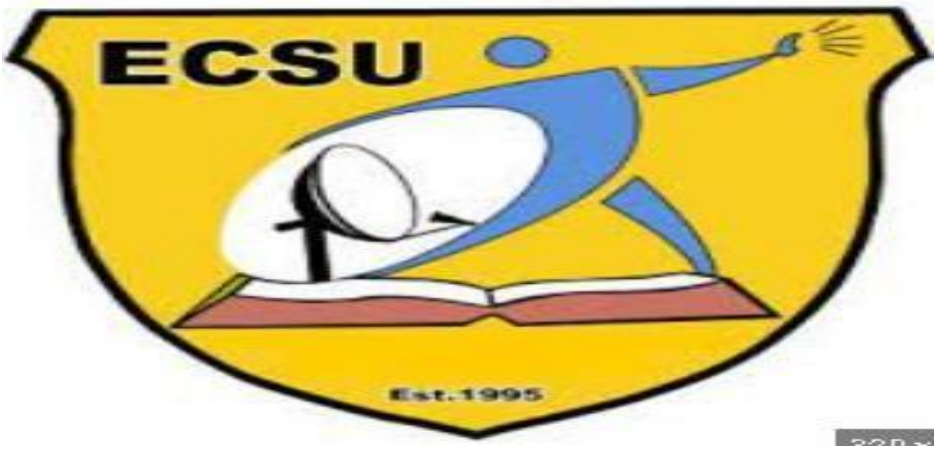

Impact of Integrated Land Use Planning on Road Infrastructure Development in Addis Ababa City

By

Gediyon Addis

Id No. ECSU 1901713

Advisor: Dr. Markos

A Thesis submitted to the School of Graduate studies, Addis Ababa University Institute of Technology in partial Fulfillment of the requirements for the degree of

Master in Urban Planning and Development

July, 2023

ACKNOWLEDGEMENTS

I am grateful indeed to the almighty God, the merciful and the compassionate. The success of this thesis involved many people from many different professional backgrounds. I am indebted to all, near and far, who encouraged me in the process and gave me the driving force when I was really tired. Without their support, guidance and patience, this journey would have been climbing up a hill. My gratitude goes to my advisor who gives me support for the success of my study. I am also grateful to several people who have helped me with many activities involved in the progress of eachstep in this thesis work. My Special thanks go to the whole instructors and staff members who supported me in many ways.

Finally, I would like to thank my parents, brothers, sisters and friends for their motivation, support and understanding during my studies. This work is dedicated to all of you and without you it would not be possible to operate at this level. It is difficult to name everyone who has helped me, but I would like to take this opportunity to express my gratitude.

Thank you all

Gediyon Addis

Ethiopian Civil Service University

Addis Ababa, Ethiopia

TABLE OF CONTENTS

Contents

List of Figures

List of Tables

Abbreviation

AACRA= Addis Ababa City Road Authority

EC= European Commission

LUP= Land Use Planning PSS=

Planning Support System

SDSS= Spatial Decision Support System

TOD= Transit Oriented Development

ABSTRACT

Urban areas face challenges in managing integrated land use and road infrastructure. This study aim is to examines the impact of integrated land use planning on road infrastructure and to identify major challenges to implement integrated land use planning on road infrastructure in Addis Ababa City to improve negative impacts on road infrastructure. Ultimately, this study aims to implement inclusive urban development in the context of integrated land use planning and road infrastructure. The research utilizes a combination of quantitative and qualitative methods, including questionnaire and interview as method of data collection with…data analysis techniques. The findings of the research indicate the benefits of integrating land use planning and road infrastructure in study area include improved accessibility and connectivity, sustainable transportation options, and enhanced road infrastructure management. The research also indicates main method used to improve impact of integrated land use planning on road infrastructure in the study area is increase financial resource for planning and implementation and also improve coordination among stakeholder. In addition, finding also indicate Mitigation measure was applied to improve challenges of integrated land use planning on road infrastructure. The conclusion draws from research include technology is important tool to integrated land use planning and road infrastructure, quality problem exists in road infrastructure due to improper integrated land use planning on road infrastructure. Problem on road infrastructure due to improper integrated land use planning can be mitigated by giving training to professional. The research contributes to the knowledge base of urban planning and provides practical insights for policymakers, planners, and stakeholders involved in shaping the future urban development of Addis Ababa City in road infrastructure and land use planning.

Key words: land use planning, road infrastructure, urban planning

CHAPTER ONE

1. INTRODUCTION

1.1. Introduction

The impact of integrated land use planning on road infrastructure development in Addis Ababa city has been a subject of great importance and concern. Addis Ababa, the commercial and political center of Ethiopia, has been experiencing rapid urbanization and metropolitan growth, accompanied by poor planning and land-use practices. This growth has resulted in inadequate infrastructure, chronic housing shortages, and congestion issues. To address these challenges, Addis Ababa has been making significant investments in road infrastructure, including the construction of a new Light Rail Transit (LRT) system and plans for a new Bus Rapid Transit (BRT) system (Belsti A., 2022).

However, these investments in road infrastructure may not have provided the intended economic and mobility value for the city's residents. One of the reasons for this is the lack of coordination between transportation and land-use planning. The current transport system in Addis Ababa faces several weaknesses, including governance issues and inadequate facilities for pedestrians. Furthermore, the rapid urban growth of the city has largely occurred in an unplanned and informal manner, outpacing the rate of population growth (Gebyahu, 2017). To understand the interactions between land use and transportation demand in Addis Ababa, studies have been conducted, focusing on specific areas such as Akaki Kality Sub City and its major destinations. These studies have highlighted the challenges posed by the increasing transportation demands, the variability of land use changes, and the rate of urban expansion. The population of Addis Ababa has been growing steadily, accompanied by a corresponding increase in the physical built-up area. Additionally, the rising number of vehicles due to economic growth and increased car ownership has contributed to the transportation problems in the city (Mekonnen, 2012).

In light of these issues, it is crucial to examine the impact of integrated land use planning on road infrastructure development in Addis Ababa city. By understanding the challenges and opportunities associated with coordinating transportation and land use planning, policymakers and urban planners can develop effective strategies to address congestion, housing shortages, and infrastructure deficiencies. This thesis aims to explore the impact of integrated land use planning and road infrastructure development in Addis Ababa, taking into account the references and studies conducted on the subject. Through this research, a better understanding of the role of integrated land use planning in improving the city's transportation system can be gained, leading to more sustainable development

1.2. Background of the Study

Addis Ababa, the capital and the largest city of Ethiopia, is expanding spatially to accommodate the increasing population resulting from natural growth and in-migration. As a result, residents living in the sprawled residential settlements at the fringes call for an affordable and efficient urban public transportation to accommodate travel to jobs, markets, health centers and other socioeconomic activities. This development trend has pushed the city's public transportation to its limits. It has therefore become a serious issue that requires decisive action in order to sustain the development of the city, where work requires long trips (Briassoulis H., 2020). Affordable and efficient road improvements are central to development as they facilitate access to a range of amenities that otherwise compromise quality of life. Moreover, without physical access to resources and markets, growth processes stagnate and the sustainability of poverty reduction programs is bleak (Delphin et. 2022).

According to MS Fernando (2011), Roads are the back bone of society movement. They facilitate the efficient movement of people and goods. So, it is essential to operate them safely and efficiently.Land development and road development are mutually reinforcing processes that increase activity along a road. However, unplanned and unchecked development, particularly along important transportation corridors, can hinder economic progress and frequently have negative effects. These include traffic jams, delays, accidents, and other related issues, all of which result in significant income losses and obstruct economic growth. Due to the numerous individual decisions made in the public and commercial sectors about projects with little thorough guidance, the appropriate functioning of roads steadily deteriorates. Taken alone, building new roads or repairing existing onesmay not always be the solution to these issues unless there is something. However, they can be applied, with suitable modifications, to other important roads. Freeways and expressways usually do not require these measures as they generally do not provide individual access to developments (Esti et., 2014).

Belsti A., 2022 State that the road coverage in Addis Ababa was about 7% of the total land use ofthe city, which was below the standards of 20-30%. To achieve the standard road coverage, construction of new roads and up grading the existing gravel and earth coated roads are required by allocating more financial resources and by developing a rational master plan.

Having said that According to Ashenafi (2018), activities and interactions are to greater or lesser extent influenced by the availability of road transport; and in addition to that the linkages between road development and activities may be important to the appraisal of road development strategies-

especially when trying to consider whether the road development system is influenced by the land use activities.

Allowing unchecked expansion along busy traffic corridors in cities can have terrible results.Increased energy consumption, vehicular emissions, decreased air quality, decreased productivity, increased road accidents, decreased productivity and lost economic opportunities, decreased air quality, functional obsolescence of roads, decreased value of the public investment, decreased abutting property values, suboptimal economic activity, and decreased economic value are just a fewof them. These can have a damaging effect on the economic growth of countries, especially in the developing world. Implementation of land use planning measures can reduce these consequences, through the integration of road planning and land use planning. (MS Fernando, 2011)

In General, Land use planning has effect on road transport systems that have effect on road development. Therefore, it is important to understand impact of land use planning on road development so decisions support strategic goals should be implemented.

1.3. Statement of the Problem

The majority of the Ethiopia economic activity is centered in the capital city of Addis Ababa. The city's population is growing, and because of the city's ailing public transportation infrastructure and other factors, taxis are becoming increasingly important. The need for road development has increased as a result of the rising vehicle population and the decline in infrastructure. This requires integration of road development and land use planning in Addis Ababa. The population of Addis Ababa comprises 23% of the urban dwellers in the country and 11times the population of the next populated urban center Dire Dawa (Administration, Addis Ababa City Atlas, first edition, 2015). Statical agency indicate the population of Addis Ababa is increasing per year. So, to achieve demand of transportation by people effective implementation integration of land use planning on road infrastructure development is necessary.

Berhane H., 2017, indicate land use planning strategies in Addis Ababa have impact on public transportation supply and environmental degradation. In addition, Dagnachew A., 2007 has emphasized that the city's current land use planning and road development regulations should implement to deal with the city's expanding urbanization and population. Although policies are crucial for guaranteeing sustainable urban growth and development, there is a lack of coordination between land use planning and road construction, whichresults in the wasteful use of land resources, traffic congestion, and environmental damage (UN- Habitat, 2016). Furthermore, the current land use

planning and road development policies in Addis Ababa city are not sufficient to address the growing urbanization and population growth (World Bank, 2019).

Although there are complex problems as indicated above for which no easy and direct solutions are available, it is generally accepted that effective land use measures through integration land use planning on road infrastructure development can reduce the incidence of such problems. So, this research will identify impacts and challenges related to integrated land use planning on road infrastructure development in Addis Ababa city and it will give ways to mitigate those problems.

1.4. Objectives of the Study

1.4.1 General objectives

The research focuses on way to assess influence of integrates land use planning on road infrastructure development and identify factors that affect integration of land use planning on road development in Addis Ababa city.

1.4.2 Specific Objectives

The research will have the following specific objectives:

- To examine the current condition of road infrastructure management practice with land use planning activities in Addis Ababa.
- To examine the current land use planning practices in Addis Ababa city and their effectiveness in balancing road infrastructure development.
- To assess the major influence of land use planning on road infrastructure development in Addis Ababa city.
- To identify the challenges and opportunities for improving the integration of land use planning on road development in Addis Ababa city.
- To evaluate major problems in plan preparation and implementation of the integration of land useplanning on road development in Addis Ababa city.

1.5. Research questions

1. What is the current state of integrated land use planning on road development in Addis Ababa city?
2. What is the impact of integrated land use planning on road development in Addis Ababa city?
3. What are the challenges and opportunities for improving the integration of land use planning on road development in Addis Ababa city?

4. What problem occur on plan preparation and implementation in the integration of land use planning on road development in Addis Ababa city to ensure sustainable urban growth and development?
5. What is the current condition of road infrastructure management practice with land use planning activities in Addis Ababa city?

1.6. Significance of the study

The problem of road traffic congestion, delay, unguided development that require construction of new road project i.e., road development particularly along major road corridors is due to improper integrated land use planning on road development in Addis Ababa city. As stated above, most of the road in Addis Ababa encounter considerable traffic delays, deterioration related issues. Accordingly, giving proper attention to the integrated land use planning on road development that requiresefficient coordination system will be essential to successful road development with its desirable city quality. Hence, integrated land use planning on road development is an important factor to be realized as it has the main role on the achieving the road development goals. And also, the significance of the research will be to Academicians, researchers and scholars stand to benefit from the findings of the research, since it may act as a reference to those interested in this area or other related topics for further research.

1.7. Limitations of the Study

The research will be limited to the on impact of integrated land use planning on road infrastructure development in Addis Ababa city. Thus, the researcher believes the document required for study is well organized for carrying out research in assessment on impact of land use planning on road development. Therefore, the research will only focus on impact of integrated land use planning on road development that has effect on road development on Addis Ababa city with the aim ofidentifying the impact, challenges and opportunity of integrated land use planning on road development and provides some ideas about problem on land use plan preparation and implementation in Addis Ababa.

1.8. Organization of the research

Five chapters make up this thesis, and the following is a quick overview of what each chapter contains:

Chapter I: This section briefly explains the research overview, the reason for and method of the research, the research's scope and limitations, and the major goal that led to the development of the research.

Chapter II: In the literature review part, a general land use planning definition and its impact on road infrastructure development, challenges and opportunities in improving road development by effective land use planning, land use planning approach, land use plan preparation and implementation problems and measure that should be taken to mitigate such problem

Chapter III: The research technique is covered in this chapter, which includes the general study strategy, the research design, the data analysis, and the production of the research paper.

Chapter IV: This chapter contains the discussion and analysis part comprising of impact of land use planning on road infrastructure development, challenges and opportunities on improving land use planning approach on road infrastructure development and problem on land use planning preparation and implementation.

Chapter V: This part mainly deals with the final conclusions and recommendations of the outcome study. This is a section believed to benefit society and government as it serves as a guide for future road development efforts.

CHAPTER TWO
LITERATURE REVIEW

2.1. Urban planning and infrastructure development

A. Urban planning

Planning is thinking about what needs to be done and how it will be done. It is the process of applying knowledge to action or solving underlying problems. It requires the establishment of a relationship between ends and means. Planning is simply setting goals, gathering and analyzing information, formulating and evaluating alternative policies, projects or designs to achieve the goals (Mekonnen, 2012). One of the most important tools of urban management is urban planning. It controls the economic and physical/spatial growth of a given city center. So, trying to grow a city without a city planning direction is like wearing blinkers. Thoughtful urban planning is a prerequisite for efficient urbanization and planned urban development. In addition, urban areas require development plans adapted to the specific topographical and demographic characteristics of the site.

The City Planning Declaration the Declaration states that i. issued according to the need to create favorable and beneficial conditions for the full participation of public and private stakeholders in the process of initiating, preparing and implementing urban planning based on national standards.Replace existing urban planning legislation, which recognizes the federal structure and the central role of cities, with comprehensive legislation focused on the creation and implementation of urban planning (Fernando M., 2001).

In 2005, the Ethiopian Council of Ministers approved the Urban Development Policy, which is the focus of the Urban Development and Good Governance Package. Achieving sustainable urban development is considered one of the main goals of many contemporary planning activities and is central to urban planning policymaking (Dur & Yigitcanlar, 2015).
As indicated by Mburu, his three key terms are used to define urban fabric in 2017:

Urban form refers to the spatial structure and arrangement of individual elements such as buildings and uses within an urban area, as well as social aggregates such as economic activities and public facilities. Alternatively, shape is the physical pattern of land-use activity. Urban interactions are the

basis for interrelationships, connections and flows that help integrate individual land uses, groups, activity patterns and behaviors into functional units. Alternatively, a feature is an activity that is performed and the flow motion required to share that activity. In Urban Spatial Structure, which referred to spatial structure as the change, placement, and extension of urban forms, von Boventer describes spatial structure as producers and consumers of various goods and services in cities and towns of various sizes. In systemic terms, form refers to interdependent parts, road networks, houses, shops, parks, and so on. Function also refers to the interrelationship of why and how people, goods and messages move or flow between parts (Kleemann, 2017).

Urban areas, especially in developing countries, are experiencing unprecedented and frightening speed and rapid growth, most of which present significant challenges. Urban planning is therefore an important tool for managing the growth of urban areas in other regions. However, planning exercises has different challenges and priorities. Due to the past colonial history of the African continent, the planning traditions of most African countries followed those of Europe (Dube, 2013).

B. Land use and Road Infrastructure

Infrastructure is one of the key factors in the process of urbanization and the emergence and continuation of urban growth. It is important to eradicate poverty through a range of job creation opportunities. This accelerates economic development and ultimately improves quality of life (Gebyahu, 2017). The development of a country's infrastructure is an important aspect in shaping the future of the country. Infrastructure development is seen as a blueprint for the development of the entire country. The country's cities, districts and villages are undergoing rapid transformation due to random and unplanned land use for infrastructure development (Coloso, 2020).

Land use means any form of use of land cultivated by humans. This is also a period of domestic scoring associated with many popular traits. It is usually a product related to the interaction between physical objects on the one hand and the cultural heritage of the country's society and the natural capacity of the country on the other (Gebyahu, 2017). Land use planning considers environmental, economic, and social factors to determine optimal land use options (Delphin, 2007). To this end, land-use studies contribute significantly to strategic urban planning that adapts available resources tothe demands of a rapidly growing population. In other words, good land management balances the needs of diverse purposes, such as industry, with the availability of available land.

Nuriye, 2015 state the phrase "land use" often refers to a combination of human activity,the condition of the built environment, and the state of the natural environment. In a more formal sense, land use describes how land is used in relation to the structures that are erected on it (such as homes, businesses, schools, and factories) and the activities that occur inside of those structures. Thus, land use and urban form are virtually interchangeable; geographers and regional scientists frequently use this phrase (Muburu, 2017). Land use planning is a tool to support proper occupation and use of land and avoid disadvantageous development. The selection of the most appropriate use depends primarily on an assessment of the land's potential and alternative use patterns, including the physical, social and economic conditions that affect its use. Its main purpose is to select the option that best suits your needs and to establish apolicy of sustainable use. Land Use Plan (LUP):

– An iterative, dialogue-based process among all stakeholders aimed at negotiating and deciding on sustainable land use patterns in rural and urban areas and initiating and monitoring their implementation. It is a process (Mekonne, 2012). Land use planning is a term that is often used interchangeably with city planning, urban planning, regional planning, and city planning. This report covers the process of using land-use planning to manage changes in the built and natural environment at various spatial scales to ensure sustainable outcomes for local communities. This includes both spatial elements such as the physical design and layout of neighborhoods, cities and regions, and strategic considerations that take into account social, economic, cultural and environmental factors. The development of local and regional statutory plans is an important part of implementing land use planning as an expression of agreed public policy (Sanchez, 2016). Land use planning serves a variety of public purposes, including the development of sustainable communities that balance social, environmental and economic values. In addition to their primary purpose of shaping the future land use, land use planning also helps communities manage opportunities and risks and select policy options.

As indicated by Litman, on his paper published in 2010, cited by Ashnafi categorized land use as follows,

Table 2.1: Land use Categories

Built Environment	**Open Space**
Residential	Agriculture
Commercial	Forest
Industrial	Undeveloped lands
Brown fields (for infill development)	
Transport Facilities	

Urban land use planning is a tool for the planned management and control of city/community growth. The essence of land use planning lies in preparation and implementation, otherwise people will be caught up in the turmoil of urban problems, especially environmental problems. Several cities in Ethiopia have land use plans. Land use/land cover is an important aspect for modeling and understanding the Earth as a system and is an important input to planning and management activities. Needless to say, sound structural planning promotes sustainable development and utilization of natural resources. The land use/extent of the study area includes settlements, scrubland, arable land, flower fields, open grasslands, plantation forests and forests (Mekonne, 2012).

Modern land use planning is always directed towards one or more specific goals and is closely tied to the concepts of efficiency, equity and sustainability. For a zoning plan to be successful, the following three conditions must be met. (a) There must be a need for change; (b) There must be political will and capacity to implement the proposed land use plan. (c) Stakeholders must be convinced of the benefits of the plan and their participation in the plan must be motivated by clear incentives (Harumin, 2013).

Land-use efficiency is commonly understood to be a function that includes both land-use effects (outcomes) and the resources used to produce those effects. ULUE specifies both achievable goal metrics and expendable resource metrics. Urban land-use efficiency can be influenced by the capacity of institutions to implement policies, the speed of urbanization, and economic growth. Therefore, you can operate based on building density. Land politics as an institution is one of the factors influencing ULUE. A region's low ULUE is largely due to the inability to implement policies or to comply with existing policies and plans. The presence of large amounts of unusedland in built-up areas, indicating low ULUE, may indicate institutional weakness in the enforcement Field (Koros et, 2020).

Urban land use efficiency in Addis A baba over the past two decades, Addis Ababa's spatial expansion and population growth were remarkable. According to data from the World Bank, the city's boundaries increased by 19% between 1994 and 2007. Population growth during that time was 30%. In addition, Addis Ababa's population and total area both expanded by 17% and 51% between 2007 and 2014, respectively (World Bank, 2015). Between 2005 and 2011 and between 2011 and 2019, the built-up area of Addis Ababa increased by 35% and 31%, respectively. In addition, the city's population and built-up area increased by 74% and 77%, respectively, from 2005 to 2019. The information above is supported by a review of satellite imagery. Addis Ababa's built- up area expanded dramatically between 2005 and 2019. Koroso, 2020 suggest that the city has a low ULUE. Despite extraordinary spatial expansion that exceeded population growth, there is a huge demand for land and housing in Addis Ababa. In 2016, about 6,000 investors who applied for land were on a waiting list.

Nuriye, 2015 state that in order to remodel road and transport sector development in Ethiopia, specific roads have been prioritized based on agreed upon criteria. Thus, about ninety road segments are prioritized having a total length of 330.2 km to be constructed in ten years" time. New road construction and existing road improvement is proposed on expansion areas and in the inner and intermediate part of the city, respectively. Part of this road will be built in Addis Ababa. This is true for Ethiopia, indicating that Addis Ababa is also included. Roads play an important role in regional development. The main function of roads is to support the development of the manufacturing and service sectors as well as the regional development of cities and regions. Transportation and land use are two separates but closely related issues.

According to Ashnafi, 2017 Addis Ababa Road network has developed in radial form shaped by the five regional exits. Recently, the road system in Addis Ababa is divided into four classes, Arterial, Sub Arterial, Collector, and Local streets: Mobility index and road density is the mechanism of measuring effectiveness of the roads in the specified area. Road density can be measured as the ratio of the total road network in the area to the total area or to the total population in that area. Higher road density value implies that as there are available transport routes resulted for higher directedness and connectivity level within the networks. Road density with regard to population context measures the availability of network distance per person.

Implementation tools for the road sector include providing ongoing capacity building to participating parties. Small and medium enterprises should participate in the production of various materials necessary for road construction. City planners, city planners and street designers should participate in street development activities. In addition, construction of new roads must comply withthe standards laid down in the structural plan and prioritize pedestrian movement (Yaakup, 2004).

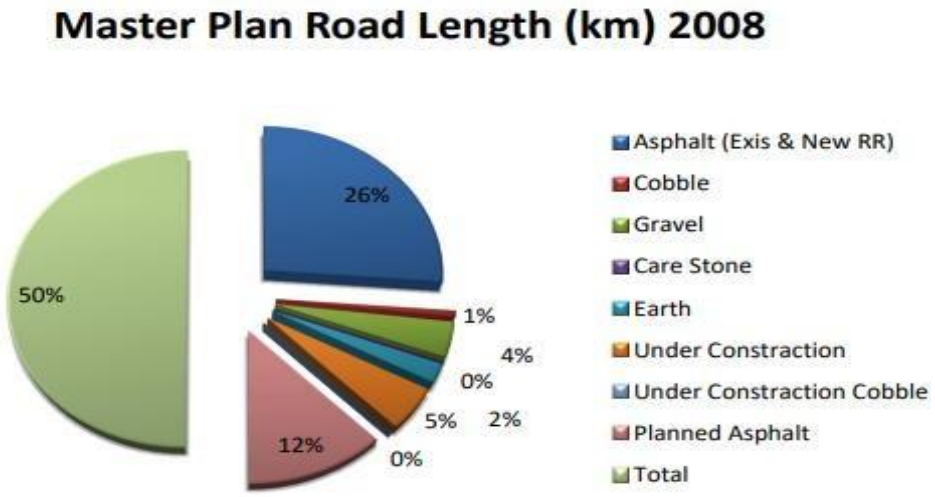

Figure 2.1 Chart Addis Ababa Master Plan Road length in (Km %) (Source AACRA PLANNING AND PROGRAM OFFICE 2016

2.2. Land Use planning and Land Use Pattern

A. Types of land use planning

Land use planning approaches need to be flexible and adaptive so as to be able suit varying circumstances. In other words, "blueprint approaches" that define the steps, procedures and tools do not function, rather, LUP must be structured as a process designed according to the needs, demands, capacities, rules and institutional structures of the place in question. There are two main phases to LUP and processes - i.e., formulation and implementation - each comprising a range of activities. The formulation of a land use plan requires a broad assessment of current land uses, as well as main limitations, and opportunities for development (Yang, 2004).

The main forms of land use planning are presented in the following.

Integrated Participatory Land Use Planning: In general, the objective of integrated participatory land use planning is to introduce or improve a holistic spatial planning approach at the local level. In collaboration with existing institutions, the entire preparation-to-assessment approach will be designed, tested, institutionalized and implemented in several pilot villages.

Integrating Spatial Planning into Existing Development Planning: Local agencies may not have the capacity to implement complex land use plans. In this case, an alternative would be to simply incorporate the spatial dimension into the development planning activities. Whereas in the past local representatives simply created a "shopping list" for the government and donors, now they will be able to decide where these developments should actually take place. If this is done participatory and involves discussion of existing infrastructure, its distribution and conditions, this already meansa significant improvement in the planning process (Dube, 2013).

B. Land Use Pattern

Ashnafi Littman, 2005, defined different land use patterns referring to land use factors and summarized into the following table,

Table 2.2 Land Use patterns referring to land use factors

Factors	Definition
Density	Per acre or hectare of land, the number of people or jobs.
Mix (Diversity)	The degree to which adjacent land uses (commercial, institutional, and dwelling) are connected. The proportion of jobs to housing, often known as the jobs/housing
Regional Accessibility	The location of the development relative to the local city center. It is often measured as the number of workstations that can be reached withina specified travel time (e.g., 30 minutes).
Centeredness	A portion of commercial, employment, or other activity in a major center Of activity.
Connectivity	The degree to which roads and trails are connected to allow direct travel between destinations.
Roadway design and Management	The size and design of roads and how different uses are managed to control traffic speeds and facilitate different transportation modes and
Parking Supply and management	The number of parking spaces per building unit or hectare and the extent of their pricing and efficiency regulation.
Walking and Cycling conditions	Quality of walking and cycling transport conditions, including the quantity and quality of sidewalks, crosswalks, paths and bike lanes, and

Transit quality and accessibility	The quality of transit service and the degree to which destinations Are accessible by quality public transit in an area.
Site design	The layout and design of buildings and parking facilities.
Mobility Management	Various programs and strategies that encourage more efficient Travel patterns. Also called

According to the Structure Plan Manual of the Ministry of Urban Development and Construction, 2012 the proposed portion of each type of land use, according to the manual can be summarized by the following able

Table 2.3: Ideal Proportion (share) of land use categories

Components of Structure Plan	Proposed Percentage
Housing (Residential)	55-70
Business and commerce/ Centers and market places	5-10
Public facilities, cultural, archaeological sites and special functions	5-10
Manufacturing/ Industry and storage	5-10
Infrastructure, utilities and transportation	15-25
Infrastructure, utilities and transportation	15-20

According to Ashnafi (2014), land is Addis Ababa's largest economic resource, but the land use pattern is characterized by unplanned development oriented mainly to horizontal expansion. In particular, most of the city's riverside areas have not been maintained and utilized to a satisfactory standard. The percentage of each land use category in the city's total area of 54,000 hectares is as follows:

Table 2.4: percentage share of land use categories

No.	Land use categories	Area (Hectare)	Percentage share
1	City Centers (CBD)	1317	2.4
2	Plantation	12647	23.4
3	Farming	7453	13.8

4	Existing Industry	1292	2.4
5	Proposed Industry	1846	3.4
6	Mixed use built up	16,900	31.3
7	Proposed social service	624	1.2
8	Existing Social service	514	1
9	Reserved	1085	2
10	Transport	1029	1.9
11	Mixed use expansion	7243	13.4
12	Road network (A r t e r i a l Streets only)	2050	3.8
	Total	54,000	100

The overall urban expansion of Addis Ababa which took place in the past few years, satellite imagery was acquired for the years 1988, 2000, 2011, and 2017. In this regard, the images were classified into five major land use and land cover classes by using the Arc GIS software. The classeswere: Built-up, Urban Agriculture, Forest, Water Body, and Barren Land. Using the classified imagery, Spatial Temporal Analysis and detecting the change of land use pattern were performed. The aim is to understand the extent of observed urban expansion (development) that directly affects the development of transport services (Belete, 2011).

2.3. Relationship between Land Use Planning and Road Infrastructure Development

The relationship between land use and road infrastructure planning is critical to building sustainable and efficient communities. Coordination and integration of these two planning processes can have a significant impact on transportation systems, accessibility and quality of life. The gradual change and gradual deterioration of road capacity and transport efficiency is a common problem faced by road authorities around the world. One of the most effective approaches to solving this problem is to integrate road planning and land use planning (Nuriye, 2015).

Integrated planning is different from the rational, comprehensive planning idea. (Heeres,2017) state that viable integration is about coordinated planning of several land uses that together add up to a specific overarching interest or long-term vision. So, the mere goal is not to try again to create a comprehensive blueprint. Modern integrated approaches in infrastructure planning aim to properly consider the interrelationships between infrastructure and other land uses in a fragmented.

Land use and road construction are two sides of the same coin. Road construction affects land use, and land use affects road development. Therefore, it is important to coordinate road development and land use planning decisions so that they are complementary andnot contradictory. This ensures that road development planning decisions support land use planning objectives and land use planning decisions support road development planning objectives. This requires an understanding of how specific land use patterns affect road development (Todd Litman, 2005).

Land use and transportation are symbiotic: development density and location influence regional travel patterns, and, in turn, the degree of access provided by the transportation system can influenceland 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 transport, in addition to automobile. Conversely, dispersed land development patterns may facilitate vehicular travel and reduce the viability of other travel modes. (Berhane, 2017)

Yang, 2019 indicated that Land use and road transport are closely inter-connected and have a mixed interaction on urban economy by accumulation of labor, material resources, and capital. Urban land is accommodating increasing numbers of residents and workers attracted to industrial clusters in newly built-up areas, thus creating more demand for fast and efficient road transport. The large-scale construction of road networks increases accessibility between different regions, and accelerates the flow of labor and material resources, which will eventually result in the consumption of more land. Thus, the close connection between urban road transport and land use jointly promotes the growth of a local economy. The interaction and integration between land use and road transport is considered an integral element for sustainable urban development.

There is a simultaneous relationship between land development and transportation infrastructure development. Transport services providing access must be available before land is developed, but the demand for development also creates demand for access, which usually contributes to the provision of the final transport infrastructure. This concurrency complicates any effort to determine the impact of road improvements on rural development, especially since most road improvements are in response to increased demand. For transportation projects, three types of growth-inducing effects were identified: projects intended to serve specific land development, projects stimulating Complementary functions and projects affecting land development site decisions within the region. (Hawbakeret, 2005).

Uncontrolled and unchecked development often has devastating consequences. These include traffic jams, delays, accidents, and other related problems that result in significant loss of income and hinder economic growth. The decline in the proper functioning of roads is gradual, almost natural, and is caused by a large number of individual decisions being made in the private and public sectors regarding development without comprehensive guidance. In many cases, building new roads or upgrading existing roads alone may not solve these problems, unless there is a serious shortage of road space. Within a few years, new construction and redevelopment like this could increase traffic and accelerate development along these roads, starting a vicious cycle. A better approach to resolving this dilemma is to manage development in such a way that it has minimal impact on the transport routes chosen. This is made possible by choosing the right location for your settlement and controlling access to important transport routes. Land use planning is a tool to achieve this goal (esti,2014).

Jahantigh 2014 stated that the road infrastructure development system is closely related to the land use system. There are variables in the relationship between road infrastructure development and land use characteristics. The first variable is the location of housing, work, and other opportunities combined with infrastructure networks. The next variable is the density of housing, jobs, and other land-use categories. The degree of mixture of land-use categories is also a variable

According to Dur, 2015 principle of integration of land use planning and road infrastructure development includes Increasing compactness of settlements and their land use mix; Planning new developments in close proximity to the existing urban services, most preferably as infill development; Encouraging active transport via design features; Enhancing public transport service and quality; Improving accessibility to urban services by alternative modes; Balancing travel costs of automobile and alternative modes; Changing travel behavior by soft measures; Enhancing the character and amenity of the urban areas; and Providing affordable housing.

2.4. Experience on integrated land use planning on road infrastructure Development

A. World experience

Rapid urbanization has led to increased demand for efficient road infrastructure networks. Studies have shown that effective land use planning can positively influence road development in urban areas. By integrating land use and transportation planning, cities can achieve compact, mixed-use development patterns that reduce travel distances and encourage alternative modes of transportation. This approach has been successfully implemented in cities like Portland and Vancouver, where land use policies prioritize transit-oriented development and promote walkability (Jedlička, J.et al. 2017)

In rural areas, land use planning plays a vital role in the development of road networks that connect remote communities. They argue that integrating land use planning with transportation planning enables the identification of key locations for road expansion, fostering connectivity and accessibility in rural regions. Such an approach has been successfully applied in several countries, including Sweden and New Zealand (MBURU, S. N. 2017). Land use planning also plays a significant role in ensuring equitable access to road infrastructure.

B. African experience

The rapid urbanization in African cities has put immense pressure on road infrastructure systems. Studies have shown that integrated land use and transportation planning approaches can positively influence road development in urban areas. The case of Lagos, Nigeria, demonstrates the benefits of land use planning in road infrastructure development. By implementing policies that prioritize transit-oriented development and pedestrian-friendly infrastructure, Lagos has improved accessibility and reduced congestion (Oruonye, E. D.,2014). Land use planning is equally crucial in developing road networks that connect rural areas and remote communities in Africa. Research by Dube, E. E.,2013 emphasizes the importance of comprehensive spatial planning in improving rural road infrastructure. They highlight the successful integration of land use planning with transportation planning in countries like Malawi and Zimbabwe, which has led to the expansion of road networks and enhanced accessibility for rural populations. The impact of land use planning on road infrastructure development in Africa goes beyond connectivity and accessibility. Environmental considerations are integral to achieving sustainable development. The study by Kamau et al. (2019) emphasizes the need for land use policies that prioritize environmentally sensitive areas and promote sustainable transportation modes. By integrating green infrastructure and non-motorized transport options into land use plans, African countries can mitigate the environmental impact of road development. Land use planning also plays a significant role in ensuring equitable access to road infrastructure in Africa. Research conducted by Suleiman et al. (2020) highlights the importance of inclusive land use policies in addressing transportation equity. By promoting mixed-use development and affordable housing near transportation hubs, land use planning can improve access to road infrastructure for marginalized communities and reduce social disparities.

C. Ethiopian experience

The rapid urbanization in Ethiopian cities has put significant pressure on road infrastructure systems. Integrated land use and transportation planning approaches have shown positive impacts on road development in urban areas. The case of Addis Ababa, the capital city of Ethiopia, exemplifies the benefits of land use planning in road infrastructure development. Through policies that prioritize transit-oriented development and the promotion of non-motorized transportation, Addis Ababa has improved accessibility, reduced traffic congestion, and enhanced the efficiency of its road network (Dagnachew, A. G. 2007). Effective land use planning is equally crucial for the development of road networks that connect rural areas and remote communities in Ethiopia. Research by Berhane, H. (2017) emphasizes the importance of comprehensive spatial planning in improving rural road infrastructure. The integration of land use planning with transportation planning has led to the expansion of road networks and improved accessibility in rural regions, such as the Amhara and Oromia regions (Belsti, 2019). The impact of land use planning on road infrastructure development in Ethiopia extends beyond connectivity and accessibility. Environmental considerations are integral to achieving sustainable development. The study by. Nuriye, G. (2015) emphasizes the need for land use policies that prioritize environmental conservation and sustainable transportation modes. Integrating green infrastructure and promoting non-motorized transport options in land use plans can help mitigate the environmental impact of road development and promote sustainable practices in Ethiopia. Land use planning also plays a significant role in ensuring equitable access to road infrastructure in Ethiopia.

2.5. Land use planning Practice

Integrated governance is on the rise as policy makers recognize the limitations of single-purpose governance. But integrating policies to address a comprehensive set of problems simultaneously is not an easy-to-conceive or easy-to-implement solution to complex urban problems. Because, despite a consensus about the need for political integration, there is a lack of understanding of the implications of political integration in practice, the experiences of political decision-makers with regard to political integration, and the mechanisms of political integration that contribute to greater integration tools hard to find guidelines. But there are increasing calls for greater policy integration from a number of areas at times when decision making is facing increasing complexity as a result of various concurrent trends (Stead et al., 2004). Moreover, policy formation and implementation are coming to involve a more variable mix of communities and actors, both within and outside the formal structures of government (Day, 2006).

Indeed, policies ultimately determine land use, resulting in changes in land cover. On the other hand, land cover often influences land use, human movements and responses. Landscape change is subject to human guidelines and plans, but these plans are simultaneously made in response to existing physical conditions and perceived changes and threats. This condition results in a cyclical pattern of development. For example, as housing development moves away from city centers, land use shifts from lesser to more intensive use. Therefore, the phenomenon of decentralization continues, with smaller communities moving further away from the city center to escape the larger settlements (Koros, 2020).

According to Oruonye, 2015 Land use planning is a complex process that involves many different stakeholders and considerations. There are a variety of tools that can be used to help with land use planning, including:

a. Zoning ordinances: Zoning ordinances are regulations that determine the types of land use permitted in various areas. Can be used to control density, elevation, land use, etc.
b. Subdivision and land development ordinances: The subdivision and building code ordinance governs the process of subdividing land and developing new land. These can be used to ensure that new developments are consistent with zoning plan objectives.
c. Master plans: Master plans are complete files that define the long-term imaginative and prescient for a community. They usually encompass desires for matters like land use, transportation, housing, and monetary development.
d. Technology: Technology can be a valuable tool for land use planning. GIS (geographic information systems) software can be used to create maps and analyze data. This information can be used to make informed decisions about land use.

The land use planning system varies broadly at more than a few scales, however the regularly occurring exercise consists of defining the aim and objectives, statistics series and analysis, design formulation, negotiation and decision-making, implementation, and monitoring and updating. The method of land use planning contributing to haphazard city enlargement in peri-urban/satellite settlements is attributed to the insufficient implementation of land use plans. The insufficient implementation of land use plans is prompted by using inadequate funding, lack of political will, insufficient manpower, interference (e.g., nearby governments, neighborhood people, developers), and corruption (Deakin,1989).

Addis Ababa's land use planning practices follow the 2012 Ministry of Urban Development and Construction Structural Planning Manual. According to the manual, the steps to follow are: Identify spatial development trends in the city. Indication of existing built-up areas with indication of key elements (production and storage activities, services, administrative and commercial activities) and indication of future development/expansion areas including key elements.

According to Jadlicka 2019 Addis Ababa has been experiencing continual growth and change mostly in all directions, but the rate of expansion for different part is varying in extent, and rate. Forests, barren lands, and urban agricultures are transforming into built-up areas (residential, industrials, commercials, and service centers) in high growth rate. This expansion of built-up area requires the availability of efficient transportation services to handle the transportation demand for instance in the transportation of goods, services, and passengers. This quickly charge of horizontal enlargement and urbanization has additionally wants for massive most economical and capital- intensive infrastructural provider development. On the different hand, due to the fact the city enlargement kind of Addis Ababa is inexperienced discipline horizontal and towards the periphery and future contract is extra than the expected. This is manifested through the numbers of condosites, residential blocks, industrial, and retail offerings that have been built and are beneath construction. This imminent residential settlements, industrial developments, and retail offerings will increase the want for excessive city transportation services.

As Berke Godschalk and Kaiser (2017) show in this process, planning enlightens stakeholders about issues and options and helps reach consensus on a common vision, thereby resolving the conflict between stability and change. You can mediate. They become a repository of data and information and describe the links between social, ecological and economic conditions. Through a participatory process, we will educate future community leaders and build community networks for resilience to stresses such as disasters. During regular updates, we provide you with an opportunity to assess your progress towards meeting your community goals and any key situational changes (Mekonnen, 2012). Uncoordinated transport and land use development gives rise to increased need for transportation due to separation of homes from work places. “Appropriate coordination needs to be envisaged in the planning process, because the most effective and cost-efficient programs frequently require attention to several normally separated areas (Day, 2006).

Here is some of the most common land use planning practices:

a. Zoning: is the technique of dividing land into one-of-a-kind zones for one-of-a-kind sorts of use, such as residential, commercial, and industrial. Zoning legal guidelines can assist to modify the density of improvement and to make sure that one-of-a-kind sorts of land use are well matched with every other.
b. Subdivision regulations: are the policies that govern the division of land into smaller parcels. These rules can assist to make sure that new improvement is well suited with the surrounding place and that it is effectively served with the aid of infrastructure, such as roads, sewers, and water lines.
c. Growth management: is a set of insurance policies and practices that are designed to manage the price and route of growth. Growth administration insurance policies can encompass zoning, subdivision regulations, and have an impact on fees.
d. Smart growth: is a planning method that emphasizes compact development, mixed-use development, and walk able communities. Smart increase policies can assist to minimize site visitors‟ congestion, enhance air quality, and promote financial development.
e. Conservation planning: is a planning approach that focuses on protecting natural resources and open space. Conservation planning policies can include zoning, land acquisition, and easements
f. Environmental justice: Environmental justice is the principle that all people should have equal protection from environmental hazards. Environmental justice policies can help to ensure that communities of color and low-income communities are not disproportionately affected by pollution and other environmental problems. (Yaakup,2004)

2.6. The challenges and opportunities in integrated land use planning on road infrastructure development

As city areas develop in size, avenue and motorway development tasks are used to facilitatevehicular journey patterns. The mission has been to accommodate neighborhood and regional journey demand with toll road tasks whilst no longer encouraging dispersed development, in particular at the city fringe. It has been proven that, whilst new improvement generates demand for new transportation facilities, improved accessibility from new motorway services can additionally result in city development. The use of built-in land use transport choice helps equipment forcoverage intervention

analysis, situation constructing and prediction in the early land use andtransport planning degrees may additionally minimize affect off land use planning on street infrastructure (Alijoutie, 2012).
According to Zeng et, 2020 challenges to develop integrated land use planning include:

Lack of Data: information predicament used to be a problem when the use of some land-use planning fashions and that some facts had to be dropped due to the fact of this. To tackle this challenge, we additionally want to higher recognize why information are so hard to collect. Land use/cover maps play a vital position in grasp land dynamics for enforcing a multifunctional panorama planning approach. Satellite remote-sensing information can grant constant land-use/covermaps with funding in information acquisition, processing, and analysis. Regarding the financial dimension, the most challenging statistics to gather are the values of ecosystem services. Lack of statistics would possibly no longer always be a predicament for selection makers or planners to enhance land-use plans and make decisions.

Lack of Political Will: The lack of political guide used to be a predominant risk to planning processes, and this used to be past the scope of scientists. Conflicting pursuits and insurance policiesamongst establishments are troubles that can sluggish down the improvement of land-use plans. Additionally, some governments nonetheless lack or can enhance the required guidelines or prison frameworks to strengthen and put into effect land-use planning processes.

Stakeholders‟ Engagement and Insufficient Financial and Human Resources: When land-use plans do now not use participatory procedures and nearby governments are no longer included, there is a hazard of creating top-down plans. The involvement of nearby human beings is critical given that they recognize the dynamics of the region. This is even greater vital in data-scarce regions, the place neighborhood stakeholders may want to be section of participatory statistics and expertise series that can assist fill current gaps and allow greater applicable decision-making.
Beside those challenges Delphin, 2022 indicate there are opportunities for integrating land use planning based on Delphin Institutional support and political will are important elements for the successful implementation of land-use plans. it might be difficult to develop an integrated land-use plan in the context of developing countries, mainly due to data availability, lack of political will, lack of stakeholder engagement, and insufficient financial and human resources. (Delphin,2022) the lack of coordination between transportation and land use plans was perhaps of less consequence when the funds were available to deliver transport facilities and services to meet, or even anticipate, demand.

Then, land use plans and zoning might permit development at levels that would swamp available transportation facilities, but there was a reasonable expectation that capacity expansions would soon be forthcoming to correct the shortfalls.

Oruonye, 2015 also state the challenges to develop integrated land use planning includes Rapid population growth and urbanization, unplanned informal settlement and urban sprawl, Limited availability and accessibility of land and inadequate infrastructure and services

The population of Addis Ababa city has been growing by 3.8% yearly while the physical built up area has been correspondingly increasing by 3.2%. Due to high economic growth and people's interest in owning private cars, the number of vehicles has been increasing by 13.5% yearly causing the yearly average urban mobility increment by 10 %. However, the road network coverage has grown only by an average of 4.1% per year which cannot accommodate the increasing transportationdemand and vehicle fleets. This results for recurrent day-today transportation problems like congestion, traffic accidents and environmental impacts (Mekonne, 2012).

Furthermore, according to the Urban Transport Study Report (2004/2006), the transportation system of Addis Ababa is characterized by low availability of road with only 7% of whereas 20% to 25% is required for the efficient system. Generally, whilst Addis Ababa is increasing horizontally to accommodate the growing populace as an end result of herbal increase and in-migration from all corners of the country, the public transportation device failed to meet the growing demand generated from sprawled contract at the peripheries. Addis Ababa has constantly been a sprawling city. „Spatial sprawl and growing transportation demand are concurrent tendencies that want coordination amongst actors and insurance policies for sustainable development.

Bely indicates Addis Ababa had a number of plans by noticeable architects and town planners between 1936 and 1986. This unsuccessful planning history of the city is reflected in its development, which has largely been characterized by spontaneous growth. Cities are now experiencing horizontal growth, but bus travel is not growing at a high enough rate to keep up with this increase. An analysis of the transport availability index shows that only the city center has the existing bus network, while the urban expansion area has low transport availability. Therefore, we need to focus on road development in Addis Ababa.

Road infrastructure planning is fundamental for the improvement and functioning of transportation systems. It performs a fundamental function in advertising monetary growth, facilitating mobility, and bettering connectivity. However, street infrastructure planning additionally faces huge challenges. In spite of that there is additionally significance such as

Economic Growth and Development: Efficient transportation networks allow the motion of goods, services, and people, merchandising trade, industry, and job creation. Additionally, expanded accessibility to markets and employment possibilities enhances productiveness and stimulates monetary activity. Inadequate or poorly deliberate street infrastructure hampers monetary increase through developing bottlenecks, growing transportation costs, and limiting market access. It can lead to inefficient grant chains, reduced competitiveness, and decreased funding in affected regions. To tackle this issue, governments and planning authorities have to prioritize strategic avenue infrastructure planning (Zeng et, 2020).

Safety and Mobility: Effective Road infrastructure planning is quintessential for making sure security and improving mobility. Additionally, environment friendly avenue infrastructure enhances Mobility, reduces tour times, and will increase accessibility to quite a number destination. Poorly deliberate street infrastructure can end result in hazardous conditions, insufficient visitors' management, and congestion. This compromises street safety, will increase accident risks, and limitsthe mobility of men and women and goods. To tackle this issue, avenue infrastructure planning mustprioritize security and mobility. This consists of incorporating site visitors calming measures, enhancing intersections and pedestrian facilities, and imposing wise transportation structures (Yang et, 2019).

2.7. Factor affecting plan preparation and implementation with road infrastructure development

Planning and implementing effective strategies are crucial for organizations and individuals to achieve their goals. However, numerous factors can influence the preparation and successful execution of a plan. Integration of infrastructure and other land uses is linked to problems in all stages of the road infrastructure planning process. However, these stages are very diverse. Early stages are concerned with the need and purpose of interventions, whereas later project studies engage in detailed design and implementation questions. Hence, we may expect problems relating tothe issues described above to be different for each stage. (Kleemann, 2017).

According to Briassoulis 2020 Factor affecting plan preparation and implementation includes:

Lack of Clear Objectives and Goals: When the desired outcomes are not well-defined, it becomes challenging to create a comprehensive plan and measure progress effectively. The absence of clear objectives and goals leads to ambiguity and confusion among stakeholders, making it difficult to align efforts and allocate resources appropriately. This lack of clarity can result in wasted time, effort, and resources, as well as suboptimal outcomes. To address this issue, it is crucial to invest time and effort in defining clear and measurable objectives and goals.

Inadequate Stakeholder Engagement: When key stakeholders are now not actively concerned in the planning process, it can lead to a lack of ownership, resistance to change, and constrained help for the plan. Without significant stakeholder engagement, there is a greater hazard of overlooking crucial perspectives, needs, and conceivable barriers. This can end result in ineffective strategies, terrible implementation, and ultimately, failure to obtain the favored outcomes.

To overcome this challenge, it is indispensable to have interaction stakeholders at a range of degrees of the planning and implementation process. This consists of figuring out and involving applicable individuals, teams, or organizations, conducting consultations, and searching for their enter and feedback. Insufficient Resource Allocation: When agencies or persons fail to allocate enough resources, suchas funding, personnel, time, or technology, it severely limits their capacity to execute the layout effectively. It can demotivate stakeholders and undermine the typical success of the plan (Kleemann, 2017). Lack of appropriate useful resource planning can additionally end result in extended expenses or an imbalance between reachable assets and the required workload. To tackle this issue, it is fundamental to behavior a complete aid evaluation at some stage in the planning phase.

Ineffective Communication and Collaboration: When there is a lack of clear and regular conversation channels, misunderstandings can arise, main to misalignment, duplication of efforts, and decreased efficiency. Ineffective verbal exchange and collaboration avert coordination between group members, departments, or exterior partners. It can end result in delayed decision-making, conflicts, and a fragmented strategy to graph implementation. To decorate verbal exchange and collaboration, it is integral to set up clear channels for sharing information, development updates, and comments (Briassoulis, 2020).

A. problem on plan preparation

A land use plan is a system that represents the different functions of land within a given area. These functions include housing, trade, production and storage, transportation and road networks, reserved

land, urban green spaces, and more. Some of these functions are therefore proposed in the structural plan of the study area.

Plan Boundary

It is apparent that the structure of the city has poor and wonderful influence on the infrastructure, carrier and utility development. If the city has compact morphology, it is price fantastic to supply services, infrastructure, and utilities for the city whereas for the elongated structure of the town, it is difficult for the city administration to gone through these simple developments. The form of a city can be evaluated by means of the use of distinctive compactness indices such as Length, breadth index and different techniques in order to recognize whether or not a positive city and /or have an effect on region has compact morphology or elongated in its shape (Deakin, 1989).

Transport and Road Network

Transportation and road network designs may not match structural planning concepts. The component's spatial proposal appears to be a zoning plan, as it proposes all local/feeder roads within the city, whereas the socio-economic survey is a structural plan. However, what is tried to analyze is the transport and road network, infrastructure, and utilities including those details of the local/feeder roads proposed as development plan accounts about 12.79% that is below the standard sated for structure plan 15-25%. On the other hand, the natural constraint of the study area for development also contributes to compromise the standard (Mekonne, 2012).

B. Problem related to plan implementation

Failure to implement plans has long been recognized as a significant obstacle to effective planning (Berke, 2006). Calkins (1979) calls the failure to implement the plan "the new planning syndrome". Plans are continually revised or updated regardless of the implementation status of the original plan. A lack of understanding of the level of implementation of plans and the determinants of effective implementation prevents planners from planning better (Mekonne, 2012).

A recent plan evaluation approach by Berke et al. (2006) represents another attempt to quantitatively assess the impact of plans on implementation. He used a sample of New Zealand County council plans, permits and planning agencies to identify his two concepts of successful plan implementation (compliance and performance), the impact of planning agency implementationpractices, and the We are reviewing the capabilities of the permit applicant to succeed.

Another key point is that, if implementation is defined and measured in terms of conformance, plans and planners have an important influence on implementation success. Alternatively, if implementation

is defined and measured in terms of performance, plans and planners are less influential in implementation (Mekonne, 2012).

Contributing factors for failure of the implementation

Urban facility is usually organized with the aid of the authorities and non-public builders additionally contributed closer to city facility in the land development. As economic system endeavor receives rapid, site visitors‟ recreation additionally receives greater in demand. The excessive site visitor's recreation additionally will increase city endeavor in the metropolis alternatively negative demand by means of visitors facility resulted troubles like site visitors‟ congestions. The cycle relationship between land use and transportation existed when visitors undertaking make bigger it attracts city endeavor to make bigger in needs as well. The success of land use and transportation planning is based totally on the accurate stability between city facilities and site visitors‟ facility. The failure of the authorities in most instances to provide environment friendly site visitors facility and additionally supplied environment friendly grasp graph for city facility resulted failure in the stability between land use and transportation planning (Harumain,2013).

Identifying factors that influence implementation is as important as implementing the plan. Laurian et al. (2004), he classifies the factors of plan implementation into two types. One is internal to the plan (e.g. quality of the plan) and the other is external to the plan (e.g. characteristics of the planningagency or local developer). Factors contributed for the failures of the expected urban plans to be implemented in accordance with the Structure plan can also be seen from Policy related, implementation tools/materials, skilled man power, and commitment of officials of the municipality,Institutional, and financial aspects. The low level of awareness of decision makers, the absence of policy and its enforcement on land management, the lack of approval on standards are the existing factors that hinders the implementation. The economy factor is not the only factor in determining the success of land use and transportation planning but there are more factors involved. This can be caused by diverse reasons such as the independence period. The independence period of a developing country contributes to the diverse historical background of a developing country and it also has determined factors of achievement in land use and transportation planning (Mekonne, 2012).

Factors of success in land use and transportation planning in developing countries as follows:

a. Government involvement in land use and transportation planning must not be biased towards economy development only but to improve the livelihood of the community.

b. Developing countries must increase public participation as to increase the awareness of the public towards the importance of land use and transportation planning. This will also ease government strategies by increasing knowledgeable community.

c. The number of skill and knowledgeable professionals involved in the policy making especially in the government should be enlarged. The cooperation between urban planning sector and transportation sector should be accordingly formedas to integrate balance in the planning (Dube, 2013).

There are tools that contribute significantly to the implementation of land use planning. In particular, software and devices are the most important factors that can affect the implementation process. Unavailability of tools is a contributing factor to land-use variability during implementation. Namely, surveying equipment's like GPS and total station in addition with Auto CAD and GIS software's are the typical examples that not common. Thus, the absence of these instruments was hindering the land use plan implementation process (Mekonne, 2012).

Low number of skilled manpower may result, inefficiency of the workers to implement the plan. This shows that there is high shortage of skilled man power in the area causing difficulties for the achievement of expected outcome in implementing the urban plan components.

Commitment of Officials: Even though there is some considerable reason that the officials have justified to give attention on the enforcement and follow up of the issues related to plan implementation some officials may not well committed (Mekonne, 2012).

Although the city government has done little to raise community awareness, public awareness of environmental issues in the city remains low in most parts of society. On the one hand, even if the problem only gets worse, it raises community awareness because everyone starts thinking about the problem so that it doesn't have a negative impact.

2.8. Effect of integrated land use planning on road infrastructure

Integrated land use planning plays a crucial role in shaping urban development and transportation systems. The way land is utilized at once influences the demand and affectivity of street infrastructure. Major avenue infrastructures and different land makes use of are conflicting as nicely as complementary interests. Conflicts between avenue infrastructure and different spatial functions, such

as housing, nature and recreation, are typically acknowledged. Examples of such conflicts are negative externalities such as noise, air pollution and safety issues. Consequent ways of responding for planning and decision-making, such as protection and mitigation, are much explored. Investments in infrastructure networks potentially generate positive local and regional spill-overs, due to the complementarity of land uses (Kleemann, 2017). As good road development promotes urban development in the vicinity of a road, pressure on acquiring land for new residential and commercial activities increases. However, there is a strong opposite link as well – the way land is used and developed directly impacts the demand for road development, hence the pressure for the construction of new or reconstruction of present parts of the road network (Jedlicka, 2019).

The idea of accessibility is crucial for comprehending how land use patterns affect transportation. Infrastructures for transportation support the spatial connection between various activities, which is measured by accessibility, which indicates the allure and accessibility of these various activities.

According to studies, the likelihood of interaction between any two locations rises as the time or money required to travel their lowers. According to the accessibility linkages between transportation and land use, the level of accessibility provided by the transportation system between various activity areas has an impact on urban shape and land use patterns (Berhane, 2017).

Allowing uncontrolled trends alongside predominant avenue corridors can create disastrous consequences. These include: minimize in roadway capacity; extend in visitors congestion and delays; enlarge in avenue accidents; minimize in productiveness and loss of financial opportunities; make bigger in transport time and cost; expand in power consumption, vehicular emissions and discount of air quality; purposeful obsolescence of roadways; diminished cost of the public investment; discount in abutting property values; sub superior financial pastime and discount in monetary validity of personal funding in abutting property; disharmony between city layout and transport objectives; and perceived combat between the transportation hall and the livability and performance of the neighborhood via which it passes (Oruonye,201).

Land use is understood to affect road development in a number of significant ways. Dispersed land use patterns are typically linked with high levels of road development requirement. The European Commission's (EC) study, Paulley and Pedler, 2000.provide higher residential densities and mixed development can lead to shorter car trips and lower levels of car use. It also indicates Traditional neighborhoods can have shorter trips and lower levels of car use than car-oriented suburbs. In addition, higher employment density can lead to greater public transport use. Developments close to public

transportation can generate higher levels of public transportation use.

According to Mburbu, 2017 Impacts can be evaluated at four general levels:

1. Analysis of a single factor, such as density, mix or transit accessibility.

2. Regression analysis of various land use factors, such as density, mix and accessibility. This allows the relative magnitude of each factor to be determined.

3. Regression analysis of land use and demographic factors. This indicates the impacts of individual factors and accounts for self-selection, that is, the tendency of people to choose locations based on their travel abilities, needs and preferences.

4. Regression analysis of land use, demographic and preference factors. This takes into account sorting effects, including the tendency of people who, from preference or necessity, rely on alternative modes to choose more accessible locations.

According to Oruonye, 2014 the key factor for understanding this impact of land use patterns on transport is the concept of accessibility. Transport infrastructures promote the spatial interplay between one-of-a-kind things to do which is measured through accessibility that displays the elegance and ease of achieving these distinctive activities. Studies exhibit that the doable of interplay between any two locations amplify as the fee of motion between them decreases, both in phrases of cash or time.

It has been long since mobility became a major issue in Addis Ababa following the enormous horizontal expansion of the city boundaries as a result of the rapid population and income growth (Belay, 2017). Land is, however, limited in extent and the amount of cultivable land in particular is finite, while the pressure on it is increasing, both as a result of the growing population (and its needs for more food and space) and of the increasing number of functions of land. Overexploitation and mismanagement of land lead moreover to soil degradation and to a reduction of the finite land reserves. This situation results in a growing competition for land. In order to avoid that thiscompetition turns into conflicts, firm agreements must be made on how and by whom the available space will be used. This means that land use has to be regulated and that choices have to be made among alternative options (Day, 2016).

The historic improvement of roads primarily based on reading ancient topographic maps can be used to come across authentic routes, pick out the stays of roads or anthropogenic types in the landscape, or to record preserved transport objects (parts of roads, bridges, tunnels, milestones, indicators, etc.) and to pick out the building substances used. The historic improvement of landscapes and their historic

shape which includes ancient roads, along with both their ecological and cultural significance, have been viewed with the aid of some authors in planning new roads. Comparisons of the outcomes of distance from a street on land use balance corresponded with land use trade processes (Jedlicka, 2019). Lack of integration between land use and transportation planning has resulted in disproportions between road development and land use developments in different sub- cities of Addis Ababa. Generally, the land use type of Addis Ababa is dominated more by residential.

Impact of the problems on city development and sustainability includes Inefficient land use and resource allocation, Social and economic disparities, Environmental degradation and hazards, avoid sprawl, Encourage mixed land use, Dense, compact dense, Transit oriented development (TOD), Good urban design and not too much land for road and parking.

Land use patterns have an effect on accessibility, people's capacity to attain favored offerings and activities, which impacts mobility, the quantity and kind of tour activity. Different land use patterns have exceptional accessibility features. Urban areas have extra handy land use and extra numerous transport systems, however slower and extra highly-priced vehicle travel. Suburban and rural areas have much less reachable land use and fewer tour selections however using is faster and more cost effective per mile.

According to Mburu, 2017 density, Centricity (also called centeredness) Land use mix Connectivity has effect on road infrastructure. Density can affect travel activity in several ways such as Increased proximity (geographic accessibility), Mobility options. Complementary factors, Historical conditions and Self-selection. Active Transport (Walking and Cycling) Conditions: Walking and biking conditions are affected by (CPSTF 2017; TRB 2008): The quality of sidewalks, crosswalks, paths, bike parking, and changing facilities, Security (how safe people feel while walking), Environmental quality, Topography, Land use accessibility, Attractiveness (quality of urban design).

Transit accessibility refers to the quality of transit serving a location and the ease of accessing that service by walking, cycling and automobile. Transit-Oriented Development (TOD) refers to residential and commercial areas designed to maximize transit access. Several studies indicate that people who live and work in TODs tend to own fewer vehicles, drive less and rely more on alternative modes than they would in more automobile dependent locations (Berhane, 2017).

According to Dolphin, 2022 improper land use planning has the following effect on road infrastructure.

Increased Travel Demand and Congestion: When land use decisions, such as zoning and development patterns, are not aligned with transportation infrastructure, it can result in dispersed developments, longer travel distances, and inefficient traffic flow.

The lack of integration between land use planning and avenue infrastructure contributes to immoderate tour demand and congestion. This leads to longer journey times, expanded gas consumption, environmental pollution, and diminished productivity. It additionally places strain on present street networks, necessitating highly-priced expansions and maintenance. To tackle this issue, it is quintessential to undertake a built-in land use planning strategy that considers transportation desires and connectivity from the outset.

Inefficient Land Use Patterns: When land is poorly utilized, with scattered developments, remote land uses, and immoderate city sprawl, its consequences in longer commuting distances, accelerated car miles traveled, and useless stress on avenue networks. Inefficient land use patterns make a contribution to immoderate automobile dependency, as human beings are pressured to journey longer distances for day-by-day activities. This leads to site visitors‟ congestion, accelerated greenhouse fuel emissions, and decreased pleasant of life. It additionally poses challenges for offering environment friendly and reasonably-priced transportation offerings to dispersed areas. To overcome this challenge, built-in land use planning needs to prioritize compact and related improvement patterns.

Inadequate Infrastructure Investment: When land use selections are made besides thinking about future transportation needs, it can result in undersized or insufficient street networks to help the expected increase and development. Inadequate street infrastructure leads to bottlenecks, restricted capacity, and diminished avenue safety. It hampers monetary growth, negatively affects accessibility, and diminishes the ordinary performance of the transportation system. Delayed infrastructure investments additionally have a tendency to be greater pricey and disruptive when applied in response to extended demand. To tackle this issue, it is vital to align land use planning with long-term infrastructure planning.

Lack of Multimodal Connectivity: When land uses are segregated, with limited access to alternative transportation modes, such as public transit, walking, or cycling facilities, it puts excessive pressure on road networks. The lack of multimodal connectivity limits transportation options for individuals and communities. It leads to overreliance on private vehicles, which further exacerbates congestion.

2.9. Importance of integrated land use planning for road infrastructure development

Land use planning stems from the increasing scarcity of land, the competition for this land by an increasing number of users, and the risk that this situation will lead to conflict. This is also related to growing interest in environmental protection and more sustainable use of space. Farmers have planned their land use for thousands of years. The application of scientific principles to the land-use planning process is relatively new (Day, 2006).

Road traffic and land use are closely related to urbanization. For that purpose, it is necessary to comprehensively improve two structures necessary for urban space. This allows us to set thephysical patterns that underlie migration patterns for future generations, while reducing urban sprawland loss of natural habitat and biodiversity. Moreover, further evaluation and implementation of integrated transport and LUPs at city and regional levels will lead to further recovery and improvement of the national economy (Mekonne, 2012).

The integration of land use and transport policies will provide safe, affordable and efficient transport, increase energy efficiency, support dynamic economies, and reduce pollution, congestion and adverse health impacts. It leads to an eco-friendly urban transportation system. This process promotes sustainable development that affirms equity among societies, dynamic economic activity and ecologically harmonious development (Henriquez, 2018). Integrated land use planning strategies enhance road improvement by reducing the number of combat elements on roads through the introduction of minimum permits and angle restrictions. In addition, curb parking is reduced by ensuring adequate parking on private property at the service site. And I'm planning on parking somewhere else. The potential for boulevards and reduced highway congestion is maintained through careful site decisions to increase visitor traffic in the surrounding area, thereby reducing highway traffic. Location trends that encourage improved public transport, biking and walking. Reduce the number of combat elements on the road and reduced the amount of curb parking (Fernando, 2001).

An integrated road infrastructure zoning plan reduces speed fluctuations and the number of stops by controlling not only intersection spacing, but also entry locations and spacing. It also improves the safety of major roads by reducing traffic congestion. Reduce human traffic. Place incompatible developments away from hazardous material routes (Dagnachew, 2007).

2.10. Measure taken to mitigate negative impact of land use planning on road infrastructure development

The negative effect of land use planning on street improvement can be mitigated via proactive measures that promote integration and efficiency. Land use planning helps minimize terrible effects of spatial dynamics with the aid of growing a land use configuration that tries to stability all actors‟ wants in a particular territory. In the absence of land use planning, sectorial plans aiming to enhance housing. Moreover, the thought of strategic land use planning has emerged to complement these plans by means of foreseeing future land makes use of in order to consider viable conflicts and suggest solutions. Since strategic land use planning focuses on the evaluation of future land uses, spatially specific modeling needs to be a critical phase for higher communication (Henriquez, 2018).Land use planning can be applied to improve the functioning of major road corridors in several ways. This can be used to screen and select appropriate developments, compatible with the functioning of roads, to be located near major road corridors or change the location of proposed developments in such a way to have minimum impacts on adjoining roads. At the same time, land use planning can impose conditions on those developments which are required to be located adjoining major road corridors, requiring modifications to reduce impacts due to these roads. An example of the latter is to request for structural modifications to reduce noise impacts to buildings adjoining major traffic routes (Briassoulis H., 2020). Land use planning measures that can be applied to screen and select incompatible developments and change locations of developments to improve the functioning of major road corridors can be broadly divided into local planning and regional planning measures. Local planning measures are generally confined to local areas (Heeres et. M., 2016). They are usually focused on limiting the number of conflicts points on major road corridors. They include subdivision control and driveway control. Subdivision control includes the following: eliminate or restrict flag lots; lot size and road frontage control; interconnecting parking across lots through shared driveways and cross driveways; and restricting the number of driveways per lot. Driveway controls relevant to land use planning include: restrictions on driveway spacing including corner clearance spacing; use of service roads/ frontage roads; and providing access through roads low in access categorization (Fernando, 2001).

Measurement taken to mitigate negative impact

i. Bus road construction

Urgent interest ought to be given in fixing issues with the aid of organizing the sectors by using introducing and the usage of scientific improvements and technological developments in the system. Therefore, a super effort ought to be made by means of the accountable retailers in attaining technological know-how switch in mass transportation system. In this regard, buses and mild rails are very environment friendly in phrases of land use due to the fact they usually use networks which may want to be wished for get entry to thru site visitors requiring much less greater spaces. So Improvement of Bus Avenue is for high quality land use planning. And it is higher if suitable zoning coverage is implemented. In this regard pertinent insurance policies want to be formulated and carried out (Day, 2006).

ii. Using information Technology

The evolution of sciences and technology has affected the change of planning decision method. Planning support system (PSS) and spatial decision support system (SDSS) is one of tools for achieving planning quality in optimum development. PSS are useful tools for the planner, public officials, and the community. PSS is a combination of GIS data, urban model and presentation technique using computer for planning support base on community. PSS is also a tool for planner, public officer or community in development plan using computer base software. PSS structure and information access should visualize the world reality and support the capabilities for analyzing, prediction and planning decision (Harumain, 2013). Although PSS is a useful tool to carry out sophisticated works as data can quickly be modeled and the result can be presented efficiently with high quality, it is highly dependable on the availability and quality of the data generated in the model. Data availability would very much depend on the cooperation of various agencies involved either at the regional or local level. In brief, the application of a PSS requires collaboration, often among different professional and disciplines, and often individuals at different locations, without which the PSS application cannot be effectively performed.

A transport service is also one of the emerging areas of technological advancement and information system. Nowadays, Intelligent Transport Systems (ITS) has enabled a new approach and implementation of advanced control, and technical as well as technological solutions, achieving greater safety, efficiency and reliability of transport. Evaluating and analyzing the existing information before travel (pre-trip), on trip and route guidance and navigation is an important element

of information technology. Though, the reliable information in transport system can be well recognized in case of receiving information from various sources. Moreover, various transport technologies are equipped with vehicles and the same time, vehicles have increasingly effective driver assistance and protection mechanisms (Frehaileab A, 2019).

According to Heeres et, 2016 the major functions of information system in planning have the descriptive function i.e., information should help to describe situation. It also has the cognitive function i.e. information system also contribute to improved understanding of regional problems by providing the key factors and variables that can be analyzed using regional modeling and other statistical techniques; iii. The normative function – the information system can also contribute to improved action by reducing the cost of actions with known consequences of actions already taken or about to be taken.

Land use planning aims to formulate activities, administer potential changes and prevent incompatible changes. Although perfect land use planning is a complex decision-making process, modern GIS technologies have made this task easier in two ways:

(i) They allow one to work simultaneously on a large number of datasets,

(ii) Some of the methods, techniques or models can be embedded in GIS used for the suitability analysis of areas of land for a more accurate land use planning a wider range of social, economic, physical and environmental indicators need to be included.

Inclusion of geographical records in GIS permits these symptoms to be used in a greater state-of-the-art way in the decision-making technique of land use planning. However, for coping with the datasets in a GIS surroundings it is integral to encompass a geographical database administration machine – especially, when the datasets are sturdy and complex. To construct such a geographical database it is essential, first to put together a conceptual mannequin so that the facts necessities and their interrelations are nicely described and that the database can be used to store, adjust and question the safety of the records (koroso, 2020).

The different necessary GIS functionality is in coping with the related databases of attribute statistics for map features. GIS structures can save the map coordinates of factor locations, linearand place features. These aspects have attributes that have to be saved in the database. Once all the statistics are stored, each the digital map and the database can be manipulated simultaneously. Thisis especially vital in many land use planning applications, which require records on a large range of bodily and

environmental attributes. Since the geographic records is saved in its foremost form, evaluation can be greater quantitative and rational (Jahantigh et. 2019).

iii. Comprehensive Transportation Planning

When transportation planning considers land use patterns, future increase projections, and connectivity needs, it helps the improvement of a built-in and environment friendly street network. Without complete transportation planning, land use choices can lead to fragmented developments, improved tour distances, and inefficient use of avenue infrastructure. To tackle this issue, Governments and planning authorities must undertake complete transportation planning procedures that align with land use decisions. This includes conducting transportation studies, inspecting tour patterns, and forecasting future demand (Briassoulis, 2011).

iv. Zoning Regulations for Mixed-Use Development

By encouraging a combine of residential, commercial, and leisure things to do inside shut proximity, it reduces the want for sizable commuting and helps extra environment friendly use of street infrastructure. When land use planning promotes segregated land uses, it contributes to longer tour distances, multiplied site visitors‟ congestion, and pressure on street networks. This undermines street improvement and creates challenges for sustainable transportation. To overcome this challenge, zoning rules need to be revised to inspire mixed-use development. This can be executed by using permitting a range of land makes use of inside particular zones, advertising greaterdensities close to transportation corridors, and incorporating pedestrian-friendly infrastructure. (Hadi et, 2021)

v. Transit-Oriented Development

TOD includes developing compact, walk able, and mixed-use communities founded round public transit stations. By integrating land use and transportation, it reduces reliance on non-public cars and promotes sustainable mobility options. The lack of transit-oriented improvement leads to car-dependent communities, accelerated visitors‟ congestion, and restricted transportation choices. It hampers street improvement efforts and exacerbates transportation-related challenges. To tackle this issue, land use planning needs to prioritize transit-oriented development. This consists of figuring out appropriate places for transit stations, setting up greater densities close to transit hubs and imparting pedestrian and biking infrastructure to facilitate get admission to public transportation (Briassoulis, 2011).

2.11. Addis Ababa city existing and proposed land use and road infrastructure

Addis Ababa city is capital city of Ethiopia located with coordinates of 9° 0' 19.4436" N and 38° 45' 48.9996" E. The land use in Addis Ababa, like in any rapidly growing city, has been subject to various changes and challenges. As the capital and largest city of Ethiopia, Addis Ababa has experienced significant urbanization and population growth in recent years. This has resulted in the transformation of land use patterns to accommodate the expanding needs of a growing population, economy, and infrastructure. land use in Ethiopia commerce and business, historical building, infrastructure, municipal service, religious institute and mixed residence. In summary, Addis Ababa's land use is a dynamic mix of residential, commercial, industrial, institutional, and recreational areas. The city is continually adapting and planning to meet the needs of its growing population while striving for sustainable development and improved urban living conditions.

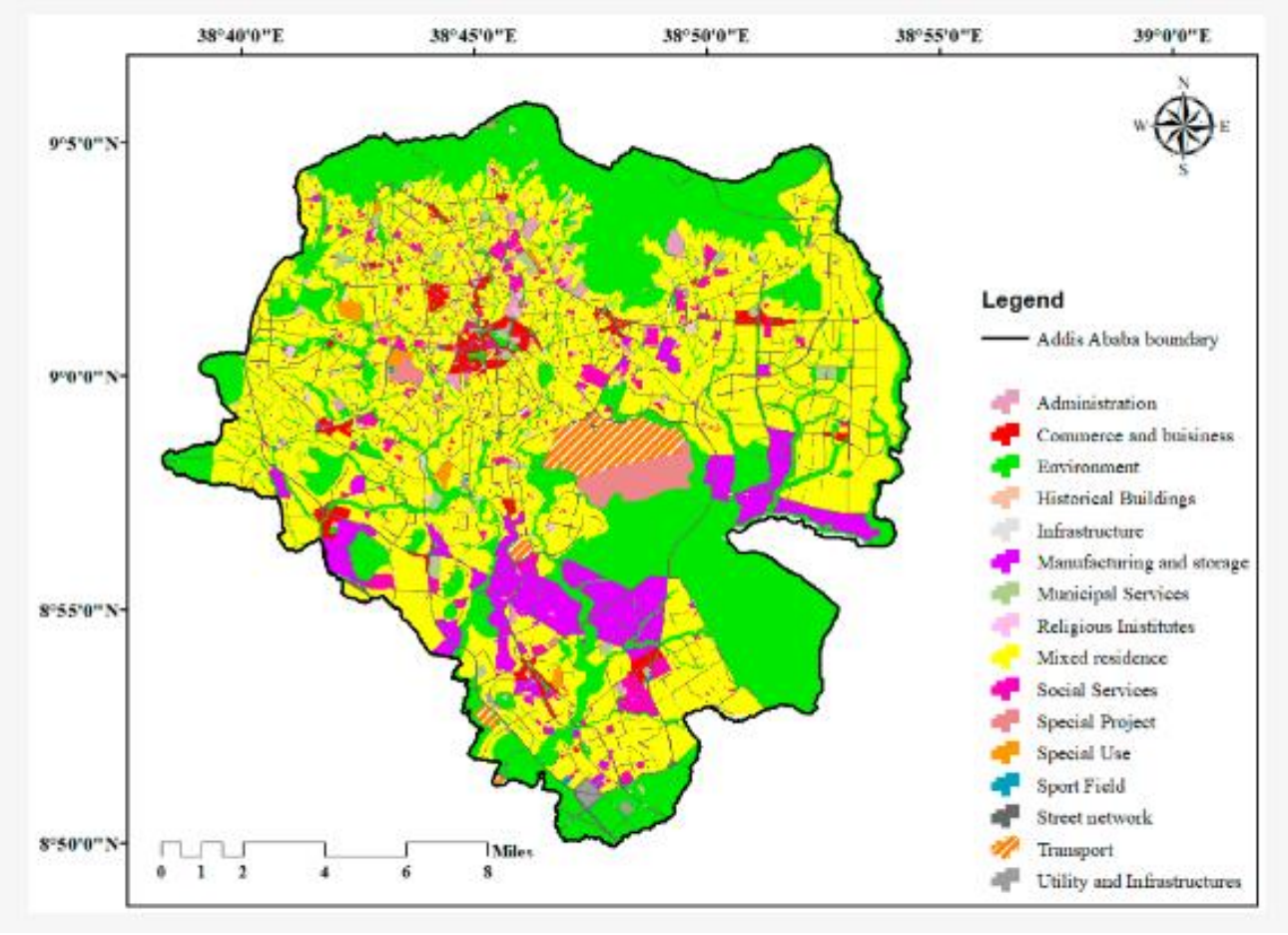

Fig 2.2. Major urban functional land uses in Addis Ababa. Source: Addis Ababa City government Planning Commission (AACPC).

Table Land use proportion of structure plan

Major Category	Area	Percent
Administration	5560102.69	1.07
Commerce and Business	7658738.77	1.47
Environment	158557678.21	30.47
Historical Buildings and Sites	188865.85	0.04
Manufacturing and Storage	30564058.19	5.87
Mixed Residence	219072034.68	42.11
Municipal Services	6156429.60	1.18
Religious Institutions	3699328.77	0.71
Social Services	14555278.28	2.80
Special Projects	7510338.19	1.44
Special Use	3313898.72	0.64
Sport Field	191757.07	0.04
Street Network	36307891.30	6.98
Transport	11527835.78	2.22
Urban Agriculture	9239017.57	1.78
Utility and Infrastructure	6193381.33	1.19

Municipal services are essential for the smooth running and sometimes, existence of urban areas. Manufacturing and storage Industries were previously located randomly without the slightest consideration given to its impact on the environment. Most industries were established at the cottage level, and were dispersed throughout the city. However, the Structure Plan introduces new concept to structure land use for manufacturing and storage. Street Network Two concepts are adapted regarding the street system - the first one is to develop alternative expressways to facilitate traffic. The other important concept is to develop or redesign streets for mass transport.

Non –motorized Transport Walking constituted the largest modal share in 2005 (60.5%). According to the household survey by CES, average walk trip is estimated to be 1.49km (CSA, 2005). Walking was still the dominant mode accounting for 55% of modal share in 2011. According to travel demand projections, the share of walk trips is estimated to be around 45% in the year 2020. Cycle transport is negligible; terrain and absence of cycle lanes have contributed to discouraging its use. Motorized Transport Total travel demand in the city was expected to reach 3.2-million-person trips per day in the year 2010 (CES, 2005).

2.12. Summary of literature review

The literature section attempts to cover previous studies that serve as a background for research on the integrated land use planning on road infrastructure developments. This part shows that integratedland use planning is an important stage for road infrastructure development. Functionality and life span of road infrastructure depend on effective land use planning. Literature reviews repetitively show that land use planning and road infrastructure go together that means one has effect on the other. From literature reviewed, Studies on integrated land use planning on road infrastructure in Addis Ababa have been limited to the relationship between them. It doesn't indicate impact of integrated land use planning on road infrastructure. My research aims at a step-by-step analysis of impact of integrated land use planning on road infrastructure. It also explicitly points out challenges and opportunities of integrated land use planning on road infrastructure. Additionally, my research attempts to show the road infrastructure management in Addis Ababa city. Finally, I provide directions and recommendations for future way of integrating land use planning with road infrastructure in Addis Ababa.

2.13. Gap Identified

A critical literature review has been done to develop understanding and to gather different views, ideas, and findings on impact and challenges of integrated land use planning on road infrastructure development. The first part of this literature introduces some general ideas about land use planning and road infrastructure terms. The second part of the literature review concentrated on the relationship between land use planning and road infrastructure, challenges on integrating land use planning on road infrastructure. The third part of the literature review on factor affecting for implementing integrated land use planning on road development, finally it shows ways of to mitigate impact of integrated land use planning on road infrastructure development. Upon reviewing different literatures, it was observed that there is impact of integrated land use planning on road infrastructure development even though, it’s natural to think through all technological advancements, problems in implementing integrated land use planning on road development is still a critical issue and also many research works have been done on identifying factors causing improper integrated land use planning on road development; However From literature reviewed, Studies on integrated land use planning on road infrastructure in Addis Ababa have been limited to the relationship between them. It doesn't indicate impact of integrated land use planning on road infrastructure. The outcome of this research shows major impact of integrated land use planning on road development and that would achieve demand of transportation in Addis Ababa city.

2.14. Conceptual framework

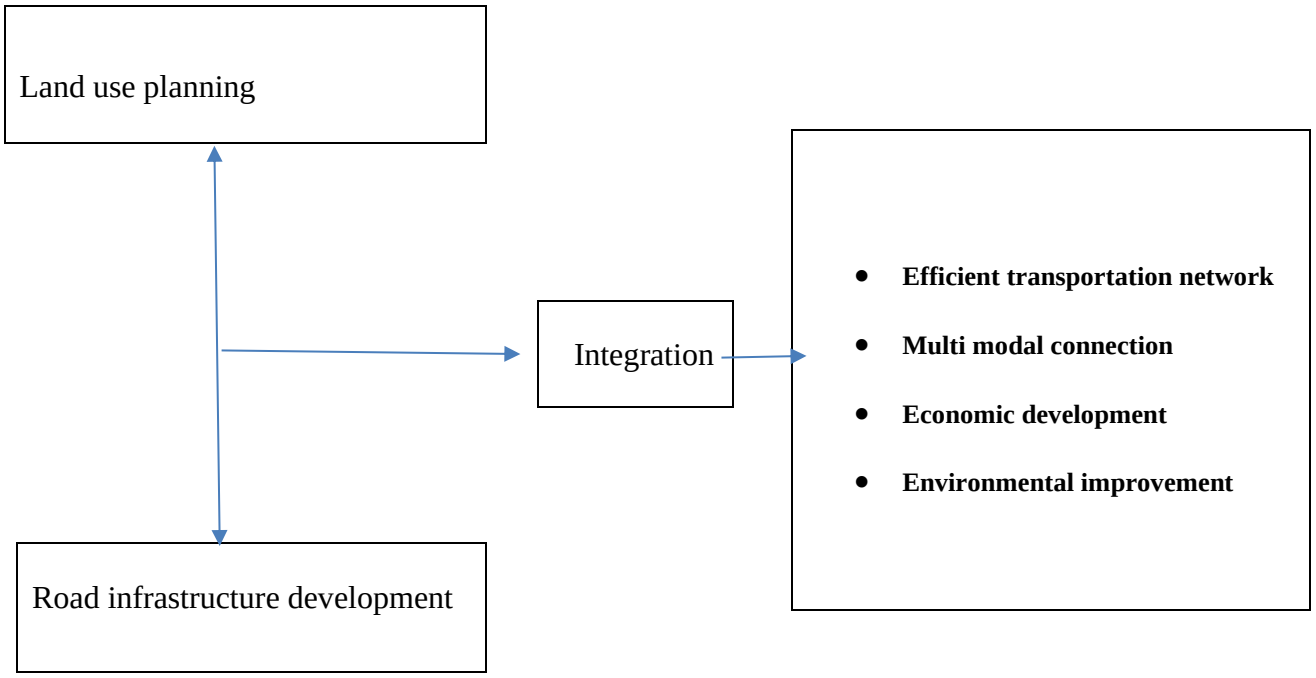

Fig 2.6. conceptual framework

CHAPTER THREE
METHODOLOGY

3.1 Introduction

Research methods include systematic steps that researchers follow from the initial identification of a problem to its final conclusion. The role of methodology is to conduct research work in a scientific and valid way (Kumar, 2006). A methodology is a method of systematically solving a research problem. It can be understood as the science that studies how research is done scientifically.Therefore, the methodology used in this study is described in this chapter. The methodology used to conduct this research uses questionnaires for data collection, data analysis to generate conclusions and necessary recommendations. This chapter describes research strategies, questionnaire design, study populations and samples, and data analysis methods.

3.2 Research strategy

In conducting this research, several steps were taken. First, problem identification has been done through preliminary literature review and researchers experience in integrated land use planning on road development. Furthermore, based on the identified problem, an extensive review of literatures on the subject was undertaken. Next, an investigation on the existing impact of integrated land use planning on road development was carried out with the view of discovering whether it matches to what has been discussed in the literature or not. Accordingly, questionnaire survey was selected as the research instrument and designed to get the factual information about the practice of integrated land use planning on road development by gathering their opinions. After the development of questionnaire, a pilot study was conducted before collecting the final data of the whole sample and this process generated some questions about explanation of certain terms and requested to modify some wording of the questionnaire. At the end of this process, the final form of the questionnaire was structured and distributed to the selected stakeholder by making some minor changes, modifications and additions. Finally, the results obtained from the questionnaire were analyzed to identify the major impact of integrated land use planning on road development, challenges that face while implementing integrated land use planning on road development, identify problems during plan preparation and implementation for land use planning which was used to propose the improvement directions.

3.3 Research Approach and methodological choice

In this research a mixed-method approach, combining both qualitative and quantitative methods was used in the research. Qualitative data collected from the interviews and surveys will be analyzed using thematic analysis to identify patterns related to integrated land use planning and road development in Addis Ababa city and also Quantitative data collected from the survey will be analyzed using statistical methods, such as descriptive statistics, to identify trends and patterns on impact of integrated land use planning on road development in Addis Ababa city. That mixed- method approach will provide a comprehensive understanding of the current state of integrated land use planning on road development in Addis Ababa city, and the findings of the study will provide valuable insights and recommendations for improving road development.

3.4 Study Area, Research population and sample

a) Study area

Recent studies indicate that Ethiopia is among the African states with very minimal motorized vehicles above 708,416 of which about 63.2% of them are found in Addis Ababa (Federal Transport Authority, 2016). In spite of that there is requirement on road development. In which Addis Ababa, the capital city of Ethiopia is located with geographical coordinates of 9°03´ North latitude and 38°42´ East longitude. Addis Ababa has witnessed an amazing horizontal expansion and rapid growth in urban population, it has not been provided with an equal growth in urban transportation provision which has resulted in increasing private car ownership, high congestion, increasing pollution and large number of road accidents with significant fatalities of pedestrians, the elderly, the disabled and the children being the primary victims.

This research/Study is conducted on Addis Ababa. The reason/Rationale behind choosing this city is the conveniences to establish effective road development that have potential to represent the identified problem at hand.

b) Research Population and sampling

In this study, the concept of study population is understood as a set of land use plans for road development from which study samples are drawn. Therefore, choosing an appropriate study population helps control external variability and defines the limits of generalizability of study results. Sample size unit is in number i.e. it indicate number of respondent (people who give response)

The sample size needed was computed using the statistical equation (Eq.3.1and 3.2).

The formula used in sample size calculation is:

$$Ss = \frac{Z2 * (p) * (1-p)}{C2} \quad \text{.....Eq.3.1}$$

Where: Ss= Sample size needed

Z= z value corresponding to the level of confidence or the standard normal distribution

P= percentage picking a choice expressed as decimal

C= confidence interval Correction for finite population

$$\text{New ss} = \frac{Ss}{1 + Ss\text{-}1\ Pop} \quad \text{.....Eq.3.2}$$

Where Pop=population

The z value corresponding to a level of confidence of 95% is 1.96 and the confidence interval (maximum error) was set to 0.05. For a given level of accuracy, p=0.5 for percentage picking a choice ex pressed as decimal using the worst-case percentage (50%). This helps in creating the most conservative (largest) estimate of sample size (Kothari,1990)

According to Eq.3.1, the required sample size will be:

$S_s = (1.96)^2 * (0.5)(0.5) / (0.052) = 384$ and the corrected new ss value will be

By using Eq 3.2 the new $s_s = (384)/ (1+ (383/121) = 96$

As a means of obtaining the population samples the study will used random sampling techniques. A simple random sample is a randomly selected subset of a population. In this sampling method, each member of the population has an exactly equal chance of being selected. This method is the most straightforward of all the probability sampling methods, since it only involves a single random selection and requires little advance knowledge about the population. Because it uses randomization, any research performed on this sample should have high internal and external validity, and be at a lower risk for research biases like sampling bias and selection bias.

The studied population is Addis Ababa city government plan and development commission, Addis Ababa city road authority and Addis Ababa city integrated infrastructure office. This is applied only to the specified office. Accordingly, the total population was 96 professionals, from those 68 were the respondent where 36 of them are from Addis Ababa city government plan and development commission, 23 of them are from Addis Ababa city road authority and 9 of them are from Addis Ababa city integrated infrastructure office.

3.5 Data collection method

Accordingly, the research literature review is structured in theoretical and empirical conceptual framework within the integrated land use planning on road development by exploring of relevant topics in land use planning and road development with A survey that will also be conducted to gather data on the public's perception and experiences with integrated land use planning on road development in Addis Ababa city. Primary data will be collected through questionnaire with relevant stakeholders, such as city planners, road development authorities. The data collected from the questionnaire will provide valuable insights into the current policies and practices related to impact of integrated land use planning on road development in Addis Ababa city. Finally, the resultsobtained from questionnaire were analyzed to identify the major impacts, challenges and opportunities of integrated land use planning on road development program which were used to propose the improvement directions.

This qualitative research was based on primary and secondary data to understand the trends of policy formulation and the need for integration of land use on road development in Addis Ababa city.

3.5.1 Primary Data

The primary data were be collected through direct observation at field survey and through questionnaire with Addis Ababa city government plan and development commission, Addis Ababa city road authority, and Addis Ababa city integrated infrastructure office in Addis Ababa, Ethiopia. The primary data will be collected using the following two instruments:

a) Questionnaire design

This research focuses on the impact of integrated land use planning on road development, identify the challenges and opportunities for improving the integration of land use planning on road development and examine the current land use planning practices and their effectiveness in balancing road development. The questionnaire consists of six sections in general to achieve the objectives of the study. The first section is addressed to the general information, the second part deals with the land use planning practice on road development in Addis Ababa, the third is addressed to the challenges and opportunities of integrated land use planning on road development, the fourth focus on impact of integrated land use planning on road development and the (fifth) one covers problems on land use plan preparation and implementation on road development. The last (six) one is about road infrastructure management in Addis Ababa city. The questionnaire was developed with closed ended questions.

The questions were adopted from the researcher's experience on integrated land use planning on road development. The original questionnaire is in (Annex 1). The questionnaire was provided with a covering letter which explains the purpose of the study, the way of responding, the aim of the research and the security of the information to be confidential in order to encourage a high response by the respondent. A draft questionnaire was first discussed with professional who gave the researcher some useful ad vices. Many of these advices have been taken into consideration during the preparation of the questionnaire. Of course, the final revision of the questionnaire was discussed with the advisor and was amended according to his advice.

Table: 3.1 Respondent office names

No.	Respondent
1	Addis Ababa city government plan and development commission
2	Addis Ababa city road authority
3	Addis Ababa city integrated infrastructure office

b) Interview

The interview contains 8 basic questions to meet the research objective. The questions were adopted from the researcher's experience on integrated land use planning on road development. The original interview question is in (Annex 1). The interview question was provided with a covering letter which explains the purpose of the study, the way of responding, the aim of the research and the security of the information to be confidential in order to encourage a high response by the respondent. Interview is performed with team leader on research conduction office who has good experience about integrated land use planning on road infrastructure development in Addis Ababa City.

3.5.2 Secondary Data

Data about the road development in Addis Ababa, the trends of development, land use and road development policies, regulations, proclamation and directives were explored and collected from literatures done on integration of land use planning on road development. Practices of other developed and developing countries in areas of road development and land use interaction and policy integration is also discussed in the theoretical part of this research. Empirical literature reviewis conducted by reading journals and articles that have been published in relation to impact of integrated land use planning on road infrastructure then from that article are put in the literature part of this research.

According to (Mugenda, 2003), validity is the precision and significance of interference founded on

the research outcomes. It's the extent which outcomes attained after the analysis of the datarepresents the phenomenon under study. The entire target population was literate and therefore there were minimal complications while answering the questionnaire. Reliability of research instrument in research and pilot testing reliability refers to the consistency measure of the characteristic of interest in time. Reliability is a measure of the degree to which research instrument produces consistent outcome or data after frequent trials in research. A pilot study was conducted to ensure the reliability of the instrument. In this study, each statement on the questionnaire is rated on a 5-point Likert response scale that includes 'strongly agree', 'agree', 'undecided', 'disagree', and 'strongly disagree'. Based on this, an internal consistency reliability test was performed. Based on this, an internal consistency reliability test was performed. Therefore, we conclude that these instruments are consistent with our research objectives.

3.6. Method of analysis

The study was analyzed based on descriptive statistics analysis. The descriptive statistics was employed to quantitatively describe variables using mean, regression, ANOVA and t-test was used to describe to what extent the factors deviated from the mean. The analysis of data in this research brings forth the important factors that affect the road infrastructure and their impacts on the Addis Ababa Road infrastructure. 68 The data collected through questionnaire were analyzed and presented in the form of diagrams, charts, and tables using SPSS (Statistical Package for Social Science) software version 26 and computer programs including Microsoft Excel sheet. The mean score result was used to rank factors based on significance. The factors and their impacts are measured using five-point Likert scale. Where 1= Agree, 2 = strongly agree, 3= Neutral, 4 = Disagree, 5= strongly Disagree and calculate the mean score for each factor that is used to determine the relative ranking. $M=1n1 + 2n2 + 3n3 + 4n4 + 5n5\ \Sigma N$ .....Equation 3.2

Where; M= average mean, n1 = Number of respondents for Agree (1), n2 = Number of respondents for strongly agree (2), n3 = Number of respondents for Neutral (3), n4 = Number of respondents for Disagree, n5 = Number of respondents for strongly Disagree (5) and N = Total number of respondents. The data analysis is determined to establish the relative importance of various factors that contribute to effective road infrastructure development and to investigate the magnitude or significance of the problem.

The study will be validated through triangulation of data, where data collected from multiple sources will be compared and validated to ensure accuracy and reliability of the findings. And also, the research design will be reviewed by experts in the field to ensure the validity and reliability of the methods used.

3.7. Methods of Data Presentation and Interpretation

The analyzed data were presented using tables, diagrams, plans and maps and were accompanied by textual discussion. Tables, illustrations, floor plans and maps are organized and listed in a way that makes important relationships clear and self-explanatory. After the study has been conducted according to the previously identified methods, the analyzes performed on the samples taken are interpreted for the population and conclusions are drawn therefrom.

CHAPTER FOUR

RESULTS, ANALYSIS AND DISCUSSION

4.1. Introduction

This chapter introduces the survey results which are analyzed by using frequency distribution and presents the results of the analysis on the main issues related to studies on the impact of integrated land use planning on road infrastructure development in Addis Ababa city.

4.2. Survey results and discussions

This section shows the results, analysis and discussions obtained from the surveyed organization. The survey results are discussed in more details in this section to explore and evaluate the existing impact of land use planning on road infrastructure development in Addis Ababa city.

4.2.1. The response rate of the questionnaire

Table 4.1 presents the response rate of the questionnaire. The result shows that the response rate from the Addis Ababa city government plan and development commission is much more than the response rate of other office (see Figure 4.1).

Table 4.1 Frequency distribution of sample respondents

Organization	**Questionnaire issued/number of questionnaires**	**Responses**	**% of Responses**
Addis Ababa city government plan and development commission	54	36	67
Addis Ababa city road authority	31	23	74
Addis Ababa city integrated infrastructure office	10	9	90

4.2.2 Study population year of experience and profession

A. Years of experience of the person in-charge of land use planning and road infrastructure

Table 4.2 presents the work experience of participants. It indicates that the highest percentage of respondents are highly experienced in Urban planning and road infrastructure field that enables them to determine the critical impact of integrated land use planning on road infrastructure development.

Table 4.2 Year of experience of person

variable		Professionals	
		No.	%
Year of Experience	0-5 Years	21	31
	5-10 Years	36	52
	10-15 Years	7	10
	Above 15 Years	6	8
	Total	68	100

B. Job title of the professional

Table 4.3, shows that the highest number of job title is the urban planner who has the whole vision about all of land use planning details and the lowest number is the project Architect title. It is good to be like that but the number of Architect who participates has to be increased for better performance of land use planning.

Table 4.3 Percent distribution of professionals according to their job title

Variable		professional	
		No.	%
Job Title	Urban planner	27	39
	Civil engineer	32	47
	Architect	7	10
	other	4	5
	Total	68	100

4.2.3. Land use planning practice on road infrastructure

A). importance of integrated land use planning for road infrastructure

Table 4.4 indicates 52 % of the respondents agree that the importance of integrated land use planning for road infrastructure is very important and their perception may arise from the linkage between land use planning and road infrastructure. However, from the researcher's point of view, they should evaluate this not only from their interest in getting the work they execute and, in the profit; they gain, but also in delivering the works with the desired quality and within the scheduled time.

32% of the respondents report that the importance of integrated land use planning for road infrastructure is somewhat important. Few respondents (8%) label the importance is somewhat unimportant.

Table 4.4 Percent distribution of importance of integrated land use planning for road infrastructure

Variable		Professional	
		No.	%
Importance of integrated land use planning for road infrastructure	Very important	36	52
	Somewhat important	22	32
	Somewhat unimportant	6	8
	Very unimportant	0	0
	Neutral	7	10

B) Performance of integrated land use planning on road infrastructure

Table 4.5 indicates 53 % of the respondents agree that the performance of integrated land use planning for road infrastructure is good and their perception may arise from their work experience inthe sector. 11% of the respondents report that the performance of integrated land use planning for road infrastructure is bad and their basic reason for this is lack of competent and experienced professionals as well as insufficient of required information to prepare land use planning etc. The other reason given by some of the respondents for the bad performance of such practices is lack of published and unique rule to perform land use planning. Few respondents (8%) label the practice very bad. They indicate the reason for that is insufficient of required information to prepare land use planning. 32% of respondent agree performance of integrated land use planning on road infrastructure is very good.

Table 4.4 Percent distribution of performance of integrated land use planning on road infrastructure based on professionals

Variable		Professional	
		No.	%
Performance of integrated land use planning on road infrastructure	Very good	21	32
	Good	38	53
	Bad	9	11
	Very bad	6	8
	Other	0	0

C) Performance of proper land use planning to achieve road infrastructure goals

Table 4.5 indicates 63 % of the respondents agree that the performance of integrated land use planning to achieve road infrastructure goal is competent and their perception may arise from the application of land use planning for road infrastructure in Addis Ababa city. 23% of the respondents report that the proper land use planning is vital to optimize road infrastructure to achieve the goal is incompetent and their basic reason for this is limited experienced professionals who involved in landuse planning as well as lack of diligence by planner due to insufficient time etc. The other reason given by some of the respondents for the bad performance of such practices is lack of published and unique rule to perform land use planning. Few respondents (8%) label the practice very incompetent.They indicate the reason for that is lack of guidelines or established standards to follow. 16% of respondent agree proper land use planning for road infrastructure is very competent.

Table 4.5 Percent distribution of proper land use planning to optimize road infrastructure

Variable		Professional	
		No.	%
Performance of integrated land use planning on road infrastructure	Very competent	11	16
	Competent	43	63
	Incompetent	17	23
	Very Incompetent	6	8

D) Degree of usage of land use planning tools and techniques for road infrastructure

As shown on table 4.6, the majority of the respondents report that technology is tool and techniques used for land use planning in road infrastructure and from the researcher point of view the technology they use are software such as GIS. In other observation, the least used tool by the respondents for land use planning in road infrastructure is subdivision and land infrastructureordinance.

Table 4.6 Degree of usage of land use planning tools and techniques for road infrastructure

Tools	Usage degree					
	Yes		No		Somewhat	
	No.	%	No.	%	No.	%
Zoning ordinances	29	42	21	31	18	26
Subdivision and land infrastructure ordinance	12	17	32	47	24	35
Master plans	31	45	9	13	18	26
Community input	21	31	8	12	39	57
Technology	39	57	26	41	3	1
Public participation	50	73	18	27		
Environmental impact assessments	10	15	27	40	31	45
Economic analysis	0		10	15	58	85
Legal analysis	6	8	38	56	24	35

E) Policies or regulations implemented to improve integration of land use planning on road infrastructure

Table 4.7 indicates 43 % of the respondents agree that polices or regulation are implemented to improve integrated land use planning on road infrastructure. 41% of the respondent's report that polices or regulation does not implement to improve integrated land use planning on road infrastructure. Few respondents (16%) label they do not have idea.

Table 4.7 Percent distribution of implementation of polices or regulation to improve integrated land use planning on road infrastructure

Variable	Response %		
	Yes	No	I have no idea
Polices or regulation implemented to improve integration of land use planning on road infrastructure	43	41	16

4.2.4. Impact of land use planning on road infrastructure

A) Road infrastructure content affected by land use planning

Table 4.8. Analysis of road infrastructure content affected by land use planning

Variable	Mean	Rank
Location for road infrastructure	1.50	4
Type of road infrastructure	1.63	3
Amount of road infrastructure	1.77	2
Density of road infrastructure	1.89	1

Mean value between 1 and 2 indicate the result is within agree and strongly agree.

Variable	Pearson coefficient ®	R2(Goodness of fit)	ANOVA (P-value)	T-test
Traffic congestion	0.98	0.96	0.001	-1.2
road infrastructure length	0.95	0.91	0.001	-1.67
Road safety	0.93	0.86	0.001	1.36
Environmental impact(noise)	0.91	0.84	0.001	2.53

R2(goodness of fit) 0.96,0.91,0.86 and 0.84 indicate impact of land use on traffic congestion, road infrastructure length, road safety and environmental impact is 96%,91%,93% and 91% respectively. Pearson coefficient is positive it indicates that there is positive relationship between the above variable and land use planning. R2 is positive it indicates that there is positive relationship between the above variable and land use planning. ANOVA significant value (P-value) is 0.001 that is less than 0.05 mean the statically analysis is significant. The analysis also indicates positive and negative t test values that indicate the independent variable have positive and negative impact on dependent variable.

B) Benefit from integrated land use planning

Table 4.9 indicates 45 % of the respondents agree that is the majority of response agree integrated land use planning reduce congestion. 4% of that is a smaller number of respondents report that thebenefit of integrated land use planning is to reduce environmental impact.

Table 4.9 Percent distribution of benefit of integrated land use planning

Variable	Professional	
	No.	%
Improved traffic flow	13	19
Better public transportation	11	16
Reduced congestion	31	45
Reduced environmental impact	3	4
Improved pedestrian and cyclist safety	5	6
Improved accessibility of public facilities	5	6
other	-	-

C) Land use pattern change

Table 4.10 indicates 88 % of the respondents that is the majority of response agree there is land use pattern change in Addis Ababa city. From those respondents 53% indicate land use pattern change is residential expansion and 29% describe there is also commercial expansion in the city. 12% of that is a smaller number of respondents‟ report that there is no land use pattern change in Addis Ababa city.

Table 4.10 Percent distribution of benefit of integrated land use planning

Variable	Professional													
	Yes										No		I have no idea	
	R		C		I		A		O		No.	%	No.	%
	No.	%	No.	%	No.	%	No.	%	No.	%				
Land use pattern change	36	53	20	29	4	5					8	12		

R= residential expansion C= commercial expansion I= industrial expansion

A= agricultural expansion O= other

D) Method to improve impact of integrated land use planning on road infrastructure

Table 4.11 indicates 53 % of the respondents agree that increase financial resource for planning and implementation will improve the impact of integrated land use planning on road infrastructure. Fewer 8% of that indicate strengthen political system will improve impact of integrated land use planning on road infrastructure. 29% and 10% of the respondent's state to improve impact of integrated land use planning on road infrastructure it is better to improve coordination among stakeholder, increase community participation respectively.

Table 4.11 Percent distribution of method to improve impact of integrated land use planning on road infrastructure

Variable	Professional	
	No.	%
Increase financial resource for planning and implementation	39	53
Improve coordination among stakeholders	18	29
Increase community participation	7	10
Strengthen political will	6	8
other	-	-

4.2.5. Challenges and opportunities to improve integration of land use planning on road

A) Factor affecting success of integrated land use planning on road infrastructure

Table 4.13 Analysis distribution of method to improve impact of integrated land use planning on road

Variable	Mean	Rank
Political support	1.63	4
Public participation	1.74	1
Data and analysis	1.71	2
Technology	1.64	3
Financial resource	1.5	6
Population growth	1.47	7
Environmental concerns	1.62	5

Mean value between 1 and 2 indicate the result is within agree and strongly agree.

Variable	Pearson coefficient (R)	R2 (goodness of fit)	ANOVA (P-value)	T-test
Political support	0.97	0.94	0.001	-0.4
Public participation	0.93	0.87	0.001	2.8
Data and analysis	0.91	0.85	0.001	1.7
Technology	0.98	0.93	0.001	-0.5
Financial resource	0.97	0.95	0.001	-3.7
Population growth	0.97	0.94	0.001	-3.5
Environmental concerns	0.97	0.95	0.001	-0.4

Pearson coefficient is positive it indicates that there is positive relationship between the above variable and land use planning. R2 is positive it indicates that there is positive relationship between the above variable and land use planning. ANOVA significant value (P-value) is 0.001 that is less than 0.05 mean the statically analysis is significant. The analysis also indicates positive and negative t test values that indicate the independent variable have positive and negative impact on dependent variable.

B) Challenges for implementing integrated land use planning on road infrastructure

Table 4.14 indicates 52 % of the respondents agree that insufficient funding is the challenge for implementing integrated land use planning on road infrastructure. Fewer 8% of that indicates lack of expertise and technical capacity is challenges for implementing integrated land use planning on road infrastructure. 31%, 9% and 2% of the respondents state the challenges for implementing integrated land use planning on road infrastructure are lack of political wills, resistance from the public and difficulty in coordinating with other stakeholders respectively.

Table 4.14 Percent distribution of challenges for implementing integrated land use planning on roadinfrastructure

Variable	Professional	
	No.	%
Lack of political wills	20	31
Insufficient funding	37	52
Lack of expertise and technical capacity	6	8
Resistance from the public	5	9
Difficulty in coordinating with another stakeholder	2	2
other	-	-

C) Activities to improve integration of land use planning on road infrastructure

Table 4.15 indicates 50 % of the respondents agree that providing technical assistance and expertise is Activity performed to improve integration of land use planning on road infrastructure. Fewer 7% of that indicates allocating resource Activity to improve integration of land use planning on road infrastructure. 30% and 11% of the respondents state the Activities to improve integration of land use planning on road infrastructure are setting policies and regulations, Encouraging stakeholder engagement respectively.

Table 4.15 Percent distribution of Activities to improve integration of land use planning on roadinfrastructure

Variable	Professional	
	No.	%
Setting policies and regulations	20	30
Allocating resources	6	7
Encouraging stakeholder engagement	8	11
Providing technical assistance and expertise	34	50
other	-	-

D) Mitigation measure to improve challenges of integrated land use planning on road infrastructure

Table 4.15 indicates 44 % of the respondents indicate that mitigation measures are applied to improve challenges of integrated land use planning on road infrastructure. Fewer 18% of that indicates Mitigation measure to improve challenges of integrated land use planning do not Applied on road infrastructure. 10% of the respondent's state some mitigation measures have taken to improve challenges of integrated land use planning on road infrastructure.

Table 4.15 Percent distribution of Activities to improve integration of land use planning on roadinfrastructure

Variable	Professional	
	No.	%
Applied	30	44
Not Applied	12	18
Somewhat Applied	26	38

4.2.6. Problem during land use plan preparation and implementation

A) Public involvement in integrated land use planning for road infrastructure

Table 4.16 indicates 88% of the respondents that is the majority of response agree there is public involvement in integrated land use planning for road infrastructure. From those respondents 52% indicate public forums and town hall meetings is public involvement about integrated land use planning for road infrastructure and 45% describe there is also survey and opinion polls for public involvement in integrated land use planning for road infrastructure in Addis Ababa city

Table 4.16 Percent distribution of public involvement in integrated land use planning for road infrastructure

Variable	Professional											
	Yes										No	
	PF		SM		SO		PH		O		No.	%
	No.	%	No.	%	No.	%	No.	%	No.	%		

Public involvement in integrated land use planning for road infrastructure	36	52	16	24	8	11	-	-	-	-	8	12

PF= Public forums and town hall meetings SM= social media campaigns

SO= surveys and opinion polls PH= public hearing and consultation

O= other

B) Success of road infrastructure due to integrated land use planning

Table 4.17 indicates 52 % of the respondents indicate there is success of road infrastructure due to integrated land use planning. From those respondents 53% indicate effective coordination among different stakeholders is key to success. Strong political will, community participation and adequate financial resource get 12 % 10% 26% from the respondent reason for Success of road infrastructure due to integrated land use planning indicates 48 % of the respondents indicate there is no success of road infrastructure due to integrated land use planning. From those respondents 53% indicate limited financial resource is challenge to success.

Table 4.17 Percent distribution of Success of road infrastructure due to integrated land use planning

Variable	Professional																			
	Yes										No									
	SP		CP		AF		EC		O		LF		LP		LC		P		O	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Success of road infrastructure due to integrated land use planning	7	10	9	13	10	14	10	14	-	-	6	9	8	12	-	-	9	13	9	13

SP= Public forums and town hall meetings AF= social media campaigns

CP= surveys and opinion polls EC= public hearing and consultation

O= other LF= limited financial resource

LP= lack of political will LC= lack of community participation

P= poor coordination among different stakeholder

C) Loss occurs due to improper land use planning on road infrastructure

Table 4.18 indicates 56 % of the respondents indicate that Loss occur due to improper land use planning on road infrastructure is quality problems on road infrastructure. Fewer 7% of that indicates low economic growth is Loss occur due to improper land use planning on road infrastructure. 10% of the respondent's state Poor productivity from transportation sector Loss occurdue to improper land use planning on road infrastructure.

Table 4.18 Percent distribution of Activities to improve integration of land use planning on roadinfrastructure

Variable	Professional	
	No.	%
Quality problems on road infrastructure	38	56
Poor productivity from transportation sector	18	26
Low economic growth	5	7
Other	7	9

4.2.7. Road infrastructure management practice with land use planning activity

A) Conditions for road management practice with land use planning activities

Table 4.19 Analysis of method to improve impact of integrated land use planning on road infrastructure

Variable	Mean	Rank
Condition of road infrastructure management	1.63	3
Funding for road infrastructure management	1.82	1
Policies and regulation for road infrastructure management	1.81	2
Level of public awareness of road infrastructure management	1.7	3

Mean value between 1 and 2 indicate the result is within agree and strongly agree.

Variable	Pearson coefficient (R)	R2 (goodness of fit)	ANOVA (P-value)	T-test
Condition of road infrastructure management	0.90	0.82	0.001	-0.68
Funding for road	0.97	0.94	0.001	1.42

infrastructure management				
Policies and regulation for road infrastructure management	0.96	0.93	0.001	-1.52
Level of public awareness of road infrastructure management	0.97	0.94	0.001	1.31

Pearson coefficient is positive it indicates that there is positive relationship between the above variable and land use planning. R2 is positive it indicates that there is positive relationship between the above variable and land use planning. ANOVA significant value (P-value) is 0.001 that is less than 0.05 mean the statically analysis is significant. The analyses also indicate positive and negative t test values that indicate the independent variable have positive and negative impact on dependent variable.

B) Factor contributing for road infrastructure management with land uses planning activity

Table 4.19 indicates 72 % of the respondents agree that Lack of funding is Factor contributing for road infrastructure management with land uses planning activity. Fewer 6% of that indicates harsh weather conditions are Factor contributing for road infrastructure management with land uses planning activity. 57%, 58% and 80% of the respondent's state inadequate maintenance practices, Poor construction quality and Heavy traffic volume respectively.

Table 4.19 Analysis of Factor contributing for road infrastructure management with land usesplanning activity

Variable	Mean	Rank
Lack of funding	1.63	2
Inadequate maintenance practices	1.75	1
Poor construction quality	1.52	3
Harsh weather conditions	1.64	2
Heavy traffic volume	1.47	4

Mean value between 1 and 2 indicate the result is within agree and strongly agree.

Variable	Pearson coefficient (R)	R2 (goodness of fit)	ANOVA (P-value)	T-test
Lack of funding	0.97	0.95	0.001	0.24
Inadequate maintenance practices	0.92	0.84	0.001	3.32
Poor construction quality	0.98	0.97	0.001	-2.60
Harsh weather conditions	0.97	0.95	0.001	0.24
Heavy traffic volume	0.97	0.95	0.001	-2.52

Pearson coefficient is positive it indicates that there is positive relationship between the above variable and land use planning. R2 is positive it indicates that there is positive relationship between the above variable and land use planning. ANOVA significant value (P-value) is 0.001 that is less than 0.05 mean the statically analysis is significant. The analysis also indicates positive and negative t test values that indicate the independent variable have positive and negative impact on dependent variable.

B) Challenges in management of road infrastructure with land use planning activity.

Table 4.20 Analysis of Challenges in management of road infrastructure with land use planning activity

Variable	Mean	Rank
Limited budget	1.51	5
Difficulty in obtaining necessary resources and materials	1.77	2
Limited access to modern technology and equipment	1.89	1
Inadequate staff training and infrastructure	1.63	3
Lack of cooperation between different levels of government	1.55	4

Mean value between 1 and 2 indicate the result is within agree and strongly agree.

Variable	Pearson coefficient (R)	R2 (goodness of fit)	ANOVA (P-value)	T-test
Limited budget	0.98	0.97	0.001	-2.6
Difficulty in obtaining necessary resources and materials	0.92	0.85	0.001	1.8
Limited access to modern technology and equipment	0.91	0.82	0.001	2.02

Inadequate staff training and infrastructure	0.95	0.91	0.001	-1.04
Lack of cooperation between different levels of government	0.97	0.94	0.001	-1.3

Pearson coefficient is positive it indicates that there is positive relationship between the above variable and land use planning. R2 is positive it indicates that there is positive relationship between the above variable and land use planning. ANOVA significant value (P-value) is 0.001 that is less than 0.05 mean the statically analysis is significant. The analysis also indicates positive and negative t test values that indicate the independent variable have positive and negative impact on dependent variable.

C) Road infrastructure management for effective transportation need

Table 4.21 indicates 52 % of the respondents agree that the Road infrastructure management for effective transportation need is effective. 10% of the respondents report that the Road infrastructure management for effective transportation need is not effective at all and other response rate is as below.

Table 4.21 Percent distribution of Road infrastructure management for effective transportation need

Variable		Professional	
		No.	%
Road infrastructure management in addressing transportation need	Very effective	20	30
	effective	37	52
	Neutral	-	-
	Disagree	6	8
	Not effective at all	7	10

D) Condition of road infrastructure management with land use planning activities

Table 4.21 indicates 52 % of the respondents agree that the Condition of road infrastructure management with land use planning activities is good. 8% of the respondents report that theCondition of road infrastructure management with land use planning activities is very poor and other response rate is as below.

Table 4.21 Percent distribution of Road infrastructure management for effective transportation need

Variable		Professional	
		No.	%
Condition of road infrastructure with land use planning activity	Excellent	-	-
	Good	36	52
	Fair	19	30
	Poor	7	10
	Very poor	6	8

E) Effective strategy for improving road infrastructure management with land use planning

Table 4.22 indicates 59 % of the respondents agree that the Implement advanced technologies and equipment is good for improving road infrastructure management with land use planning. 8% of the respondents report that the upgrade construction standards are not that match for Effective strategy for improving road infrastructure management with land use planning and other response rate is as below.

Table 4.22 Percent distribution of Effective strategy for improving road infrastructure management with land use planning

Variable	Professional	
	No.	%
Increase funding for maintenance and repair	7	10
Improve maintenance practices and quality	7	10
upgrade construction standards	6	8
Implement advanced technologies and equipment	40	59
Increase staff training and infrastructure	8	11
other	-	-

4.3. Qualitative Result and Discussion

Semi-structured interviews were carried out to enhance and validate questionnaire results as part of data triangulation. The interview targeted 9 professionals working for 5 of them working for Addis Ababa city government plan and development commission, 3 from Addis Ababa city road authority, and 1 from Addis Ababa integrated infrastructure office. Interview participants were drawn from those who filled in the questionnaire for the reason of triangulating the data and to collect reliable and first-hand information. It took 30 - 40 minutes to interview each of the respondents. The purposewas to obtain an in-depth understanding as well as background information on the impact ofintegrated land use planning on road infrastructure. Interviewees‟ were requested to respond to one of themain objectives of the research

4.3.1. Main purposes and principles considered when integrating land use planning and road infrastructure

Sustainable Urban Development that has the primary purpose is to promote sustainable urban development by ensuring that land use planning and road infrastructure development are coordinated. Efficient Land Use with the integration aims to promote efficient land use by strategically locating roads and infrastructure to support the city's development goals. It involves identifying areas suitable for various land uses, such as residential, commercial, industrial, and recreational zones, and designing road networks that facilitate connectivity and accessibility.

Transportation Accessibility is also the other purpose in the integration emphasizes providing efficient transportation accessibility for residents, businesses, and visitors. Road infrastructure development is coordinated with land use planning to ensure that different areas of the city are well- connected, reducing travel distances and promoting multi-modal transportation options, including public transit, walking, and cycling. The other purpose is Traffic Management and Safety so with Effective integration considers traffic management and safety as key principles. It involves planning road networks and infrastructure in a way that optimizes traffic flow, minimizes congestion, and enhances road safety for all road users. This may include measures such as traffic calming, pedestrian-friendly designs, and the provision of dedicated cycling lanes.

4.3.2. Main challenges and limitations faced in executing integrated land use planning in relation to road infrastructure

The interview indicates that executing integrated land use planning in relation to road infrastructure in a city can present several challenges and limitations. Some of the main ones include: Stakeholder Coordination that integrated land use planning involves coordination among various stakeholders, including government agencies, community groups, developers, and residents. Achieving consensus and coordinating diverse interests can be challenging, as different stakeholders may have conflicting priorities and perspectives. Ensuring effective collaboration and engagement throughout the planning process can be time-consuming and require skilled facilitation and also Institutional Capacity for Implementing integrated land use planning requires strong institutional capacity within government agencies responsible for planning and infrastructure development. In addition to that Data Availability and Accuracy in integrated land use planning relies on accurate and up-to-date data on factors such as population, land use, transportation patterns, and infrastructure needs. However, gathering comprehensive data can be challenging, especially in developing or rapidly growing cities. Limited availability of data and inconsistencies in data sources can hinder accurate analysis and decision-making.

4.3.3. Importance of integrating land use planning on road infrastructure

Based on the interview point of view Integrating land use planning and road infrastructure in Addis Ababa city holds several important benefits and importance's. These include: Efficient Land Utilization that Integrating land use planning with road infrastructure development enables optimal use of available land. By strategically aligning transportation networks with land use patterns, it allows for compact and efficient development. This can help minimize urban sprawl, reduce travel distances, and enhance the overall efficiency of the city's land use. Improved Accessibility and Connectivity in Integrating land use planning and road infrastructure ensures better accessibility and connectivity within the city. Well-planned road networks can enhance connectivity between residential areas, commercial centers, industrial zones, and recreational facilities. This promotes easier and more convenient movement of people, goods, and services, thereby improving overall mobility and quality of life. In addition to that it Enhanced Traffic Management that the integration of land use planning and road infrastructure assists in managing traffic effectively. By considering land use patterns and transportation needs, it enables the design of road networks that mitigate

Congestion and optimize traffic flow. This includes the implementation of intelligent transportation systems, traffic calming measures, and the provision of appropriate parking facilities.

4.3.4. Integrated land use planning influenced the development and maintenance of road infrastructure

The interview indicates that integrated land use planning has had significant influences on the development and maintenance of road infrastructure in Addis Ababa city. Some of the key impacts are: Improved Accessibility and Connectivity: Integrated land use planning aims to enhance accessibility and connectivity within the city. By strategically locating roads and transportation infrastructure, it improves connectivity between residential areas, commercial centers, industrial zones, and recreational facilities. This ensures that residents have convenient access to essential services, employment opportunities, and recreational amenities, thus improving overall quality of life. And also, Traffic Management and Safety that integrated planning takes into account traffic management and safety considerations. Road infrastructure development includes measures to manage traffic flow, such as the design of intersections, traffic signals, and dedicated turn lanes. Additionally, it incorporates safety features like pedestrian crossings, traffic calming measures, and improved signage to enhance road safety for all users.

4.3.5. Integration of land use planning and road infrastructure does affect the accessibility and connectivity

The integration of land use planning and road infrastructure has a significant impact on accessibility and connectivity within different areas of Addis Ababa city. Here's how it affects these aspects: Reduction of Transportation Barriers: The integration of land use planning and road infrastructure aims to minimize transportation barriers and improve equity. By providing well-connected road networks, including sidewalks, pedestrian crossings, and cycling lanes, it enhances accessibility for vulnerable populations, such as pedestrians, cyclists, and people with disabilities. This reduces transportation barriers, promotes inclusivity, and ensures that all residents can easily access different areas of the city. And also, Multi-Modal Transportation Options: The integration of land use planning and road infrastructure promotes multi-modal transportation options, which further enhances accessibility within different areas of the city.

4.3.6. Integration of land use planning on road infrastructure

The interview state that to improve the integration of land use planning and road infrastructure in Addis Ababa city, several measures can be taken: Strengthen Collaboration and Coordination: Enhance collaboration and coordination among different government agencies responsible for land use planning and road infrastructure development. Establish mechanisms for regularcommunication, information sharing, and joint decision-making to ensure a cohesive approach. Involve residents, community groups, and other stakeholders in consultations, workshops, andpublic hearings. Seek their input and feedback to ensure that the planning process reflects the diverse needs and aspirations of the city's population

4.3.7. Strategies or methods implemented to mitigate the negative impacts of road infrastructure

From the response of the interview In Addis Ababa city, several strategies and methods have been implemented to mitigate the negative impacts of road infrastructure development on the environment and communities. Some of these include: Non-Motorized Transportation Infrastructure:Addis Ababa has prioritized the development of non-motorized transportation infrastructure, such aspedestrian-friendly sidewalks and dedicated cycling lanes. These infrastructure improvements encourage active transportation, reduce dependence on motorized vehicles, and contribute to improved air quality and community health.

4.3.8. Data and analysis methods used to assess the effectiveness and impact of integrated land use planning on road infrastructure

The interviewee indicate that In Addis Ababa city, various data and analysis methods are used to assess the effectiveness and impact of integrated land use planning on road infrastructure. Some of the key data and analysis methods include: Geographic Information System (GIS) Analysis that is used to gather, analyze, and visualize spatial data related to land use, road networks, population distribution, and infrastructure. GIS allows planners to overlay different layers of information,identify patterns, and assess the spatial relationships between land use and road infrastructure. It aidsin understanding the current state of the city, identifying areas for improvement, and evaluating the impact of proposed interventions. Surveys and Stakeholder Engagement such as interviews, focus

groups, and public consultations, are conducted to gather qualitative and quantitative data on community perceptions, preferences, and experiences related to integrate land use planning and road infrastructure. These methods provide valuable insights into the effectiveness and impact of planning decisions on various stakeholders and help in identifying areas for improvement.

From existing land use and road infrastructure of Addis Ababa city finding drawn include that commercial and business center, mixed residence and green area exist that is problem for proper road network so to improve that it is better to increase financial resource for road infrastructure construction. The main highway from Akaki kality to Garment improved traffic flow, reduced congestion and improve accessibility to public facilities. Most of the city is covered by mixed residence that impact efficient transport network in city so to mitigate it multimodal connection should be performed. In Addis Ababa city most of manufacturing and storage area located at Kality and Bole Lemi area so that area is environmental sensitive area relative to other area in Addis Ababa city. Public facility is dispersed that require construction of road infrastructure. Most of the administrative center of the city is located at junction of Kirkos and bole sub city. And also, Addis Ababa city structural plan (2017-2027) proposed mixed residence and environmentally friendly area are major land use type in proposed structural plan. Most of the proposed road network are around industrial zone in Kality and Bole Lemi area.

CHAPTER FIVE
CONCLUSION AND RECOMMENDATION

This chapter contains conclusions and recommendations that correspond to research objectives, taking into account the results, analyses, and discussions. The research conducted has revealed someof the issues related to integrate spatial planning of road infrastructure. Recommendations from the assessment will help improve the impact of land use planning on road development.

Conclusion

An assessment of land use planning and implementation of road infrastructure was carried out in the study area. The researchers therefore concluded that land-use planning and its implementation were highly effective due to internal and external influencing factors. The creation of the city's structural plan had a factor that made the plan contagious. Factors affecting quality include lack of funding as well as lack of public participation. In addition, the effectiveness of plan implementation was also hampered by factors such as lack of policy and authority involvement, lack of implementation tools, skilled workforce, and lack of community awareness. In general, the following conclusions were drawn from the results and analysis:

1. The majority of the respondents agree the importance of integrated land use planning for road infrastructure.
2. Almost above half of the respondents agree that the performance of integrated land use planning for road infrastructure is good and their perception may arise from their work experience in the sector.
3. The majority of the respondents report that technology is tool and techniques used for land use planning in road infrastructure and from the researcher point of view the technology theyuse are software such as GIS. In other observation, the least used tool by the respondents for land use planning in road infrastructure is subdivision and land infrastructure ordinance.
4. Analysis Pearson coefficient is positive it indicates that there is positive relationship between road infrastructure content and land use planning and land use planning have positive significant effect on extent and density of road infrastructure. Many of the respondents agree there is land use pattern change in Addis Ababa city. From that majority respondent indicate land use pattern change is residential expansion.

5. Above half of the respondents agree that increase financial resource for planning and implementation will improve the impact of integrated land use planning on road infrastructure.
6. Analysis Pearson coefficient is positive it indicates that there is positive relationship between factor affecting success of land use planning and land use planning. And also, data analysis and public participation have positive significant
7. Half of the respondents agree that providing technical assistance and expertise is Activity performed to improve integration of land use planning on road infrastructure.
8. Analysis Pearson coefficient is positive it indicates that there is positive relationship between road infrastructure management practice and land use planning activity in Addis Ababa.There is also positive significance impact of funding on road management by land useplanning.
9. More than half of the respondents that is the majority of response agree there is public involvement in integrated land use planning for road infrastructure. From those respondents almost half of respondent indicate public forums and town hall meetings is public involvement about integrated land use planning for road infrastructure.
10. Analysis Pearson coefficient is positive it indicates that there is limited budget, inadequate training and lack of corporation challenge to effectively implement road management in Addis Ababa.
11. Above half of the respondents indicate that Loss occur due to improper land use planning on road infrastructure is quality problems on road infrastructure.
12. Most of Addis Ababa city is covered by mixed residence and major road network exist around industrial area in the city

Recommendation

Recommendation for improving impact of integrated land use planning on road infrastructure in Addis Ababa city includes:

- In-service training should be provided to educate professionals and staff on land use planning and implementation. Implementation tools such as GPS, total station, software such as GIS and his AutoCAD should also be available to the professional.
- Formulate and apply appropriate policies, rules and regulations in land use planning and implementation. Authorities are obliged to enforce them and transfer inconsistent and improperly implemented land uses to road infrastructure.
- Municipal governments and competent authorities should require developers to monitor land use development and act in accordance with recommended road infrastructure planningnorms, principles, rules and regulations.
- Public participation should be employed in land use planning implementation and required disciplinary should be incorporated in land use planning team for road infrastructure.
- To minimize impact of integrated land use planning on road infrastructure Implement proposed structural plan road network.

References

1. Addis Ababa city structure plan 2017-2027, Addis Ababa city, Ethiopia
2. Aljoufie, M., Zuidgeest, M., Brussel, M., & van Maarseveen, M. (2012). Integrated land use and transport planning in Jeddah: policy assessment and simulation. In CODATU XV: The role of urban mobility in (re) shaping citiesCODATU.
3. Ashenafi D.(2018). Effects of Land Use Forms and Pattern on the Demand for Publictransport (The case of Addis Ababa, Asko – Merkato- Piassa Corridor). Addis Ababa university institute of technology.
4. Belay, A. A. (2017). Major land development challenges of Addis Ababa city from the perspective of general land development procedures of the country. International review of humanities and scientific research.
5. Belete, D. A. (2011). Road and urban storm water drainage network integration in Addis Ababa: Addis Ketema Sub-city. Journal of Engineering and technology research, 3(7), 217-225.
6. Belsti A. (2018) Analysis of Land Use and Transportation Demand Interactions in Addis Ababa: (a Case Study: Akaki Kality Sub City) Addis Ababa science and technology university
7. Berhane, H. (2017). Land use Planning Strategies and their Impacts on Public Transportation Supply of Addis Ababa (Mesalemiya-Kolfe-Aserasement Mazoriya-Lekuwanda Area).
8. Briassoulis, H. (2020). Analysis of land use change: theoretical and modeling approaches.
9. Dagnachew, A. G. (2007). Integrating Transport and Land Use Policies for Sustainable Development; Theory and Practice. A study of suburbs of Addis Ababa, Ethiopia.
10. Day, K. L. (2006). Assessing the impact of highway development on land use/land cover change in Appalachian Ohio (Doctoral dissertation, Ohio University).
11. Deakin, E. (1989). Land use and transportation planning in response to congestion problems: A review and critique (Vol. 1237, No. 1237-1244, p. 77). Transportation Research Board, The National Academies of Sciences, Engineering, Medicine.
12. Delphin, S., Snyder, K. A., Tanner, S., Musálem, K., Marsh, S. E., & Soto, J. R. (2022). Obstacles to the Development of Integrated Land-Use Planning in Developing Countries: The Case of Paraguay. Land, 11(8), 1339.

13. Dube, E. E. (2013). Urban planning & land management challenges in emerging towns of Ethiopia: The case of Arba Minch. Journal of Urban and Environmental Engineering, 7(2), 340-348.
14. Dur, F., & Yigitcanlar, T. (2015). Assessing land-use and transport integration via a spatial composite indexing model. International Journal of Environmental Science and Technology, 12, 803-816.
15. Enoguanbhor, E. C., Gollnow, F., Walker, B. B., Nielsen, J. O., & Lakes, T. (2021). Key Challenges for Land Use Planning and Its Environmental Assessments in the Abuja City-Region, Nigeria. Land, 10(5), 443.
16. Esti, D. R. S., Woltjer, J., & Hasanov, M. (2014). Evaluation in Integrated Land-Use Management: Towards an Area-Oriented and Place-Based Evaluation for Infrastructure and Spatial Projects.
17. Fernando, M. S. (2001). Integration of road planning and land use planning, Australian experience. SATC 2001.
18. Gebeyehu, Z. H., Woldegiorgis, S. B., Belete, A. D., Abza, T. G., & Desta, B. T. (2017, March). Ethiopia‟s move to a national integrated land use policy and land use plan. In Proceedings of the 2017 World Bank Conference on Land and Poverty. Washington DC (p. 28).
19. Gidebo, F. A., & Szpytko, J. (2019). Reliability assessment of the transport system, Addis Ababa case study. Journal of KONBiN, 49(4), 27-36.
20. Hadi Hadi, P. L., Wasanta, T., & Santosa, W. (2021, November). Land use change due to road construction. In IOP Conference Series: Earth and Environmental Science (Vol. 920, No. 1, p. 012003). IOP Publishing.
21. Harumain, Y. S., & Morimoto, A. (2013). Factors determining land use and transportation planning achievement in developing countries. WIT Transactions on Ecology and the Environment, 179, 315-325.
22. Hawbaker, T. J., Radeloff, V. C., Hammer, R. B., & Clayton, M. K. (2005). Road density and landscape pattern in relation to housing density, and ownership, land cover, and soils. Landscape ecology, 20, 609-625.

23. Heeres, N., Tillema, T., & Arts, J. (2016). Dealing with interrelatedness and fragmentation in road infrastructure planning: An analysis of integrated approaches throughout the planning process in the Netherlands. Planning theory & practice, 17(3), 421-443.
24. Henríquez-Dole, L., Usón, T. J., Vicuña, S., Henríquez, C., Gironás, J., & Meza, F. (2018). Integrating strategic land use planning in the construction of future land use scenarios and its performance: The Maipo River Basin, Chile. Land Use Policy, 78, 353-366.
25. Jahantigh, H. R., Masoudi, M., & Jokar, P. (2019). A quantitative approach to land use planning using GIS–A case study of Chabahar County, Iran. European Journal of Environmental Sciences, 9(1), 12-20.
26. Jedlička, J., Havlíček, M., Dostál, I., Huzlík, J., & Skokanová, H. (2019). Assessing relationships between land use changes and the development of a road network in theHodonín region (Czech Republic). Quaestiones Geographicae, 38(1), 145-159.
27. Kleemann, J., Inkoom, J. N., Thiel, M., Shankar, S., Lautenbach, S., & Fürst, C. (2017). Peri-urban land use pattern and its relation to land use planning in Ghana, West Africa. Landscape and Urban Planning, 165, 280-294.
28. Koroso, N. H., Zevenbergen, J. A., & Lengoiboni, M. (2020). Urban land use efficiency in Ethiopia: An assessment of urban land use sustainability in Addis Ababa. Land Use Policy, 99, 105081.
29. Kothari. C.R. ,1990,Research Methodology:Methods and Techniques ,2nd ed , New Age International Publisher ,New Delhi .
30. MBURU, S. N. (2017). Influence of project planning on sustainability of road construction projects in Nairobi City County, Kenya: A case of China Wuyi Company Limited (Doctoral dissertation, mua).
31. Mekonnen, M. (2012). Evaluation of land use planning and implementation with respect to environmental issues in Sululta town (Doctoral dissertation, Thesis Advisor: Hailu worku (phd), Ethiopian Institute of Architecture, Building, Construction and city Development/EiABC).
32. Nuriye, G. (2015). Implementation Challenges of Proposed City Plan in Ethiopia: A Critical Evaluation of Transportation Oriented Land Use Changes in Hawassa City. Journal of Natural Sciences Research, 5(5), 5.

33. Oruonye, E. D. (2014). An assessment of the impact of road construction on land use pattern in urban centres in Nigeria, A case study of Jalingo LGA, Taraba StateNigeria. Mediterranean Journal of Social Sciences, 5(10), 82.
34. Sanchez, T. W. (2004). Land use and growth impacts from highway capacity increases. Journal of urban planning and development, 130(2), 75-82.
35. Yaakup, A., Bakar, S. Z. A., & Sulaiman, S. (2004). Integrated land use assessment (ILA) for planning and monitoring urban development. Universiti Teknologi Malaysia.
36. Yang, T., Guan, X., Qian, Y., Xing, W., & Wu, H. (2019). Efficiency evaluation of urban road transport and land use in Hunan Province of China based on hybrid data envelopment analysis (DEA) models. Sustainability, 11(14), 3826.
37. Zeng, C., Zhao, Z., Wen, C., Yang, J., & Lv, T. (2020). Effect of complex road networks on intensive land use in China‟s Beijing-Tianjin-Hebei urban agglomeration. Land, 9(12), 532.

Appendix I: Survey Questionnaire

Ethiopian Civil Service University

College of Urban planning and infrastructure

Masters in urban planning and Development

Dear Respondents this is a deliberate survey for Masters Research work, on the issue of the impact of integrated land use planning on road infrastructure in Addis Ababa, in the Department of urban planning and infrastructure of Ethiopian Civil Service University and it is firmly trustworthy. Your individual response will not be debated with, or on the loose to, anyone else. So, your responses are used only for academic purposes, for writing the thesis. Please note that your personal details or affairs are not required in the survey. Your responses will be secured with a code number only. Please complete all questions because missed responses cannot be included in the analysis.

Research objectives

- To examine the current land use planning practices in Addis Ababa city and their effectiveness in balancing road infrastructure.
- To assess the impact of land use planning on road infrastructure and the effectiveness of land use planning in mitigating any negative impacts on road infrastructure in Addis Ababa city.
- To identify the challenges and opportunities for improving the integration of land use planning on road infrastructure in Addis Ababa city.
- To identify problem during land use plan preparation and implementation in Addis Ababa city. To
- examine the current condition of road infrastructure management practice with land use planning activities in Addis Ababa.

Thank you in advance for your heartfelt cooperation

Part I: General Information

Tick (√) "ONLY ONE" of the answers provided

1. What is your educational background?

☐ High school ☐ Diploma

☐ Bachelor's degree ☐ Master's degree ☐ Doctoral degree

2. What is your occupation?

☐ Urban planner

☐ Civil engineer

☐ Architect

Other (please specify) _____

3. How familiar are you with the integrated land use planning on road infrastructure Practices In Addis Ababa city?

☐ Very familiar

☐ Somewhat familiar

☐ Not familiar at all

. 4. How long have you been working in field of land use planning and/or road infrastructure?

☐ 0-5 years

☐ 5-10 years

☐ 10-15 years

☐ Above 15 years

Part II: Perception about the current land use planning practices on road infrastructure in Addis Ababa city

Tick (√) "ONLY ONE" of the answers provided

5. How important do you think integrated land use planning for road infrastructure in Addis Ababa city?

☐ Very important ☐ somewhat important

☐ Neutral ☐ somewhat unimportant ☐ Very unimportant

6. In general, how do you describe the performance of the integrated land use planning Practice on road infrastructure in Addis Ababa?

☐ Very Good ☐ Good ☐ Bad ☐ Very Bad

Other (Please specify) _____

If your answer is bad or very bad, what challenges may have contributed in your opinion for the poor performance? (Please check all that apply in your point of view)

☐ Lack of competent and experienced professionals

☐ Inappropriate and malpractices in the land use planning (fraud, corruption etc.)

☐ Insufficient of required information to prepare land use planning

☐ Lack of published and unique rule to perform land use planning

Other (Please specify) _____

7. Proper land use planning is vital to optimize road infrastructure. How does a land use planning practice in Addis Ababa perform to achieve these goals?

☐ Very Competent ☐ Competent ☐ Incompetent ☐ Very Incompetent

If it is incompetent or very incompetent, what factor(s) do you believe behind the problem?

☐ Lack of skilled professional in land use planning and road infrastructure

☐ Limited experienced professionals who involved in land use planning

☐ Lack of guidelines or established standards to follow

☐ Lack of diligence by planner due to insufficient time

Other (Please specify) _____

8. To what extent you evaluate the degree of usage of the following tools and techniques in land use planning for road infrastructure in Addis Ababa city?

No.	Tools	Usage degree		
		Yes	No	Somewhat
1	**Zoning ordinances**			
2	**Subdivision and land infrastructure ordinance**			

3	**Master plans**			
4	**Community input**			
5	**Technology**			
6	**Public participation**			
7	**Environmental impact assessments**			
8	**Economic analysis**			
9	**Legal analysis**			

9. Are there any policies or regulations that could be implemented to improve the integration of land use planning on road infrastructure in Addis Ababa city?

☐ Yes ☐ No ☐ I have no idea

10. If you answered "yes" to above question please provide details on the policies or regulations that could be implemented to improve the integration of land use planning on road infrastructure.

_____

_____

_____

_____

_____

_____

Part III: Perception about the impact of land use planning on road infrastructure in Addis Ababa city

11. How do you rate the following road infrastructure content affected by land use planning in Addis Ababa?

No.	Content	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
1	**Location for road infrastructure**					
2	Type of road infrastructure					
3	**Extent of infrastructure**					
4	**Density of road infrastructure**					

12. Which benefits you observed from integrated land use planning in Addis Ababa city? (Select all that apply)

☐ Improved traffic flow ☐ reduced congestion

☐ Better public transportation ☐ Improved pedestrian and cyclist safety

☐ Reduced environmental impact ☐ improved accessibility to public facilities

☐ Other (please specify): _____

13. Have you noticed any changes in land use patterns in Addis Ababa city over the past five years?

☐ Yes

☐ No

☐ I have no idea

14. If yes, what kind of changes have you observed in land use patterns?

☐ Residential expansion

- ☐ Commercial expansion
- ☐ Industrial expansion
- ☐ Agricultural expansion
- ☐ Other (please specify) _____

15. How can improve impact of integrated land use planning on road infrastructure in Addis Ababa city?
    - ☐ Increase financial resources for planning and implementation
    - ☐ Improve coordination among stakeholders
    - ☐ Increase community participation
    - ☐ Strengthen political will
    - Other (please specify) _____

Part IV: Perception about challenges and opportunities for improving the integration of land use planning on road infrastructure in Addis Ababa city

16. Do you think integrated land use planning can improve road infrastructure in Addis Ababa city?

☐ Strongly agree ☐ Agree ☐ Neutral ☐ Disagree ☐ strongly disagree

17. How do you rate the following factor affect the success of integrated land use planning on road infrastructure in Addis Ababa?

No.	Factor	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
1	**Political support**					
2	**Public participation**					
3	**Data and analysis**					
4	**Technology**					
5	**Financial resources**					
6	**Population**					

	growth					
7	**Environmental concerns**					

18. What challenge do you mention for implementing integrated land use planning on road infrastructure in Addis Ababa city? (Select all that apply)

☐ Lack of political wills ☐ Lack of expertise and technical capacity

☐ Insufficient funding ☐ Resistance from the public

☐ Difficulty in coordinating with another stakeholder's

Other (please specify): _____

19. Which roles, activities are being performed by city administration in improving the integration of land use planning on road infrastructure in Addis Ababa city?

☐ Setting policies and regulations

☐ Allocating resources

☐ Encouraging stakeholder engagement

☐ Providing technical assistance and expertise

Other (please specify) _____

20. Does mitigation measurement applied to improve challenges of integrated land use planning on road infrastructure in Addis Ababa?

☐ Applied

☐ Not Applied

☐ Somewhat Applied

Part VI: Perception about problem during land use plan preparation and implementation in Addis Ababa city.

21. Is there public party involved in integrated land use planning for road infrastructure in Addis Ababa city?

☐ Yes ☐ No

22. If yes, how do you think the public can be involved in the integrated land use planning process for road infrastructure? (Select all that apply)

☐ Public forums and town hall meetings ☐ Surveys and opinion polls

☐ Social media campaigns ☐ public hearings and consultations

☐ Other (please specify): _____

23. Do you think there is success in road infrastructure due to integrated land use planning in Yeka sub city?

☐ Yes ☐ No

24. If yes, what are the key factors that have contributed to the success of integrated land use planning for road infrastructure in Addis Ababa city?

☐ Strong political will

☐ Community participation

☐ Adequate financial resources

☐ Effective coordination among different stakeholders

Other (please specify) _____

25. If no, what are the key factors that have hindered the success of integrated land use planning on road infrastructure in Addis Ababa city?

☐ Limited financial resources

☐ Lack of political will

☐ Lack of community participation

☐ Poor coordination among different stakeholders

Other (please specify) _____

26. What loss will occur due to improper land use planning on road infrastructure?

☐ Quality Problems on road infrastructure

☐ Poor Productivity from transportation sector

☐ Low economic growth

Other (Please specify) _____

Part V: Perception about the current condition of road infrastructure management practices with land use planning activity in Addis Ababa city

27. How do you rate the adequacy of the following terms on current road infrastructure management practice with land use planning activity in Addis Ababa?

No.	terms	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
1	condition of road infrastructure management					
2	funding for road infrastructure management					
3	policies and regulations for road infrastructure management					
4	level of public awareness of road infrastructure management					

28. How do you rate the following factor contributing to the current condition of road infrastructure with land use planning activity in Addis Ababa city?

No.	Factor	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
1	Lack of funding					
2	Inadequate maintenance practices					
3	Poor construction quality					
4	Harsh weather conditions					
5	Heavy traffic volume					

29. How do you rate the following challenges in the management of road infrastructure with land use planning activity in Addis Ababa city?

No.	Challenges	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
1	Limited budget					
2	Difficulty in obtaining necessary resources and materials					
3	Limited access to					

	modern technology and equipment					
4	Inadequate staff training and infrastructure					
5	Lack of cooperation between different levels of government					

30. To what extent are the current road infrastructure management practices effective in addressing the transportation needs of the community with land use planning activities?

☐ Very effective ☐ effective ☐ Neutral ☐ Disagree ☐ Not effective at all

31. How would you rate the current condition of road infrastructure with land use planning activities in Addis Ababa city?

☐ Excellent ☐ Good ☐ Fair ☐ Poor ☐ Very poor

32. What are the most effective strategies for improving road infrastructure management and maintenance with land use planning activities in Addis Ababa city?

☐ Increase funding for maintenance and repair
☐ Improve maintenance practices and quality
☐ Upgrade construction standards
☐ Implement advanced technologies and equipment
☐ Increase staff training and infrastructure

Other (please specify): _____

Name of researcher student: ……. Date of Survey: …… Signature ……

Annex 2: - Interview Questions

I am Gediyon Addis master of urban planning and development student in Ethiopian civil service university and This checklist is a research instrument for the study on impact of Integrated Land use Planning on road infrastructure in Addis Ababa city: This interviewing will remain is strictly confidential and your feedback will be used as input for the infrastructure of the research work which is dedicated as totals combined with those of other respondents for academic purposes only.

Research objectives

- To examine the current land use planning practices in Addis Ababa city and their effectiveness in balancing road infrastructure.
- To assess the impact of land use planning on road infrastructure and the effectiveness of land use planning in mitigating any negative impacts on road infrastructure in Addis Ababa city.
- To identify the challenges and opportunities for improving the integration of land use planning on road infrastructure in Addis Ababa city.
- To identify problem during land use plan preparation and implementation in Addis Ababa city. To
- examine the current condition of road infrastructure management practice with land use planning activities in Addis Ababa.

Thank you in advance for your heartfelt cooperation

Date of Interview.....

1. What are the main purposes and principles considered when integrating land use planning and road infrastructure development in Addis Ababa city?
2. What are the main challenges and limitations faced in executing integrated land use planning in relation to road infrastructure city?
3. What do you believe are the importance of integrating land use planning on road infrastructure in Addis Ababa city?
4. How has integrated land use planning influenced the development and maintenance of road infrastructure in Addis Ababa city?
5. How the integration of land use planning and road infrastructure does affect the accessibility and connectivity within different areas of Addis Ababa city?
6. How can the integration of land use planning on road infrastructure be improved in Addis Ababa city?

7. What strategies or methods have been implemented to mitigate the negative impacts of road infrastructure development on the environment and communities in Addis Ababa city?
8. What data and analysis methods are used to assess the effectiveness and impact of integrated land use planning on road infrastructure in Addis Ababa city?

DECLARTION

This thesis is the result of my own research and has not been submitted as a course to another university. Additionally, all materials used in the work are properly cited.

Candidate

Name_____

Signature _____

EXAMINERS' APPROVAL SHEET

We, the undersigned, members of the Board of Examiners of the final open defense by Gediyon Addis have read and evaluated his thesis entitled "impact of integrated land use planning on road infrastructure development in Addis Ababa city" and examined the candidate. This is, therefore, to certify that the thesis has been accepted with very good grade in partial fulfillment of the requirements for the degree of Master of Science (M.Sc.) of urban planning and development from Ethiopian civil service university.

Name of Advisor	Signature	Date
Name of Internal Examiner	Signature	Date
Name of External Examiner	Signature	Date
Name of Chairperson	Signature	Date