ASSESSING THE CONTRIBUTION OF POOR URBAN DESIGN TO CONGESTION IN KISII TOWN

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DECLARATION

I Marceliano Mogendi declare that this research project is my original work and has not been presented for a degree or any other award to any university or institution other than Maasai Mara University in Narok for academic credit.

Signed…….

Date……

Marceliano Mogendi

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This research project has been presented for examination with my approval as the university supervisor

Signed……

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DEDICATION

This project is dedicated to my mum Edna Mogendi Bonareri, my grandfather Aloys Mogendi Tamaro and my lecturer Miss Mary Mwangi for the support and encouragement during the study.

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Firstly, I thank my almighty God for giving me better health, strength and wisdom from the beginning up to completion of this project.

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ABSTRACT

Congestion has become one of the major problems in Kisii town. This has led to slowing down and delay of several activities in town. Congestion is caused when there is no smooth flow of traffic or the available public spaces like streets, walking paths and parking areas are not developed well enough to serve the number of people who intend to use it. The study tries to connect this to poor urban design of the town. The study then breaks down urban design to streets, public spaces and layout of buildings. The aim of this research is to assess the contribution of poor urban design to congestion in Kisii town. The research findings will have valuable information to relevant institutions like the physical planning department as well as all relevant stakeholders involved which makes the environment a better place. For the success of the research an interview was done at the physical planning office and satellite imagery was used to confirm how the streets and layout of buildings look like. The results showed that poor urban design is a contributor to congestion where the town does not have well developed public spaces like paths that would encourage walking and cycling, lack of well-designed parking areas that would satisfy the demand, incomplete streets and a poor layout of buildings caused by lack of adhering to the zoning regulations as well as other relevant regulations. Lack of more alternative routes in town also contributed to congestion in town. Alternative routes offer more choices as well as direct routes to the road users destinations. Urbanization is leading to population increase in town which contributes to more cars and more pedestrians in town. Lack of implementing a new design with well-developed streets, public spaces and a good layout of buildings means that congestion is likely to increase in town. When congestion is increased the town is likely to have security threats due increase in crime rate as well as increase of conflicts among the road users and may lead to increase in accidents in town. The study concluded that preparation of a better design of the town which considers all aspects as well as accommodates all the types of street users can reduce congestion in town. The design as well should give individuals option like walking and cycling that not only help to reduce congestion but are also environmental friendly. Congestion being a menace in most urban areas in developing countries the study recommends that experts need to increase on research on how to reduce congestion as well as develop sustainable plans.

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CHAPTER ONE

1.1 INTRODUCTION

This chapter contains a brief background of the study followed by the statement of the problem. The objectives and research questions that will guide the study are stated under that. Justification of the study and significance of the study are done in this chapter. The chapter seeks to justify existence of a problem as well as need for the study.

1.2 BACKGROUND OF THE STUDY

Streets and public spaces define the character of a city. A public space that is well designed and managed is a key asset to the function of a city with some positive impact on the environment, health, safety, economy and connectivity (Clos, 2015). Street network efficiency majorly focuses on improving traffic flow on limited access and arterial road network (Staley, 2012). The streets should be designed in a sustainable way to accommodate the needs of pedestrians, the cyclists as well as public transport to ensure sustainable modes of travel are made attractive, accessible and convenient. According to the manual of streets the designers should consider a user hierarchy that follows in the street design process. The pedestrians should be considered first, then cyclists, followed by public transport use, then special service vehicles like emergency service vehicles and then lastly other motor traffic. This hierarchy helps to ensure the streets will serve all the users in a balanced way (department for transport, 2008).

Spatial networks such as paths, streets and transit lines help to organize the human dynamics of urban transportation (Boeing, 2018). Underground space can help cities solve the problem of increased demands while still they remain compact. The need for congestion relief is the most recognized problem in the city streets. Using separate rail systems can help reduce rush hour traffic pressure hence saving time. Moving from above the ground car traffic to the underground mass transit system, large amounts of surface land will be freed up for other uses. Improving tunneling and excavation support technology continually adds success to urban rail system (Broere, 2015).

In many metropolitan areas traffic congestion is reaching intolerable levels both in developed and developing countries. New building developments are considered to be one of the major causes of congestion problems in cities (Kazunori Hokao, Shihana Mohamed, 2012). According

to the UN-Habitat, public spaces are considered to be vital ingredient of successful cities. Public spaces help to create livable communities as well as facilitating enjoyment of the higher density neighborhoods found in cities (Kristie, 2016).

1.3 STATEMENT OF THE PROBLEM

Congestion is one of the major concerns in Kisii town. When cities in developing countries were being developed, the engineers and planners involved failed to consider the long term effects. This led to urban areas not being sustainable hence years down the line the effects are now being felt. All this effects are majorly caused by poor urban design. When sustainable roads are being planned the planners consider the services offered up to fifty years to come and the plan on population growth rate is also considered as well as the rate at which the use of vehicles is increasing. Traffic congestion comes along with increase in conflicts among car owners, the motorcycle riders and the pedestrians. It also leads to increase in road accidents because in Kisii town there are poor or no footpaths or foot bridges. In addition to that you find that there are high rise buildings constructed along the road. They accommodate many people both those working at the place and those coming to access services depending on the demand and interests. All these people have no standard footpaths for those walking to the buildings and good roads with proper packing places for those who use cars. The end result is congestion. No proper market places in town. Open air business people spread their goods along the road minimizing the small space available to be used as a footpath. These act forces pedestrians to walk at the edge of the road hence exposing them to accidents. The population of pedestrians that accesses the town is huge and because the small space available has been taken over by hawkers and open air business people, congestion has to arise as well as conflicts between pedestrians and car users. These has led to congestion in Kisii town since despite the narrow roads and lack of footpaths people have to go to work as well access services available in town. A new sustainable plan for the town needs to be developed with the solutions of existing problems in it.

1.4 OBJECTIVES OF THE STUDY

1. To assess the state of public spaces in Kisii town.
1. To analyze the layout of buildings in Kisii town.
2. To assess the street network in Kisii town.

1.5 RESEARCH QUESTIONS

1. Are public spaces available in Kisii town?
2. How accessible are public spaces in Kisii town?
3. How often are public spaces used in Kisii town?
4. How is the layout of buildings in Kisii town?
5. What is the state of street networks in Kisii town?

1.6 JUSTIFICATION OF THE STUDY

In order to achieve sustainable development goal 11, sustainable cities and communities, there is need to invest in public transport, create green spaces and involve a broader range of people in urban planning decisions. It will help to keep things we love about a city and change the things that we don't like. This makes urban planning essential in solving the existing problem in the city like congestion in this study. Kisii town is a growing town hence to achieve sustainability it should not carry existing problems to its future.

The study will help shade some light on the conditions of the town that lead to congestion. The study also can be helpful to the Kisii county government and help them to realize how they can minimize or stop congestion in town.

1.7 SIGNIFICANCE OF THE STUDY

This study will look into congestion and how it's brought about by poor urban design. Poor urban design will be broken down to unplanned streets, lack of proper layout of buildings and lack of well-developed public spaces leading to congestion. Once the problem is well analyzed the possible solutions will be suggested to ensure that the congestion problem is solved. This will help improve better and improved services, good condition of the town and people operating in town get to their desired places in time. Investors will be attracted to the place because of improved efficiency in town creating more jobs and improving livelihoods within and outside the town. In the long run good roads meant to improve on connectivity and efficiency, implemented and adhered policies as well as improved infrastructure like green spaces will eventually make the town the best place to be.

1.8 SCOPE OF THE STUDY

The study is carried out in Kisii town. It's located in south western Kenya and about 30 miles east of Lake Victoria. It is the main urban and commercial center in Gusii Highlands as well as

the South Nyanza region. The study will focus on streets, layout of buildings and public spaces under urban design and how they contribute to congestion if not properly planned.

CHAPTER TWO

LITRATURE REVIEW

2.1 Street network

The gap between urban design, urban regulation and understanding the urban structure needs to be bridged and one practical outcome is said to be to support the appropriate streets design making it part of urban development (Trova, 2012). It will help in giving information on how the street network should be designed to ensure some places which are intended to be business cores, local centre or retail hubs are likely to attract higher density movement while others which are intended for residential use will remain quieter.

How people interact and move between places is linked to spatial form of these places. The spatial form can be conceived in cities, in terms of related routes and networks of streets, open spaces, buildings and clusters of land parcels (Cos, 2013). With the growing interest in smart growth, the traditional street patterns are coming back in some quarters and coincidental with the trend is a need to have a more comprehensive approach to road safety that takes into account the complete street network (Trova, 2012). The physical infrastructure shapes circulation and accommodates different kinds like pedestrian, vehicular and public transportation. Therefore the form of physical infrastructure can facilitate or impede the circulation and consequently the human presence in public space (Clos, 2015). According to National Complete Streets Coalition in America, designing streets for automobiles only reduces opportunities for safe travel choices which can ease congestion to invest in incomplete streets is likely to prevent people from using better options like bicycling, walking or that is bicycling, walking and taking public transportation (Federal Highway Administration, 2008). A complete streets network with bicycle and pedestrian infrastructure as well as improved access to and efficiency of public transportation are needed to reduce the burden of congestion in our roadways as well as improve travel times for all the users regardless of walking, biking, taking public transportation or driving. The approach gives information to guide urban design decisions when creating new streets or when realigning the existing ones. The measures of street connectivity have been missing so that they can support the decisions about the street layout design. The concern of urban design is the internal structure of areas and the way in which the street layout impacts the orientation, the nature and the performance of building developments in which it provides the

context (Trova, 2012). Walking is after all a pre-eminently context-dependent activity which is one that occurs according to the fine grain of environment as well as its larger scale structure. This is the reason why we need the enriched models of street layout and urban form to enhance better design that improves walk ability. Well designed and connected complete Streets do make travel more efficient by giving choice not only in modes but also in routes (Marshall, 2010). The pedestrians as well as public transportation riders are motivated to find direct routes leading to their destination and they prefer lower traffic streets. This makes it much easier to do when street network is a connected grid of relatively short blocks. The street system will provide the connectivity matrix for the city which is important for urban mobility (Cos, 2013). The efficiency of this mobility determines the urban economic productivity; it also provides the matrix for the urban basic services layout which is mainly energy, drainage, water supply and sanitation, parking slots transportation and other services and the affordability of the urban services is related to the quality of street patterns. Also the street pattern, including public gardens and plazas, is the key element of communication and personal interaction between the citizens. It defines the political and cultural quality of life in the city. Lastly, the walk ability of the spaces as well as the safety of sidewalks and the location and form of shops along the street determines the quality and quantity of street life.

In most places built since 1950s, roadway design mostly means a system of widely spaced, large arterials fed by smaller roadways that rarely connect with each other. Hence this system concentrates motorized traffic on a limited number of large roads leading to longer, indirect trips as well as limits opportunities for alternative routes (Institute for Transportation Engineers, 2010). Such a network makes it difficult for individuals who might decide to bike, walk, or take public transportation. This is because the indirect routes their trips longer forcing them onto roads that are usually not designed for their safety and comfort. Decades of investing in expanding automobile capacity have not succeeded in keeping congestion in check in the United States (David Schrank, Tim Lomax, 2009). 60% to 70% of increased road capacity that is increased road-miles on state highways in California counties was filled with new automobile traffic within just five years. Mostly a comprehensive complete streets approach to transportation planning as well as designing will lead to increase in transportation choices hence encourage efficient use of current roadways by offering alternatives to the automobile mostly during peak travel times. Providing travel choices like walking, bicycling and public transportation can

reduce the demand for peak-hour travel in cars which is the principle cause of daily congestion in towns.

Public transportation also finds it difficult to serve isolated neighborhoods which have only one or two entry or exit points (Cos, 2013). This leads to people driving even for very short trips. Towns that have adopted complete streets policies sometimes get to struggle with retrofitting multi-lane arterials that must carry the heavy automobile traffic but they are also the only choice for walking, bicycling and public transportation. Most towns realize they must look for opportunities so as to increase the street connectivity in order to give the public choices when traveling between home, schools, medical offices, shops, and their workplaces (Thomas Gotschi, Kevin Mills, 2008).

When the network is complete short local trips may be done without burdening the arterial systems with more cars (Stephanie Haynie, John Peponis, 2009). Roads in most sprawling communities see up to 75% more travel demand on those arterials than similar arterials in a connected networks. Individuals with a complete and connected network of options may opt to get to their destination without entirely driving on arterials or will instead decide to bike, walk, or take public transportation. Instead of trying to make each street perfect for every traveler, communities can create an interwoven array of streets that emphasize different modes and provide quality accessibility to everyone. Some streets may emphasize vehicles and trucks, while others emphasize pedestrians and public transportation (David Schrank, Tim Lomax, 2009).

Connected streets do reduce traffic congestion by dispersing traffic as well as offering travel options (Cos, 2013). A network of connected complete streets can carry as many travelers as conventional sprawling roadway design, but they do not rely on a sparse network of major arterials. Parallel routes which are within connected networks maintain the high corridor capacity while still providing different routes to different destinations for convenience, variety of options or to avoid construction. These choices help the users of the system by reducing the travel delays which are associated with reliance on very little availability of routes. Grid networks help create a safer road system (Peponis, 2011). The grid-like street networks experience fewer fatal or severe crashes. The gridded networks do not need to rely on overly wide roads and they have more intersections hence lowering the drivers' speeds but still the travel times remain comparable to conventional network because the trip distances are shorter, the routes are more

direct and because timed traffic signals can provide a consistent speed. Pedestrians benefit from additional signalized and safe crossing opportunities at intersections while both people on foot and on bike benefit from the slower vehicular speeds. The emergency service personnel are able to get to emergency sites more quickly due to the redundancy of the network. A study in Charlotte, North Carolina found that as street connectivity increased, a fire station could reach far more households in town and more quickly due to reduced congestion (Pleasant, 2008).

2.2 Public spaces

Future cities should be 'designed to live together' and urban planning is the best tool that will help us accomplish this aim (UN-Habitat, 2015). The reason is that the design of the physical environment has a great influence on how individuals interact with each other. Availability of broad road sidewalks and the commercial street frontage enhance economic activity and make the neighborhoods safer. Cities with small building blocks and short distances between intersections are easy to walk and navigate (Clos, 2015). As well the cities with quality public space usually invite people to come outside; to communicate and collaborate with each other as well as participate in public life. This is the reason why the mission to create 'public spaces for all' is one of the major anchors of urban planning and design.

When safety and security issues arise, public space is abandoned and gated communities emerge as a form of protection against the rest of the city (Lipton, 2003). This results in the failure in the function of cultural life of the street. The relevance of street patterns and public space requires planning at the initial stage of urban growth. Otherwise, if urbanization happens spontaneously, the introduction of public space afterwards becomes very difficult and expensive, both politically and economically. This paradox of the public space stage of growth, there is insufficient legal and technical capacity to address the planning issue. A political decision should be firmly in place to avoid the risk of unplanned growth. The perverse consequences are congestion, inequalities, segregations and lack of street life and safety. Together, this jeopardizes the chances of prosperity for the people living in the city (Clos, 2015).

The character of cities is defined by the available streets and public spaces (UN-Habitat, 2015). When we think about great cities, we invariably think of their iconic public spaces: Times Square in New York, Avenida Atlantica in Rio de Janeiro, Piccadilly Circus in London, Uhuru Park in Nairobi and Azad Maidan in Mumbai. From squares and boulevards to neighborhood gardens

and children playgrounds the public space frames city image. The connective matrix of the streets as well as the public spaces forms the skeleton of the city upon which all rests. Public space is an important component of a prosperous city. A well designed and managed public space is a key asset for a city's functioning (Clos, 2015). It also has a positive impact on its environment, economy, safety, health, integration and connectivity. The quality of life for individuals in cities is directly related to the state of its public spaces.

2.2.1 Public space is crucial for the urban poor:

Public space is often referred to as 'the poor man's living room' which hints at its particular importance for marginalized groups, but also its ability to foster integration between different socio-economic groups (UN-Habitat, 2015). Improving access to good public spaces for the most vulnerable urban residents is a powerful tool to improve equity, promote inclusion and combat discrimination.

2.2.2 Public space contributes to building social cohesion:

Public space provides room for social and cultural interaction and can foster a sense of belonging and pride in an area. A public space that is open to all, regardless of ethnic origin, age or gender, provides a democratic forum for citizens and society. Public space can bring communities together, provide meeting places and foster social ties. These spaces shape the cultural identity of an area, are part of its unique character and provide a sense of place for local communities (UN-Habitat, 2015).

2.2.3 Public space promotes gender equality:

The mainstreaming of gender equality into urban planning, development and design is essential if we are to create public space where men and women, boys and girls have equal opportunities to be happy, healthy, secure as well as economically and politically empowered (UN-Habitat, 2015).

2.2.4 Public space enhances safety:

A mixed and diverse public space that is use, users, design, state and time provides a place that is vibrant and busy automatically reducing insecurity. Where public space is inadequate, poorly designed, or privatized, the city becomes increasingly segregated (UN-Habitat, 2015). The result can be a polarized city where social tensions are likely to flare up and where crime and violence rises. Fear of crime and crime itself can deter people, not just vulnerable groups such from using

public spaces. Well-designed and well-maintained streets as well as public spaces can help to reduce these fears and contribute to improving a mutual trust and safety.

2.2.5 Public space supports economic development:

A good connective matrix of public space has impact on economic productivity as it improves the efficiency of the supply chain, reducing production costs and promoting the mobility of goods and people (UN-Habitat, 2015). Public space provides important benefits to all forms of business, both formal and informal. As cities increasingly compete with one another to attract investment, good streets, market places, parks, squares, gardens and other public facilities becomes a vital business and marketing tool. In addition, good public spaces can increase the land values of the adjacent properties. Entrepreneurs, large or small, are attracted to locations that offer well-designed, well-managed public places and these in turn attract customers, employees and services.

2.2.6 Public space improves public health:

Good quality and well maintained network of public spaces help to improve physical and mental health by encouraging more physical activity and play, makes walking more attractive, reduces stress and provides a calming environment (UN-Habitat, 2015).

2.2.7 Public space increases transportation efficiency:

One of the important functions of public space is that it allows us to move around and to access our homes, schools, work and other important amenities on foot, by bicycle, motorbike, by car or public transport (Cos, 2013). A well designed connective matrix of our streets and public spaces encourages walking as well as cycling and has the power to create a safe environment for us by reducing vehicle speeds and use.

2.2.8 Public space improves the environment:

Most cities are developing and implementing policies that promote a compact and livable area with enough public space that encourages walking, facilitates public transport and cycling, thereby helping to reduce carbon emissions. Public space is very critical for environmental sustainability. A green and open public space comes along with many important environmental benefits like, the air cooling and absorption of atmospheric pollutants (UN-Habitat, 2015).

2.2.9 Public space is all around us, a vital part of everyday urban life:

The streets that we pass through as we go to school or work, to places where the children play, where we encounter wildlife and nature, local parks where we enjoy sports, sit at lunchtime or simply somewhere quiet we go to get away for a moment from the bustle of a busy daily life. Public space is an open-air living room and our outdoor leisure centre (Lipton, 2003).

2.3 Layout of buildings

Over time, urban development with increased densities has led to a decrease in private open space as well as lack of public open space. Residential open spaces are missing in housing legislations as they are estimated based on floor area ratio and building coverage ratio, whereas they cannot be used as an all-encompassing measurement tool. Moreover, it is important for designers to consider housing layout to ensure a pleasant environment for residents; eventually, a range of benefits and opportunities will be available in residential open spaces. Therefore, to achieve a better quality of space in residential areas, new indices in the evaluation of residential environments should be proposed (Azad, Morinaga, & Kobayashi, 2018).

The designers must work with building owners and operators to ensure that the optimal balance is achieved (Gaynor, 2013). Thus, coordination with the design team is critical. Planners, architects and landscape designers play an important role in identifying and implementing crucial asset protection measures while still considering land use, site selection and orientation of buildings on the site, integration of vehicle access, control points, physical barriers, parking, landscaping and protection of utilities to mitigate threats (Azad et al., 2018).

For land use design, designers should consider aspects. The aspects involve the characteristics of the surrounding area, including construction type, occupancies and the nature and intensity of adjacent activities as well as the implications of these characteristics for the protection of the people, property and operations on the site under consideration (Gaynor, 2013).

2.2 CONCEPTUAL FRAMEWORK

Conceptual framework being an interconnected set of theories or ideas describing about how particular phenomenon functions or how it is related to its parts. It is the basis of understanding the patterns of interconnections across ideas, events, observations, knowledge, concepts, interpretations and other components of experience (Svinicki, 2010). That guides as to understand that urban design is a broader concept. When a good urban design need to be

developed streets, buildings and public spaces should be considered. Unfortunately, this has not been properly considered in many urban areas in most developing countries.

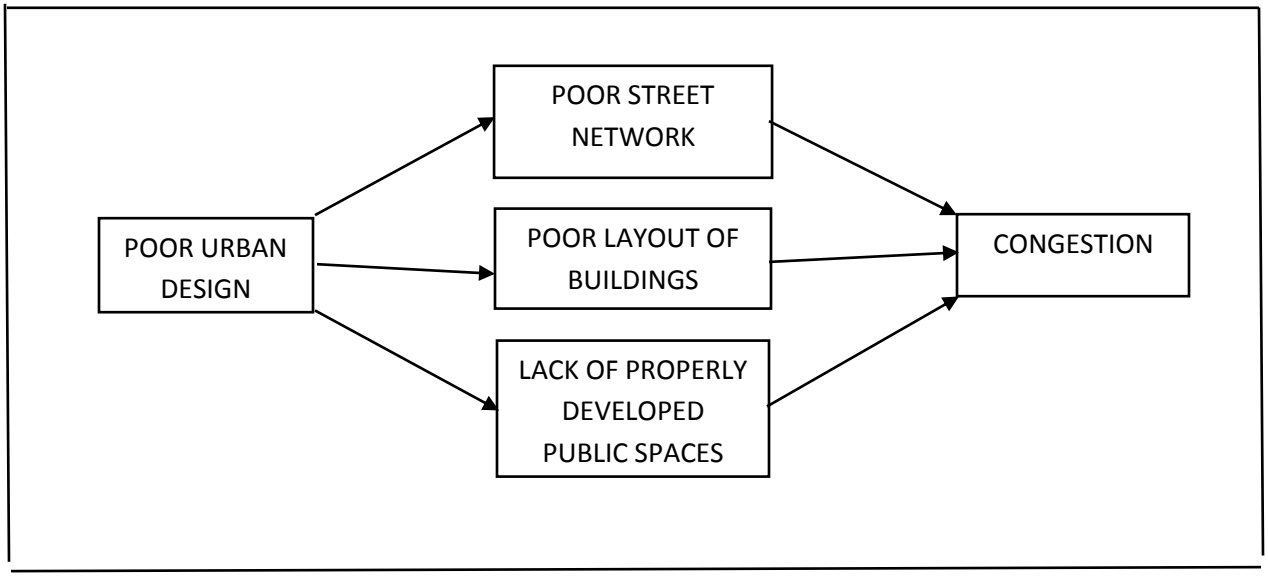


Figure 2.1: Research concept
(Researcher, 2019)

Congestion has been a threat eating into our urban areas in the recent years. Urban design has been one of the important tools to experts as they try to solve the problem in our towns. Urban design has got three variables that is, streets, buildings and public spaces. When all these variables are considered properly by the responsible experts they should be able to stop or minimize congestion.

Public spaces are very important to the development of urban areas. The public spaces should be assessed in terms of availability, accessibility and usability. The public spaces should be available to the public to serve its function, they should be accessible to mean they should be developed in areas that are easily accessible by the target group that is the public and they should be able to serve the intended purpose that is how they are used by the public. Towns without public spaces tend to have more congestion compared to those with properly developed public spaces. You find that in urban areas there are many jobless people who hang around the town waiting for minimal opportunities or idle around waiting for the day to end. When there are well

developed public spaces most these people can spend time there hence reducing congestion in town.

In this study, the layout of buildings will be looked into in terms of the physical outlook of buildings as well as the permanent and temporal buildings. There are legal procedures to be followed before any building is constructed and if any of the requirements is ignored then the building is likely to have a negative influence to its environment. The street networks will be assessed in comparison to smart transportation. Well planned streets reduce congestion by increasing connectivity for easy movement in town. If all this is not considered in the development of an urban design, then the end result will be increase in congestion in town.

CHAPTER THREE

STUDY AREA

3.1 Introduction

This chapter describes the study area deeper. It gives a chance for one to understand the study area better before conducting the research. A brief history of the study area is given, the position and size, demographic features, physical and natural conditions as well as economic activities in Kisii town are looked into.

3.2 Study area description

Located in south western Kenya, Kisii town is about 50km East of Lake Victoria. The town is a driving distance of 309km from Nairobi the capital city of Kenya. It is one of the most productive areas in Kenya in terms of agriculture due to abundant rainfall and very fertile soils. Despite Kisii people being more prominent the town has a sizable number of Indians, kikuyu as well as other communities who are involved in trade. Tremendous growth has been experienced over the past few years especially with the entry of firms in the town (Intergrated & Plan, 2018).

3.3 Brief history

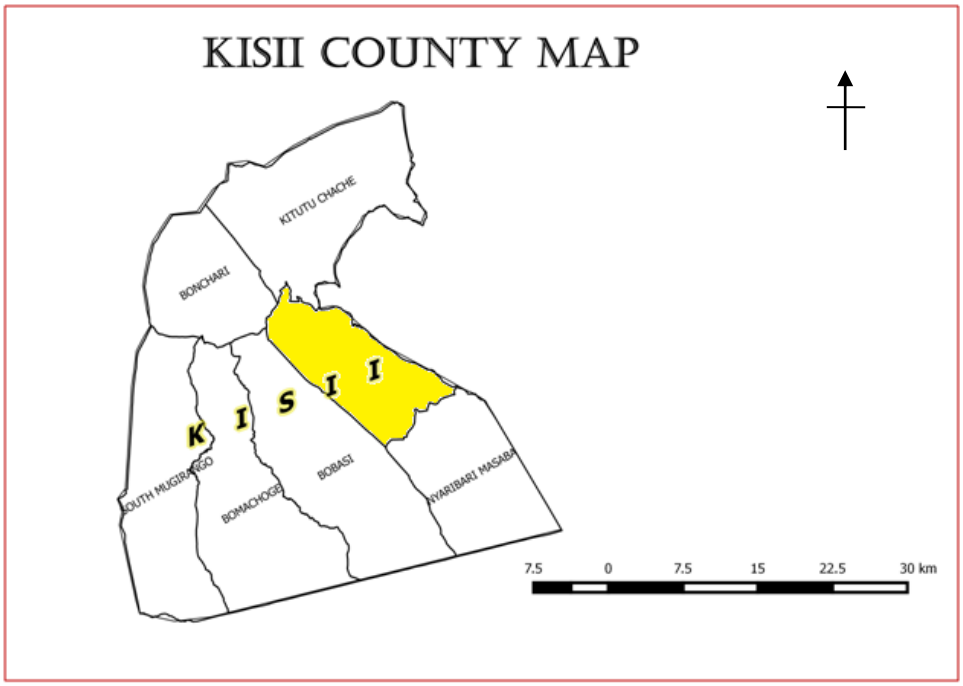
In the early 1900's it is believed young men would go to graze their cattle where the town stands since it was a bushy forest. Originally Kisii town was known as Getembe by the Gusii people. Later it was named Bosongo a name believed to have originated from 'Abasongo' which means the white people who stayed in the town during colonial days. The British soldiers established the town as they were forced to retreat from Lake Victoria by a heavy gunfire between them and the German soldiers during the Great War early 20th century. Kisii town was later chosen to be the district headquarters of the large South Nyanza and Kisii region (Onchari, 2017).

3.4 position and size

The study is done within Kisii town, which is marked yellow in the map below, a city south western of Kenya. Kisii towns is a major city in Kisii County. It is the main urban and commercial center serving Gusii highland and south Nyanza region. Kisii County is one of the 47 counties in Kenyan Republic. It shares common borders with Nyamira County to the North

East, Narok County to the south, and Homabay and Migori counties to the west. The county lies between latitudes 0º 40’ 38.4’’South, and longitude 34º 34’ 46º 61’’ East and covers an area of 1,317.5km^2(Intergrated& Plan, 2018)

Figure 3.1: Kisii county map with Kisii town colored yellow



Source: Researcher 2019

(ii) IIBRC Proposed Map for Kisii County

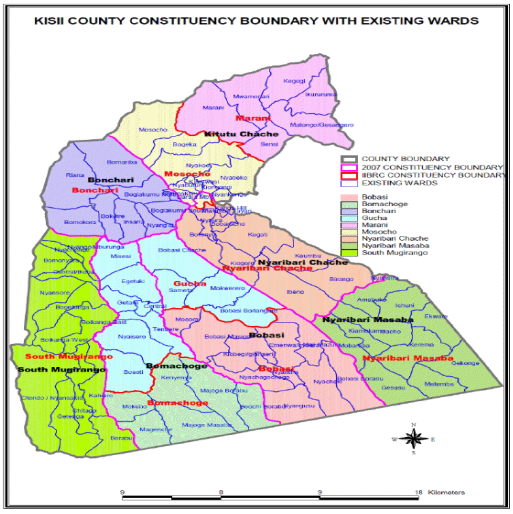


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Figure 3.2: Kisii county ward boundaries
Source: Adopted from Google map

3.5 Demographic features

Demographic features include population size, composition, distribution and density.

3.5.1 Population size and composition

Kisii town is found in Kisii central ward. The population size and composition was derived from Kisii central data. The total population of the ward was at 31,929 where the male formed 15,691 of the population and female formed 16,328 of the population (Kisii county, 2013).

3.6 Physical and natural conditions

3.6.1 Physical and topographic features

The hilly topography with several ridges and valleys characterize Kisii. The land generally slopes from east to west. Kisii is dissected by permanent rivers that flow westwards into Lake Victoria. They include Kuja, Riana, Mogussii and Iyabe rivers. There are also valleys and depressions in Kisii town(Intergrated& Plan, 2018)

3.6.2 Ecological conditions

Red volcanic soils which are deep in organic matter form 75% of Kisii land. The rest is covered by clay soils, red loams and sandy soils. At the bottom of the valley there is black cotton soils

and organic peat soils. The red volcanic soils support the growth of cash crops like tea, pyrethrum, coffee and subsistence crops like beans, maize and potatoes. Kisii is divided into three ecological zones that is upper midland 75%, lower highland 20% and lower midland 5%. Approximately 78% of Kisii is arable of which 57%is under crop (Kisii county, 2013).

3.6.3 Climatic conditions

Kisii town enjoys a highland climate. Kisii is located on latitude O° 41'0s and longitude 34° 46'0s E. Due to its positioning in the Lake Victoria, lake basin and heavily foliaged Kisii highlands it generally receives rain all year round. Kisii town has never experienced floods due to its unique positioning within hills. It has a bimodal rainfall pattern with annual average of 1500m. long rains are experienced between March and June while short rains are experienced from September to November. Its relatively dry on July and January. Maximum temperature ranges between 21°c-30°c while minimum temperature ranges between 15°c-20°c (Kisii county, 2013).

3.7 Economic activities in Kisii town

The Kisii town economy is derived from agriculture and commerce. Some of the types of crops and fruits cultivated around the area are maize, beans, managu, bananas, avocados, pineapples and paw paws. The town as well is dotted by tall commercial buildings and it is always bustling with activity. It is one of the fastest growing towns in western Kenya due to its high population, general tranquility and political stability. The town has few industrial activities although it has a potential for larger agro-based industries due to its location in a rich agricultural area. Quarrying of soapstone takes place near the town around Tabaka Southwest of the town and has largely boosted tourism in the area as well as helped the locals to grow economically. The Coca-Cola Company has a bottling distribution plant in Kisii municipality. Large supermarket chain stores are hosted in the town like Nakumatt, Tuskey's and Naivas. The town is a host to 19 commercial banking and financial institutions' branches. Like many of Kenya's major urban centers, in Kisii town there is an influx of many other business ventures like the hospitality sector with hotels, restaurants, bars, sports pubs among other commercial activities (Kisii county, 2017).

CHAPTER FOUR

RESEARCH METHODOLOGY

4.1 Introduction

Research methodology is a systematic technique that guides research and determines how it is conducted. It serves a purpose of describing and analyzing methods as well as shading more light on the limitations and resources. It is important in provision of tools that are used to carry out the research, develops critical and essential scientific attitude, enriches the research process and provides a chance for an in depth study as well as understanding the subject and it inculcates the potential to learn, read and think critically (Igwenagu, 2016)

4.2 Research design

This is a framework of methods as well as techniques that are chosen by a researcher so as to combine various components of research in a reasonable logical manner so as to efficiently handle the research problem (Bhat, 2019). This helps to enhance convenience in collection and analysis of data. In this study descriptive research design will be used because it gives an attempt of describing, explaining and interpreting present conditions. Its purpose is to examine a problem occurring at a specific place in a given time. Descriptive research design is mainly concern with differences or relationships that exist, practices, conditions, structures, ongoing processes or evident trends. There are many types of descriptive research design. Case study is best suited for the study because it describes and interprets events, conditions or situations occurring at the present. It emphasizes on analyzing a detailed context of limited conditions or events and how they relate.

4.3 Sampling technique

4.3.1 Purposive sampling

Purposive sampling is a sampling technique where the researcher relies on personal judgment when deciding on which members of the target population will participate in the research study (Mark Saunders, Philip Lewis, Adrian Thornhill, 2012). The physical planners working at the physical planning office in the county will sampled purposively. This is because I believe they have the information needed to complete my research. In purposive sampling the researcher believes that a representative sample can be obtained by using sound judgment. This will help to

save time and money. The method proves to be effective when a limited number of people from the target population serve as a source of primary data. This is because of the nature of the research design and objectives. The need to use personal judgment is to choose the cases that will help in answering research questions as well as achieve the research objectives. Purposive sampling was best for the study because it is a cost effective and time effective method of sampling, it is the only appropriate available method when the source of primary data that can participate in the study is limited and it is effective in exploring situations that are anthropological where the discovered meaning can be benefited from an approach that is intuitive (Mark Saunders, Philip Lewis, Adrian Thornhill, 2012).

4.4 Data collection methods

4.4.1 Interviews

This was a method used to collect data by involving presentation of oral verbal stimuli and replies. This is done face to face during the personal interviews the stakeholders will have with the researchers. The interviews will be done at the county government especially with officials under physical planning. They will explain how space is regulated in Kisii town. An interview with physical planning director will be organized to talk about space and how it is regulated in Kisii town.

4.4.2 Direct observation

This is a systematic data collection approach where researchers use all of their senses to examine people in a natural setting. It was a simple method of data collection and did not require much technical knowledge. It will be essential in analyzing urban design in Kisii town. It will be done by observing and taking note how the town was designed for analysis.

4.4.3 Geographic information system

This is a system used to input, analyze, store, retrieve, manipulate and output geographically referenced data so as to support decision making in planning and management. The process involves collection of data from the real world. The data is input in the data sources for data management and then the data can be retrieved for data analysis. The data is then analyzed and the information is available to users for decision making. Then an action is taken depending on the intentions of the user.

4.5 Validity and reliability

Data collection methods used that is, interviews, direct observation and geographic information system, are more reliable. Experts under physical planning department will be interviewed because are responsible for urban designing with more considerations being given to public spaces, layout of buildings and street network. Direct observations will be done to confirm facts on the ground. This will ensure that the responses from the interviews are in line with what is on the ground. Geographic information system will be used to analyze the layout of buildings and street networks which are variables under urban design. Images from space are frequently updated and the most recent images will be used since they will have recent data hence more reliable. The images with less cloud cover will be considered for the research because they will be clearer than those with cloud cover making them more efficient for analysis.

4.6 Data processing and analysis

Data analysis is a process with a goal of discovering useful information, conclusions and supporting decision making by inspecting, cleansing, transforming and modeling data. The downloaded images are not interpreted but the researcher is able to analyze the data depending on the needed information. Using an example of street maps once is able to identify how the streets look like in the given places since the image will be downloaded using coordinates of the same place. The image will then be interpreted to obtain valuable information.

4.7 Ethical consideration

Priority will be given to respect the participants dignity, I will ensure protection of the participant's privacy, exaggeration of research objectives will be avoided, honesty and transparency in any communication about the research will be important, I will ensure I consider a good dressing code since it will contributes to the participants trust on my work, I will be time conscious to avoid inconvenience, language should be considered in this case I will use English when doing interviews because its official and I will ensure I use the appropriate titles to show respect to the respondents.

CHAPTER FIVE

DATA ANALYSIS, DISCUSSIONS AND PRESENTATION

5.1 INTRODUCTION

This chapter contains analysis and presentation of the results from the study that is assessing the contribution of poor urban design to congestion in Kisii town. The data is represented using street maps and discussions on findings.

5.2 Discussions

Figure 5.1: Satellite image of Kisii town streets
Source: Adopted from street maps

From figure 5.1 above the streets in Kisii town are not more connected to provide short routes to destinations. More connected and complete streets offer direct routes to different destinations and reduce travel time hence reduce congestion in town. The block size from one street to the next can also be identified. To minimize congestion the block size from one street to the next should be minimized.

Figure 5.2: Satellite image of Kisii town streets
Source: Adopted from street maps

These are street maps that show how the street network of Kisii town looks like. On the maps major streets are identified as well as major facilities in town. A network made of complete streets works best when the block size is reduced which can be identified as one of the weakness on the design of streets in town. Some of the streets are not complete from the sources above. The block size from one street to the next can provide better services if it is reduced compare the streets above. This will help to provide more choices and the street users will tend to choose direct routes to their destinations.

Figure 5.3: Satellite image showing streets and layout of buildings in Kisii town
Source: Adopted from Google earth

Figure 5.3 above in an aerial satellite image that shows how Kisii town looks like. From the image the layout of buildings can be identified as well as the network of streets. More streets need to be done between the blocks to improve on street connections which will help to minimize congestion.

Figure 5.4: satellite image showing streets and layout of buildings in Kisii town
Source: Adopted from Google earth

Figure 5.5: Image of a street in Kisii town
Source: Researcher 2019

From figure 5.5 above it can be seen that the street does not have proper parking places as well as walking paths. People can be seen walking at the age of the road which is not safe for then. This kind of street does not give better choices to the public like walking and cycling.

Figure 5.6: Street and layout of buildings in Kisii town
Source: Researcher 2019

From figure 5.6 above vehicles are seen parked at the edge of the road limiting space available for movement which confirms lack of parking spaces is a major problem in Kisii town. To the left side pedestrians can be seen walking next to the cars parking on the side of the road. This increases risk of accidents and increases congestion due to limited spaces for movement and lack of properly done public spaces. To the right side people are seen walking at the edge of the road because there are no walking paths for them. It can also be identified that despite the small streets that are not well developed, tall building are still being constructed to the edge of the road. The building will accommodate a huge number of individuals who will need to use the street either to work or receive services hence leading to congestion.

Figure 5.7: View of a street in Kisii town
Source: Researcher 2019

The image above represents a street in Kisii town. Due to limited public spaces like parking areas it has led to people parking cars at the edge of the road. This limits the available space for moving vehicles, pedestrians and motorbike operators. High rise building is coming up next to the road that is not well developed to accommodate the people who will use the building. The end result is congestion in town. Lack of proper walking paths increases conflicts between pedestrians and car owners as well as motorbikes leading to congestion and risks of accidents.

CHAPTER SIX

SUMMARY OF THE FINDINGS, CONCLUSIONS AND RECOMMENDATIONS

6.1 Introduction

This chapter contains summary of the findings as analyzed in the previous chapter. The conclusions and recommendations based on the findings are also represented.

6.2 Summary of research findings

According to the study Kisii town experienced congestion. This was contributed by the number of individuals who visit the town to access services as well as the business people who keep exploiting every opportunity to invest more. This has led to high rise buildings being constructed along the narrow streets in town. The buildings accommodate a huge number of people, all people working in the building and the service seekers, who will need to use the streets each day with no properly done walk paths in most streets. This will lead to congestion because the street will serve the cars, trucks, pedestrians and cyclists. In the same streets there are huge trucks trying to make a delivery at major business centers and spends five hours without moving hence breaking the flow of traffic as well individuals trying to walk at the edge of the streets.

Lack of enough public spaces like parking areas is another contributor to congestion. This makes people to park at the edge of streets limiting the space available for smooth flow of traffic. The local business people have also aired their products along the streets.

There are no enough alternative routes leading to congestion. When alternative routes are enough drivers, pedestrians and cyclists can have more options to get them to their options. By that there will be a smooth flow of activities within town. When the network is complete short local trips may be done without burdening the arterial systems with more cars. This helps to minimize congestion in town.

Designing streets for automobiles only reduces opportunities for safe travel choices which can ease congestion. To invest in incomplete streets is likely to prevent people from using better options like bicycling, walking or that is bicycling, walking and taking public transportation. A complete streets network with bicycle and pedestrian infrastructure as well as improved access to and efficiency of public transportation are needed to reduce the burden of congestion in our

roadways as well as improve travel times for all the users regardless of walking, biking, taking public transportation or driving. Lack of proper infrastructure in Kisii town like walking paths has also contributed to congestion in Kisii. Pedestrians are forced to walk along the roads in some places hence exposing them to accidents.

New buildings being constructed at a high rate means that there is demand majorly contributed by urbanization. Many people are moving to town to find jobs and exploit the available opportunities in town. Population increase has led to the current bringing up of building structures in town including along major streets. This has contributed to congestion since the number of people who need to use the town each day is increasing.

According to the information given by one of the physical planners is that, they have some strategies yet to be implemented like building more car parking area which help to control cars from parking at the edge of streets. It was also said that for the safety of pedestrian warking paths are soon being constructed in town and the project will be start from Mashauri- Daraja Moja road heading to town. They also have some regulations that try to reduce congestion like, public cars are limited from accessing some streets in town and some streets are one way hence only cars headed to the same place can use the streets. Building a backstreet to be used by trucks is also part of the plan so that the trucks that do not need to deliver goods in town will not be allowed to use streets in town instead they will use the backstreet which will connect them directly to the major road moving out of town.

6.3 Conclusion

In conclusion, the design of Kisii town is not proper because of a factor like incomplete streets that do not accommodate without congestion walking, cycling, public means, cars and trucks. Because of this people have limited opportunities to get to their destinations. Well designed, connected and complete streets make travel to be more efficient because they provide choices not only in modes but also in routes. When the street network is a connected grid of relatively short blocks the pedestrians and public transportation riders are motivated to find direct roots to their destination and they prefer lower traffic streets.

The available spaces in Kisii town are limited with most streets suffering from lack of parking areas and poor walking paths as well as cycling. Green spaces are not well developed and it’s not

enough to serve the total population in town. The green spaces can absorb some a number of people who need a place to relax for a while, people in town without a major agenda, people who need to enjoy nature and those who want to find space for recreational activities mostly kids. This will help reduce congestion in town because most of the people in town without a busy schedule or need to relax could have a place to be instead of spending their time on the streets.

The layout of buildings is not properly regulated in Kisii town. There is no space between streets and building limiting smooth movement in town. The high rise building close to narrow streets absorb more people whereby most of them end up on the streets during peak hours. The buildings done close to the road will also limit development of infrastructure like, expansion of streets or construction of better infrastructure.

6.4 Recommendation

The following recommendations are given to help in solving the congestion problem caused by poor urban designing.

I. Creation of public spaces mostly parking areas, walking paths and green spaces which will motivate the public to use alternative means of transportation like cycling, walking and using public transportation.
II. Rehabilitation of existing public spaces so that they can be able to accommodate the increasing population. An example can be development and expansion of streets and improving the state by constructing paths to encourage walking and cycling.
III. The street network should be a connected grid of relatively short blocks. This will help to provide pedestrians and public transportation riders with alternative routes and direct roots to their destination and it will make the street users to prefer lower traffic streets.
IV. Policies and regulations should be implemented to help minimize congestion in town. Example trucks that do not intend to drop goods in town should be encouraged to use alternatives routs instead of passing in town.
V. Relevant institutions should manage the construction of buildings in town without going against any existing policies and regulations. Example the zoning regulation should always be considered.

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APPENDIX

KEY INFORMANT INTERVIEW SCHEDULE - KISII COUNTY DEPERTMENT OF PHYSICAL PLANNING

I am a student of Maasai Mara University currently pursuing undergraduate studies in Environmental Planning and Management. This interview schedule is part of my research study on assessing the contribution of poor urban design to congestion in Kisii town, case of Kisii town. The information provided is confidential and shall be used on academics only.

1. What is the role of your institution as far as urban designing is concerned?
2. What are some of the challenges you face while developing an urban design?
3. Do you have any existing strategy to ensure congestion in town is minimized?
4. In your opinion do public spaces, streets and layout of buildings have a contribution in Kisii town?
5. Does your institution have any policies and regulations to govern public spaces and layout of buildings?
6. How do you manage the movement in the streets?
7. How does your institution ensure that public spaces are accessible to the public?
8. In your own opinion what are some the major contributors to congestion in town?
9. In your own opinion what can you comment about the current state of streets, public spaces and the layout of buildings in town?
10. What are some of the mitigation measures can you give to minimize congestion?

Observation checklist

In the study three variables guided the study that is;

I. street networks
II. public spaces and
III. layout of buildings

The study was to identify how the streets are connected from block to block. Streets without some public spaces like walking and cycling parks and parking area are likely to face challenges caused by congestion. The study also was guided by the layout of buildings and how the structures are done to accommodate the population in town. The layout of buildings also guided the study to identify how structures in town contribute to congestion.