Highway Patrol (2013)*

### **3.4. Sampling Techniques and Sample Size.**

Study shows that 30% of vehicles plying Thika superhighway are Matatus. This number is approximately equal to 18,000 vehicles. A large population is served by these vehicles but the researcher used a total of five hundred (500) Matatu operators (drivers, conductors and SACCO administrators) plying the four selected routes which are managed by the respective SACCOs. Respondents were chosen for this study by simple random sampling. Bell (1993) & Orodho (2005) agree that target population is the hypothetical population from which the data is collected.

According to Mugenda and Mugenda (1999), a sample is a subset of a given population obtained from target population. This means that the sample is a representation of the population from which the data will be collected. The researcher significantly used Simple Random Sampling Method (SRSM).

The routes served by Thika super highway are numerous that includes route 145, 44, 100, 102, 120, 146, 17 B, 25, 11, 45, 46, and 237 that were written on pieces of papers, folded and placed in a container. The researcher picked four (4) pieces from the box. Routes bored by the four (4)

pieces became samples for the study and information was deducted from the members of key SACCOs plying those routes. The researcher therefore used a ballot method of simple random sampling.

Summary of the sample size (N = 12 routes);

$$\begin{aligned}
 N &= 12 \\
 N^{\text{th}} &= 12/3 = 4 \\
 N^{\text{th}} &= 12/3 = 25\%
 \end{aligned}$$

**Table 2 : Sample of study**

Category of Respondents	Number of Respondents
a) Drivers	300
b) Conductors	140
c) SACCO personnel	10
d) Matatu owners	50
<b>TOTAL</b>	<b>500</b>

Source: *Researcher, 2013*

### **3.5. Research Instruments.**

The researcher used questionnaires as his main instrument for data collection. However, he also made use of direct interviews especially to the stakeholders whose performance (revenues and costs) is directly influenced by the upgraded highway, such as owners and drivers who are members of the SACCOs plying the selected routes.

#### **3.5.1. Questionnaires.**

These are list of questions given to respondents to answer on their own or mailed. There are advantages associated with the use of questionnaires as tools of data collection. They are a quick method of collecting data, plenty of data can be collected, it is a cheaper method of collecting data and very economical in terms of time (Brog et al., 2009). By use of questionnaires, owners,

drivers and conductors have enough time to reflect on before answering. More so, they help to minimize researcher's biasness which may result from personal characteristics.

On the same note, questionnaires have drawbacks including being difficult for the researcher to clarify ambiguous questions in a mailed questionnaire (Keclinger, 1970). The researcher may give incorrect data if they don't understand some of the questions. Researcher has no control over the persons who fills out the questionnaires. The person who is expected to respond to the questionnaire may not be the one filling it. Moreover, the questionnaires are useful for literate people whereby some of them may be given to illiterate and some questions may not be answered and gaps may be left.

### **3.5.2. Interviews.**

It is a set of questions that a researcher asks when interviewing respondents. It is a face to face discussion. Interviews were useful in that the researcher's questions are usually responded because it is a face to face discussion (Brog et al., 2002). The researcher is able to gather other data about the operators and the environment they operate and were useful in the research. The researcher and the respondents are able to clarify issues that may be ambiguous on direct conversations.

In using direct interviews, difficulties are encountered. They are time consuming and expensive undertaking (Bamberg & Moser, 2007). The interview from the researcher might not be exactly the same from one respondent to another since clarification may be needed.

### **3.6. Data Collection Procedures.**

The researcher went through various steps to collect the data that will be used to prepare the final report. To start with, the researcher obtained a letter from the university offices to introduce him as a researcher pursuing a Masters course of Kenyatta University. He then proceeded to the routes sampled. He sought permission from the SACCO administrators to allow him gather data from the SACCO members. After permission was granted, the researcher made requests to sample a proportion from them intended for the study. He sought for their most convenient time for filling in the questionnaires and interviews . During his visits, the researcher issued out the questionnaires, let them fill in and then collect the filled in questionnaires from the SACCO offices.

Thorough checking followed this and deductions of the questionnaires ensued. He critically analyzed them to obtain the required data for the study..

### **3.7. Validity.**

Validity is the degree to which a test measures what it purports to be measuring (Mugenda&Mugenda,1999). Validity is the accuracy and the meaningful of inference. Reliability of an instrument has been defined as the consistency in producing a reliable result. The researcher used content-validity by relying on the expert opinion so as to check for validity of the test measures. He thus sought the opinion of the supervisor.

### **3.8. Reliability.**

Reliability focuses on the degree to which empirical indicators are consistent across two or more attempts to measure the theoretical concept, (Orodho, 2005).

Mugenda&Mugenda (1999) define reliability as a measure of the degree to which a research instrument yields consistent results or data after repeated trial. It is necessary that the research instruments are piloted as a way of finalizing them (Wiersman, 1985). This is vital as it enables the reliability of the instruments to be determined. Reliability is synonymous with repeatability or stability. A measurement that yields consistent results over time is said to be reliable (Wiersman, 1985). When measurement is prone to random error, it may lack reliability. The researcher tested reliability of the instruments using the Cronbach - Alpha ( $\alpha$ ) reliability test model.

### **3.9. Data Analysis Methods.**

For the raw data collected from the field to be meaningful, it was subjected to statistical analysis by use of the SPSS statistical package. It was tabulated then presented in statistical figures like frequency polygons, graphs, pie-charts, histograms, pictograms, among others. Measures of dispersion on the performance of the sector, was then established. Multiple regression models were then drawn. The data was then interpreted and summary, conclusions and recommendations drawn afterwards.

## Statistical Model

$$Y = a + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + e$$

Where

Y is the performance of the sector measured in terms of profits

A is the constant

$X_1$  is the effect of drainage systems on the sector

$X_2$  is the effect of number of lanes on the sectors performance

$X_3$  is the effect of lighting systems on the sectors performance

$X_4$  is the effect of footpaths and bridges

$X_5$  effects of quality of construction materials on the performance of the sector

e Error term

### **3.10. Ethical Considerations.**

During the study, difficulties are expected to be encountered (Borg & Gall, 1989). These include factors due to pressure of work and distance where study was done. There was diverse spread of the target population which may hinder easy access. There were expenses involved during the study. Additionally, some respondents did not consent with the researcher. There was also the infringement of privacy by the researcher. Though it was hoped that all respondents were honest, some of them may knowingly or unknowingly have given wrong/false information that may impede accuracy of findings, conclusions and recommendations of the study.

## CHAPTER FOUR: DATA ANALYSIS, PRESENTATION AND INTERPRETATION

The research design employed in this study was the descriptive research design in form of a census survey. Data was collected using questionnaires administered through the drop and pick method. SACCO members from each of the four randomly selected SACCOs in the target population were randomly selected to complete the questionnaire. These four SACCOs were the MWI SACCO, the Githurai 45 SACCO, the Thika SACCO and the Githurai 44 SACCO.

Out of the 500 dropped questionnaires to the targeted 4 SACCO members as well as administrators, 456 questionnaires were well completed and picked. This indicates a 91.20 % response rate. Mugenda and Mugenda (1999) scales 50% as an adequate response rate as suitable and representative enough for analysis, 60% as good response rate while 70% and higher is excellent. To this extent, this chapter presents the analysis findings of data randomly collected from an adequate and representative sample.

### 4.1 Demographic analysis of respondents.

The sample of operators from the four SACCOs constituted of 63% and 37% male and female respondents respectively. This ensured that gender biasness on opinions and ratings of various variables is minimized, since each gender had over 30% representation. However it is worth saying that this industry is largely male dominated.

Table 3 shows the percentage distribution of the participants Gender.

**Table 3 The participant's gender**

<b>Gender</b>	<b>Frequency</b>	<b>Percent</b>
Male	305	63%
Female	178	37%

Further, periods of experience for the respondents ranged from less than 2 year to more than 11 years. All this went a long way in to randomizing the attitudes influenced by level of experience and therefore randomized the responses. The job titles of the respondents included among others;

Matatu owner's drivers, conductors, SACCO managers and SACCO clerks. Table 4 shows the percentage distribution of the respondent's levels of experience.

**Table 4 The experience of the Matatu operators**

<b>Years of road experience</b>	<b>Frequency</b>	<b>Percent</b>
Less than 2 years	89	19%
3-7 years	189	39%
8-11 years	133	28%
more than 11 years	68	14%

From the findings of the survey highest number of the operators had experience of between 3 and 7 years i.e. 39 % while the second highest level of operators had 8 to 11 years of experience at 28 %. from the findings it can be found out that operators are likely to quit the industry at age of experience of 11 years and above because they reported the lowest percentage at 14 %.

on the age of the respondents, the study shows that a majority of the respondents at 42 % are between the age of 31-40 years while 27 % of the respondents are between the ages of 18-30 years. as the age increases the respondents seem to quit the industry. for example between the age of 41-50 only 23% of the respondents were in the industry and as the age increases to between 51-60 years only 7 % of the respondents were in the industry. non of the respondents were involved in this industry at age of 61 and above. The following table 5 shows the age structure of the respondents.

**Table 5 The ages of the respondents**

<b>Age in years</b>	<b>Frequency</b>	<b>Percent</b>
18-30 years	128	27%
31-40 years	198	42%
41-50 years	108	23%
51-60 years	33	7%

With regard to the education level of the respondents, a majority of the operators had a certificate of a certain course at 36% followed by diploma holders at 19 % and the KCSE holders at 18 %.

Interestingly the degree holders were at 15%.the following table four shows the educational level of operators

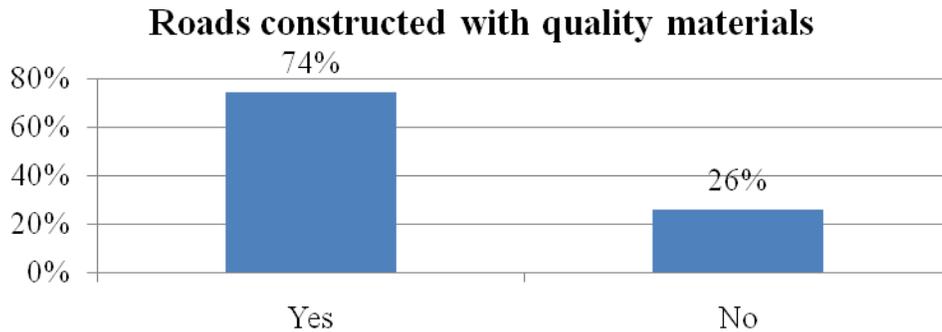
**Table 6 The educational level of the respondents**

Education level	Frequency	Percent
KCPE	23	5%
KCSE	84	18%
Certificate holder	168	36%
Diploma holder	87	19%
Degree holder	68	15%
Others	38	8%

**4.2. The quality of construction materials and the performance of the Matatu industry.**

The study sought to investigate whether the use of quality materials would in any way lead to improved performance of the Matatu sector. The study found out that 74% of the respondents believed that the road was constructed with quality materials. This is shown in figure 3 below

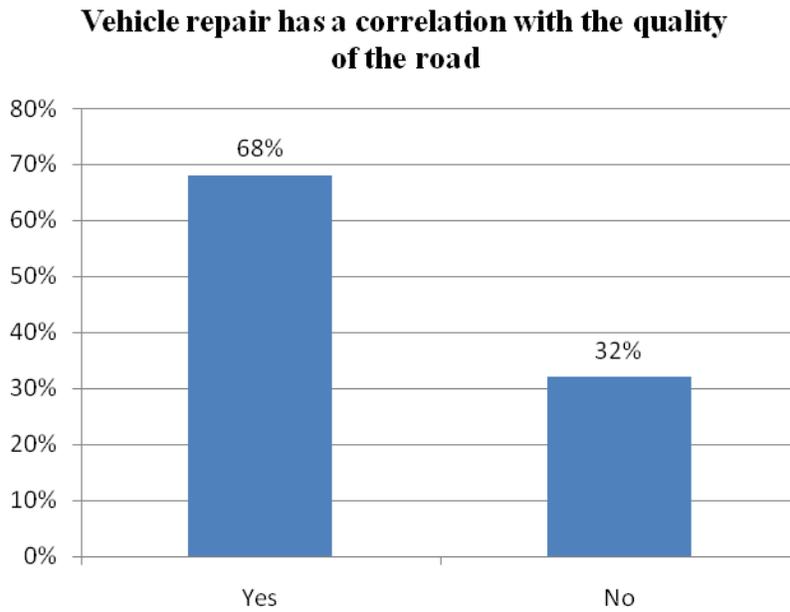
**Figure 3 Roads constructed with quality materials**



The respondents however believed that the use of quality materials will have a direct relationship with vehicle repair. 68% of the respondents believed that use of quality materials has a

correlation with motor vehicle repair. Although the nature of the change is not given it is believed that the change is positive and that with a quality road in place the vehicle repair costs will reduce drastically. This is shown in figure 4 below.

**Figure 4 Vehicles has correlation with the quality of the road**



Respondents were asked whether the use of quality materials will help to improve the revenues of the sector.

A Likert scale of measurement was used as follows:

1: strongly Disagree      2: Disagree      3: Neutral      4: Agree      5: Strongly agree

From the table 7 it can be seen that a majority of the respondents at 66.40 % agree that the use of quality material will help improve the revenues of the sector. 9% of the respondents agree that there will be an improvement in the revenues of the sector.

**Table 7 There will be increased revenue collected as a result of road construction by quality materials.**

<b>Responses</b>	<b>Frequency</b>	<b>Percent</b>
Strongly disagree	20	4.4%
Disagree	52	11.4%
Neutral	40	8.8%
Agree	303	66.4%
Strongly Agree	41	9.0%
Total	456	100.0

On the Likert scale the mean of the respondents was 3.83 with a standard deviation of .707. This means that of the respondents agreed that the superhighway was constructed with quality materials.

As far as the increased revenues were concerned the mean was 3.77 while the standard deviation was .764. This again is an indication that a majority of the respondents believed the road would help improve their revenues. This is shown on Table 8

**Table 8 Descriptive Statistics**

	Mean	Std. Deviation	N
Quality of construction materials	3.83	.707	456
Increased revenue collected	3.77	.764	456

Clearly from the statistics the respondents seemed to agree the revenues were to increase if quality materials were to be used in the road construction.

The correlation coefficient was run and the results were as shown below on Table 9.

**Table 9 Correlations**

		Quality of construction materials	Increased revenue collected
Quality of construction materials	Pearson Correlation	1	.908**
	Sig. (2-tailed)		.000
	N	456	456
Increased revenue collected	Pearson Correlation	.908**	1
	Sig. (2-tailed)	.000	
	N	456	456

\*\* . Correlation is significant at the 0.01 level (2-tailed).

The quality of raw materials and increased revenue collected seem to have a very High degree of positive correlations with Pearson’s coefficient of 0.908

The study shows that quality of road as enhanced by the materials used will have positive impact on the revenues collected by the sector since they have a very high correlation.

**4.3 The drainage systems on the road and the performance of the Matatu sector**

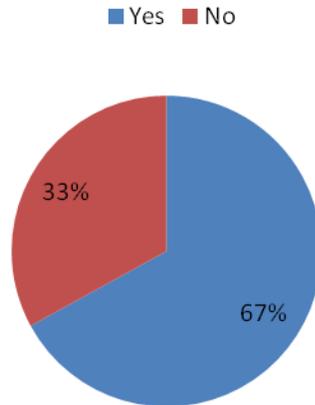
This study was to establish the extent to which the drainage system in place could contribute towards the performance of the Matatu sector.

The respondents were asked whether there was an effective drainage system on the superhighway.

67% believed that there was an effective drainage system on the highway whereas 33 % believed that there was no effective drainage system on the highway. This is presented in figure 5 below.

**Figure 5 Effective drainage on the super-highway**

**Effective drainage system on the super-highway**



A Likert scale was used to analyse the responses which were posed as:

Would an effective drainage system contribute towards the performance (revenues) of the Matatu sector?

1: strongly Disagree      2: Disagree      3: Neutral      4: Agree      5: Strongly agree

The responses were run on the Likert scale and 68.90 % of the respondents agreed that there would be an increase in the revenues of the sector while 10.50 % had strongly agreed that the revenues would increase. This is shown in the table 10 below

**Table 10 Revenue collected relate with an effective drainage system**

Responses	Frequency	Percent
Strongly disagree	22	4.8%
Disagree	40	8.8%
Neutral	32	7.0%
Agree	314	68.9%
Strongly Agree	48	10.5%
Total	456	100.0

The respondents believed that effective drainage system had an effect on the costs of running the business. 65% agreed that effective drainage system would reduce costs while 8% strongly

agreed that effective drainage would reduce costs of running their business. This is shown in table 11 below.

**Table 11 Costs reduction with effective drainage system**

Responses	Frequency	Percent
Strongly disagree	22	7.5%
Disagree	40	12.5%
Neutral	32	7.0%
Agree	314	65.0%
Strongly Agree	48	8.0%
Total	456	100.0

The descriptive statics were run on the Spss and revenue collected with an effective drainage system had a mean of 3.83 and a standard deviation of .707 while drainage relate with the cost incurred while running the business had a mean of 3.76 and a standard deviation of .870 as shown in table 12. Below

**Table 12 Descriptive Statistics**

	Mean	Std. Deviation	N
Revenue collected relate with an effective drainage system	3.83	.707	456
Drainage relate with the cost incurred while running the business	3.76	.870	456

As per the pearsonian correlation coefficient, the revenue collected relate with an effective drainage system and drainage system relate with cost incurred while running the business had a correlation of 0.737 . This is an indication of strong positive relationship between the two variables a shown on table 13 below.

**Table 13 Correlations**

	Revenue collected relate with an effective drainage system	Drainage relate with the cost incurred while running the business
Revenue collected relate with an effective drainage system	1	.737**
Sig. (2-tailed)		.000
N	456	456
Drainage relate with the cost incurred while running the business	.737**	1
Sig. (2-tailed)	.000	
N	456	456

\*\* . Correlation is significant at the 0.01 level (2-tailed).

Therefore the study found that there is a positive correlation of Pearsons’ correlation coefficient of 0.737 between the revenue collected and costs with an effective drainage system in place.

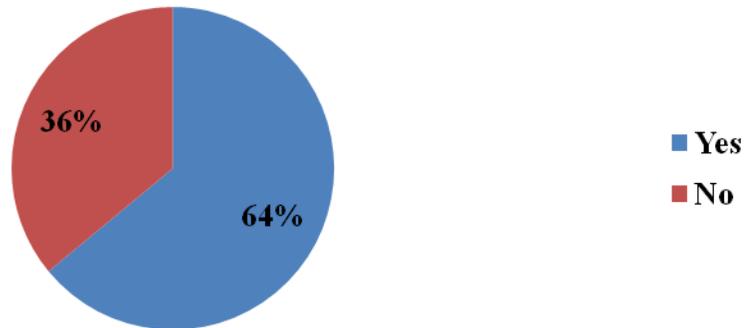
**4.4 The lighting systems and road signs enhancement of the sector’s performance.**

The study also sought to establish whether the adequate lighting systems and performance of the sector had any correlation.

The study sought to find out whether the respondents believed were aware there was adequate or effective lighting system on the highway. 64% of the respondents believe that there is effective lighting system on the highway whereas 36 % believe that there is no effective lighting system on the highway. This is shown in the diagram below.

**Figure 6 Highway has effective lighting system**

**Highway has effective lighting system**



The respondents were required to read the questionnaires and fill as per their view on the subject matter.

A Likert scale was used to analyze the respondents’ view where the question asked was.

Do you think that the quality of lighting systems correlate positively with the increased revenues of the sector?

1. Strongly disagree
2. Disagree
3. Neutral
4. Agree
5. Strongly agree.

68.6 % of the respondents agreed while 10.6 % strongly agreed that there would be positive impact on the revenues when the lighting systems were in place. Very few respondents disagreed that the lighting systems did not have any positive impact on the performance of the Matatu industry.

The findings are shown in table 14

**Table 14 The quality of lighting correlate with the revenue collected**

<b>Responses</b>	<b>Frequency</b>	<b>Percent</b>
Strongly Disagree	22	4.8%
Disagree	41	9.0%
Neutral	32	7.0%
Agree	313	68.6%
Strongly Agree	48	10.6%
Total	456	100.0

The data was run in the spss program and the findings were as shown in table 15.

**Table 15 Descriptive Statistics**

	Mean	Std. Deviation	N
Quality of lighting	3.86	.688	456
Cost of the sector change when highway lightings are in place	3.88	.751	456

Quality of lighting had a mean of 3.86 and a standard deviation of 0.688 whereas the cost of the sector change when highway lightings are in place had a mean of 3.88 and a standard deviation of 0.751.

This data was again run on the pearsonian correlation coefficient software and the findings were as shown in table 16

**Table 16 : Correlations**

		Quality of lighting	Cost of the sector change when highway lightings are in place
Quality of lighting	Pearson Correlation	1	.844**
	Sig. (2-tailed)		.000
	N	456	456
Cost of the sector change when highway lightings are in place	Pearson Correlation	.844**	1
	Sig. (2-tailed)	.000	
	N	456	456

\*\* . Correlation is significant at the 0.01 level (2-tailed).

The study found that there was high positive correlation of Pearson's coefficient 0.844 between the quality of lighting system and the costs of the sector when highway lightings are in place.

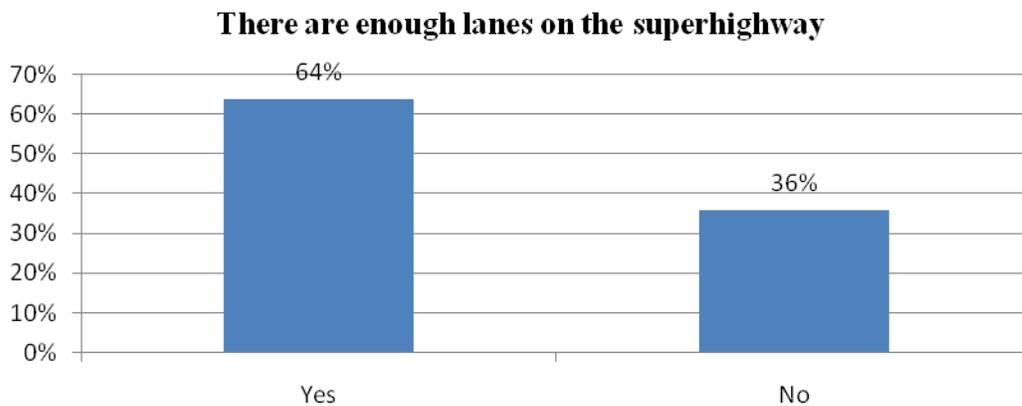
This is an indication that the qualities of lighting significantly affect the incurrence of costs in the sector.

#### 4.5 The increased number of lanes and the sector's performance.

The study sought to find out whether the increase number of lanes would improve the performance of the sector.

On the issue of the lanes, the respondents believed that the there were enough lanes on the road at 64% while the 36 % believed that there is not enough lanes on the highway.

**Figure 7 There are enough lanes on the superhighway**



The question asked was whether the increased number of lanes would improve the sector's performance.

68.9 % of the respondents agreed that there would be a positive improvement of the sectors performance with regard to the increased number of lanes.10.5 percent strongly agreed that the number of lanes would highly contribute to improved performance. This is as shown in table 17 below

**Table 17 The strength of the lanes positively impact on the business performance**

<b>Responses</b>	<b>Frequency</b>	<b>Percent</b>
Strongly Disagree	12	2.6%
Disagree	37	8.1%
Neutral	45	9.9%
Agree	314	68.9%
Strongly Agree	48	10.5%
Total	456	100.0

A majority of the respondents believed that the number of lanes on the highway would impact on the performance of the sector with a mean of 3.83 and standard deviation of 0.707 as shown below in Table 19

**Table 18 Descriptive statistics**

	Mean	Std. Deviation	N
Number of lanes impact on Performance of the sector	3.83	.707	456

#### 4.6 Statistical Model.

The study sought to find out the exact statistical model that defines the relationship between the performance of the sector and the independent variables.

In the model the performance linked with the revenues generated with effective drainage system in place, effective lighting system in place, good quality construction materials and increased number of lanes

**Table 19 Coefficients**

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
1 (Constant)	10.117	.216		46.871	.000
Quality of materials X <sub>4</sub>	.058	.050	.051	1.157	.248
Lighting system X <sub>3</sub>	-.022	.046	-.021	-.488	.626
Drainage system X <sub>1</sub>	-.347	.019	-.447	-18.229	.000
Increased Lanes X <sub>2</sub>	-.659	.032	-.494	-20.541	.000

a. Dependent Variable: Performance of the sector

Statistical Model

$$Y = a + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + e$$

Where

Y is the performance of the sector measured in terms of profits

A is the constant

X<sub>1</sub> is the effect of drainage systems on the sector

X<sub>2</sub> is the effect of number of lanes on the sectors performance

X<sub>3</sub> is the effect of lighting systems on the sectors performance

X<sub>4</sub> effects of quality of construction materials on the performance of the sector

β<sub>1</sub> coefficient for drainage system

β<sub>2</sub> coefficient for the number of lanes

β<sub>3</sub> coefficient for lighting systems

β<sub>4</sub> coefficient for quality of construction materials

e Error term

From the variables analyzed the coefficients were as follows

$$Y = 10.117 + (-0.347) X_1 + (-0.659) X_2 + (-0.022) X_3 + (-0.612) X_4 + (0.058) X_5$$

$$Y = 10.117 - 0.347X_1 - 0.659X_2 - 0.022X_3 - 0.612X_4 + 0.058X_5 + e$$

## **CHAPTER FIVE: CONCLUSIONS AND RECOMMENDATIONS**

For a brief but comprehensive report on the outcome of the study, this chapter summarizes the findings of the study and draws conclusions based on the data collected and analyzed. Further, the chapter gives recommendations for better road infrastructural improvements to enhance the performance of the Matatu sector. Lastly, the chapter gives the suggested areas of further research in relation to the findings of this study.

### **5.1 Conclusions**

The Matatu sector is largely male dominated. Male operators account for 63% of the total number of operators while female account for only 37% of the total number of operators. A majority of the operators have experience of between 3-7 years at 39% while the least number of operators have experience levels of above 11 years at 14%. Most of the operators are aged between 31-40 years at 42% whereas the least number of operators are aged between 51-60 years at 7%. Further a majority of the operators have above high school education of a certificate level at 36% while the least number of operators just have KCPE qualification at 5%.

The operators believe that the highway has been constructed with quality materials at 74% while 26% of these operators believe that the road has not been constructed with quality materials. They agree (66.4%) that revenues will increase with the use of quality materials on the roads while 4.4% strongly disagree that the revenues will not increase even when quality materials have been used on the road. A vast majority agrees that the performance of the sector will improve when good roads are in place. With regard to costs a vast majority of the operators (68%) believed that repair costs will change with use of quality materials while 32% of the operators did not see any way that the repair costs will change when quality materials are used to construct roads.

With regard to the drainage systems on the road, 67% agreed that there is an effective drainage system on the road while 33% said that there was no effective drainage system on the road.

Again a majority of the operators (68.9%) agrees that the effective drainage system would result to an increase in revenues of their business while 4.8 % strongly disagreed as to the positive effect of the drainage system on the revenues of their business. On the costs incurred by the sector, 65.0% of the operators agreed that with effective drainage system in place the sector's costs are likely to reduce while 7.0 % were neutral as to the effect of the drainage system on costs incurred by the sector.

Further, there is an effective lighting system on this road. 64% agrees there is an effective lighting system whereas 36% agrees there is no effective lighting system on this road.

The operators agrees also that with effective lighting system in place the revenues of the sector would also increase.68.6 % agrees while 4.8 % strongly disagree that the effective lighting system would nod add to the revenues of the sector.

The numbers of lanes have direct impact on the revenues collected by the sector members. Firstly, 64% of the operators believe that there are enough lanes on the highway while 36% believes that there are not enough lanes on the highway. But the strength of the lanes would have a direct impact on the performance of the sector as agreed by 68.9% of the operators while 2.6% strongly disagrees that the numbers of lanes have any direct link on the performance of the business.

The independent variable was strongly correlated with performance of the business (dependent variables). For example, quality of construction materials and increased revenues had the highest correlation of 0.908 while the quality of lighting system and costs incurred by the business had a correlation of 0.844 and the drainage system and revenues collected had a correlation of 0.737.

This confirms that the sector places high ranking quality road that can last long. These are roads constructed with quality materials and also regards highly the lighting system on the roads as this aids the sector to navigate at night. Further, the sector highly regards the drainage system as in times of bad weather; these systems should be able to carry away the water and mad components that may be dangerous for driving on such roads. When these independent variables are in place there will be improved performance of the sector.

## **5.2 Recommendations.**

Infrastructural improvements seem necessary as an ingredient to improved performance of the sector. Road network should be improved and the standards of improvement should be above board. Quality materials should be used, lighting systems should be adequate, number of lanes should be high and the drainage system should be effective. With these in place the sector would realize increased revenue collection, reduced cost of repair and vehicle breakdowns and even fuel consumption is likely to reduce.

Governments should therefore enhance infrastructural improvements to aid the improved performance of the Matatu industry. This would boost the incomes of the operators and may see reduced costs of operations. Reduced costs may have a direct effect on the fares charged by the operators.

## **5.3 Suggested areas of further research.**

The correlation coefficient between the independent and dependent variable was hardly 1. for example quality of construction material and increased revenues had a correlation of 0.908 while quality of lighting system and costs incurred had a correlation of 0.844 and the drainage system and revenues collected had a correlation of 0.737

Further more, 36% of the respondents disagreed that lighting system would improve the revenues of the sector while 36% and 33% disagreed that the number of lanes and drainage systems would positively impact on revenues collected. These statistics are high and probably further research should be carried especially on the intervening variables to establish whether these variables could be influencing the performance of the sector as well.

#### **5.4 Challenges encountered.**

A handful of challenges were encountered in this study. Firstly some of the respondents did not fill the questionnaires correctly. 8.8 % of the respondents filled their questionnaires wrongly and were rejected in the analysis stage.

Secondly there was not enough time on the side of the respondents and they took longer than expected to finish filling the questionnaires. Some respondents returned their questionnaires to the respective SACCOs long after the agreed upon dates. Also the respondents were promising other days for filling of questionnaires for they saw it as a bother and a distraction to their normal business.

Thirdly, some of the respondents were not able to fill the questionnaires but could not openly disclose it. The researcher considered this as ignorance on the side of the respondents.

Money resources were not enough. The researcher estimates that he overshot the budget when he was collecting data. This is largely due to failure of respondents to honour the appointments given to the respondents.

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## APPENDICES

### APPENDIX I: INTRODUCTION LETTER

Benjamin kinuthia

Reg no: D53/OL/10553/2008

c/o

KENYATTA UNIVERSITY,

MAIN CAMPUS,

10<sup>th</sup> September, 2013.

Dear Sir/Madam,

Re: Request for Information

I am a student at Kenyatta University pursuing a degree of Masters in business administration. I am humbly requesting your assistance in the provision of data necessary in the drawing of report and conclusions on the research topic

My research topic is; Effects of road infrastructural improvements on the performance of the Matatu sector.

I pledge to uphold confidentiality of the information provided by all my respondents.

With thanks

Benjamin kinuthia

**APPENDIX II: QUESTIONNAIRES**

The information you provide in the questionnaire will be treated with a lot of confidentiality and will only be used for research purposes only. Please do not write your name on the questionnaire.

Be objective as possible and complete it honestly.

Answer by putting a tick (√) against the most appropriate answer or fill the blank spaces.

NB: Some questions may have more than one answer.

**a) Questionnaires for the Drivers/Conductors/Owners**

**Part I: General Information**

1.State your Gender

a) Male [ ]

b) Female [ ]

2.What is your experience on the road?

a) Less than two years [ ]

b) 3 – 7 years [ ]

c) 8 - 11 Years [ ]

d) More than 11 Years [ ]

3.State your age bracket

a) 18-30 years [ ]

b) 31-40 years [ ]

c) 41 -50 years [ ]

d) 51 - 60 years [ ]

4.Education level of operators

a) KCPE [ ]

b) KCSE [ ]

c) Certificate Holder [ ]

d) Diploma Holder [ ]

e) Degree Holder [ ]

Other (specify).....

## Part II: Road Infrastructural Improvements

### 5. Road marking and signs.

- a) Does a good road marking on the superhighway help improve revenues of your business? Strongly agree [ ] Agree [ ] Neutral [ ] Disagree [ ] Strongly disagree [ ]
- b) If yes by how much?
- c) Do the road markings and signs help reduce the costs of running your business of your business? Strongly agree [ ] Agree [ ] Neutral [ ] Disagree [ ] Strongly disagree [ ]
- d) If yes by how much?
- e) Can you say that the road signs may contribute to improved profitability of this sector? Strongly agree [ ] Agree [ ] Neutral [ ] Disagree [ ] Strongly disagree [ ]
- f) If yes by how much?
- g) Do good road signs have any correlation with a vehicles lifespan? Yes [ ] No [ ].
- h) If yes by how?

### 6. Quality of construction materials

- a) Do you think the road have been constructed with quality materials Yes [ ] No [ ].
- b) Does the quality of material have any correlation with the performance of the Matatu sector? Strongly agree [ ] Agree [ ] Neutral [ ] Disagree [ ] Strongly disagree [ ]
- c) If yes, state how the quality of materials relates with the performance of the sector.....
- d) Do you think that vehicle repair has a correlation with the quality of the road? Yes [ ] No [ ].
- e) Does the revenues corrected relates with the quality of the roads?  
Strongly agree [ ] Agree [ ] Neutral [ ] Disagree [ ] Strongly disagree [ ]

### 7. Lighting systems

- a) Do you think that the super highway have effective lighting systems? Yes [ ] No [ ].
- b) Does the quality of lighting have any correlation with the revenues corrected?  
Strongly agree [ ] Agree [ ] Neutral [ ] Disagree [ ] Strongly disagree [ ].
- c) Does the cost of the sector change when highway lightings are in place?  
Strongly agree [ ] Agree [ ] Neutral [ ] Disagree [ ] Strongly disagree [ ].
- d) If yes, state how the costs and revenues would change.....

8. Foot path and bridges

- a) Are there foot paths and bridges on the superhighway? Yes [ ] No [ ].
- b) Would the foot paths and bridges assist in the realization of your revenues? Strongly agree [ ] Agree [ ] Neutral [ ] Disagree [ ] Strongly disagree [ ].
- c) Does the foot path and bridges enhance road safety? Yes [ ] No [ ].

9. Drainage systems.

- a) Are there effective drainage systems on the superhighway? Yes [ ] No [ ].
- b) Does the revenue you collect relate any how with an effective drainage system? Strongly agree [ ] Agree [ ] Neutral [ ] Disagree [ ] Strongly disagree [ ].
- c) If \_\_\_\_\_ yes, \_\_\_\_\_ state how.....
- d) Does the drainage system have any relation with the cost you incur while running your business? Strongly agree [ ] Agree [ ] Neutral [ ] Disagree [ ] Strongly disagree [ ].
- e) If \_\_\_\_\_ yes, \_\_\_\_\_ state how.....

10. Standard lane

- a) Are there enough lanes on the superhighway? Yes [ ] No [ ].
- b) Does the strength of lanes positively impact on your business? Strongly agree [ ] Agree [ ] Neutral [ ] Disagree [ ] Strongly disagree [ ].

**Questionnaires for the SACCO Administrators**

**Part I: General Information**

1.State your Gender

- a) Male [ ]
- b) Female [ ]

2.What is your experience on the SACCO administration?

- a) Less than two years[ ]
- b) 3 – 7 years [ ]
- c) 8 - 11 Years [ ]
- d) More than 11 Years [ ]

3.State your age bracket

- a)18-30 years [ ]
- b) 31-40 years [ ]
- c) 41 -50 years [ ]
- d) 51 - 60 years [ ]

4.Education level of the administrator

- a) KCPE [ ]
- b) KCSE [ ]
- c) Certificate Holder [ ]
- d) Diploma Holder [ ]
- e) Degree Holder [ ]

Other (specify).....

**Part II: Road Infrastructural Improvement**

5.Standard lane

- a) Have the increased lanes on the highway positively impacted on the performance of your business? Strongly agree [ ] Agree [ ] Neutral [ ] Disagree [ ] Strongly disagree[ ].

6.Quality of construction materials

- a) Was the road constructed with quality materials? Yes [ ] No [ ].
- b) Does the quality of materials impact positively on your business? Strongly agree [ ] Agree [ ] Neutral [ ] Disagree [ ] Strongly disagree[ ].

c) If \_\_\_\_\_ yes, \_\_\_\_\_ state  
how.....

7.Lighting systems

- a) Are there adequate lighting systems on the road? Yes [ ] No [ ].
- b) Does the lighting system impact positively on the revenues collected? Strongly agree [ ] Agree [ ] Neutral [ ] Disagree [ ] Strongly disagree [ ].
- c) Does the lighting system impact positively on the cost reductions in your business? Strongly agree [ ] Agree [ ] Neutral [ ] Disagree [ ] Strongly disagree [ ].

8.Foot path and bridges

- a) Are there adequate foot path and bridges in the superhighway? Yes [ ] No [ ].
- b) Does the footpath and bridges impact on the revenues collected? Strongly agree [ ] Agree [ ] Neutral [ ] Disagree [ ] Strongly disagree [ ].
- c) Does the cost change with the new foot paths and bridges on the road? Strongly agree [ ] Agree [ ] Neutral [ ] Disagree [ ] Strongly disagree [ ].

9.Drainage systems.

- a) Are there effective drainage systems on the superhighway? Yes [ ] No [ ].
- b) Does the revenue you collect relate any how with an effective drainage system? Strongly agree [ ] Agree [ ] Neutral [ ] Disagree [ ] Strongly disagree [ ].
- c) If \_\_\_\_\_ yes, \_\_\_\_\_ state  
how.....
- d) Does the drainage system have any relation with the cost you incur while running your business? Strongly agree [ ] Agree [ ] Neutral [ ] Disagree [ ] Strongly disagree [ ].
- e) If yes, state how.....

10.Road marking and signs.

- a) Does a good road marking on the superhighway help improve revenues of your business? Strongly agree [ ] Agree [ ] Neutral [ ] Disagree [ ] Strongly disagree [ ].
- b) Do the road markings and signs help reduce the costs of running your business of your business? Strongly agree [ ] Agree [ ] Neutral [ ] Disagree [ ] Strongly disagree [ ].
- c) Can you say that the road signs may contribute to improved profitability of this sector? Strongly agree [ ] Agree [ ] Neutral [ ] Disagree [ ] Strongly disagree [ ].
- d) Do good road signs have any correlation with a vehicles lifespan? Yes [ ] No [ ].

**APPENDIX III: INTERVIEW SCHEDULE**

The information you provide in this interview will be treated with a lot of confidentiality and will only be used for research purposes only.

Part one: Drivers and Conductors and Owners and SACCO Administrators

What is your name and gender?  
.....

How long have you been in business (for operators)?  
.....

How long have you been in business (for administrators)?  
.....

How have the quality of the road benefited you as the operator of a matatu in this road?  
.....

Are there enough road signs and marking n this road and how do they assist in your operations.....

Does the drainage system constructed on this road contribute to the improvement of profits of this sector? .....

Are they sufficient foot path and bridges on this road?  
.....

How do the foot paths and bridges assist in the realization of profits of this sector?  
.....

Are there adequate lighting systems on the highway?  
.....

How does the lighting system contribute to the realization of profits of this sector?  
.....

#### APPENDIX IV: BUDGET

<b>Activity</b>	<b>Amount</b>
Preparation of proposal	5,000
Literature review	5,500
Piloting 2 days @ 1500	3,000
Production of research instruments	9,500
Data collection 1. Transport and accom.	10,000
2. Lunches	7,400
Final Report writing 4 copies and binding	9,000
<b>TOTALS</b>	<b>49,400</b>

**APPENDIX V: WORK PLAN**

Activity	May	June	Jul	Aug	Sept	Oct	Nov	Dec
Preparation of proposal								
Literature review								
Proposal submission								
Proposal defense								
Piloting								
Research instruments								
Production of research instruments								
Data collection								
Data analysis								
Final report writing								
Binding and submission								