THE IMPLICATION OF HIGHWAY DEVELOPMENT ON LAND USE; CASE STUDY OF THE SOUTHERN BYPASS IN THE VICINITY OF KIKUYU TOWN

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A Planning Research Project Submitted in Partial Fulfillment of the Requirement For the Award of the Degree of Bachelor of Arts in Urban and Regional Planning

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DECLARATION
This planning research project is my original work and has not been presented for a degree in any other University.
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This planning research project has been submitted for examination with my approval as the University supervisor
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MR. OSENGO C.K
(University supervisor)
DEDICATION
I dedicate this project to you my parents Mr. Samwel Langat and Mrs Eunice Leleito, my siblings Diana, Brian and Timothy and to my daughter Keyla. Thank you for always being there for me.
ACKNOWLEDGEMENTS
My gratitude goes to the almighty God for this far he has brought me, for patience and perseverance he gave me and his grace and mercies which made this research project a success.

It is with sincere gratitude that I thank all those who had an input in this research project. Much gratitude goes to my supervisor Mr. Osengo C.K for his insights, Dr. Opiyo and Dr. Mwangi who were the project coordinators.

I also thank my classmates for their support and input during the entire course duration. Special gratitude to my family and friends.
ABSTRACT

This Planning Research Project examines ways that transportation decisions affect land use patterns and how land use decisions affect transportation. Impacts of transportation decisions include direct impacts on land used for transportation facilities, and indirect impacts caused by changes to land use development patterns. This study analyses the case of how the development of the Southern Bypass impacts on the land use pattern of Kikuyu town.

This research was guided by objectives as outlined below; to assess the existing land use formation along in the vicinity of Kikuyu town before the Southern Bypass, to assess the emerging land use formations of the town and their relationship to the Southern Bypass, to explore the planning interventions to harmonize land-use planning and transportation planning.

The methodology for carrying out this particular research entailed in depth, longitudinal and qualitative methods. The methodology used covered the collection, interpretation, arrangement, combination and presentation of information in a form readily understood as summarized below: identification of the broad problem and formulation of objectives, undertaking of research and collection of data from secondary sources, conducting of field surveys and interviews, analysis of data collected using different techniques, presentation of data collected using different techniques.

The major findings of this study were: lack of an up to date development plan for Kikuyu town, increasing population, land subdivision to smaller portion that are uneconomical, encroachment into agricultural land to accommodate the increasing population, change in use of town plots to give way to new developments, unsafety in use of the highway in the town section due to lack of pedestrian walkways and speeding vehicles, increase in PSVs in the town, lack of designated paths for different modes of travel.

The major recommendations from the study findings include: Fast tracking the preparation of a comprehensive plan for the town to guide its development, policies regulating land prices in Kikuyu be formulated as these have the potential to rise to restrictive levels due to speculation, the informal daily markets, predominant at the roadside reserves, be relocated to an official space for such activities, segregation of motorized and non-motorized forms of transport, as well as provision of infrastructure for pedestrian traffic at the road reserves, is recommended, improved traffic management system along the corridor and the town in general and redesigning of entry and exit points into and out of the Southern Bypass within the town to mitigate the issue of heavy traffic and integrate pedestrian walkways.
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LIST OF ACRONYMS
G.o.K - Government of Kenya
GIS - Geographic Information System
Ha - Hectares
HH - Household
KeNHA - Kenya National Highways Authority
KeRRA - Kenya Rural Roads Authority
KNHPC - Kenya National Housing and Population Census
KURA - Kenya Urban Roads Authority
NEMA - National Environment Management Authority
PSV - Public Service Vehicle
SACCOs - Savings and Credit Cooperative Organizations
SPSS - Statistical Package for Social Sciences
SWOT - Strengths, Weaknesses, Opportunities and Threat Analysis
TOD - Transit Oriented Development
CHAPTER ONE: INTRODUCTION

1.1 Overview
Land use development patterns refer to human use of the earth’s surface, including the type and design of infrastructure such as roads and buildings.

Interaction between land use and transport is a complex two-way relationship. The spatial separation of human activities creates the need to travel and good transport. However, the reverse impact from transport to land use is less understood. Transportation planning decisions influence land use directly, by affecting the amount of land used for transport facilities, and indirectly, by affecting the location and design of development. For example, expanding urban highways increases pavement area, and encourages more dispersed, automobile-oriented development (sprawl), while walking; cycling and public transit improvements encourage compact, infill development (smart growth). How the development of the transport system influences the location decisions of landlords, investors, firms and households is not clearly understood. It is therefore necessary to co-ordinate transport and land-use planning since they co-determine each other as in the figure below:

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Transport system ← accessibility ← land use ← activities
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The distribution of land uses determines the location of human activities. The distribution of human activities in space requires spatial interactions in the transport system to overcome the distance between the locations of activities. The distribution of infrastructure in the transport system creates opportunities for spatial interactions (accessibility). The distribution of accessibility in space co-determines location decisions and so results in changes of the land-use system.

Road transport is one of the key channels of transport that has been used by man all over the world to facilitate mobility. In Kenya, road transport has been essential in the growth of the country’s economic performance because Kenya is primarily dependent on agriculture. Access to markets is made simple by an elaborate network of roads that transverse the country, though some regions such as the Northern and Eastern parts of the country have little or poor roads (King’ori, 2007).

In the Nairobi region, road transport is relatively well established in most places. The National Government and the City County of Nairobi initiatives have ensured that road networks are maintained well and other new ones are established. In the recent years, traffic
congestion in the City of Nairobi has caused a serious concern to the City authorities, government agencies, planning fraternity, private sector and citizens.

Nairobi as the capital City of Kenya has had two master plans since the year the British moved their capital from the hot and humid Mombasa to the cool Nairobi. The first master plan was in 1948 (Nairobi Master Plan for a Colonial Capital) as a guideline for planning the consequent 20 years, to cope with the urban challenges that were arising in Nairobi following the rapidly growing economy in Nairobi. The Second Master Plan was formulated in the year 1973 (Nairobi Metropolitan Growth Strategy); a strategy whose projections indicated that the City of Nairobi would experience an increase in its commuter traffic and demand on transport facilities.

Among the proposed road networks included the ring roads of the “Bypasses” whose functions included:

- Divert through traffic from passing through the CBD,
- To open new economic opportunities to the periphery of Nairobi,
- To improve accessibility to the Nairobi City region’s edges, and
- To mark an edge between Nairobi and its neighbours.

The Eastern, Northern and Southern Bypass roads were therefore meant to provide an alternative for motorists who have no interests in the City to bypass the City via other routes passing at the peripherals of the City and hence reduce the demand for the road through Nairobi as aspired by the action plans in the 1973 Master Plan.

The Southern bypass is a 28.6 kilometre dual carriageway, with two lanes in each direction. Other key features include 12 kilometre slip roads and 8.5 kilometre service roads, four modern interchanges and street lighting.

This study focuses on ways transportation decisions affect land use patterns and the resulting economic, social and environmental impacts. A specific case study of the Southern Bypass effects on land use patterns in the Vicinity of Kikuyu Town. Changes in land use are taking place along the Southern Bypass with varied intensity. However, in certain parts like near Kikuyu town, the changes are intense which require an inquiry into their nature of consequences in relation to land use.
1.2 Statement of the Problem

The development of urban roads is crucial in ensuring there is minimal congestion of vehicular traffic. It was for this purpose that bypasses (Northern, Eastern and Southern) were planned so as to reduce congestion in the City of Nairobi.

In planning circles, it is worth noting that transport and land use are closely intertwined and the development of new roads have for a long time led to the development of areas along the roads. The development of along the roads should thus be anticipated and be planned for to support it such as provision of the necessary infrastructure needed.

The Nairobi Metropolitan Growth Strategy of 1973 was intended to guide development of Kenya’s capital up to the year 2003, from where a new master plan for the City should have been incepted. However, by the year 2003, there was no other master plan to guide development that had been developed. The City was more of growing organically than with a guiding document. The City authorities had no guidelines by which to abide by rather than the policy documents in City Hall, dealing mostly with zoning regulations and guidelines, which have constantly been revised to cope with the City’s development needs. (Mairura, 2008).

The Nairobi Southern Bypass is meant to reduce congestion in Nairobi by providing an alternative route for motorists going to Western Kenya and other destinations west of the capital City. Having been planned for in 1973, land for construction was acquired at the time and under the control of the county council and the physical department. Land use organization was not done, so people have encroached on the bypass land. With the construction of the Southern bypass set to be completed, Kikuyu town is set to undergo major changes. The bypass threatens to flatten some buildings in the developing township. The small town which used to serve as a railway station is in the brink of demolition as the massive Southern Bypass approaches. Kikuyu town has most of its structures which are along the main highway earmarked for demolition, paving way for the junction with the bypass.

At the time of bypass planning, land use planning was not carried on either side of the highway and even as construction is being undertaken, land use planning has not been done. The likely implications of this shortcoming include speculation, unplanned and unbalanced development.

All urban areas need basic infrastructure facilities to realize sustainable development. These basic infrastructure needs are mandatory to support other land uses in an urban area and they
include power supply, water supply, sewerage provisions, road works and solid waste management facilities.

This study is therefore relevant to decision makers in City planning authorities and other relevant ministries to plan appropriately so as to address the effects that new highway developments have on the areas it passes through.

1.3 Research Questions

- What has been the existing land use formation of Kikuyu town before the Southern Bypass?
- What are the emerging land use formations of the town and their relationship to the Southern Bypass?
- What are the planning interventions to harmonize land-use planning and transportation planning?

1.4 Research Objectives

- To assess the existing land use formation of Kikuyu town before the Southern Bypass.
- To assess the emerging land use formations of the town and their relationship to the Southern Bypass.
- To explore the planning interventions to harmonize land-use planning and transportation planning.

1.5 Assumptions of the Study

The assumptions of this study are that opening up of the Southern Bypass will have significant impact on land use along the bypass and within the town.

1.6 Justification of the Study

Transportation planning decisions can have countless direct and the indirect land use influences. These impacts are many times significant and ought to be considered when appraising a particular policy or project. When we talk of conventional transport planning decisions, impacts of these decisions are often ignored.

This study is therefore important as it will give a complete analysis of the impacts of Southern bypass on land uses and can help assimilate transportation and land use planning resulting in transport decisions that support land use objectives and land use decisions that support transportation decisions. This can help planners find out the best approaches to achieve development objectives, enhance accessibility and conserve open spaces.
1.7 Scope of the Study
The research will investigate on how construction of the Southern Bypass impacts on land use pattern in Kikuyu Town. The emerging trends against the previously existing land use pattern will be studied to understand the degree of impacts. The study will rely on both primary and secondary sources of information.

The study was organized in the following chapters:
Chapter 1: Introduction: this chapter provides the general introduction, statement of the problem, the objectives, justification, scope of study and research methodology.
Chapter 2: Literature review: this chapter focuses on the review of related literature, policies and plans, comparative case studies and the identification of a conceptual framework.
Chapter 3: Research methodology: this chapter describes the process of data collection, data analysis and data presentation for the purpose of this study.
Chapter 4: The background of the study area: this chapter examines the general background of the study area, its location, history of the development of the area, development of the problem which will include the analysis of the existing situation.
Chapter 5: Findings: This chapter focuses on the planning implications and their analysis.
Chapter 6: The planning and policy implication of the findings: this chapter focuses on examining the alternative policy strategies to address the problems identified.
Chapter 7: The summary and conclusion: this chapter provides the general summary and conclusion of the study.

1.8 Study Limitations
This study was limited on various grounds: there were time and financial constraints experienced, difficulty in acquiring some of the needed statistical information regarding the household incomes and also profits earned by the market traders, some of the respondents were reluctant to answer the questionnaires up to the end due to time factor, it was difficult to reach all the key informants, but also when they were reached some were unsupportive.

1.9 Definition of Terms
Transport and transportation
Transport refers to the link between activity spaces. Transportation is defined as a means of movement of goods, persons and services from one point to another. Hence it does not only involve the movement of vehicles. It is usually composed of origin and destination of people, goods and services (Obiero, 1992).
**Transport planning**
Planning is inherently about looking ahead (Freestone, 2012), while transport as mentioned above refers to the link between activity spaces. The relationship between land use and transport is that transportation is a means of reducing the ‘friction of space’ between activity sites (Black, 1981). This reduction of friction is done through the separation of activity locations to improve efficiency and social-economic development.

**Land use**
This refers to the human use of land. Land use involves the management and modification of natural environment or wilderness into built environment such as settlements and semi-natural habitats such as arable fields, pastures, and managed woods.

**Land use planning.**
The process by which lands are evaluated and assessed to become a basis for decisions involving land disposition and utilization.
CHAPTER TWO: LITERATURE REVIEW

2.1 Overview
The purpose of this chapter is simply to provide the review of related literature dealing with theories, concepts and principles relevant and related to the subject of study. This includes; plans, policies, case studies among others and the development of a conceptual framework to guide this study.

2.2 Nairobi Metropolitan
Nairobi Metropolitan Region covers approximately 32,000 km$^2$. This covers 15 local authority areas with the City Council of Nairobi Covering (684 km$^2$); County Councils of Kiambu, Olkejuado, Masaku and Thika; Municipal Councils of Ruiru, Thika, Kiambu, Limuru, Mavoko, and Machakos; and Town Councils of Karuri, Kikuyu, Kajiado, and Kangundo (Ministry of Nairobi Metropolitan Development, 2009, p. 38).

Nairobi metropolitan region is faced with numerous problems and challenges. This includes, among others (Ministry of Nairobi Metropolitan Development, 2009, p.38): rapid urbanization and population growth, high unemployment and low incomes, massive urban sprawl and encroachment into rich agricultural and water catchment areas, haphazard and uncoordinated and incompatible urban and rural development, rapid growth, inadequate and informal housing, poor provision and inadequate infrastructure and utility services, Poor and inadequate community and social services, poor transport services, environmental degradation and poor sanitation, poor and uncoordinated governance system.

Nairobi has severely limited mobility and poor transport system. Kenya’s car population is between 400-500,000 units, of which 30-40% are in Nairobi. This means that Nairobi has a high car dependence level compared to other towns. Within the city, regional commuter distances are in excessive 30-40 kilometres long. In the metropolitan region urban transport is expensive and poorly run. Public transport in Nairobi is mainly run by the private matatu sector. This sector is often blamed for causing traffic congestion, accidents and flouting traffic rules.

To address poor transportation services within Nairobi the metropolitan authority aims at improving the transport system in the region. This includes reduction in travel time and costs, improved connectivity and accessibility, increased public transport, and enhanced transport safety and security.
2.3 Transport-land Use Relationships

It is commonly accepted that transport and changes in land use are closely related. It is also known that the spatial distribution of human activities such as living or working generates demand for the movement of people and goods.

Changes in accessibility are likely to influence the relative attractiveness of a location, potentially inducing shifts in land values, uses, or densities. These changes are results of the relationship between transport, land and human activities (housing, employment, industry, etc.), a tri-partite interaction that generates travel demand and the requirement for transport infrastructure as illustrated in diagram one below.

Diagram 1: the urban land-transport relationships and some of the variables involved.


Some of the impacts of transport on land are fostering/reduction of population density growth, change in operational patterns of bus transport systems, and enhancement/ depression of areas within the City (possibly including economic revenues by changes in land uses and/or land values due to an improved accessibility). On the negative, visual impacts and noise are the most common considerations. Diagram two above summarizes the basic variables affected (positively or negatively) by the transport-urban land relationship.
2.4 Relationship between Land Use and Transportation Planning

Transportation’s purpose is moving people and goods from one place to another, but transportation systems also affect community character, the natural and human environment, and economic development patterns. A transportation system can improve the economy, shape development patterns, and influence quality of life and the natural environment. Land use and, in turn, the degree of access provided by the transportation system can influence land use and development trends. Urban or community design can facilitate alternative travel modes. For example, a connected system of streets with higher residential densities and a mix of land uses can facilitate travel by foot, bicycle, and public transportation, in addition to automobile. Conversely, dispersed land development patterns may facilitate vehicular travel and reduce the viability of other travel modes. Activities intended to stimulate economic development can affect the transportation network, and, in turn, the transportation network can affect economic development.

2.5 Transport Land-use Function

Land use is any of man’s activity on land. Herling (1995) defines land use as the accommodation in terms of space of all human activities on land and the way in which the land surface is adapted or could be adapted to serve human needs. Thereby, land uses must possess locational and spatial aspects. According to Will Rodgers in Sullivan (1990), the trouble with land is that it cannot be made anymore. Of all the factors of production, it is rigid and the supply is constant.
Transport and land use have shared a closed loop system for a long time. For a long time, land use and transport define one another mainly because land use patterns in a place generate differential demands for locational access into a given area. This differential access demand is supplied using transport. Transport serves existing land uses and at the same time it can attract land-uses and at the same time it can attract land-uses in a particular area (Elliot, Et al, 2007).

When a land use activity is established in an area that is unserved by a transport channel, there is a need to service that area with a road, rail, and waterway or air transport facility to facilitate movement into and out of the area. This is the essence of planning; harmonizing land uses. This investment will attract laying down infrastructure to tap into the multiplier effects the land use and new road will have on the surrounding area.

When transport precedes a place, this serves as an opportunity for opening investment choices because transportation and access to markets is assured. The bid rent function will shift to favor more rent or land values, and low economically productive activities give way to highly productive economic activities, which earn more income and mostly create more jobs. Densities potentially rise to tap into the new land uses.

2.6 Land Use and Transportation Interactions

Land use and transportation are inextricably linked. Agencies often struggle to understand and respond to this linkage in a way that fulfills natural resource and quality-of-life objectives while fulfilling community economic objectives. New transportation infrastructure can help shape land uses by increasing the accessibility of sites and the mobility of site users. For example, on a highway corridor through undeveloped land, a new interchange increases the accessibility of sites in the vicinity, enabling their development. In addition, the new interchange offers some existing users of the highway network time savings over their current routes and destinations, thereby increasing demand for new development on these sites. These pressures can result in land development, often at quite a distance from the interchange. While the new interchange may represent a transportation agency’s good-faith effort to fulfill its charge of improving mobility, it also produces powerful effects on land use. Other transportation investments produce “induced growth” in similar ways. That growth can then contribute to undesired environmental outcomes. If not managed properly, habitat loss from new greenfield development can interfere with ecosystem functions, including support of fish and wildlife populations. Impervious surface can quickly grow to the point of degrading
surface and ground water quality. Losses in open space, increases in the heat-island effect, and greater air pollution from higher amounts of vehicle travel can all degrade human and environmental health and community quality. Of course transportation investment cannot produce growth absent demand. That demand, and the land use policies that affect it, drive land use and resulting impacts. Local policies may produce new development, creating new travel demand and taxing the existing transportation network. As a result, the transportation agency may be unable to maintain its level of service standards, leading users and the locality to call for expanded capacity. Thus begins again the cycle of new transportation projects that encounter environmental issues.

Thus the importance of coordination between transportation and land use agencies, as decisions by each can affect the other’s ability to carry out its responsibilities. To understand how to achieve real coordination, it is useful to first revisit briefly the institutional contexts in which land use and transportation planning take place. The traditional context in which transportation projects are selected and developed, and the separate context in which land use concerns are addressed, pose challenges for integrated evaluation. Attempts at better coordination, then, need to respond to these challenges.

### 2.7 Stakeholder Coordination

Induced growth can reduce the effectiveness of transportation investment, may conflict with local growth desires, and trigger adverse environmental impacts. An integrated effort can benefit transportation agencies and the community at large in the following ways:

First, projects emerging from planning processes that consider transportation and land use together can **respond better to community needs**. Transportation agencies can support community goals that extend beyond mobility and economic vitality, enabling them to select projects that combine mobility and economic objectives with quality-of-life and environmental ones.

Just as important is the ability of projects from more coordinated planning processes to **garner greater public support**. Engaging with land planning processes allows transportation projects to be conceived within a community vision for land use and transportation. The support built around this vision can in turn help facilitate transportation project implementation.
Finally, coordinated land use and transportation planning processes can develop more community- and environmentally sensitive land use plans and policies. Transportation projects can be catalysts to initiate local and regional dialogues about how to manage future growth, illuminating the impacts of land use choices. The ties that transportation agencies have to state and federal resource agencies can bring natural resource concerns into local planning, allowing land use plans and policies to better address those concerns.

Engagement with land use planning enables transportation agencies and land use jurisdictions together to develop and implement the planning and mitigation strategies necessary to avoid or reduce negative land use impacts of transportation projects. Transportation agencies stand to gain from involvement in land planning processes not only through better projects, but also from a better environment in which to implement projects.

2.8 Approaches to Transport-land Use Planning
The goal of engaging in land planning is to create a vision for land use in which transportation plays an integral role, ensuring that transportation projects have the effects that local communities desire and so are supported by the communities they serve. Recognizing that the institutional contexts in which transportation and land use are planned will generally remain fixed, the way for transportation agencies to become involved in land use is to partner with other stakeholders. Transportation agencies have access to and control over substantial funding resources, as well as a wealth of technical expertise. They can become engaged in land use planning by bringing to the table the funding and expertise needed to support efforts to address growth impacts. Transportation agencies can make these linkages with:

- Statewide growth efforts;
- Local or regional growth planning efforts; and
- Local land use goals in transportation project selection.

2.9 Integrating Transport and Land use Considerations
Although transportation and land use are planned in separate contexts, transportation agencies can support easier and faster implementation of transportation projects and avoid the problems the separation inevitably creates by considering the land use impacts of projects earlier and producing initiatives that truly address those impacts. Doing so does not require transportation agencies to abandon the goals of improving mobility and accessibility, but rather to employ new means to achieve those goals. Three kinds of responses can help strengthen linkages between transportation and land use:
Engagement in Local Land Planning
Transportation agencies can develop mechanisms to engage with local land planning processes as a way to bridge the divides created by divisions of responsibility for transportation and land use. Through this engagement with land planning, more holistic solutions can realistically be considered and implemented. In fact, mitigation strategies often depend on advance planning work in order to be implemented. This engagement can also provide a political environment that is more conducive to good-faith dialogue about how transportation agencies, land use agencies, and the community at-large can work together to address growth issues.

Analysis Method
Transportation and land use interactions are complex and therefore many current analysis methods have proved insufficient for capturing these interactions. Agencies can work to improve the methods used to predict the land use effects of transportation projects, and the methods to help convey these effects to broad audiences, especially visually.

Mitigation Strategies
Ultimately, strategies are necessary for implementing land use growth and development management visions and goals. Agencies can employ such strategies in connection with transportation projects, or as general initiatives unconnected with particular projects. Some of these strategies involve land use regulations, underscoring the importance of close coordination and partnerships with land use jurisdictions. Others transportation agencies themselves can undertake. By engaging with and supporting land use planning, transportation agencies can build partnerships and help form a regional consensus on managing growth and its effects. In many areas, new analysis methods are needed to improve the understanding of land use and transportation interactions. And finally, mitigation strategies are needed to help implement these regional strategies to manage growth. The nature of these responses highlights the need for successful coordination with land use at all stages of decisionmaking, from system planning to project implementation. Success lies in determining the most effective kinds of analysis and actions to be undertaken at each stage.

2.10 Implication of Transportation System on Land-use
There are various concerns when it comes to impacts of transport on the environment; how transportation decisions affect land-uses both directly and indirectly due to changes in the type, density, design and location of development (Rodrigues, 2010). These impacts are discussed below:
Traffic congestion and parking difficulties

Congestion is one of the most prevalent transport problems in large urban areas. This is directly linked to motorization which has directly increased the demand for transport infrastructures. However, the transport infrastructure supply has not kept up with the growth of mobility; Since vehicles spend the majority of the time parked, motorization has expanded the demand for parking space, which has created space consumption problems particularly in central areas; the spatial imprint of parked vehicles is significant. Congestion and parking are also interrelated since looking for a parking space creates additional delays and impairs local circulation (Rodrigues, 2010).

Longer commuting

On par with congestion, people are spending an increasing amount of time commuting between their residence and workplace. An important factor behind this trend is related to residential affordability as housing located further away from central areas are known to be affordable. Therefore, commuters are trading time for housing affordability (Rodrigues, 2010).

Public transport inadequacy.

Many public transit systems, or parts of them, are either over or under used. During peak hours, crowdedness creates discomfort for users as the system copes with a temporary surge in demand. Low ridership makes many services financially unsustainable, particularly in suburban areas. In spite of significant subsidies and cross-financing (e.g. taxes) almost every public transit systems cannot generate sufficient income to cover its operating and capital costs (Rodrigues, 2010).

Difficulties for non-motorized transport.

These difficulties are either the outcome of intense traffic, where the mobility of pedestrians, bicycles and vehicles is impaired, but also because of a deliberate lack of consideration for pedestrians and bicycles in the physical design of infrastructures and facilities (Rodrigues, 2010). The Southern Bypass is a dual carriageway used by both the motorists and NMTs and since the NMT modes move at a slower speed than the motorists, they frequently faces challenges such risks of accidents are high, traffic congestion from other modes (motorists).

Loss of public space

The majority of roads are publicly owned and free of access. Increased traffic has adverse impacts on public activities which once crowded the streets such as markets, agoras, parades and processions, games, and community interactions. These have gradually disappeared to be
replaced by automobiles. In many cases, these activities have shifted to shopping places while in other cases, they have been abandoned altogether (Rodrigues, 2010).

**Environmental impacts and energy consumption.**

Pollution, including noise, generated by circulation has become a serious impediment to the quality of life and even the health of urban populations. Further, energy consumption by urban transportation has increased and so the dependency on petroleum. This has had an implication in the rise and fall of prices of products (goods and services) that directly affect the consumers (Rodrigues, 2010).

**Accidents and safety.**

Growing traffic in urban areas is linked with a growing number of accidents and fatalities, especially in developing countries. Accidents account for a significant share of recurring delays. As traffic increases, people feel less safe to use the streets.

**Attraction of other land uses**

The transportation networks also tends to attract other land uses within their areas of locations. Hence leading to Transit Oriented Developments (TOD). Such land uses majorly are the business activities and residential developments.

2.11 **Policy, Legal and Institutional Framework**

2.11.1 **Policy Framework**

**The Kenyan Vision 2030**

The Kenya Vision 2030 is a long-term development blueprint for the country motivated by collective aspiration for a much better society by the year 2030. The aim of this Kenya Vision 2030 is “the globally competitive and prosperous country with a high quality of life by 2030.” The vision aspires to meet the MDGs for Kenyans.

The Vision is anchored on three key pillars: Economic; Social; and Political Governance. The economic pillar aims to achieve an economic growth rate of 10 per cent per annum and sustaining the same till 2030 in order to generate more resources to address the MDGs. The vision has identified a number of flagship projects in every sector to be implemented over the vision period to facilitate the desired growth that can support the implementation of the MDGs on a sustainable basis. In addition the vision has flagged out projects addressing the MDGs directly in key sectors such as agriculture, education, health, water and environment.

The social pillar seeks to create just, cohesive and equitable social development in a clean and secure environment. The political pillar aims to realize an issue-based, people-centered, result-oriented and accountable democratic system.
The 2030 Vision aspires for a country firmly interconnected through a network of roads, railways, ports, airports, and water ways, and telecommunications. The role of infrastructure band which includes the roads sub-sector is one of the main buttresses to help the six sectors that constitute the backbone of the vision, namely; tourism, agriculture, wholesale, retail, and manufacturing, marketing local investment potential and financial services. It should provide water and modern sanitation facilities to her people. By 2030, it will become impossible to refer to any region of our country as “remote”. To ensure that the main projects under the economic pillar are implemented, investment in the nation’s infrastructure will be given the highest priority.

**Integrated National Transport Policy of 2009**

The transport policy provides strategies that can be used to manage transport planning in the country to facilitate efficient movement and accessibility. This policy provides guidelines on the linkages that should be established in the country. The achievement of this objective quite significantly can be enhanced by putting in place measures to enhance free and faster flow of passengers and freight along the country’s transport roads (e.g. the Southern Bypass) which is both necessary both for the national economy generally and the efficient functional operation of the urban areas such as Nairobi.

**Nairobi Metropolitan Growth Strategy**

The Vision of Nairobi is to be a world class African metropolis by 2030. It will strive to create a world class working environment with a wide range of jobs, transport options and communication infrastructure. It is a vision of a world class living environment with modern housing, healthcare, cultural amenities and recreational facilities. Nairobi intends to provide high-quality office, production and storage space supported by a full range of ancillary services and information infrastructure.

The Nairobi 2030 plan intends to achieve its vision through a range of integrated initiatives that address the challenges that currently hinder urban development and social progress. Central to the City's plan on improving its international economic competitiveness is the development of regional and global service hubs for business, trade and finance. In addition to attractive foreign investment through a thriving business economy, the plan also supports the continued development of Nairobi’s tourism sector through investments in hotel facilities, transportation access (including a massive upgrade of the Jomo Kenyatta International
Airport) and crime prevention. Finally, the plan also intends to spur the development of industrial parks and facilities within the City as well.

The City also plans on investing heavily in building modern municipal infrastructure to improve access to electric, water delivery and sanitation utilities across the entire metropolitan region. In addition to providing basic access to these utilities, the plan also stresses the importance of improving access to information and communication technology networks that support business, government, education and literacy.

The plan also outlines the development of a transport master plan to effectively improve transportation infrastructure and land use planning to improve existing transportation options around the City. Focusing on improvement of the existing road network, the plan also details an urban mass transit strategy that centers on investments in high occupancy buses and modernization of the existing commuter rail network. By improving the City's accessibility to mass transportation, the City can effectively reduce road congestion and increase commuter access to the City center, while improving public health at the same time.

By implementing these strategies, Nairobi hopes to serve as a gateway between Africa and the rest of the world. It also addresses the growing poverty issues with the intention of creating a creating a better quality of life for those living in the metropolitan area.

**National Development Plan 2002-2007**

This planning period spanned a time when there was a lot of emphasis on *Economic Recovery Strategy for Wealth and employment creation 2003-2007* (ECREC). During this period, road infrastructure was recognized by the government as a catalyst to accelerate economic recovery. In the economic recovery programme, the government had intent to improve roads by constructing durable and quality standard roads within this strategy period to boost economic development. The idea was to surface land uses and open up new areas for investment opportunities.

The road design manuals were revised and updated specifications for construction materials, adopted cost effective road construction designs for roads and civil engineering structural work, reformed the legal, institutional and regulatory framework in the road transport sector with the aim of radically transforming proper road designs, integrity in contracting and procurement of materials and allowing private sector participation in management of roads in the country. The Kenya Urban Roads Authority, Kenya Rural Roads Authority and the Kenya National Highways Authority were each assigned clear roles to undertake in the transport sector.
The Southern Bypass in Nairobi is under the jurisdiction of Kenya National Highways Authority.

### 2.11.2 Legal Framework

**The Repealed Land Planning Act Cap 303**

This Act of parliament was repealed by the Physical Planning Act Cap, 286. It made provision for planning the use and development of land.

A local authority was charged with the responsibility of preparation of a town plan or area plan after consultation with, and with the agreement of, the Minister for that part of the area under its jurisdiction. Such plans were supposed to include maps and descriptive matter necessary to illustrate the planning proposals and in particular define: existing development, proposed roads, the different use and density zones proposed and areas in which no sub-division is permitted for the time being.

For the purpose of securing the proper sub-division of land in an area other than of unalienated government land, the Minister required a local authority which had submitted a town plan or area plan to submit to him for approval sub-division and use plans for its area or any part thereof.

Plans and particulars of any amendment to a town or area plan were prepared by an interim planning authority and submitted to the Minister for approval.

Where no town, area plan or subdivision and use plan had been approved and in respect to government land, the Minister was required to prepare such plans.

With respect to development of roads, this plan introduced the building line which could be defined by the Central authority or an interim planning authority as a line prescribing the minimum distance of any building or proposed building from the boundary of any proposed or existing road boundary or the centre line of any proposed or existing road.

**Physical Planning Act, Cap 286**

The Physical Planning Act is a statute that provides for physical planning and development control. The Physical Planning Act was enacted in 1996 repealing two earlier statutes the Town Planning Act (Planning in Urban areas) and the Land Planning Act (Planning in rural areas). The Physical Planning Act provides for planning in both urban and rural areas. It came into effect in November 1998 as a response primarily to the outcry relating to the excision in Karura Forest. Nevertheless it is now in effect. Institutionally the Physical Planning Act places the functions of Physical Planning in the Office of the Director of
Physical Planning, administratively the director of physical planning is an officer in the ministry of lands. The Act states that the Director of Physical Planning is the chief government advisor on all matters related to physical planning and in that capacity he shall formulate physical development policies prepare physical development plans, advise the Commissioner of Lands on the alienation of government lands, advise the Commissioner of Lands and Local authorities on the most appropriate use of land and require local authorities to ensure the proper execution of physical development control. The Act establishes committees known as physical planning liaison committees at National, provincial and district levels. The function of these committees is to act as an appeal mechanism from the decisions of the Director of Physical Planning. The membership of these committees is comprised of permanent secretary as the chair, the Director as the secretary.

This act emphasizes on development control. Local authorities are empowered to prohibit or control the use and development of land and buildings in the interests of proper and orderly development of its area, to control or prohibit the subdivision of land or existing plots into smaller areas, to consider and approve all development applications and grant all development permissions, to ensure the proper execution of implementation of approved physical development plans, to consider and approve all development applications and grant all development permissions, to ensure the proper execution and implementation of approved physical development plans, to formulate by-laws to regulate zoning in respect of use and density of development and to reserve and maintain all the land planned for open spaces, parks, urban forests and green belts in accordance with the approved physical development plan.

**The Traffic Act Cap 403**
Section 91 of this act declares it illegal to erect any structure of interference within the road reserves. This forms the legal basis of the demolition of houses and structures built along the road reserves in Nairobi to pave way for expansion and development of the roads.

**The Trust Land Act Cap 28**
The above Act states that while giving due considerations to the rights and obligations of land owners, there shall be compensation wherever a materials site, a diversion, or realignment results into relocation of settlement or any change of user whatsoever of privately owned land parcels.
Kenya Roads Act 2007
This Act gives the Kenya National Highways Authority the mandate to provide oversight of three roads authorities which will operate under the State Corporation Advisory Board Regulations. All roads in the country including those controlled by local authorities therefore fall under these new authorities. The three authorities are: the Kenya Highways Authority(KeNHA), Kenya Urban Roads Authority(KURA), National Development Strategy.

Physical Planning Handbook
The Physical Planning Handbook is a guiding document compiled by the Physical Planning department in the Ministry of Lands, Housing and Urban Development to give guidelines and standards to planning activities. It considers having development that is sustainable by balancing between economic, community and ecological development.
For urban infrastructure, the appropriate standards point to improving conditions by outlining minimum standards to be applied uniformly in all areas with an aim of propagating a safe and healthy living environment. This is done by having a more equitable distribution of infrastructure that is mandatory to all sectors. The adopted standards aim at achieving:

- Flexibility
- Suitability/adaptability to the prevailing local conditions and economic state of the residents
- Sustainability of the infrastructure

Environmental Management and Coordination Act Of 1999
This Act establishes an appropriate legal framework and institutional framework for environmental management and matters connected with it; with an aim of enhancing a safe, clean and healthy environment.
NEMA is established in section 7 of this legislation to execute all the requirements outlined in this Act and policies relating to the environment. However, NEMA does not have the necessary institutional framework to enforce environmental protection thus there is a blank note stating who should oversee an Environmental Impact Assessment (EIA) process. There are also not very clear guidelines on what to be followed to assess impacts of major projects such as major highways.

To effectively actualize the vision of creating this Act, there is need to harmonize it with other acts and outline clearly the powers of the state and local authorities in environmental protection and EIA oversight and approval.
In planning practice, the many laws in operation are not in tandem with the Physical Planning Act or with each other thus causing a differential application of planning standards that are set out differently in many acts of parliament. There should thus be a harmonization exercise to ensure harmony in the operational laws to help streamline planning practice.

2.11.3 Institutional Framework

**Physical Planning Department**

The physical planning department is mandated with the production of physical development plans. The urban areas as well as the rural areas in the country are facing numerous problems with respect to sustainable space utilization, resources utilization and distribution, poor infrastructure, poverty, declining urban areas and environmental degradation. All these have a direct impact on the well-being of the society and the physical planning department is untrusted with the provision of solutions to such pressing needs.

Preparation of development plans to guide Kikuyu Town is a task of this department in consultation with other relevant agencies to ensure proper coordination of land use activities.

**NEMA**

EMCA gives NEMA mandate to: coordinate the various environmental activities being carried out by lead experts; promote the integration of environmental concerns into development policies, plans, programs and projects, with a view to ensuring the proper management and rational utilization of environmental resources on a sustainable basis for the improvement of the quality of human life in Kenya; take stock of the natural resources in Kenya and their utilization, conservation; establish and review land use guidelines; examine land use patterns to determine their impacts in the quality and quantity of natural resources; carry out research which will assist in the proper management and observation of environment or the implementation of relevant international treaties, conventions and agreements to which Kenya should be a part and follow up the implementation of these treaties.

**The Kenya Highways Authority (KENHA)**

This is the implementing agency that manages and maintains all road works on class A, B, and C roads. In addition to implementation of works, KENHA advices the Kenya National Highways Authority on technical issues such as standards, axle loads, research and development. KENHA also creates regions and then reports to the Kenya National Highways Authority that approves its development budgets while the Kenya Roads Board approves the maintenance budget.
**Kenya Urban Roads Authority (KURA)**

KURA manages and maintains all road works on urban cities and major municipalities. It falls under the Kenya National Highways Authority where the ministry approves its roads development budgets. The Local Authorities Transfer Fund has the meaning assigned to it by the Local Authorities Transfer Fund Act, 1999. The Kenya Wildlife Service (KWS) remains a roads agency responsible for roads under their jurisdiction as well as access roads allocated to KWS by the Kenya National Highways Authority. KWS reports to the Kenya National Highways Authority and Public Works on development projects while the Kenya Roads Board 34 approves its maintenance works. The implementation of the Kenya Roads Act 2007 acts as a catalyst for mobilizing more resources for roads developments and maintenance.

### 2.12 Planning Standards

#### Roads

Roads in any place have to be hierarchical to have orderly access and utility. The guidelines adopted in planning should ensure that; activities that are incompatible with traffic flow are to be restricted on designated roads, reduction in the number of road intersections to reduce the risks of accidents, concentration of traffic on a few selected traffic corridors.

The following table is a summary of the desired road reserves needed in planning for roads in Kenya.

<table>
<thead>
<tr>
<th>ROAD CLASSIFICATION</th>
<th>DESIRABLE ROAD RESERVE (M)</th>
<th>REDUCED ROAD RESERVE (M)</th>
</tr>
</thead>
<tbody>
<tr>
<td>International Trunk Road</td>
<td>A</td>
<td>60</td>
</tr>
<tr>
<td>National Trunk Road</td>
<td>B</td>
<td>60</td>
</tr>
<tr>
<td>Primary Roads</td>
<td>C</td>
<td>40</td>
</tr>
<tr>
<td>Secondary Roads</td>
<td>D</td>
<td>25</td>
</tr>
<tr>
<td>Minor Roads</td>
<td>E</td>
<td>20</td>
</tr>
<tr>
<td>Special Purpose Roads</td>
<td>E</td>
<td>20</td>
</tr>
</tbody>
</table>

The design standards for urban roads are as follows:

**Table 2 Design Standards for Urban Roads**

<table>
<thead>
<tr>
<th>ROAD</th>
<th>ROAD WIDTH</th>
<th>ROAD RESERVE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Highways/major routes</td>
<td>13.5m-16m</td>
<td>60m</td>
</tr>
<tr>
<td>Spine/major roads</td>
<td>11.5-13.5m</td>
<td>25m</td>
</tr>
<tr>
<td>Collector streets</td>
<td>9m-11.5m</td>
<td>18m</td>
</tr>
<tr>
<td>Access streets</td>
<td>7m-8.5m</td>
<td>15m</td>
</tr>
<tr>
<td>Service lanes</td>
<td>6</td>
<td></td>
</tr>
</tbody>
</table>


**Highway Development**

Development of highways involves;

- Conducting feasibility studies and engineering assessments of highway alignment and structure of the road, giving a careful attention on measures to reduce negative impacts on the natural environments.
- On completion of the road construction, action should be taken to protect exposed ground by tree planting, turfing of slopes and other protective measures.
- Appropriate and congruent land use planning of adjacent land should be undertaken carefully.
- Provide boulevards along the transport corridor by planting trees on clear road stretches and shrubs where visibility cannot be hampered with.
- Beautification of the entire road system by allowing compatible land uses such as flower selling businesses.
- Integration of transport with recreation by providing NMT channels and outdoor resting places.
- Provide for stopover facilities at reasonable intervals such as supermarkets, stalls, convenience places such as sanitation facilities, internet cafes, eating joints and parking lots.

The Traffic Act limits the speeds of travel within the boundaries of any market centre, township, municipality or City not to exceed 50km/h and there be erected signage to inform drivers of this restriction; where it begins and ends.

Vehicles stopping along the roads are required not to park on the roads but pull as of the road as possible to avoid traffic obstruction.

The City Council bylaws prohibit rearing livestock within the City boundaries, safe for pets for owners with permits. The traffic act also places a charge on any person who does not
exercise careful charge of wildlife and any animal and they stray to roads being liable to prosecution. This is because they are capable of causing accidents on the roads.

2.13 Bend Case Study

Description

The Bend case study evaluated the land use impacts of improvements to a section of US Highway 97 (The Dalles-California Highway) from milepost 132.6 on the North (about 0.5 miles north of the Smalley Road/US 97 intersection) to the Highway 97/Highway 20 Interchange at milepost 134.8. Parts of the improvement were inside, and parts outside, the Bend urban growth boundary (UGB) at the time of construction. The project was called the Bend-Redmond South Unit. The project improved a 2.2-mile section from two to four lanes.

Figure 1 Location of the Bend Project

Source: Bend-Redmond South Unit Environmental Assessment, 1987.
A full EIS was not completed for the Bend-Redmond South Project. ODOT completed an Environmental Assessment (EA) for the project in 1987. Construction was completed in 1991. According to the EA, the purpose of the project was to increase the capacity and level of service of the facility and to improve safety along this stretch of Highway 97. The EA explained that the need for the project resulted from operational problems due to heavy traffic volumes.

According to the Environmental Assessment, the purpose of the project was to increase the capacity and level of service of the facility and to improve safety along this stretch of Highway 97. The EA explained that the need for the project resulted from operational problems due to heavy traffic volumes. The EA projected that traffic volumes in the project corridor would increase as much as 70% between 1987 and 2008.

**Figure 2 Study Area Boundaries**

*Source: Bend-Redmond South Unit Environmental Assessment, 1987.*
**Findings**

The evidence is mixed that ODOT's improvement of Highway 97 influenced land use changes in Bend, and more specifically, in the Highway 97 corridor. Development has certainly occurred in the corridor but (1) it has not accounted for a large amount of growth relative to the rest of Bend, and (2) it has been generally consistent with the types of development called for in local plans and policies.

While a commercial development pattern had begun to emerge on the east side of Highway 97 prior to completion of the EA, the redesignation of lands slated for light industrial use to highway commercial use might be construed as an unanticipated indirect land use impact. City planning staff suggested that the plan designation change was a “housekeeping” matter to get the plan designation consistent with existing uses. Focus group participants suggested that commercial use was the “highest and best” use of the land, and that the initial plan designation should have been commercial. Moreover, a considerable amount of vacant land exists east of the highway.

Many factors affect the functionality of land in the corridor, including highway capacity, access, and visibility. Commercial property in the project area may have developed sooner with the highway improvement than it otherwise would have.

The research found several reasons for the development patterns observed:

- Planning and public policy allowed for growth not only in the study area, but in other parts of Bend as well.
- The modifications to Highway 97 improved safety, convenience, and travel by alternative modes, and kept congestion from increasing as quickly as it would have otherwise. Because the project was only 2.2 miles in length, reductions in travel times have been small.
- Rapid population growth, coupled with a strong economy made Bend attractive to large discount retailers. Some of those retailers chose to locate in areas designated for commercial use in the highway corridor.
- According to focus group participants, there were few large sites designated for commercial use that would be suitable for large retail operations in Bend. The only other suitable sites were in the southern portions of Bend along the Highway 97 corridor. A lack of services to those sites provided a comparative advantage to vacant commercially-zoned areas in the study area.
Field observation and conversations with Deschutes County Planning staff indicate that little development has occurred in the highway corridor outside the Bend UGB since 1987. This is consistent with the agricultural zoning that existed in the area in 1987 and still exists.

2.14 Albany Case Study

Description

The Albany case study evaluated the land use impacts of improvements to a section of Oregon Highway 99E (the Albany–Junction City Highway) from Queen Avenue on the north to Oregon Highway 34 (at Tangent) to the south. The project widened a 5.5 mile section from two to four lanes, with a continuous left-turn median.

Figure 3 Project Location

Source: Queen Avenue to Tangent Drive Section, DEIS, ODOT, 1983.

The draft environmental impact statement (DEIS) was completed in 1983, and the final environmental impact statement (EIS) in 1985. The project was built in two phases. Phase I,
completed in 1988, included improvements from Queen Avenue to Linn-Benton Community College (LBCC). Phase II was completed in 1994 and included improvements south of LBCC to the 99E/34 intersection. According to the DEIS, the purpose of the project was to accommodate increases in traffic and provide greater highway safety. The DEIS explains that the need for the project resulted from anticipated commercial and residential development, as well as rapid growth of LBCC.

**Figure 4 Study Area Boundaries**

![Study Area Boundaries Image]

*Source: Queen Avenue to Tangent Drive Section, DEIS, ODOT, 1983.*

**Findings**

The analysis showed that ODOT’s improvement of Highway 99E did not cause substantial land use changes in Albany, because little land use change is evident since project completion. Since completion of the first phase in 1988, growth in Albany has been distributed throughout the City; it has not concentrated along Highway 99.

The research found several reasons for the development patterns observed:
• Planning and public policy encouraged growth not only in the study area, but in other parts of Albany as well.
• The improvement to Highway 99 did not create new access: it improved safety, convenience, and travel by alternative modes, and kept congestion from increasing as quickly as it would have otherwise. Because the project was only five miles in length, its impacts on existing travel times were small.
• Little development occurred on vacant commercial and industrial property along OR 99E and elsewhere in Albany during the recession of the early 1980s.
• Land must be available at market prices for development to occur. Focus group participants pointed out several key sites they felt would have developed had the owners made them available.
• The availability and cost of infrastructure (water, sewer, etc.) was a limiting factor for sites south of Oak Creek, which runs midway through the project area. Albany policies would require looping of the water system for any major development south of Oak Creek. It is difficult for any one development to absorb the costs of extending services across the Oak Creek flood plain.

2.15 General Patterns and Trends from the Case Studies
Generalisation from these case studies are cautious since they are only two. The key points that emerged from these case studies are:

• All the case studies illustrate that the development that occurred after the highway improvement was consistent with the development envisioned in local plans before the improvement. The highway improvements may have, facilitated making the existing expectations or hopes about future development a reality.

• All the case studies illustrate the interactive, iterative, and incremental nature of most urban development. City and county comprehensive land use plans say what kind of development is wanted or acceptable; the highway improvement may facilitate that development. Future land use plans may change in response to the way that growth occurs. The case studies all paint a picture of incremental decisions: small changes in land use plans and highway improvements, each responding to previous changes in land use and transportation.

• The case studies support the hypothesis that the scale of land use change will correlate with the scale of the access improvement. Where access already existed (as in the case studies), increasing highway capacity did not cause a change in the type or rate of development. Where
access was increased, the highway capacity improvement did appear to affect the rate of the development.

• Good access is a necessary but not sufficient condition for local development. The amount of development is also dependent on the availability of other key public facilities (especially water and sewer).

• As implemented by counties, state policies that restrict development of resource lands have been effective in limiting development associated with highway improvements outside Urban Growth Boundaries.

2.16 Conceptual Framework between New Highways and Centers
Transportation and land use are closely interloped functions in all development scenarios. In developing new roads, a transportation plan has to be developed. The transportation plan should outline all the design processes, principals and guidelines to be followed with a critical condition to the transport routes physiographic. Implementation takes place and the road network becomes a physical infrastructure component.

Once a highway has been constructed in any given place, due to the unique nature of land uses locating on or close to the transport network, there shall be an attraction of land uses close to the new road such as business premises, industries and public amenities. After the new road uses are in place, human labor moves closer to the land uses so as to provide labor in the new establishments and offer any support services that will assist operate economically.

These human agglomerations lead to the formation of centers which with time and upgrading of services offered therein grow to become towns. In towns, the influence of man is both positive and negative. These manifestations of negative impacts in new towns are normalized by planning, development control and coordination. Positive impacts are also kept on check and enhanced by planning activities. At the long run, this results in sustainable towns and transport networks.
CHAPTER THREE: RESEARCH METHODOLOGY

3.1 Introduction
The methodology for carrying out this particular research entailed in depth, longitudinal and qualitative methods. The methodology used covered the collection, interpretation, arrangement, combination and presentation of information in a form readily understood.

The techniques applied were economical and within the resources available.

The people who were targeted in this research included the following; The area residents of Kikuyu town along the Southern Bypass, Business operators along the Southern Bypass in the vicinity of Kikuyu town, the Kiambu County Physical Planning Department, the Kikuyu Sub-County Physical planning Department, the key informants in the transportation sector (Kenha).

3.2 Research Design
This research process entailed the following chronological aspects;

* Literature review;* this involved a desktop research in books, journals, government documents, conference papers, research thesis, internet and relevant documents relating to the research topic. The main purpose was to gain the concepts put across in the topic of study by other authorities and aided in informing the research process.

* Field survey/visits;* this involved making field visits and calling at relevant public and private sector offices to collect first hand information.

* Data collection;* this was the actual data collection exercise in the field using primary and secondary data collection methods. This was carried out between 15\textsuperscript{th} and 19\textsuperscript{th} January.

* Data analysis;* data collected in the field was synthesized and verified against findings from desktop research.

* Compilation of findings and conclusion;* the findings from the field were analyzed and compiled to help in drawing conclusions and workable recommendations.

3.3 Sources of Data
Data collected were guided by the objectives of the research used primary and secondary sources in the following form.

- Existing literature on the examination of transport and land use interactions.
• Historical literature on Kikuyu centre and on the planning of southern bypass.
• Primary sources which included administration of questionnaires, interviews with key informants, fields records, photographs and sketches.

3.4 Data Collection Process
Prior to the commencement of data collection, I obtained an introduction letter from the University. Audience with the sampled local authorities in the region was sought to clarify the purpose of the study. Upon getting clearance, I distributed the questionnaires to the sampled individuals who are living in Kikuyu town along the Southern Bypass. Assistance from the local authorities was sought. During the distribution of the instruments, the purpose of the research was explained.

3.5 Methods of Primary Data Collection
The keys methods of primary data collection used in the preparation of this study included:

3.5.1 Questionnaires
The questionnaires were used for the following reasons:

a) its potential in reaching out to a large number of respondents within a short time,

b) ability to give the respondents adequate time to respond to the items,

c) offers a sense of security (confidentiality) to the respondent and

d) it is objective method since no bias resulting from the personal characteristics (as in an interview) (Owens, 2002).

The questionnaires were structured into direct questions for the purpose of gathering information from households and business operators. The questions were structured into closed ended and open ended. The questionnaire was divided into the main areas of investigation except the first part which captures the demographic characteristics of the respondents. Other sections are organized according to the major research objectives.

The responses were recorded in written form for analysis.

3.5.2 Interviews
The key informants interviewed included, the County Physical Planner of Kiambu County, Kikuyu Sub-County Physical Planner, Kenha officers among others. These interviews guided with a list of questions on land use planning, development and zoning data of the study area.
3.5.3 Photography, Sketching and Mapping
Photographs of the study area were taken to visually record observations to aid in analysis and visually link recorded findings in the area. Picture captured included, the Southern Bypass design in the vicinity of Kikuyu town, access to and from the highways to the premises along it among others. Sketches were drawn to illustrate the linkage of the Southern Bypass to adjacent land uses. Maps were used to find the spatial distribution of land uses within the study area.

3.5.4 Observation
Direct field observation and recording facts was done during the field trips to record observable physical situations of infrastructure and land use structure. This was done by guide of a data checklist.

3.5.5 Focus Group Discussions
This was a group of respondents comprising residents of all ages discussions. This was a group of respondents comprising of the residents (all ages), the chief as a community leader who was later assembled for an informative discussion regarding the subject of study and issues prevalent in the study area.

3.6 Methods of Secondary Data Collection
The data from secondary sources were obtained through the review of relevant documents of existing publication related to the study topic. This aided in enhancing the understanding of the study area, its establishment, what was done by others in the same sector and what can be used in this study to curb the existing problems. These data type were sourced from relevant books, internet sources, government publications, articles, plans, policy reports and research reports and office records among others.

3.7 Sampling and Sampling Techniques
A sample is a smaller group or sub-group obtained from the accessible population (Mugenda and Mugenda, 1999). This subgroup is carefully selected so as to be representative of the whole population with the relevant characteristics. Each member or case in the sample is referred to as subject, respondent or interviewees.
Sampling refers to the process of selecting units (people, organizations) from a population of interest so that by studying the sample, one may fairly generalize results back to the population from which they were chosen. According to Mugenda & Mugenda a sample size of between 10 and 30 % is a good representation of the target population and hence the 30% is adequate for analysis. It is a more preferable approach where the area of study is
widespread and the researcher cannot cover all the target population and carry out a profound assessment. Given the limitations on time and resources, it is necessary to use this technique as the area is quite extensive making it impossible to undertake a research of the entire population. In any research the sample should not be too large or too small, that is, it should be optimum in order to fulfill the required reliability, efficiency, flexibility and representativeness (Mugenda, 2003). The key factors which were taken into consideration in deciding on the 10 sample size included amongst others are the following: size of the population, time constraints and budgetary constraints.

For this study, random stratified sampling was employed based on the character of the population being studied to obtain respondents for questionnaires. The study comprised of two types of respondents; the business operators along the Southern Bypass and the households living along the Southern Bypass in Kikuyu town. Random sampling was further used to select sample size from each strata.

To determine the sample size for the households and business operators, the following formula was applied:

\[ n = \frac{Z^2pqN}{e^2(N-1) + Z^2pq} \]

Where:

- \( N \) = Population size
- \( n \) = Sample size
- \( p \) = Sample population estimated to have characteristics being measured. Assume a 95% confidence level of the target population.
- \( q \) = 1 - \( p \)
- \( e \) = Acceptable error (\( e = 0.05 \), since the estimated should be 5% of the true value).
- \( Z \) = the standard normal deviate at the required confidence level = 1.96

For the purpose of this study, the 2009 Population and Housing Census figures for Kikuyu town were used; the population was 233,231 persons.

\[ 0.05^2(50-1) + 1.96^2 \times 0.95(1-0.95) \]

\[ n = 1.96^2 \times 0.95(1-0.95) \times 50 = 30 \]

The sample size was distributed according to the main respondents in the study area. Since the study focus was along the Southern Bypass in the vicinity of Kikuyu town, the main respondents were the business operators and the residents of the the town along the Southern Bypass.

Questionnaires were administered to 15 business operators and 25 households.
Data from key informants were limited to one person each, since they are specific people who the required data can obtained from. The key informants included, the County and Sub-county physical planners, Kenha. Their selection was by purposive sampling.

3.8 Methods of Data Analysis
Data analysis involved the use of various techniques to evaluate and synthesize data to answer the research objectives. The main focus of analysis were the questionnaires which were analyzed in an endeavor to establish the varied challenges within the area of study. A spatial analysis was also done to identify the specific challenge points which need planning interventions. Excel and SPSS analysis were used to analyze quantitative data from the answered quantifiable answers from the questionnaires. Structured analysis will be used for the analysis of the qualitative data based on the field notes, sketches, interviews and questionnaires which were administered in the field, this analysis aided in bringing out the different and explanation for the same which helped the researcher to focus on particular aspects being studied. Spatial data were analyzed using GIS tools, using the GIS attribute tools the different land uses sizes were found, they were also used to buffer (especially roads in this case to indicate the size of the riparian reserves for the roads), illustrative analysis was done using the photographs. The methods of data analysis to be used in this particular research include the following:

3.8.1 Quantitative Data
- Classification and tabulation were used to analyze data from questionnaires and help get measures of central tendencies, dispersions, trends and making graphical presentations.
- Photographic analysis of photographs which had been taken in the area during visits and fieldwork.
- Map and satellite imagery analysis using mapped sources such as Google maps to synthesize data on the area.
- Time series analysis of Google imagery to assess the trend of development of the area over time.
- Measures of variation to deduce the rate and magnitude of change in areas such as population over time.

3.8.2 Qualitative Data
Analysis and comparison of people’s opinion was done to ensure right data is encoded into the research findings.
3.9 Methods of Data Presentation

The data derived from the above study included continuous and categorical data; categorical data were those in form of absolute form (whole numbers) such as months, gender, while the continuous data included those that had decimals and fractions e.g. distances of 5.6 km among others. Continuous data were presented using line graphs and description while categorical data were presented through pie charts and bar graphs among others. Spatial data were presented in form of maps and photographs which were used for illustration purpose, and finally the presentation of the research project as a compiled written report. The methods of data presentation used in this particular research included the following techniques:

- Use of bar graphs,
- Tables,
- Pie-Charts,
- Photographs,
- Report Writing,
- Mapping,
- Descriptive Notes.

3.10 Summary of Research Methodology

The methodology for carrying out the research may be summarized into the following stages: identification of the broad problem and formulation of objectives, undertaking of research and collection of data from secondary sources, conducting of field surveys and interviews, analysis of data collected using different techniques, presentation of data collected using different techniques.

3.11 Ethical Considerations in Research Involving Human Participants

The researcher explained to the respondents about the research and that the study was for academic purposes only. It was made clear that the participation is voluntary and that the respondents would be free to decline or withdraw any time during the research period. Respondents were not coerced into participating in the study. The participants had informed consent to make the choice to participate or not. They were guaranteed that their privacy would be protected by strict standard of anonymity.
Table 3 Data Needs Matrix

<table>
<thead>
<tr>
<th>RESEARCH OBJECTIVES</th>
<th>DATA NEEDS AND REQUISITIONS</th>
<th>DATA SOURCES</th>
<th>DATA COLLECTION METHODS</th>
<th>DATA ANALYSIS METHODS</th>
<th>DATA PRESENTATION METHODS</th>
</tr>
</thead>
<tbody>
<tr>
<td>To assess the existing land use formation along in the vicinity of Kikuyu town before the Southern Bypass.</td>
<td>Land ownership of the area of study Circulation and accessibility within the area before the Southern Bypass. Level of amenity provision within the area of study. Land uses adjacent to the study area and their relationship before the Southern Bypass. Activities within the town, their organization and space they occupied. Operation and management of the town before the Southern Bypass.</td>
<td>Secondary sources (KeNHA records) Primary sources (field survey and observation, Records of the chief Survey of Kenya.</td>
<td>Literature on historical record, Observation and Interviews</td>
<td>MS EXCEL, Spatial analysis through (Arch GIS tools e.g. for finding of distance and area of land uses), Illustrative data analysis for qualitative data.</td>
<td>Maps, Photographs, Descriptive texts, Report writing.</td>
</tr>
<tr>
<td>To assess the emerging land use formations of the town and their relationship to the</td>
<td>To assess the emerging land use trends as influenced by the construction of Topographic and cadastral maps from the Survey of Kenya Observations</td>
<td>Review of population census data Observations</td>
<td>Descriptive analysis Statistical computation</td>
<td>Photographs Graphs Sketches Descriptive texts</td>
<td></td>
</tr>
<tr>
<td>Southern Bypass.</td>
<td>the Southern Bypass.</td>
<td>Measurements of road reserve Census reports Nairobi City County SACCOs</td>
<td>Questionnaires Interviews</td>
<td>using SPSS analysis Spatial analysis (using Arc GIS tools) Quantitative analysis</td>
<td>Report writing</td>
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</tr>
<tr>
<td><strong>To explore the planning interventions to harmonize land-use and transportation planning.</strong></td>
<td>Legal and policy goals in the transportation sector Institutional framework for land use planning Transportation planning standards Models of effective transportation systems with regard to land use. Case studies Applicable land use form Possible alternative solutions, scenarios and options.</td>
<td>Secondary sources (literature on policies and the legal framework etc.) Field survey findings</td>
<td>Synthesis of the field survey findings Literature review (plans, policy reports, research reports etc.)</td>
<td>Descriptive analysis Spatial analysis through Arc GIS tools</td>
<td>The final report writing Maps</td>
</tr>
</tbody>
</table>

*Source: Author, 2015.*
CHAPTER FOUR: BACKGROUND OF THE STUDY AREA

4.1 Location of Study Area
Kenya is located on the equator with the Indian Ocean lying to the south-east and is bordered by Tanzania to the South, Uganda to the west, south-west, Ethiopia to the north and Somalia to the north-east as illustrated in Map 1.

Map 1 Location of Kenya in the African Context


Map 2 Location of Kiambu County

Kiambu County is a county in the former Central Province of Kenya. Its capital is Kiambu and its largest town is Thika. The County is adjacent to the Northern border of Nairobi County as illustrated in map 2.

Source: Adopted and modified from the Kenya GIS data.
Kikuyu is a town in the Kiambu County of Kenya. The town is located 20 km (12 mi) northwest of central Nairobi, the capital of Kenya. Kikuyu hosts a town council and an administrative division in Kiambu County as shown in Map 3 and Map 4 Below.

**Map 3 Location of Kikuyu Town in the Regional Context**

*Source: Adopted and modified from the Kenya GIS data.*

It is about 20 minutes from Nairobi via a number of routes, including a dual carriage road, and it has a railway station.
Map 4 Location of Kikuyu Town in Relation to Nairobi Town.


Map 5 Map of Kikuyu Town

Source: Adopted from google earth and modified from the Kenya GIS data.
4.2 Historical Growth of Kikuyu Town

The town is named after Kikuyu people, the major ethnicity that has settled in the area. It is well known for its colonial history links for instance the Right Reverend Musa Gitau which is swahili for Moses Gitau. He was an African believer in democracy who led among the first christian faithful during colonial times. He lived and worked in the town as a reverend till the time of his death and in his honor two schools and a church were named after him.

Kikuyu town has a station on the Uganda Railway. The railway station reached the station in the year 1899. During the British colonial era the town was known as Fort Smith named after a famous officer Eric Smith in 1891 of IBEA- the Imperial British East African Company. In whose watch it was strengthened. The IBEA Company had identified a place at the border between the Kikuyu and Maasai tribes that was ideal for supplying the Uganda road with farm produce from Kikuyu farmers and when it became imperative to protect caravans on the Uganda Road the place that was first selected by Captain Lugard was abandoned for Dagoretti.

From the early days of Swahili and Arab traders, the fortified village was a sort of supermarket. Caravans stopped over to trade with the Kikuyu near the fort. Neighbouring centres to the town include Dagoretti and Thogoto.
There are several historical sites within the town, such as the underground caves dug by Indian coolies when constructing the Kenya-Uganda railway. These caves are found just below the town under the railway facing Magana farm.

Other sites include the graves of two explorers who were killed by lions in the 19th century at Kanyariri, a few meters from where Fort Smith was situated; the Ondiri swamp; the Anglican Mothers Church at Kabete; and the PCEA Church of the torch, the first building at Thogoto.

4.3 Physiographic Characteristics

4.3.1 Geology and Soils
The area has shallow black cotton soils overlaid by volcanic rocks. The soils type is typically dark-brown to black, loamy and shallow inorganic. Below the soil layer is a sequence of rocky formations and minor clay fraction mixed with silt.

4.3.2 Hydrology and Drainage
There are no well established storms water drains within the study area but water drains along the open grounds and access paths. Given the low permeability of the soil, significant surface runoff is generated from the area under present condition. With the exception of open surfaces and areas with road, there are no surface water detention ponds on the site.

4.3.3 Climatic Conditions
The area falls within the bi-modal rainfall pattern climate trends where the long rains are experienced between Mid-march and May while the short rains occur between October and December. The annual average precipitation averages 1800mm while temperatures in the area rise to a maximum of about 350 C and fall to a minimum of 120 C. There are two rainy seasons, but rainfall can be moderate. The cloudiest part of the year is just after the first rainy season, when, until September, conditions are usually overcast with drizzle. As Nairobi is situated close to the equator, the differences between the seasons are minimal. The seasons are referred to as the wet season and dry season. The timing of sunrise and sunset varies little throughout the year, due to Nairobi’s close proximity to the equator.

4.3.4 Vegetation
Much of the grass and small bushes that covered the vast land are continually being cleared as more people move into the area. The vast area was used for grazing due to its rich grass cover.

4.4 Population and Demographic Characteristics
The town itself has an urban population of 10,000, but the surrounding densely populated rural territory brings the total population to 165,594. In recent times the population has grown
to over 600,000 people. High population density has put pressure on land leading to fragmentation into smaller uneconomical units.

The population structure of the municipality indicates a fairly balanced sex ratio. The overall male/female ratio is 1:1.

All forms of poverty including food and absolute poverty are experienced and indeed poverty incidence is on the increase due to factors such as unemployment, collapse of agricultural sector, collapse of industries, poor infrastructure and the rise in HIV/AIDS.

4.5 Communication
Kikuyu town can be accessed through Nairobi-Nakuru highway via Dagoreti-Kikuyu road hence there exist a good communication network around Kikuyu Town. The town has good accessibility to clean water, industrial development, telephone, mail service, radios, televisions, newspapers and several magazines.

4.6 Land and Land Uses
The area has become famous amongst real estate and land speculators on completion of the Southern bypass. The town has become popular as alternative for development due to the by pass, availability of land and as means to decongest the City. However, the decline in industrial development has hit local economy as much of the products are imported from abroad in finished. This has led the economy to be consumer based thereby affecting sector that could be a pillar in employment creation. The creation of Southern bypass has accentuated growth and opening of new fronts for development.

Area zoning for development: The area is currently not categorized, but main use is for both commercial and residential. However zoning is not clearly spelt out but the County government approves developments that comply with all applicable laws.

Transport & road networks: the project study area along the Southern Bypass. The road has opened up the area for such developments. The road eventually connects to Mombasa road thereby forming very important link and hence opening up kikuyu town.

Institutions: Many institutions have developed in this town, including a major eye unit hospital, a Christian university, and many primary and secondary schools.

Recreational facilities and accommodations include Sigona Golf Club, the Wida Highway Motel, Kari Holiday Retreat Center, and the PCEA Lay Training Center

Shopping Centres & Amenities: there are many shopping facilities that offer a full shopping experience; from supermarket, services stations, restaurants and open food markets, banking facilities (ATMs) to bookstores and pharmaceutical retail shops.
4.7 Emerging Issues
From the situation analysis of Kikuyu town, the layout characteristics of land uses are continually changing. These changes include: rapid encroachment on agricultural land to pave way for commercial and residential improvements, rapid growth and increase in population within Kikuyu town and its environs, improved transportation system, increased unplanned development activities, high rate of development in the area.
CHAPTER FIVE: STUDY FINDINGS AND ANALYSIS

5.1 Overview
This Chapter elaborates the field work findings systematically. It provides a detailed analysis of the situation along the Southern Bypass in Kikuyu Town; the existing situation on land and land use along the Southern Bypass, traffic situation on the highway and the challenges and issues arising as result of the construction of the Southern Bypass. The analysis makes it possible to articulate the implication of the highway on land use in the town therefore makes it possible to provide appropriate planning policy recommendations.

5.2 Respondents’ Characteristics
Majority of the respondents (household heads and business operators) were aged 30-49 with the most being of the male gender as illustrated in graph 1 and chart 1 below. The dominant age group of 30-49 comprises the working class of the population. Household questionnaires were done during the weekend when majority of the respondents were at home while most of business premises operators were opened on both weekdays and weekends.

Graph 1 Age of Respondents

![Graph 1 Age of Respondents](image)

Source: author 2015

Chart 1 Gender of the Respondents

![Chart 1 Gender of the Respondents](image)

Source: author 2015.

Of the respondents interviewed, 60% of the respondents were married, 35% were single while 5% of them were widowed as illustrated on Chart 2.
Majority of the respondents had pursued education to the tertiary level. Only 2% had attended school up to primary level. This explains why they were able to secure formal jobs as a way of earning their living as in Chart 3.

The daily occupation for respondents varied greatly. Majority of the respondents interviewed practise farming as a mean of generating income. Other occupations included teaching, shop attending amongst others as illustrated in chart 4 below.
Most of the respondents worked within Kikuyu and in Nairobi City. Karen, Thogoto, University of Nairobi Kikuyu Campus were the other locations of the daily operations of the respondents. The respondents who work outside Kikuyu Town chose to live there because they find it easy to commute to and from their workplaces daily without delaying to report to their workplaces.

**Graph 2 Locations of Main Occupation**

*Source: author 2015*
5.3 Immigration Trends
Respondents who have lived in Kikuyu since birth made up 35% while 65% have not lived in the town since birth. Those who immigrated to the town did so for various reasons with most having moved because of work. Other reasons for immigration was for business and because of marriage. Before relocation, the respondents lived in Kericho, Kisumu, Machakos, Makueni, Nakuru, Nyeri, Ongata Rongai, Vihiga and Voi.

Chart 5 Lived in Kikuyu Since Birth

![Lived in Kikuyu Town Since Birth](source)

Source: author 2015

Chart 6 Area of Residence before Moving to Kikuyu

![Area of residence before moving to Kikuyu](source)

Source: author 2015.
Out of the respondents interviewed 70% of them had HH members who had relocated elsewhere while 67% of those who resettled moved outside the town. The remaining 33% of those that had relocated resettled within the town as in chart 8 below.

**Chart 8 Relocation of Household Members**

Respondents who did not have HH members who had resettled elsewhere stood at 30% as illustrated in chart 9 below.

**Chart 9 Resettlement Location**
5.4 Land Ownership and Tenure

According to the respondents interviewed, 55% of them own land with 82% having purchased it while the remaining 18% inherited the land. The remaining 45% do not own land as shown in chart 10 and chart 11. These land owners own land that was initial part of larger size but subdivided over the years to smaller portions. This implies that there is increased interest to purchase land in the town and they are being sold in smaller portions. The rapid of subdivision is high.

Chart 10 Land Ownership

![Chart 10 Land Ownership](source: author 2015)

Those who live on rented premises pay monthly rent of different amounts. Majority pay 12000-15000 Kshs. According to the respondents monthly rents have increased over the months due to increased demand in residential premises. Monthly to cater for rent as illustrated on graph 3 below.
Graph 3 Monthly Rents in Kshs.

Source: author 2015

5.5 Basic Road Infrastructure, Land Use and Development
Access to residential units was by access roads and footpaths.

Chart 12 Type of Access to Residential Unit

Source: author 2015

Access to commercial premises is mainly via access roads as described by 70% of the respondents and offices while 30% accessed via footpaths. They are mainly earthed.

Chart 13 Type of Access to Commercial Premises and Offices

Source: author 2015
Some respondents felt that safety in use of the Southern Bypass is unsafe mainly because of speeding vehicles and lack of Non-motorised facilities such as pedestrian walkways.

**Chart 14 Safety in Traveling Along the Highway**

<table>
<thead>
<tr>
<th>How safe it is to travel along the Southern Bypass</th>
</tr>
</thead>
<tbody>
<tr>
<td>Safe</td>
</tr>
<tr>
<td>Unsafe</td>
</tr>
</tbody>
</table>

*Source: author 2015*

**Chart 15 Reason for Being Unsafe**

<table>
<thead>
<tr>
<th>Reasons for being unsafe</th>
</tr>
</thead>
<tbody>
<tr>
<td>Speeding vehicles</td>
</tr>
<tr>
<td>Lack of pedestrian walkways</td>
</tr>
</tbody>
</table>

*Source: author 2015.*

There has also been notable changes in public service transportation. There has been an increase in public service vehicles and this has had a negative impact in the traffic flow in the highway. The town’s bus terminus is adjacent to the highway and with the increase of PSVs means inadequate space within the terminus to accomodate the increased number of PSVs. This increase at times overflows into the highway therefore affecting movement in it.
5.6 Business Premises Findings
Respondents from the business premises also gave some insight to this study.

Trade type of business is predominant in the area practised by 60% of the business owners while 40% operated service type of business.

Chart 17 Business Type

Majority of the business operators have been in business more than 12 years. They were optimistic that with the development of the Southern Bypass, their business will be boosted due to increased consumer demand of their goods. They believe that the development of the highway will attract a larger resident population and other operators to the town due to increased mobility to and from the town.
Business operators who rented their business premises made up 55% while 45% owned their operations premises. Owners of business premises acquired them through purchase, inheritance and allocation by the County government as in charts 18 and 19 below.

**Chart 18 Tenure Status of Business Premises**

- **Own**: 45%
- **Rented**: 55%

**Source: author 2015**

**Chart 19 Acquisition of Business Premises**

- **Purchased**: 11%
- **Inheritance**: 11%
- **Allocated**: 78%

**Source: author 2015**
Business operators on rented premises paid rent as illustrated in chart 20 below. Majority pay monthly rent of more than 20,000 Kshs.

**Chart 20 Monthly Rents for Business Premises**

![Monthly rent for business premises](image)

*Source: author 2015*

### 5.7 Concerns about the Bypass passing through the Town

Majority of the respondents interviewed gave their concerns about the highway passing through the town. These concerns according to the respondents interviewed included:

- **Increased pollution in the City:** this is due to the increased number of mass transit vehicles which will cause noise pollution.

- **Increased population into the City due to increased accessibility:** the town has attracted a number of people with the construction of the bypass. Travel time to and from Nairobi City and neighbouring towns has reduced. This has made it a suitable location for most people since besides being accessible, other amenities are available and fresh food are readily available.

- **Depletion of agricultural lands:** there has been an increase in demand for land for residential and commercial development. This has put pressure on the existing land and encroachment on agricultural land closer to the town.

- **Uncontrolled land subdivision for sale:** land owners are selling their lands in portions to interested buyers so as to attract higher prices rather than in their original sizes.

- **Use of highway in the town would be unsafe section due to lack of designated pedestrian walkways,**
Likelihood of congestion in the town’s bus stage which in turn would affect movement in the highway due to increased PSVs:

The likelihood to increase in rent of residential unit and business premises.

5.8 Suggested Solutions
To address the concerns mentioned in 5.7 above, the respondents suggested the following:

Planning to accommodate future population: this should include increasing capacities of existing social amenities and basic infrastructure to avert future congestion on the existing ones.

Proper land management to ensure efficient use for economical value and the regulation of land prices: Developers in the area are already setting themselves up to receive super-normal profits from land sales as a result of the impact of the Southern Bypass Road on land prices in the area.

Planning for pedestrian walkways to ensure their safety: pedestrian walkways and designated zebra-crossing and footbridges should be constructed to ensure safety of pedestrians as they go about their activities in the town.

Re-designing of the town’s bus stage to accommodate increased PSVs.

5.9 Emerging Issues
Kikuyu town originally was surrounded by vast agricultural land but recent developments have led to encroachment of this land to give way for more developments. Notable developments in the town are multi-dwelling residential premises and commercial premises.

An outdated comprehensive plan of 1974 is being used to guide development of the town. Preparations of Kiambu County Spatial plan and for Kikuyu town are being undertaken. During preparation of the town’s 1974 plan, the aspect of the bypass was incorporated but did not tackle the aspects of increase in population and likely implications on land use.

There is anticipation of changes in zoning regulations in the near future to guide type of developments that occur in the area so as not to result in conflicting land uses neighbouring one another.
Due to the highway development, there has been an rapid increase of population into the town due to increased accessibility. This has put pressure on the need to invest in more residential houses to accommodate the rising population and also pressure on the existing public facilities. There has been a lot of interest in the town by investors. Due to highway development and increase in population, the town has the potential to grow. Investors view it as an opportunity for their growth by the availability of target groups to consume their goods and services.

Subdivision of land is being undertaken rapidly and whose value has increased tremendously compared to before the development of the highway. Land owners attract more profit by selling the land parcels in smaller portions than in their original large sizes. Other land owners are holding on to their parcels of lands in the hope of attracting higher prices in the future.

Change of use for town plots are being done to allow new developments.

Use of the Southern Bypass by the residents of Kikuyu town is unsafe due to speeding vehicles. There has been lack of disintegrated travel paths for the different modes of travel.
CHAPTER SIX: PROBLEM ISSUES AND POLICY RECOMMENDATIONS

6.1 Overview
The chapter briefly summarizes the emerging planning issues with the aim of delivering a critical view of emerging issues with the aim of relating them to planning and policy implications for future development in Kikuyu Town.

6.2 Emerging Issues from Chapter Two
From the literature reviewed, it emerged that urbanization has attributed to various changes in the social and economic lives of the people i.e. it has increased the distance of travel as the city expands. Transport systems are seen to have affected the arrangement of different land uses i.e. TOD (Transit Oriented Developments) has resulted.

From the policy reviewed it emerged that for sustainable land use layout, land use and transportation need to be focused on right from the planning stage.

Land use and transportation planning is a task of various stakeholders. In the case of Kikuyu town, stakeholders include County Council of Kiambu, NEMA, KURA, Ministry for transport and infrastructure and the Kikuyu town community.

6.2 Emerging Issues from Chapter Four
- Kikuyu town lacks an up to date comprehensive plan to guide development within it.
- Majority of the population in the town immigrated for various reasons with the main reason being because of work. Other reasons include business and marriage. Such trend has contributed to an increase in population over the years.
- Land owners acquired their land mainly through purchase and were holders of title deeds. Their land were initially part of larger sizes that were subdivided into smaller portions whose values appreciate quickly especially with the construction of the Southern Bypass.
- Former agricultural land is being encroached to accommodate commercial developments and to accommodate the growing population of the town.
- There is an emerging trend of change of use in plots in the town to give way to new developments. This is driven by the passing of a highway in the town which is being anticipated to attract population. This will greatly contribute to the change in land use in the town.
- Safety in road use in the town has reduced with the construction of the Southern Bypass as a result of speeding vehicles and lack of pedestrian walkways.
• There has been an increase of PSV vehicles in the town and this has contributed to heavy traffic in the town due to limited planned entry points into and exit of the Southern Bypass into the bus terminus adjacent to the highway.

• There are no designated travel paths for different modes of travel.

6.3 Emerging Issues from Chapter Five

Kikuyu town originally was surrounded by vast agricultural land but recent developments have led to encroachment of this land to give way for more developments. Notable developments in the town are multi-dwelling residential premises and commercial premises. An outdated comprehensive plan of 1974 is being used to guide development of the town. Preparations of Kiambu County Spatial plan and for Kikuyu town are being undertaken. During preparation of the town’s 1974 plan, the aspect of the bypass was incorporated but did not tackle the aspects of increase in population and likely implications on land use.

There is anticipation of changes in zoning regulations in the near future to guide type of developments that occur in the area so as not to result in conflicting land uses neighbouring one another.

Due to the highway development, there has been an rapid increase of population into the town due to increased accessibility. This has put pressure on the need to invest in more residential houses to accommodate the rising population and also pressure on the existing public facilities. There has been a lot of interest in the town by investors. Due to highway development and increase in population, the town has the potential to grow. Investors view it as an opportunity for their growth by the availability of target groups to consume their goods and services.

Subdivision of land is being undertaken rapidly and whose value has increased tremendously compared to before the development of the highway. Land owners attract more profit by selling the land parcels in smaller portions than in their original large sizes. Other land owners are holding on to their parcels of lands in the hope of attracting higher prices in the future.

Change of use for town plots are being done to allow new developments.

Use of the Southern Bypass by the residents of Kikuyu town is unsafe due to speeding vehicles. There has been lack of disintegrated travel paths for the different modes of travel.

6.4 Implications of the Emerging Issues

This study examines the implication of highway development on land use patterns in the vicinity of Kikuyu town. Implications of the emerging issues are as follows:
• The development of a major highway through the town which lacks pedestrian walkways and cycling lanes has implications for road safety along it.

• Limited points of entry into and exit the highway in town is partly responsible for the congestion observed in the corridor.

• Increase in the number of PSV into the town is also responsible for the heavy traffic in the highway section in the town as they exit and enter the highway. There is slow movement because their increase has led to congestion in the bus terminus which is adjacent to it whose effects overflow into the highway affecting movement in it.

• With the current trend of change in use to accommodate major development as a result of highway development, the general land use of the town should first be understood. This will enable effective response to land use change. This could be achieved by adopting concepts that encourage the development of high density mixed land use of housing and employment along major highway corridors of metropolitan areas.

• Initial large land sizes are being subdivided into smaller portions that are uneconomically productive. There is need for proper land use management through updated development plans for the town with the view of achieving healthy, investment friendly and sustainable urban planning and development.

6.5 Recommendations

1. Fast tracking the preparation of a comprehensive plan for the town to guide its development: the town is currently using an outdated plan, the Kikuyu Development plan of 1974 for its development purposes. Since its preparation, the town has undergone many changes in its design and form. This also involves reviewing the current policies guiding zoning, land use, subdivision, change of use, extension of leases etc. to ensure Kikuyu develops as an efficient highway town and to prevent haphazard developments in the area.

2. Policies regulating land prices in Kikuyu be formulated as these have the potential to rise to restrictive levels due to speculation. Developers in the area are already setting themselves up to receive super-normal profits from land sales as a result of the impact of the Southern Bypass Road on land prices in the area.

3. The informal daily markets, predominant at the roadside reserves, be relocated to an official space for such activities. This is also true for the sand trucks which usually park at the road reserves. This clearing of activities encroaching on the road reserves is
necessary so that the space can be used for what it was intended – provision of service way leaves. This will also take advantage of the increased economic potential of the area and create more job opportunities.

4. Segregation of motorized and non-motorized forms of transport, as well as provision of infrastructure for pedestrian traffic at the road reserves, is recommended. This needs to be done so as to ensure pedestrian safety and reduce the risk of accidents, as well as ensure the aesthetics of the area.

5. Improved traffic management system along the corridor and the town in general: since the bypass has blocked direct access into the town and has divided it into two, there have been increased traffic jams in and around Kikuyu town. There should therefore be designing of an overpass access within the Southern Bypass in the town section to connect the town for both pedestrians and motorists. This will ensure easy movement within the town and safety of pedestrians who risk their lives by crossing the highway.

6. Redesigning of entry and exit points into and out of the Southern Bypass within the town to mitigate the issue of heavy traffic and integrate pedestrian walkways.

**Proposed Immediate Action**

*Segregation of motorised and non-motorised forms of transport along the bypass section of Kikuyu Town.*

In order to address segregation of motorised and non-motorised forms of transportation in Southern Bypass of Kikuyu Town Section, two design alternatives are plausible:

1. Improving pedestrian facilities on the road while preserving the current carriageway.
2. Modifying the carriageway in order to gain space for NMT by re-distributing lanes.

**Alternative one: Improving pedestrian facilities on the road while preserving the current carriageway.**

Pedestrian facilities may be created adjacent to the road by extending the highway to encompass land directly adjacent to the highway boundary.

Advantages of this approach include: enhancement traffic flow along the Southern Bypass, there are likely to be fewer signposts, lighting columns and fewer obstructions, job opportunities for the locals within the area who shall be involved in the and redevelopment of
the highway, enhanced economic value of the area; with efficient transportation, the area will attract investors and which will lead to increase in the economy of the area.

Disadvantage of this alternative is that it requires purchase of additional land

**Alternative two: Modifying the carriage way in order to gain space for NMT by redistributing lanes**

Pedestrian facilities may also be created immediately adjacent to the road within the existing highway. This alternative is often the most appropriate solution in operational, financial and legal terms. In many instances, a footway is already in existence, which should be re-used. Many trunk roads have a reasonable verge between the carriageway and the highway boundary or other property boundary.

However, where the verge is too restricted, consideration could be given to purchasing land adjacent to the highway boundary to accommodate NMT Facilities.

Crossing facilities often require a considerable amount of space and as a result may prove to be an overriding constraint.

**Preferred Design Alternative**

From the analysis, in order to meet both the current and future demands of the residents/pedestrians/the vehicle operators an inclusive approach is needed. From the above discussion, alternative one of improving pedestrian facilities on the road while preserving the current carriageway is an effective approach for long term use while alternative two of modifying the carriageway in order to gain space for NMT by redistributing lanes will address the short term and medium term needs of the project area.

Therefore the most viable approach is to modify the carriageway in order to gain space for NMT by redistributing lanes.
CHAPTER SEVEN: CONCLUSION

Transportation planning decisions can have many direct and indirect land use impacts. These impacts are often overlooked. The relationships between transportation and land use are complex. Transportation land use impacts include: Impacts of land uses for transportation facilities, Impacts on the location, type and cost of development, Impacts on accessibility and travel options, Impacts on travel behaviours.

As in the case of this study, the development of the Southern Bypass has contributed to such changes in the town: increased population, development changes, increased land value, pollution.

More comprehensive analysis of these impacts can help integrate future transportation and land use planning, resulting in transport decisions that better support land use objectives, and land use decisions that support transport objectives.
BIBLIOGRAPHY


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A RESEARCH PROJECT ON THE IMPLICATIONS OF HIGHWAY DEVELOPMENT ON LAND USE; CASE STUDY OF THE SOUTHERN BYPASS IN THE VICINITY OF KIKUYU TOWN

HOUSEHOLD QUESTIONNAIRE

Information given here is confidential, will be treated with ultimate confidentiality and used for the purpose of academic research only.

Interviewer:_____________________ Questionnaire no:_____ Date: ______________

A. BACKGROUND INFORMATION

1) Name of respondent (Optional) ______________________________

2) Age ________ Sex 1. Male 2. Female 3. Other

3) Marital Status: Married ( ) Single ( ) Divorced ( ) Widow ( ) Widower ( )

B. DEMOGRAPHIC CHARACTERISTICS OF THE HOUSEHOLD

4) What is your household size? …………………

(Pre-primary=1, Primary level = 2, Secondary level = 3, Tertiary = 4, None=5).

<table>
<thead>
<tr>
<th>2.2 Members of HH</th>
<th>2.3 Sex</th>
<th>2.4 Age</th>
<th>2.5 Highest Level of education</th>
<th>2.6 Main occupation</th>
<th>2.7 Location of main occupation</th>
<th>2.8 Other occupation</th>
<th>2.9 Location of other occupation</th>
<th>2.10 Lives On or Off Farm</th>
</tr>
</thead>
<tbody>
<tr>
<td>1=Household head 2=Wife 3=Sons 4=Daughters 5=Sons &amp; Daughters in law 6=Grandchildren 7=other relatives.</td>
<td></td>
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</tbody>
</table>
C. MIGRATION TRENDS

Immigration

5) Have you lived in Kikuyu Town since birth? Yes (  ) No (  )
6) If No, where were you living before you came to Kikuyu?

__________________________________________________________________________________
__________________________________________________________________________________

7) Which year did you relocate to Kikuyu?

__________________________________________________________________________________

8) If No, state the reasons for coming to Kikuyu Town. (Tick where necessary)

<table>
<thead>
<tr>
<th>Purchased land</th>
<th>Land Allocation</th>
<th>Inheritance</th>
<th>Marriage</th>
<th>Business</th>
<th>Farming</th>
<th>Other</th>
</tr>
</thead>
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</tr>
</tbody>
</table>

Emigration

9) Has any of your HH members left to permanently settle elsewhere? Yes (  ) no (  )
10) If Yes, where to: 1. Within town 2. Outside the town

D. LAND OWNERSHIP AND TENURE

11) Does the household own the land? a) Yes b) No .................
12) If yes how did they acquire the land?
   a) Purchased b) Inheritance c) Allocated d) other (specify)
   ...........................................................................

13) What ownership documents do you have?

a) Titles (freehold) b) Leasehold c) Temporary occupation license d) Allotment letter e) None

14) Do you own other parcels of land besides this one? a) Yes b) No

If yes, provide

a) Parcel no. ........................................................................

b) Year of acquisition ................................................................

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c) Location of land ________________________________

d) Within/outside the Town ________________________________

e) Acreage ________________________________

15) Was your land a part of a bigger size that was subdivided? a) Yes  b) No

If yes, provide the following

a) Initial size of land ________________________________

b) Subdivided into how many portions ________________________________

c) Size of the portions ________________________________

16) If rented, what is the monthly rent of the house? (In Kshs.)
a) 0-3000  b) 4000-7000  c) 8000-11000  d) 12000-15000  e) 16000-19000  f) more than 19000

E. BASIC ROAD INFRASTRUCTURE, LAND USE AND DEVELOPMENT

17) Type of access to the residential unit to and from the Southern Bypass.
a) Footpath b) Access road c) Other (specify)

18) Type of access to commercial premises and offices to and from the Southern Bypass.
a) Footpath b) Access road c) Other (specify)

19) How safe is it to travel in the centre along the Southern Bypass? a) Safe b) Unsafe

20) If unsafe, why? a) Speeding vehicles b) No traffic barriers c) Traffic integration d) Lack of pedestrian walkways e) Other (specify)

__________________________________________________________________________

21) How has the bypass changed accessibility of the centre? 1. Shorter travel time 2. More traffic in the centre 3. Other (specify) …………………………………………………………………………………..

22) How has public transport in the centre changed since the construction of the bypass? 1. More PSV 2. Less PSV 3. No change

23) Are you aware of any development changes in the town? Yes/ No

24) If yes, what do you think are the likely implications of such development on the functioning of the bypass?
25) What concerns do you have about the Southern Bypass passing through the Centre?

___________________________________________________________________________

___________________________________________________________________________

26) What do we do to address the concerns above?

___________________________________________________________________________

___________________________________________________________________________

Thank you for your time.
F. BACKGROUND INFORMATION
1. Name of respondent (Optional)

2. Age ____________ Sex 1. Male 2. Female
5. Number of years of operation: a) 1-3 years b) 4-6 years c) 7-9 years d) 10-12 years e) more than 12 years.
6. Why did you choose the location to set up your business?

G. TENURE STATUS
7. Tenure status: a) Own b) Rented c) Other (specify).................................
8. If own, how was the property acquired?
   a) Purchased b) Inheritance c) Allocated d) Other (specify)............................
9. What ownership documents do you have?
a) Titles (freehold) b) Leasehold c) Temporary occupation license d) Allotment letter e) None

10. Do you own other parcels of land besides this one? a) Yes  b) No

11. If yes, provide
   f) Parcel no.  ________________________________
   g) Year of acquisition  ________________________________
   h) Location of land  ________________________________
   i) Within/close the Town (in meters) ________________________________
   j) Acreage  ________________________________

12. Was your land a part of a bigger size that was subdivided? a) Yes  b) No

13. If yes, provide the following
   d) Initial size of land  ________________________________
   e) Subdivided into how many portions  ________________________________
   f) Size of the portions  ________________________________

14. If rented, what is the cost range of the premises in Kenya Shillings?
   a) 0-5000 b) 6000-10000 c) 11000-15000 d) 16000-20000 e) more than 20000

H. ROAD NETWORK

15. Are there any issues affecting business operations? Yes ( ) No ( )
    If yes, what are they?
    ____________________________________________________________
    ____________________________________________________________
    ____________________________________________________________

16. Has the Southern Bypass affected business operations? Yes ( ) No ( )

17. If yes, state how?
    ____________________________________________________________
    ____________________________________________________________
    ____________________________________________________________

18. What can be done to improve business operations in the town?
19. What affects traffic flow on the by-pass?
   a) Entry to it b) exit from it c) heavy traffic d) lack of pedestrian walkways e) other (specify)

20. Are there planned points of entry or exit into and out of the Southern Bypass? Yes/No
21. If yes, where are they along the road?
   i) Entry ___________________________
   ii) Exit __________________________

22. If no, how do you access the Southern Bypass from your business premise?

23. What concerns do you have about the Southern Bypass passing through the Centre?

24. What do we do to address the concerns above?

THANK YOU FOR YOUR TIME.
A RESEARCH PROJECT ON THE IMPLICATIONS OF HIGHWAY DEVELOPMENT ON LAND USE; CASE STUDY OF THE SOUTHERN BYPASS IN THE VICINITY OF KIKUYU TOWN

PHYSICAL PLANNING OFFICE (KIAMBU COUNTY)

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Information given here is confidential, will be treated with ultimate confidentiality and used for the purpose of academic research only.

Name of interviewer: ___________________________ Date:______________ Time:__________

Name of respondent_____________________________________________

LAND USE AND DEVELOPMENT

1. What have been the trends in development activity in Kikuyu town over the past 15 years (development types, location and sizes)? How will these trends change or continue over the next 5-10 years with the construction of the Southern Bypass?

2. Can you provide a list of the location, type, and size (number of lots/units, size) of substantial residential, commercial, industrial, or institutional development projects that are under construction and are approved?

3. Are there any large-scale developments or upcoming phases of current developments planned for the future?

4. What is driving the need for large-scale developments in the town?

5. What are the likely consequences of the change in development trend in the town?

6. Has the Southern Bypass triggered developments in the town? If yes, what type of developments?

7. Would the construction of the Southern Bypass have any effect on the timing or probability of these developments?
8. Would the upcoming land developments have effect on the Southern Bypass?
9. Were the changes in land use anticipated? Are they being undertaken according to a plan or not?
10. Are there any specific concerns about recent land use and development trends in the town?
    If yes, what are they?
    What is being done to address the concerns?
11. What should be done to ensure harmony between land use and road infrastructure?

**PLANNING AND ZONING DATA**

12. Is there a comprehensive plan for Kikuyu Town that guides its development?
13. If yes,
    a) State type of plan
    b) Duration of the plan and when it going to be next updated.
    c) Would the plan be adequate to address future issues with transportation improvements?
    d) During planning of the town, was the bypass an aspect included in the plan (links between land use and the Southern Bypass, Entry and exit to and from the bypass?)
14. If no, what is being used to guide the development of the town?
15. Are major changes in zoning or land development regulations likely to occur in the near or distant future in the area? Describe if possible.
16. Is the town considering growth management regulations (adequacy/timing of public facilities ordinance, large lot zoning, and performance standards)?
17. Other than the town’s comprehensive plan, do there exist special area redevelopment plans, or any other studies of future land use/development patterns?

**THANK YOU FOR YOUR TIME.**
TO WHOM IT MAY CONCERN

Dear Sir/madam

RE: CHEROTICH MERCY LANGAT – B65/1567/2011

This is to confirm that the above named is B.A. Fourth Year Student Urban & Regional Planning since October 2011.

The purpose of this letter is to ask you to assist her in obtaining data for purposes of research.

Any assistance accorded to her will be highly appreciated.

With much thanks.

DR. SAMUEL V. OBIERO
CHAIRMAN
DEPARTMENT OF URBAN & REGIONAL PLANNING

SVO/ewn