ADDIS ABABA UNIVERSITY

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Title- PUBLIC TRANSPORTATION SYSTEM: THE CASE OF ADDIS ABABA

By

MULU ESHETE

A THESIS SUBMITTED TO THE SCHOOL OF GRADUATE STUDY OF ADDIS ABABA UNIVERSITY IN PARTIAL FULFILLMENT OF THE REQUIREMENT FOR THE MASTERS DEGREE IN GEOGRAPHY AND ENVIRONMENTAL STUDIES

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This is to certify that the thesis prepared by Mulu Eshete, entitled: ***Public Transportation System: The Case of Addis Ababa*** and submitted in partial fulfillment of the requirements for the Degree of Master of Arts complies with the regulations of the University and meets the accepted standards with respect to originality and quality.

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Advisor: _____Signature_____ Date _____

I declare that this thesis is my original work. It has not been presented for a degree in any other university and all sources of materials used for the thesis have been fully acknowledged.

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ACRONYMS AND ABREVITIONS

AA - Addis Ababa

AACRA - Addis Ababa City Roads Authority

AACTA - Addis Ababa City Transport Authority

AATB - Addis Ababa Transport Bero

AATPA - Addis Ababa Traffic Police Authority

AAU - Addis Ababa University

ACBE - Anbessa City Bus Enterprise

AU - African Union

CBD - Central Business District

CDP - Comprehensive Development Plan

CSA - Central Statistics Agency

ERA - Ethiopian Roads Authority

FDRE - Federal Democracy Republic of Ethiopia

GDP - Growth Domestic Production Growth

GPS – Global Positioning System

LRT- Light Rail Transit

ORAAMP - Office for the Revision of Addis Ababa Master Plan

PTC – Public Transport Corporation

SPSS - Statistical Package for Social Science

UN - United Nations

UNECA - United Nations Economic Commission of Africa

Abstract

The major modes of public transportation in the Addis Ababa are anbessa bus, minibus taxis, star alliance bus, higer midi-bus and salon taxi. In addition, public service bus, white minibuses and cross – country bus are serving the city. The presence of an efficient public transport system creates a safe, sustainable and equitable urban mobility. The residents of Addis Ababa have to face great inconveniences, as well as additional costs to the daily trips to their destinations. This study evaluates the extent to which the public transport in Addis Ababa has an impact on the urban mobility of the city. It also assesses the possible strategies and approaches that can be devised to enable this mode play a significant role in mitigating the worsening level of congestion that we see in the city at this moment. The study mainly relies on secondary data for its analysis and findings; however primary data has also been generated and analyzed with the help of sample surveys and structured interviews and attempts to identify the major factors that contribute to the high demand for public transport system in the city. The increasing population size and physical expansion of Addis Ababa largely contributes to the demand for public transport. However, the existing public transportation system could not satisfy the demand. Moreover, the insufficient finance for investment by the government and the limited participation of the private sector in the service has also contributed for deficiency of transport supply in the city. The overall findings of this study revealed that despite the fact that an efficient public transport system is the best way to maximize urban mobility, in reality this mode of transport is in a critical condition to begin with in Addis Ababa. Furthermore it has been observed that increasingly heavier reliance on vehicles with small passenger carrying capacity, such as private automobiles and mini bus taxi, is resulting in congested junctions, with heavy traffic. Other factors such as the existence of only one dominant core area in the city, demand overlap that emanates from the similar working hours that are observed for almost all institutions in the city have also been identified to be the main drawbacks that need to be addressed to create an efficient public transport system in Addis Ababa. Finally the paper puts suggestions that revolve around policy issues and decision making considerations.

Key words: *Transportation, Mobility, congestion, demand, Transportation System*

CHAPTER ONE: INTRODUCTION

1.1. Background of the Study and Problem Formulation

Today, Addis Ababa is facing with huge challenges emanating from years of poor coordination in its existing urban systems. Transport, one of these components of the urban system, which is responsible for bridging the gap between areas of production and consumption, as well as creating a medium for spatial interaction, continues to be in the these challenges. The lack of properly planned urban transport in Addis-Ababa is manifested through the low degree of efficiency of urban mobility that is now observed in almost all of the city's center, sub-centers and other major traffic corridors.

Urban mobility, which is increasingly becoming inefficient in Addis Ababa and resulting in congestion, can be viewed as a function of various components of the urban transport system problems. These elements are traffic management, and transport infrastructure.

Congestion is becoming a common experience in all the different parts of the city due to the lack of consistent concerted efforts from the various stakeholders and police makers. It is also in part a result of the numerous socio-economic factors whose combined effect is to increase the pull factor of the city of Addis Ababa and hence resulting in an ever increasing population. This in turn makes the battle to curb the gap between the demand for an efficient urban transportation system and the city's ability for its provision, a seemingly perpetual one.

Public transportation or public transit is a shared passenger transport service which is available for use by the general public, as distinct from modes such as taxicab, carpooling or hired buses, which are not shared by strangers without private arrangement. Public transportation in Addis is the blue-white line "taxies" which are shared minibuses, anbessa bus, higer bus and star alliance bus. Public transportation in the Ethiopia is a crucial part of the solution to the nations economic, energy, and environmental challenges - helping to bring a better quality of life. In increasing numbers, people are using public transportation and local communities are expanding public transit services. Every segment of Ethiopian society - individuals, families, communities, and businesses - benefits from public transportation.

The public transport system, is one of such elements mentioned above, with regards to the urban transport systems, that can be a valuable area of focus in this battle against congestion with all its socio-economic implications in particular and urban mobility in general. In light of the preceding scenario this paper on the public transport sector of the city of Addis Ababa with a general objective of providing solutions and suggesting measures that should be taken to make it play a leading role toward maximizing urban mobility.

Mobility in the developing world is often characterized by travel demand that far exceeds supply *(Darido, 2003)*. The city of Addis Ababa is not an exception to this reality. Demand for urban public transport services is growing in the same way as in other Third-world cities *(Jacobs et al. 1986).*

Public transportation is an important element in day-to-day activities in Addis Ababa because: It is a relatively affordable means of transportation, infrastructure is not sufficient to promote private vehicle ownership, and it promotes reduction of environmental pollution and traffic accidents. Even though the role of public transportation is noteworthy, the service provision is not good enough as the demand is much greater than the supply. As the population and the number of passengers increase, service should be expected to grow. This is not practically true in the city because of financial and managerial constraints. Despite prevailing problems, efforts to make an empirical study of the transportation in the city are insignificant. Therefore, this study focuses on public transportation system the case of Addis Ababa. The following figure shows the Causes of public transportation problems in Addis Ababa.

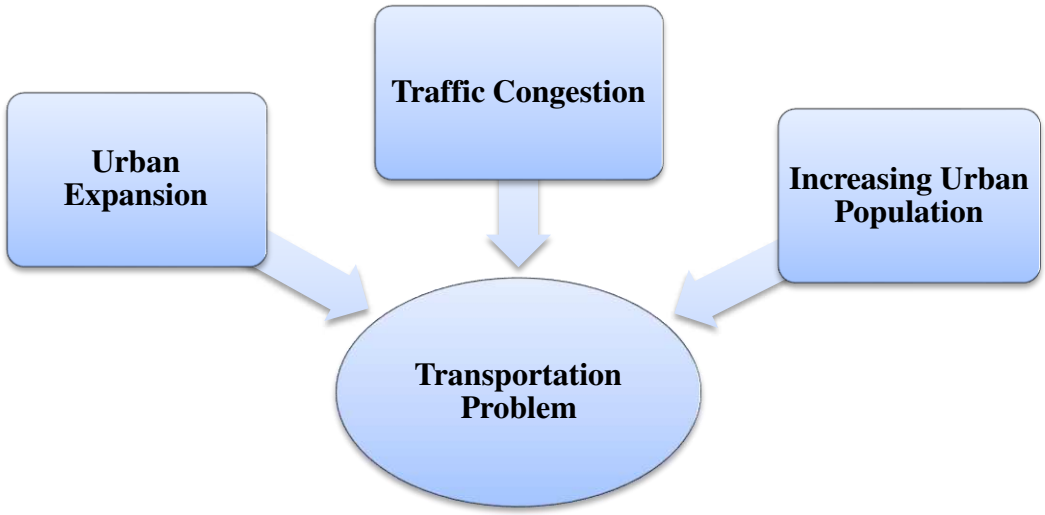


Figure1.1: Causes of public transportation problems in Addis Ababa

1.1.1. Addis Ababa City Profile

Addis Ababa, which is the capital city of Ethiopia, was founded in 1886 by Manlike II. The city is only 129 years old. There were three main factors that contributed for the permanence of as the capital city of Ethiopia, since many cities have been capital cities along the history of Ethiopia.

1. The introduction of eucalyptus (a tree that grows very fast and provides a lot of wood for energy and cooking),
2. The proclamation for legalizing private ownership of urban land in 1907, and
3. The completion, mainly by the French, of the Addis Ababa – Djibouti Railway in 1917.

It has an expanded area of over 540sq.km, and is situated at an altitude of about 2500 meters above sea level. Administratively, the city is subdivided into ten sub cities and ninety-nine kebeles. Addis Ababa is also an unofficial capital city of Africa, largely due to the fact that it hosts various international organizations such as the African Union (AU), United Nations (UN), and Economic Commission of Africa (ECA) and so on. The city has experienced several planning changes that have influenced its physical and social growth.

The transport network of Addis Ababa is characterized by poorly maintained streets and sidewalks coupled with occupation of sidewalks by economic and human activities, subsequent use of vehicle lanes by pedestrians, for walking, mounting buses, and taxis. Overall the city transport system suffers from many inadequacies. The primary roads of the city include two east-west and north-south axial, a newly built “ring road” and a number of other roads.

Only a small proportion of roads and streets have hard paving or asphalt. Due to the topography and unplanned and uncontrolled growth of the city, certain areas of Addis Ababa are without coverage by transport network suitable for vehicular traffic. These include slums and shanty quarters but also blocks with permanent housing and other facilities. At the same time there are some streets and roads in the urban center built properly and with grandiosity. However, some of these roads do not actually have any useful links to the other existing road network and thus, carry only little traffic. *(CSA, 2014)*

The traffic in Addis Ababa in general, is characterized by features that are common to many metropolitan cities of the developing world. Some of these common features include:-

i. Very high proportion of pedestrian trips
ii. Small number of public service vehicles compared to the population
iii. Relatively large number of medium size private taxis, pick-ups and mini buses mainly running on lines
iv. Relatively less number of buses running on lines.

Other more rare and peculiar features of traffic in Addis Ababa include

i. Negligible number of bicycles and motorcycles
ii. Higher number of pack animals on certain routes and during times of the day
iii. 'Live' transport of cattle, sheep and goats, especially around special holidays

Today the public transport system of the city of Addis Ababa which mainly consists of the city bus and shared taxi is facing significant challenges due to the following key and general problems:

i. The continued spatial growth of the city horizontally or urban sprawl is becoming a major cause for the increase of travel distances. This phenomenon discourages people from resorting to non-motorized transport modes such as walking and cycling and results in an increased demand for public transport.
ii. Furthermore the demand for public transport services in Addis Ababa is growing at a rapid rate due to the continued rise in population.

Furthermore the limited growth of Addis Ababa City Bus Enterprise (Anbessa), the only institution tasked with the cumbersome function of pubic mass transport, in comparison with the fast growing number of passengers continues to show huge disparities.*(ORAAMP, 2010)*

1.2. Objective

1.2.1. The General objective

The main objective of the research is to investigate possible strategies and approaches to improve the public transportation system to play a major role in creating safe, sustainable, and equitable urban mobility in the context of Addis Ababa.

1.2.2. Specific objectives

1) To review historical development transportation in general and public transport in particular;
2) To assess the availability and conditions of public transport system of Addis Ababa;
3) Assess the existing transport system with special emphasis on mass transport;
4) Study the problems of the system and the relationship with other supporting systems such as the existing road network, the local development plans, traffic management, and the like;
5) Examine the relevance of the public transportation system in alleviating the imbalance between transportation systems as a whole and the ever growing urban population in the city of Addis Ababa.

1.3. Research Questions

Urban transportation system is an effect of various actors in an urban area such as spatial dimensions, road networks, traffic management system, socio-economic profile and different public modes. The present study's main research question is there for;

i. What possible strategies and approaches exist to enable the public transport system play a major role in mitigating the worsening level of transportation in Addis Ababa?
ii. How is the balance between the provisions of an efficient transportation system, urban expansion, and the high population growth rate of Addis Ababa?
iii. Why have the current efforts by the concerned institutions, such as building of new roads, increasing the number of automobiles rendering public transport services, tightening of traffic safety regulations and so on, not been able to curb the level of road congestion or decrease the average travel time?

1.4. Research Methodology

1.4.1. Data Collection Technique and Source

This paper tries to demonstrate facts and findings by using (data and information) primary and secondary sources. The secondary data was mostly obtained from such sources as published and unpublished documents collected from pertinent institutions as the city bus enterprise, Addis Ababa roads authority, taxi associations, Addis Ababa traffic police, and central statistics agency (CSA), Addis Ababa city transport authority, and different research papers studied by the former office for the revision of Addis Ababa master plan (ORAAMP).

Surveys were made with subjects under varying circumstances such as taking bus rides, riding in mini bus taxis, waiting in line for a bus to come and the like. This is aimed at giving a glimpse of the public transport sector at work. The survey was carried out with the help of data collectors that were given adequate briefings in order to enable them conduct their survey efficiently.

1.4.2. Case Study as a Research Strategy

Even though this research could have been carried out with the help of secondary data alone, a case study, primary data, has been identified so as to be able to assess the socio- economic aspects of the public transport sector. This was done with the help of semi structured interviews with the subjects of the survey, questionnaires, in depth open ended interviews with the pertinent government officials, and personal observations that have been depicted both in terms of photographs and writings.

1.4.3. Sampling

The case study covers a general assessment of mobility along the east-west axis from “Ayertena” to “Legehar”, which is one of the busiest and most congested routes in the city and also it can be the best axis to study because one can get different kinds spots like the main transit spot “Tor Hailoch” which may have train station that is coming soon. The other reason is that there is a study made by researchers on that street so that it is very easy to get information. The primary data for the analysis was obtained in three major ways:-

1. Questionnaire Surveys

I. These were conducted on subjects, 300 used randomly from passengers, drivers, workers and students for who are relying on the public transport sector, the city bus, higer bus, star alliance bus and the shared taxi, along this line. Here special emphasis was given to the particular times of the day when the sample was taken, i.e. surveys were conducted both on and off peak hours. Furthermore deliberate focus was given to such major public transport transit areas as Legehar, Mexico, Lideta, Tor Hailoch, Total, Zenebwork and Ayertena.

II. The conditions under which this sample questionnaire was surveyed have varying characteristics. This was done in order to get a real feel of the public transport system in operation. To this end, samples were taken of subjects actually taking a ride on a bus, others waiting in line for one to come and still others hustling on early mornings to get a taxi.

The questionnaire prepared to collect the primary data in general has three parts. The first part of this survey deals with the socio-economic characteristic of the subjects of the study; to know the basic issues in play in the decision making with regards to choice of travel-mode. The second part of the analysis deals with the travel behavior of the subjects; to see demand patterns of the public transport, Lastly, a set of questions, which were aimed at getting a brief feedback about the current status of the public transport sector were forwarded to the subject of the survey.

2. On-site Traffic Count

Traffic count of the different modes of motorized urban transport that exist in the city of Addis Ababa was conducted at selected junctions along the route. These junctions were selected based upon the degree of congestion observed especially at peak hours. Therefore based on the various observation sessions, which are depicted below with the help of pictures, seven principal locations were pinpointed. These are Ayer Tena, Zenebework, Total, Tor Hailoch, Lideta, Mexico, and Legehar.

3. In depth Interviews

The last and the third sources of primary data are informal discussions made with taxi drivers and with people moving around the study area. This was aiming at knowing the attitudes and reflections of the citizen on the functions of the public transportation system, namely the city bus, higer bus, star alliance bus, public bus and the shared taxi as it exists now. This is aimed at providing the social context in which these transport modes operate.

1.4.4. Data Analysis

After collection of the research data the analysis of the data by using SPSSvs16, and its interpretations then follows. The analyses of the collected information from the different sources are organized into their representative categories so as to come up with logical results. In dealing with the qualitative analysis based on the evidence collected from the different sources, an effort was made to carefully understand and interpret the information to use it together with the quantitative data.

1.5. Significance of the study

This research document is of significant in terms of the following aspects:-

i. The outcome of this study will able to assess the public transport sector of Addis Ababa from as many angles as possible. Hence the end result will give a comprehensive overview of the constraints as well as the potentials that this mode of transport offers.
ii. The outcome of this research can also be used as a springboard for further studies in the urban transport area.
iii. This study will also be significant in terms of providing the necessary resource in light of the possibility of future urban transport intervention projects that might be proposed or even carried out.

1.6. Scope of the Study

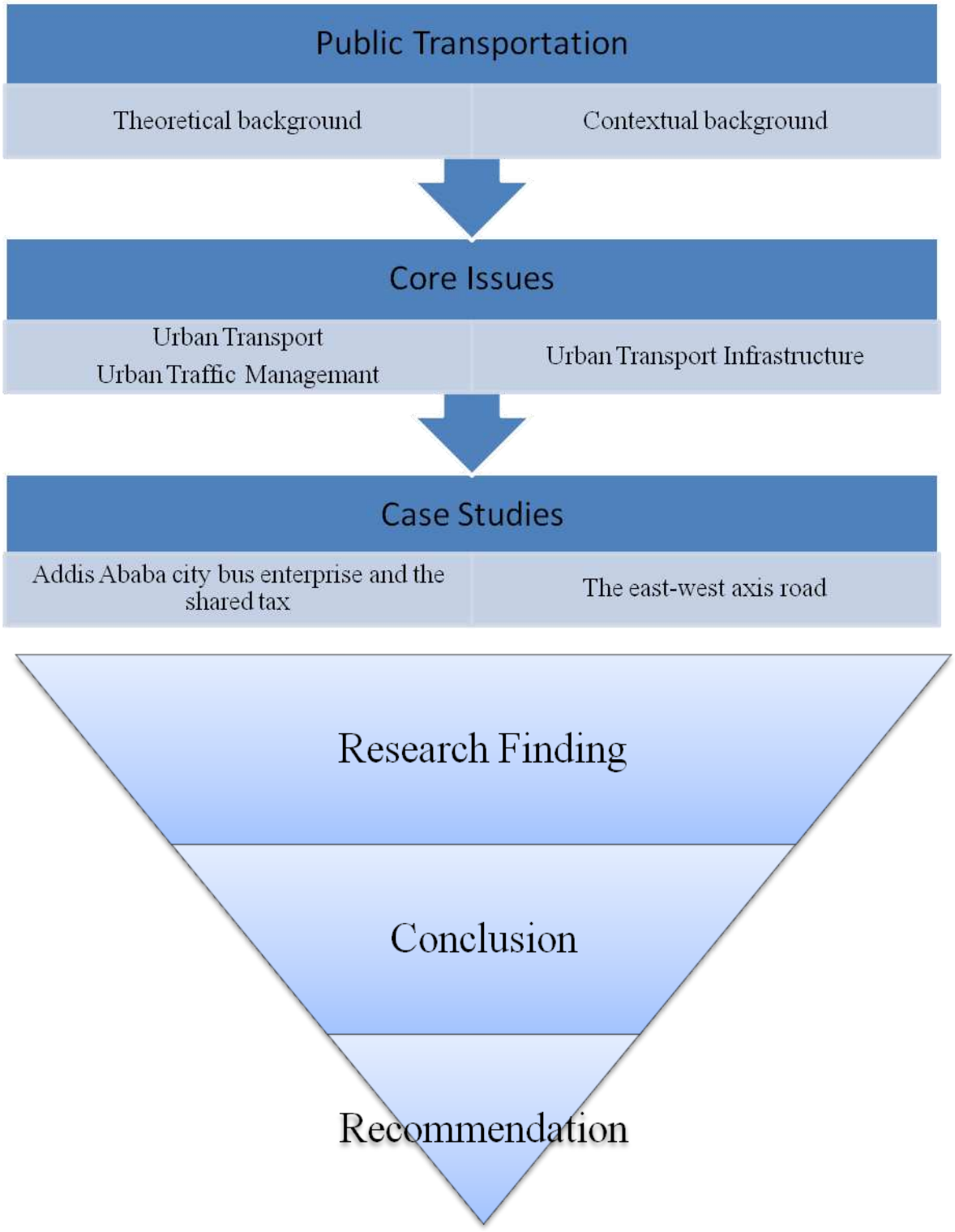
The scope of this study is very much limited to the study of the role the public transportation system in urban mobility as it pertains to the city of Addis Ababa. Thus the paper will greatly dwell upon discussions about the six existing public transportation service operators that the resident has, these are the city bus enterprise, higer bus, star alliance bus, public serves bus, shared taxi and salon taxi.

In so doing the principal focus will be the discussion of their impact upon from Ayer Tena to Legehar of the city as it exists now. However the paper will limit itself to suggesting recommendations that can make this sector function more efficiently.

1.7. Limitations of the Study

i. Unwillingness of the subjects of the survey to disclose some important data such as financial income, family size and so on.
ii. Unavailability of up to date resources for and research and literature review.
iii. Financial limitation, and finally due to the fact that this study deals with wide to be difficult and it make asses to all of them but it figures out the public transportation system in the city and it helps to give attention for the problem and furthers study.

1.8. Structure of the Thesis



1.9. Organization of the thesis

This study has six main parts.

i. The first chapter is the introductory section which depicts the existing characteristics of public transportation system in Addis Ababa. This part also includes the following subtopics, objective, methodology, scope and rationale of the study.

ii. In the second chapter of this study literature review of relevant topics, namely, traffic management and transport infrastructure is presented from various sources.

iii. Chapter three gives the contextual background in general.

iv. Chapter four gives the analysis of urban transport system in Addis Ababa in detailed manners that have been discussed in the literature review.

v. This is followed by the fifth chapter of the study which deals with the case study presentation. Even though the research could have solely relied on secondary data, this part was included so as to be able to get primary data about the social aspect of public transportation system and also enrich the research.

vi. The final chapter presents summary, the findings of the study, conclusion, and recommendations.

CHAPTER TWO: LITERATURE REVIEW

2.1. Theoretical Framework

Introduction

Transport plays a vital role in the development of the modern era as an integral part of the socio-economic and political structure of the country. Thus urban transport, transport infrastructure, and traffic management should involve optimal integration of the means and ways of mobility to create maximum ease and comfort maintaining the socioeconomic and physical integration of the city.

It is well understood that the modernization and urbanization processes accelerate, the importance of this sector in providing accessibility and mobility reaches higher levels. Transport is an integral part of human life. Proper transport link enable efficient frequency of services, flow of passengers and commodity on (rail, roads, air, water) mode of travel. Transport theory (or the law) stresses strongly that whatever the mode will be, it should primarily consider the human aspect (i.e. safety, livability, economy, satisfaction…etc.).*(Peter and Christian, 1998)* This gives every individual the right to choose the services that he/she desires.

Transport and the different modes have evolved through time to where now in the quest to accommodate the complex pattern of the world trade and globalization, its magnitude and efficiency in the distribution process is continuously being brought into effect by technological and operational improvement.

The urbanization process increases substantially the demand for urban services such as transport, on whose efficiency and availability, the successful and continued existence of urban society depends. It has played a great role in the transformation of the society and facilities modernization at large. By so doing it has changed the lifestyle of society from traditional to modern. The level of motorization and cost of its accommodation directly correlates with trends in per capita income and the demand for urban transport is affected the city size and population.

The urban transport system should be modified and structured to contribute and operate within the principles and limitations of urban development planning by simultaneously considering and weighing several socioeconomic, spatial and other perspectives in the problem solving process. Hence, an efficient urban transport system can only be realized and sustainable through planning which responds adequately to movements requirements and offers guidelines for better and efficient use of investment serving as invaluable input for spatial development policy.

2.2. Urban Transport

Urban transport: - all types of means of transportation used in urban areas. *"It is commonly accepted that cities are the engines of growth in most developing as well as developed countries. More importantly, urban transport can be viewed as the oil that prevents this engine from seizing up." (ORAAMP, 2010)*

Transportation is also diverse. It is multi-sector and, as such, it needs to be fully integrated with other municipal sectors. New transport infrastructure must be part of a balanced urban development program including traffic demand management, public transport provision and supporting land use policies.

Economically, transport is an essential element of city development that, in turn, is a major source of national economic growth. Simply stated, poor transport inhibits growth. Furthermore, socially, transport is the means of accessibility to jobs, health education and social services essential to the welfare of the city residents. Deteriorating transport conditions affect all city residents; they impact particularly the poor through a decline in public transport service levels, increased length of the journey to work and other essential services and the negative impacts on environment, safety and security that the poor are least able to mitigate. *(World Bank, 2001)*

2.2.1. Urban Transport Problem

Even though, urban transport plays a big role in maximizing the rate of mobility of an urban population, it also has its own problems which are being observed in most cities nowadays. The urban transportation problem is actually a complex bundle of inter related problems. These problems can be grouped into three major categories: congestion, mobility and other additional impacts.

A. Congestion

Congestion causes increased costs for travelers and freight movement, loss of time, accidents, and psychological strain. (*Alan Black, 1995*) This is not simply congestion of transit vehicles during peak hours, congestion of pedestrian on sidewalks as well as congestion of bicycle. Congestion is neither a new phenomenon nor a role effect of automobile.

"*As soon as the increase of population is created a demand for wheeled traffic in Rome, the congestion became intolerable. One of Julius Caesar's first acts on seizing power was to ban wheeled traffic from the center of Rome during the day…. Just as motor car congestion now affects small towns as well as big ones, so the increase of animal-drawn vehicles impeded circulation everywhere. Hence Claudius extended Caesar's prohibition to the municipalities of Italy; and Marcus Aurelius, still later, applied it without regard to their municipal status to every town in the Empire*" *(Lewis Mumford, 1991)*

Congestion is what most people find objectionable about traveling in cities. It is the most common complaint. If there were no congestion, most people would be happy with their cars, and transportation would not be a widely discussed problem.

Congestion has several generic causes. *(Alan Black, 1995)*

i. The first is urbanization-the concentration of people and economic activities in urban areas.
ii. The second cause is specialization within cities. People want to travel between different land uses, which are dispersed around the city. Workplaces are concentrated in some areas, living places in other areas, and recreation activities in still others. But these activities are interdependent, and people must travel between them.
iii. The third cause is the problem of matching supply and demand temporally. Demand, however, varies greatly over the day; this is the peaking problem. It stems largely from

the Journey to work and the practice of having most people start and end their workdays at about the same time.

iv. A fourth cause of congestion is that supply often creates demand. Increases in transportation capacity can be self-defeating. A new highway that seems spacious when it opens may fill up with traffic in a few years.

B. Mobility

According to a paper of *(Akinyemi, 1998);* a new concept of mobility was introduced. It was shown that the level of mobility of a group of people is dependent on four main characteristics which are;

1. Traveling time budget of people.
2. Availability of transportation modes or services to the people.
3. The average speed at which the people can convey from one location to another by available modes.
4. The person carrying capacity of network of facilities.

It has also shown in Akinyemi (1998) that sustainable mobility requires, among other things, acceptable levels of environment impact, and costs of development and operation of transportation system etc. three main inferences can be made from these ideas.

The first inference is that sustainable mobility is significantly transportation supply dependent.

The better and more sustainable the supply characteristics of a transportation system, higher will be the level of mobility of peoples.

The second inference is that current levels of people mobility in many developing cities can be said to be low and unsustainable largely because of inadequate transportation supply characteristics. The inadequacy of transportation supply in many countries manifests mainly through inadequate public transportation services, low productivity and level of ride ability of facilities and high level of transportation related environmental impacts. For example, in many cities, it is difficult to move around by any mode of transportation wit out physically and/or mentally exhausted in the process.

Thousands of people wait for hours at public transportation stops while public transportation vehicles are unable to get to them because they are stuck in queues on the roads. In addition, walkways are often non-existent or in very poor condition. In places where there are walkways, pedestrians are often forced to walk on the streets due to market and trading activities occurring on the walk ways. Traffic delays are ubiquitous and rides by any vehicle are uncomfortable, unsafe and expensive because of inadequate law enforcement and presence of large crevices on many roads. Furthermore, there is little or no classification of roads in general and inadequate distributor and access roads in particular in many cities. Also, based on the results of studies such as *(TRRL, 1998)* the efficiencies of major roads in many cities seem to range between five to 25 percent.

The Third inference is that sustainable mobility can be engineered. That is, mobility can be sustainably enhanced through appropriate design and management of the facilities and the services they provide.In general mobility is one of the structural elements which influence the transformation of urban systems. Transport is discussed either as a spatial interaction or as a stage in the marketing process that bridges the gap between points of production and points of consumption. Transport plays probably the most important role in shaping the general structure and urban land use spaces and hence urban transport plays a crucial role in maximizing the degree of mobility.

C. Ancillary Impacts

The ancillary impacts of a transportation system or the externalities make up the third aspect of transportation problem. These are: land use (urban sprawl), energy consumption, environmental impact, land consumption, aesthetics, accidents, and disruption of urban fabric. (A detailed explanation of these impacts is given under the section that studies, the social impact of public transport system)

Land use: Fulfilling the resource requirements of a growing population, due to either migration or natural growth, ultimately requires some form of land-use change or urban expansion (urban sprawl) in order to provide for food, living space, recreation, infrastructure development and service provision. This in turn is easily manifested through the demand for an increased transport supply. However there has always been a major debate amongst land use and transport planners over which comes first, the development of land or the provision of transport. Does development

follow the availability of road infrastructure and/or rail, bus or taxi transport or does intensified land use and developments occurs which results in the demand for improved transport. *(J.D.Sampson, 1980)*

Energy consumption: Transport is a major and an increasing user of energy in modern society and road transport is responsible for a bulk of the energy consumed with in the transport sector. *(D.A. Blackleg, 1994)* identifies the combined effect of a number of factors that have contributed to increases road transport energy consumption as follows:-

i. Increases in the number of journeys resulting from the considerable growth in urban activities, and dispersion of the population.
ii. Increases in private vehicle ownership.

2.2.2. Urban Transport Modes

Urban transport is broadly categorized in to motorized or non-motorized modes. The choice of a particular mode of urban transport depends on such factors as accessibility and ease of operation. Non-motorized modes include animal drawn mode, walking mode, and bicycle. Whereas motorized modes includes railways, air plane, and vehicular and motor cycle.

2.2.3. Public Transport Modes: The History of Public Transport

The first public transportation known to history was introduced by the Romans, who established a system of vehicles for hire during the reigns of Emperors Augustus and Tiberius in 1995.*(Alan Black, 199*5). These two- or four-wheel wagons were stationed at inns every five or six miles along the fine highways for which the Romans were famous. Coaches that ran on regular schedules between major towns appeared in Europe during the 16th century. Stagecoaches were introduced in the 17th century. However, most roads were poor, fares were high, and the service was slow and uncomfortable.

The first form of public transportation to operate solely within cities was the "hackney carriage*"*, the forerunner of the taxi, which appeared in Paris and London shortly after 1600. The name came from the French word "*haquenee"*, meaning a horse of fair size and quality used for riding, but not for war or hunting.

As the 19th century opened, the average person walked to work. Cities were dense and compact; the geographical area of a city was largely limited to the radius of walking distance from the center. Some wealthy families lived on the outskirts and traveled by horseback or carriage, but horses were too expensive for common people to keep. The modern era of urban mass transit began in 1819 with a coach line in Paris [Miller, 1941]. It used an existing type of stagecoach called *"a diligence"*. The first transit service in the United States was started by Abraham Brower on broadway in New York City in 1827. For this he designed a modified stagecoach seating 12 passengers, it was named *"the accommodation"*. The second generation of this stagecoach had a different design: all the seats ran lengthwise, and there was a door at the rear with an iron stairway to the ground. This vehicle was named the *"Sociable"*.

Development of Public Transport

i. Omnibus

In 1825, a coach builder named George Shillibeer built specially designed coaches with large seating capacity for use in Paris. The vehicle was called an omnibus.

ii. **Horse-Drawn Street Railway**

A major advance came in the form of the horse-drawn street railway. The first one in the world was the New York & Harlem Railroad, which began service in 1832. The use of horses was first considered temporary, but the horses performed well and were never replaced by steam engines.

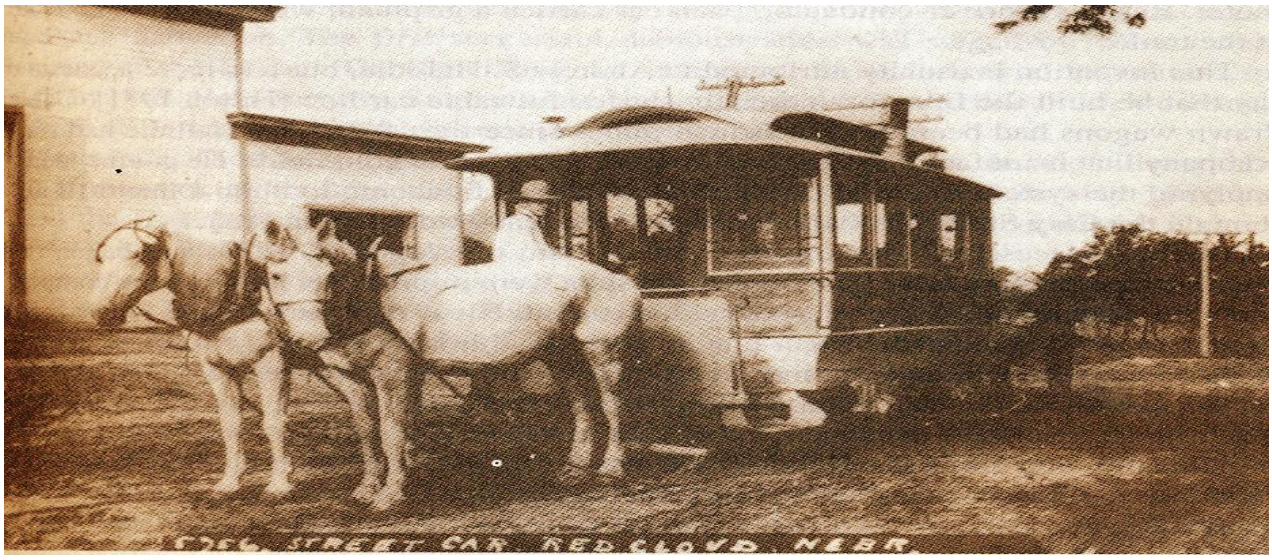


Figure 2.1: A horse car. (Alan Black, 1995)

iii. Cable Car

In this system, a cable is laid in a small trough between the rails and is kept in continuous motion by a steam engine located at the end of the line. A car is propelled by gripping onto the cable with a metal arm that reaches down; the grip is released when the car brakes to a stop. The car itself has no motor. Besides a driver-conductor, each car carries a grip man, who must develop skills at the trade.

Figure 2.2: A San Francisco cable car. San Francisco was the first city with cable cars. (Alan Black, 1995)

iv. Electric Streetcar

The streetcar-also called the electric railway, trolley, or tram-was the next and most important innovation.

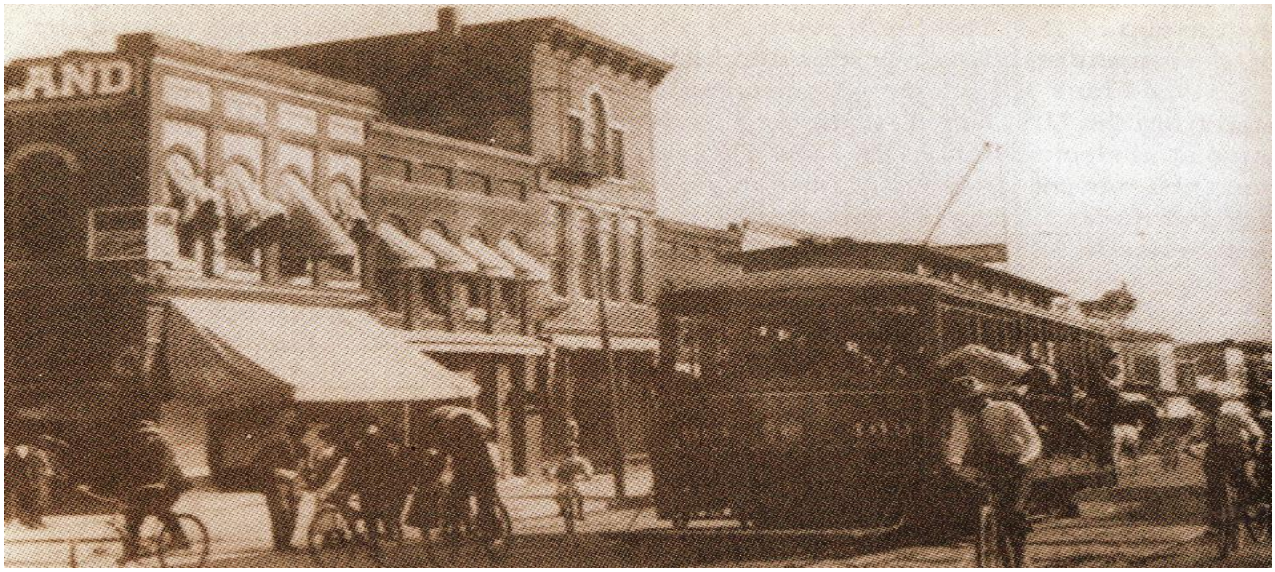


Figure 2.3: An early streetcar. (Alan Black , 1995)

v. The Steam Railroads

The 19th century also witnessed the development of steam railroads. The first intercity railroad service began in 1830 between Liverpool and Manchester in England. This inaugurated a century in which steel wheels on steel rails became the dominant form of intercity transportation. The railroad industry formed a major part of the economy, much as the automotive industry does now.

vi. Subway and Elevated Systems

Several attempts were made to introduce steam trains into the heart of cities. The first Subway in the world, 3.7 miles long, opened in London on January 10, 1863 [*Bobrick,1981*].the trains were pulled by steam locomotives, and while special efforts were made to expel the smoke, ventilation remained a major problem. The line was popularly called *"the sewer railway"*. However, it continued to operate for many years and eventually was electrified.

vii. Arrival of the Motor Vehicle

The forerunner of the private motor vehicle was the road locomotive or steam carriage. This was a steam engine on wheels-something like a railroad locomotive, but with flat surfaced wheels to run on highways.

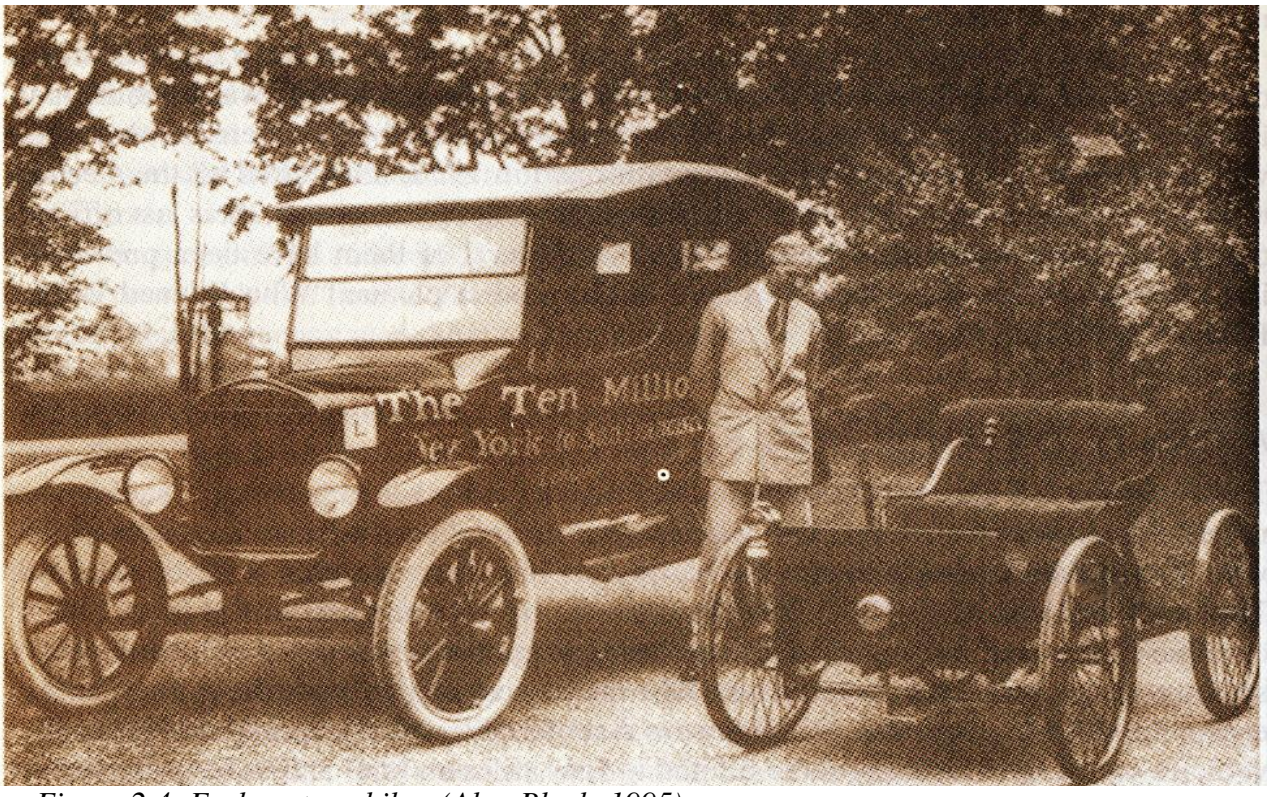


Figure 2.4: Early automobiles. (Alan Black, 1995)

The automobile was soon accompanied by the truck, the tractor and the bus. The first motor bus service in the world began in London in 1899 and by 1911 the London General Omnibus company had completely replaced horse-drawn omnibus with motor buses [*Miller, 1941*]. Because of the narrow streets, double-decker buses were designed to increase seating capacity.

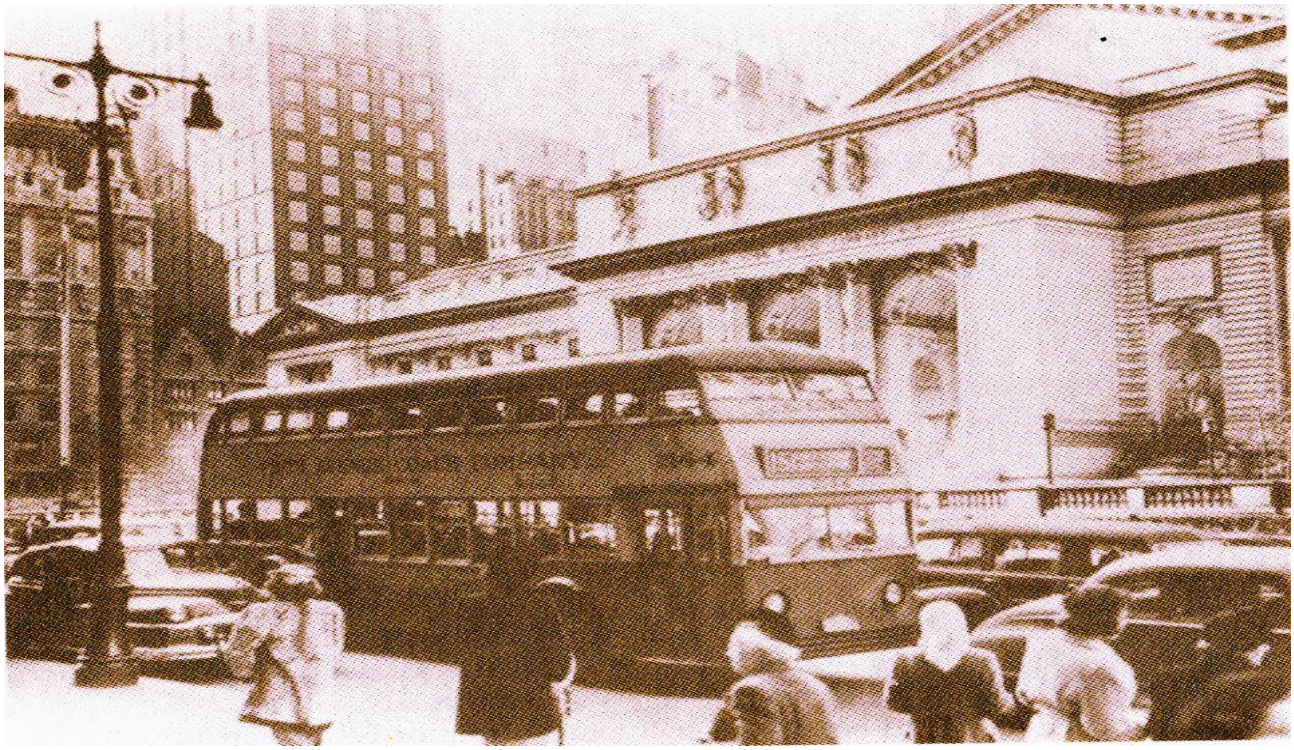


Figure 2.5: A double-decker bus. (Alan Black, 1995)

Early buses ran on gasoline, but its high price in Europe led to experimentation with the engine invented by the German Rudolf Diesel back in the 1890s.

2.2.4. General Natures of Modern public transport:

Various studies have classified modern public transport in to four general categories based on their nature of operation *[Dandena Tuffa and Tsegaye Girma, 2001]*. These are

1. **Buses and trolley buses**: - operate on public streets in either mixed traffic or bus only lanes or exclusive bus ways. They employ engines that use fuel and or electric energy. Electric buses usually run with the help of cables that are mounted on electric poles which run along the whole line.
2. **Light rail transit Trains**: - operate in mixed traffic along public streets to semi-metro rail systems on exclusive trucks.

3. **Rapid rail transit (Metro, subways or underground)**: - operates on exclusively right-of-ways at high speed and high capacity passengers' board from high-level platform to facilitate rapid loading.
4. **Sub-urban rail transit (Commuter rail system)**: - operates on trucks shared with inter-city passenger crews and freight.

Urban Mass Transport systems can also be classified based on the line system they employ *[Dandena Tuffa and Tsegaye Girmay, 2001]*.

A. On-street systems: buses; trolley-buses; trams.

B. Mixed on-street and off-street systems: bus lanes; bus ways; light rail.

C. Off - street systems: metros; commuter-rail.

Comparison of Public Transport Modes

1. City - Bus Service

Advantages:

a) Can be used on the existing streets
b) Low cost of investment (initial)
c) Flexibility in use on steeps streets.
d) Accustomed technology (easy to maintain, operate, etc.)
e) Affordability
f) Environmentally friendly, in the case of electric bus.

Disadvantages:

a) Pollution and excessive noise
b) Long waiting time where there is no only bus lane
c) Moves fewer travelers (in comparison to light rail transit)

2. Light Rail Transit

Advantages:

a) In most case, the existing rail line can be utilized.
b) Consumes less energy than buses
c) Can move more people
d) Emits less pollution
e) Reduces congestion on the street

Disadvantages:

a) Inflexibility (existence of line and slope to be crossed)
b) Expensive truck maintenance
c) High initial cost (construction of line, demolitions)
d) Users should change mode of transport beyond the end of the line.

3. Trolley-Bus

Advantages:

a) Environmentally friendly
b) Can move more people
c) Cheaper operation cost than normal buses
d) Reduces traffic congestion on streets.

Disadvantages:

a) Very high initial cost
b) Relatively high electric consumption
c) Doesn't provide flexibility
d) Maintenance and power distribution needs skill.
e) Needs heavy subsidy

2.2.5. Public Transport in the Socio-Economic Context

The need for an understanding of the factors affecting demand, and hence the research necessary to gain such understanding, depend upon the social and economic context in which public transport providers operate. This section discusses the characteristics, policies, roles and resultant objectives of public transport, and the associated criteria for making decisions about resource allocation.

The Characteristics and Role of Public Transport

Travel by public transport is necessarily subject to constraints in time, space, money and effort, since people are restricted to traveling at certain times and to certain places only. The conflict between the needs of travelers and the costs of satisfying these demands leads to a divergence of views with regard to the role which public transport should play.

i. At one end of this spectrum, public transport is expected to 'pay its way' with the services being provided in the most cost-effective way possible and paid for entirely by passenger revenues,

ii. While at the other end public transport is regarded as a social service to be funded largely from public money so that users pay much less than the true costs, and those with a special need (the old, the infirm, children, those in remote areas, those with no car available) are treated even more benevolently.

iii. A role of a rather different nature is the use of public transport to further objectives which are only indirectly connected with public transport travel; these are mainly concerned with problems of the environment such as air pollution, visual intrusion, noise and congestion and urban form which rely on travelers switching from private transport to public transport for their achievement.

Total use of Resources

If all these resources, land use, energy, manpower and the other resources consumed in the provision and operation of the total transport system are considered together in a comparison of the total resource efficiency of alternative transport systems, it seems clear that high levels of public transport provision can achieve an overall efficiency advantage in areas where there is a concentrated travel demand in time and particularly in space. In such areas the unrestrained use of private cars would not be possible for reasons of space and cost.

Resource Allocation within the Transport Sector

It can be seen therefore that questions of resource allocation within the transport sector, between public and private provision, hinge in very general terms around: - [Report of the international collaboration study of the factors affecting public transport patronage UK, 1980]

Firstly, the efficiency arguments favoring public transport in areas of concentrated travel demand;

Secondly, the environmental objectives which are particularly important for large cities and historic towns;

Thirdly, social objectives in relation to the provision of public transport for those who cannot afford private means of transport, which will be especially important in areas where the efficiency benefits of public transport either do not apply or are not overriding.

Fourthly, safety considerations

Thus, any comprehensive comparison of the performance of public and private transport, or different public transport modes, is faced with the difficulty of comparing quite contrasting aspects. For example consideration of the efficiency of public and private modes, purely in terms

of their direct transport effects, would have to compare the faster private car which saves travel time but is more expensive to operate against the slower public transit mode which is cheaper but involves its users in spending more travel time.

In principle it is possible to treat other costs and benefits of transport in similar fashion so that the advantages and disadvantages of different modes in terms of the various social, environmental and safety effects could all be estimated in terms of money, though as has already been noted above there are severe practical difficulties in attempting to do so.

Thus, considerations of this sort may justify the provision of subsidy to public transport, but unless the various factors can be quantified there is still no answer to the question of how much subsidy should be provided to achieve the transport system which offers maximum benefit to the whole community. In an attempt to overcome some of the difficulties inherent in costing the more indirect social and environmental effects, and so producing a single monetary measure which can be used in a social cost/ benefit analysis (CBA), there have been attempts to develop multiple goal objective functions that rank non-monetary objectives, such as environmental quality and income redistribution effects, in parallel with the direct transport effects.

Operational Criteria for Public Transport

The general guidelines under which most public transport providers operate are broad in terms of their objectives. These objectives are often couched in very general 'social' terms, such as 'the provision of public transport facilities to meet the needs of the community'. There is hence the need to translate such overall aims into quantifiable criteria in order to determine optimal allocation of resources within the public transport operation. A range of possible operating criteria is identified below: - [Report of the international collaboration study of the factors affecting public transport patronage UK, 1980]

i. Profit maximization
ii. Use of standards, covering e.g. access to the public transport network, or frequency of service
iii. Maximization subject to constraints
    a) Turnover maximization with a budget constraint

b) Maximization of the benefits to public transport travelers, within a budget constraint. Technically, this corresponds to maximizing 'consumer surplus' i.e. the difference between the amount the traveler is prepared to spend in time and money (and effort) and the amount he actually has to spend in order to travel.
c) 'Social surplus' maximization within a budget constraint (i.e. maximizing the benefits to society)
d) Demand or output maximization, e.g. the maximization of passenger-kms or journeys or vehicle-kms (or journeys) within a budget constraint.

Of these criteria, simple profit maximization is almost completely inappropriate for most public transport operations, because of the increasing importance of social objectives. It would be irrational to treat support payments from Government, regional and local authority funds simply as revenue and to run the operation on strictly commercial lines, because the justification for the subsidy would depend on the extent to which the services provided met the noncommercial objectives.

The use of 'standards', on the other hand, has much to commend it. It is a relatively simple and understandable system to operate, although it tends to be insensitive both to differential needs and potential marketing opportunities. Despite these limitations, however, the sheer simplicity of the method has meant that it has become the most common type of criterion applied in practice to public transport operations.

2.2.6. Urban Transportation Planning

The three important variables that must be quantified before any form of solution can be found while entertaining issues of urban transportation planning are: [New town planning and principles]

1. Desired level of usage of vehicles,
2. Standard of desired environment, and
3. Cost of improving the environment by changing existing physical patterns. The solution is largely to be found in the unification of the new separated functions of the road engineer and planner-architect, as well as ‘administrative split mindedness.’

Planning Transportation Systems

Transportation networks are compromises between planners' ideals and complex reality. Transportation has always been dictated by such factors as economics, dynamics, social intensity, physical constraints, financial resources, and political desires. Thus planning transportation systems should be a result of the contribution of team experts before final formulation of network. Although concerned professionals such as economists and sociologists may play an important role in forwarding the alternative assumptions in light of the future developments, a final plan should include flexibility alternatives and adaptability to future changes. Generally the following steps should normally be considered in the planning process of transportation systems.

i. Define goals and objectives.
ii. Study the site and region.
iii. Collect data and survey.

A. physical aspects

1. Land suitability
2. Soil hazards and limitations
3. Availability of quarries and building materials.
4. Projected land use information and scheme

B. social and economic aspects

1. Existing and expected travel behavior of the population
2. Trends of income
3. Potential development traits

IV. Plan preparations

1. Pedestrians
2. Highways and streets
3. Town traffic center
4. Local and regional transportation centers
5. Setting in regional network

Public Transport Network

A network is a kind of graph, which is a geometric figure made up of points and lines. In practical applications, the points and lines are always interconnected. Each line has a point at

each end, and several lines may meet at a single point. Transportation planners usually refer to a point as a node and to a line as a link. A network is defined as a graph in which there is some sort of flow. (*Alan Black, 1995*) A transit network resembles the route map that a transit operator publishes. The links represent segments of transit routes. For a rail line, a link is a section of track; for a bus route, it is a street on which buses run.

Bus Network

In most small cities, bus routes are radials converging on the CBD. In medium-size and large cities, the bus networks are larger and more complex and may not resemble any simple pattern. Most routes follow major streets, so the network resembles the street pattern. [*Alan Black, 1995*] In cities where radial streets are prominent, the busiest routes are radials. Real bus networks differ from any ideal pattern. There may be irregular streets, topographical constraints, or barriers such as freeways and railroad tracks. Further, routes are adjusted according to demand. In low-density areas where most households have automobiles, routes are spaced farther apart than in high-density areas that generate more transit riders. Socioeconomic characteristics of the residents also play a part. Low-income communities may be numerous routes, while wealthy areas have little service.

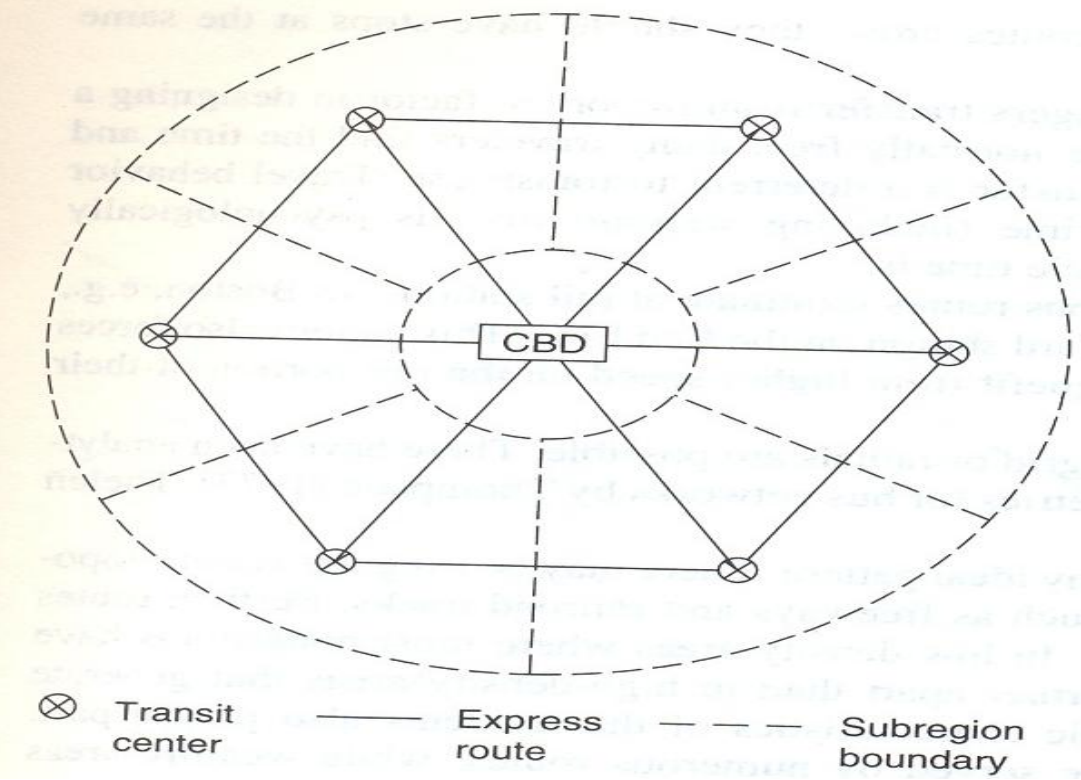


Figure 2.6: The transit center system for buses, Alan Black, 1995

The region is divided into sub regions, as indicated by the broken lines. The central one contains the central business district (CBD) and has conventional service. Each of the others has a transit center where buses circulating within the sub region (not shown) terminate. Express buses run between each transit center and the CBD. There is also circumferential express service connecting the transit centers.

Designing a Single Route

Bus routes should follow arterial streets as much as possible and avoid minor streets. Arterial streets are wide enough for buses which are otherwise difficult to maneuver and have higher average speeds because of traffic engineering measures designed to increase flow. Side streets are more likely to be blocked by parked vehicles or children playing. Arterials are more likely to be lined with buildings that have high trip generation. Ideally a bus route should be straight and direct. This is easier for people to understand, and usually it provides a faster trip from end to end. *(Alan Black, 1995)*

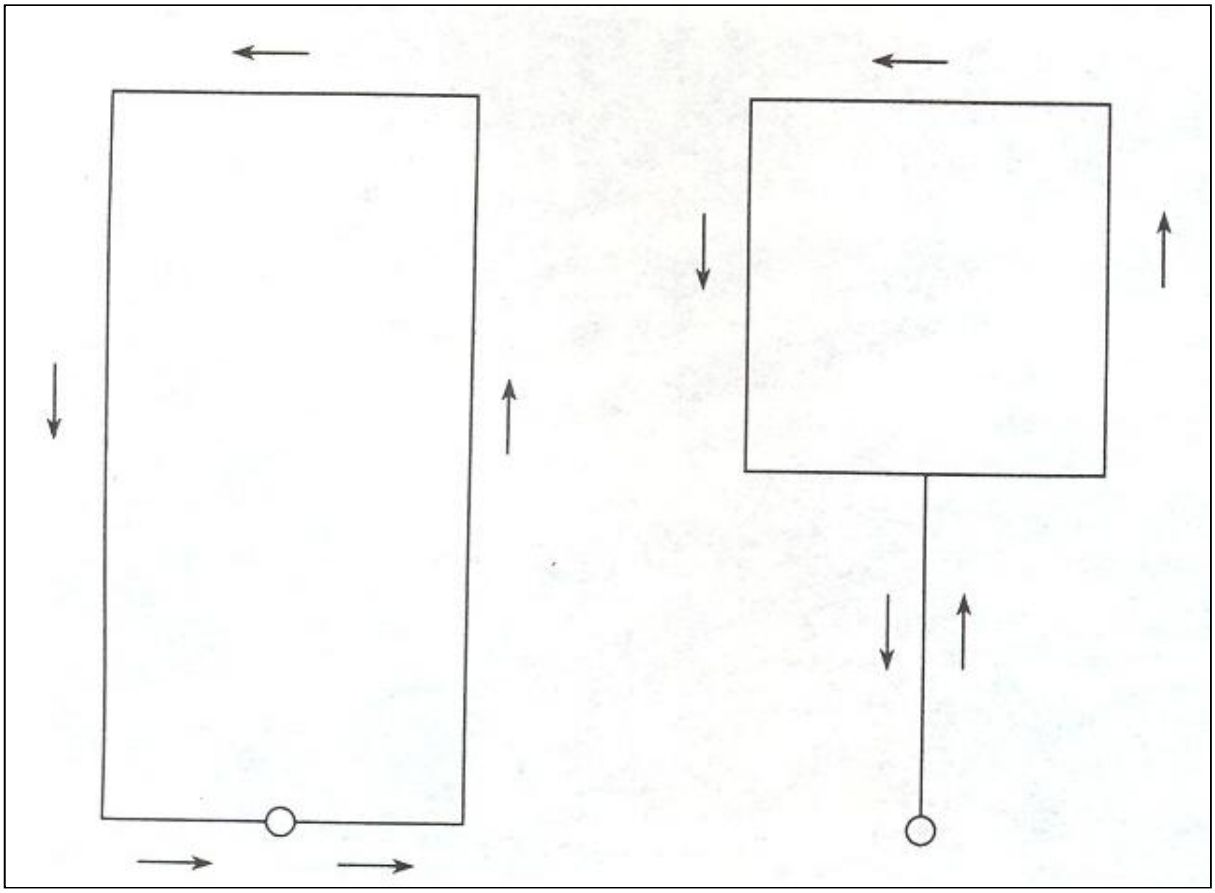


Figure 2.7: Cycle and Balloon routing, Alan Black, 1995.

In a cycle route (on the left), buses travel in one direction around the entire loop. In a balloon route (on the right), buses follow a one-way loop on the outer portion of the route, while two-way service is provided on the rest of the route.

Spacing of Routes

In a radial city with radial bus transit routes in which population density varies with distance from the center, the following relationship is observed: when the total amount of service is held constant, wide spacing between routes leads to lower construction cost, because fewer routes are built, more frequent service on each route and hence less waiting time, and greater access distance to the routes which is an important factor if most people walk. The opposite results hold: Close spacing between routes means greater construction cost, less frequent service on each route, and shorter access distance. *(Meron Kassahun, 2007)*

Spacing of Stops

The spacing of stops largely determines the average operating speed on a line, which affects the quality of service perceived by travelers. The maximum speed of the vehicles is only secondary. In deciding on the number of stops on a line, it is important to realize that each stop causes time losses for braking to a stop, unloading and loading passengers, and accelerating back to running speed. There is a certain spacing of stops that will minimize travel time for passengers. As stops come closer together, each person walks less distance to a stop. At the same time, average speed of the transit vehicles declines and the ride takes longer. *(Feder, 1973)* found that the optimal spacing between bus stops should be 0.5 mile. Typical bus routes have 6 to 10 scheduled stops per mile but they stop only on demand. *[Alan Black, 1995]*

2.3. Traffic Management

2.3.1. Traffic Management in Public Transport

An increasingly important task in traffic management is the improvement of public transport services. A primary objective of current transportation planning strategy is to encourage more public transport use, and this can be achieved by restraint of personal vehicles and better service levels of public transport. It is necessary not only to improve services but also to provide additional facilities for travelers transferred or restrained, from the use of other modes if the viability of an area is to be safeguarded. Once the specific objectives of the transport plan have

been derived, for the respective areas in terms of movement requirements, standard traffic study methods are applied to a number of case studies.

These include the location of potential transport interchanges on bus and rail systems and the sitting and size of appropriate car parks. Estimates of existing and future traffic are required to determine generated and diverted traffic. Because catchment areas are likely to be changed, and route patterns affected, particularly for the remaining car drivers, schemes must be carefully assessed for environmental consequences before making changes to the road network. In most cities and towns, the principal public mode is the bus and most of the improvements will be directed towards improving their priority over other vehicles.

2.3.2. Traffic Control

The primary emphasis of traffic control is on the safe and efficient flow of vehicles over urban streets and highways. The means of promoting this can vary from simple improvement of local streets by installing traffic signs and road markings to constructing comprehensive motorway control systems. Such comprehensive systems use access-road meters to monitor and control motorway access; closed-circuit television surveillance to detect quickly any deterioration in traffic flow; and emergency services to provide aid in case of accident and injury.

Other traffic-control techniques include the use of one-way streets, enforcement of traffic flow regulations, channelization (building traffic islands, turning lanes and so on), and the use of traffic signals. Traffic signs and road markings follow a uniform practice throughout the world and are designed to convey information with a minimum of words to avoid confusing drivers unfamiliar with the area and the language. Uniform pictorial signs and markings have been adopted throughout Europe and the United States. They include uniform sign formats and sizes, and uniform codes regulating traffic flow.

2.4. Transport Infrastructure

As a general rule, the optimum urban transport system and the road network should involve the efficient integration of the means and ways of mobility to create ease and comfort so as to maintain local, regional and international interactions. Accordingly, urban road classification depends on the character of services they provide. The role that road network plays in providing access to property and travel mobility is the major part of traffic management.

Efficient urban road network classification is derived from blood circulation patterns of living organism**.** The patterns are hierarchically divided into main roads, secondary roads and tertiary roads. Equally important intersections are in urban road network because of their effect on the movement and safety of vehicular traffic flow. In the planning process of road network system and the overall nature of mobility and accessibility, planners should take environmental dimensions as well into consideration. *(Mathewos Asfaw, 1999)*

Lastly, there is an argument of equity which essentially implies that spatial mobility, provided by infrastructure facilities, is a merit that should be provided at a minimum level to all citizens, irrespective of their ability to pay for it. Hence the need for the government's involvement in the provision of transport infrastructure is indispensable.

CHAPTER THREE: CONTEXTUAL BACKGROUND OVERVIEW OF THE URBAN TRANSPORTATION SYSTEM IN ADDIS ABABA

3.1. Addis Ababa City Development Plan

Previously, there have been two master plans that were prepared for Addis Ababa so as to guide and regulate its growth. The first master plan was prepared in 1984, later on a comprehensive development plan (CDP), as the second master plan, was prepared in 1994 with a perspective up to the year 2010. Presently the period of the second master plan has been extended up to 2020. Transport was an important component of this CDP. It envisioned for the residents of the city to have access to 'affordable transport, enhanced access and mobility'.

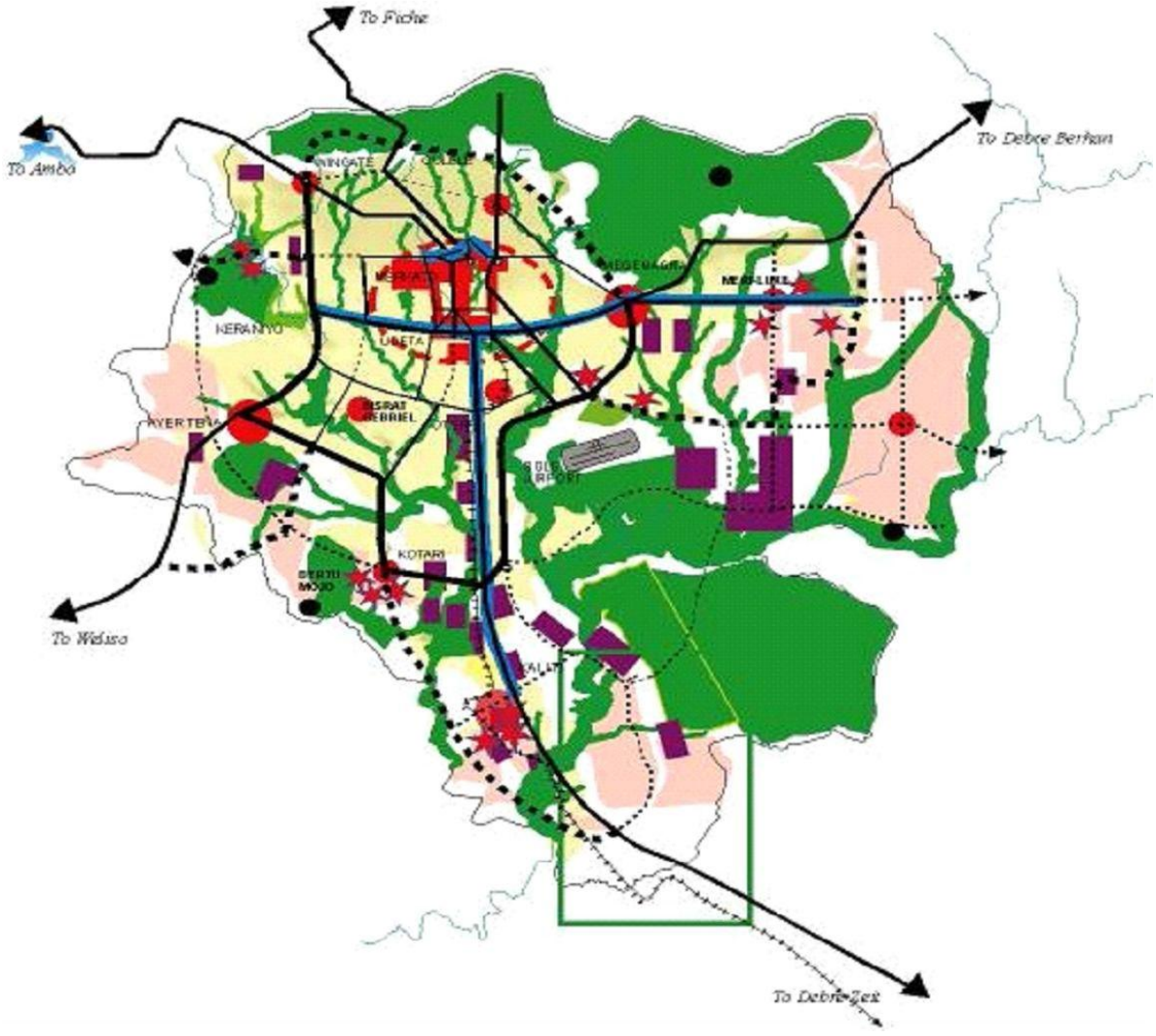


Figure 3.1: Transport Systems and Road Network in Addis Ababa

3.2. Institutional organization

The private and public transport in Addis Ababa comes under the responsibility of the transport authority, which is part of the Addis Ababa city administration municipal services; the organizational structure is as shown in the following chart.

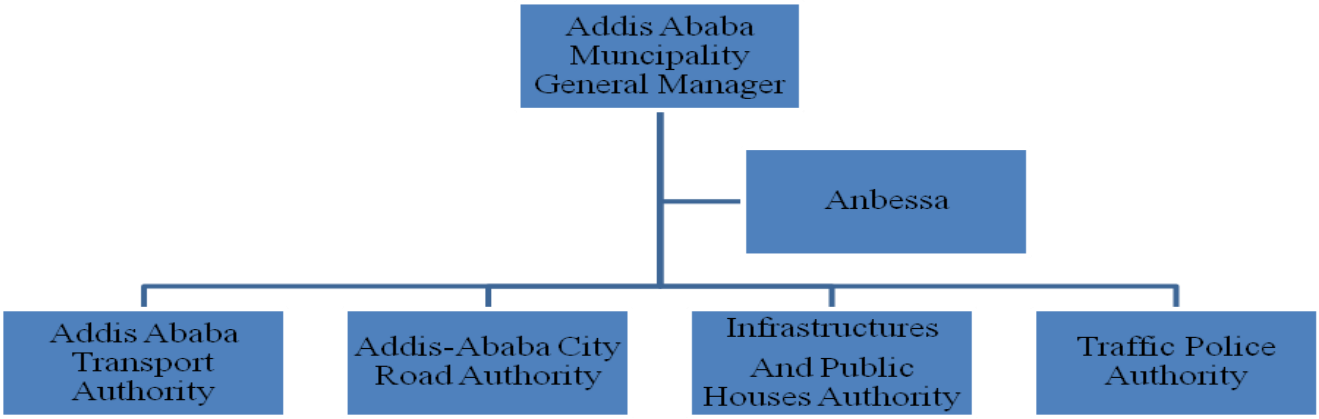


Figure 3.2: Institutional organization, Addis Ababa

3.3. Facts about Addis Ababa City Transport

3.3.1. General Conditions of Traffic and Transport Development

Addis Ababa is the seat of government of the Federal Democratic Republic of Ethiopia (FDRE). It is also home to the African Union, the Economic Commission for Africa and other international organizations. For administrational purposes Addis Ababa is divided into ten sub city. Hence, Addis Ababa has a significant contribution in the economic, social and political sector development of the country. Over the past years the city of Addis Ababa has witnessed with an amazing expansion of the city size. Located at heart of the country with population of three million and Addis Ababa has a total land area of 54,000 hectares. The rapid increase in urban population with an annual growth rate of 3.8 percent per year has not been provided with an equal growth in urban transport provisions.

Urban transport in Addis Ababa is carried by a mixture of ownership structures, of which public and private operators are predominantly contenders for business. The modes of urban transport system in the Addis Ababa are categorized in to motorized and non- motorized traffic. As such the modes of transport include public bus; minibus; taxis and the non-motorized transport, while walking and animal carts dominant the periphery. Currently, taxis, city bus and private cars

altogether cover 30 percent of the urban mobility, that is, 26% bus, 70% taxis and 4 % private cars, While 70% of urban mobility is covered on foot.

For the year 2014G.C, Addis Ababa's budget amounts to about 22,193,121,063 Ethiopian birr of which 4,149,334,541 is recurrent expenditure budget and 16,629,848,079 is capital expenditure budget. The share of the transport authority is about 1,069,414,069 Ethiopian birr. (*Addis Negarit Gazeta, 2014)* Many of the traffic congestions and road safety problems in Addis Ababa may be attributed to inefficient use of road networks, weak enforcement capability and poor design of roads. As such road traffic safety regulations have been issued in the 1998 by the council of Addis Ababa administration. Accordingly, who so ever, by omission, contravenes what is laid down depending on the gravity of the offence committed is obliged to be punished.

3.3.2. Basic Indicators for the Description of Urban Mobility

Addis Ababa transport has special characteristics of its own. The foundation of the city in 1886, the broad physiognomy of a radial road system had evolved focusing around the centre. The radial system which consists of five main arterial roads. Besides their national and regional level functions also ensure connection and accessibility to new expansion areas. A combination of these radials with a set of ring roads has been envisaged so as to minimize travel distance, time and energy consumption to discourage long-distance traffic from passing within the city Centre.

As modernization and consequently the urbanization moves forward, the use of motorized transport to maintain the socio economic and physical integration of the city increases. Currently city buses, taxis and private cars altogether cover only 30 percent of the total urban mobility. While70 percent of the urban mobility is covered on foot. The rise in automobile ownership although not yet very significant together with the poor condition of the roads and the poorly functioning traffic system have resulted in high level of congestion particularly at peak hours.

3.3.3. Main Problems of Traffic Development in Addis Ababa

The rate of traffic accidents and pollution in Addis Ababa goes up together with the increase of motor vehicles and population size. The rise in automobile ownership together with the poor condition of the roads has resulted in the high level of traffic safety and congestion problems. Despite it has low level of motorization, the share of the city in the total number of accidents

been 60 percent in 1989 and 55 percent on the average from 1986-1989. During this period, annual average traffic accident growth had been 31.4 percent. Besides, the increase in car traffic has resulted in an increase in air and noise pollution of the city. More than 12, 000,000 Ethiopian birr is being lost every year because of traffic accidents. (Addis Ababa traffic police) Thus the rise in automobile ownership together with the poor conditions of the road has resulted in high level of traffic safety and congestion problems. In general the major transport problems in Addis Ababa include among others:

i. Shortage and low quality of transport services and facilities

ii. Poor quality of roads, pedestrian walkways

iii. Low affordability level by most urban citizens

iv. High rate of congestion at peak hours and hence high rate of traffic accidents

v. Lack of lane animal transport, bicycle and pedestrian

Moreover, the high unemployment rate, the rising household size and the low income level negatively affect the demand for motorized transport. City bus transport is the second cheapest mode of transport next to walking. The fact that the revenue it generates doesn't cover its costs and that even the subsidized fares are unaffordable by the majority of the citizens are the major challenge.

3.3.4. Main targets of Traffic Polices and Practice

The urban transport system could be viewed as a nervous system whose proper functioning is central to the overall well-being and functioning of the city. In view of this the main target of traffic polices in Addis Ababa include:

A. Improvement of infrastructure facilities: There are good opportunities in the existing land tenure, liberalization and decentralization policies that could be utilized to improve the situation of mobility in Addis Ababa. Upgrading of slum areas with main focus on the infrastructure (road access provision) should be promoted in order to improve accessibility and the safety of the living conditions for the poor.

In this regard, a city ring road is one of the major on-going projects phase I and II of this ring road is under construction while the 3rd is under study. This road is expected to facilitate the flow and accommodation of more traffic and hence lessening the effect of congestion on mobility.

B. Involvement of the Private sector and seeking international partners: - With the ongoing privatization process and the government's strong orientation towards enabling the private sector, possible and effective areas of action could be identified and built upon. The private sector should be mobilized to provide services within a competitive framework. The public sector might be limited to ensuring the process to meet social and environmental objectives for example by controlling fares. The city government is showing interest in this direction. To improve the situation, donors could also take part in promoting these varieties initiatives Donors can take part in the actual physical provision of services and facilities such as equipments in the development of traffic regulations and management systems, through different institutions and arrangements as deemed appropriate.

C. Appropriate policy and programmer: - Traffic management is crucial and thus should be given importance to improve the movements of people and goods; to ensure efficient and safe access and distribution; alleviate traffic congestion and adverse traffic impacts arising from major land use developments. Construction of new roads in the new development expansion areas, enhancing the capacity of the existing roads and improvement of the drainage system, improvement of road and transport facilities, increased involvement of the private sector are among the major direction of the Addis Ababa transport authority.

These strong initiatives could be fostered towards practical actions if appropriate tools and implementation are put in place. Increasing the number of buses for mass transport, provision walkways and thoroughfares, road maintenance and redesigning and reconstruction of critical junctions and squares could help ease the problem of traffic congestion, The application of road changes and taxes can help correct subsidizing private motor vehicles. Creation of an enabling policy environment and provision of facilities such as parking spaces, terminals etc. and limiting the non-motorized ones to specific route could be recommended as a viable strategy.

3.3.5. A Planning Strategy to reach goals

Addis Ababa is a metropolitan city where there is rapid growth of population increasing number of vehicles moving in it and it is a centre of many business activities. Besides, Addis Ababa is a seat of many national and international organizations like organization African Unity and the Economic Commission for Africa. Hence, the promotion of modern urban transport and traffic management is indispensable for the purpose of ensuring sustainable urban transport development.

The Addis Ababa City Government has developed a strategy to deal with transport issues: The main concerns of the strategy are:

a) To increase the number of buses;
b) Encourage more involvement of private sector in the provision of the city bus and taxi services, management of park meters , park lots , drivers training ,
c) Improve road utilization culture through mass media campaign to remove traffic flow obstructions
d) Improve transport utilities by construction of terminals and installation of park meters for charging street side parking.

CHAPTER FOUR: ANALYSIS AND FINDINGS OF THE URBAN TRANSPORT SYSTEM IN ADDIS ABABA

4.1. Urban transport problems in Addis Ababa

Urban transport problems are classified into three areas of interest. i.e. Congestion, Mobility and Ancillary impacts.

4.1.1. Congestion

Congestion, become a common characteristics in urban road transportation system of cities in developing countries which result in high operating cost, loss of users productive time, and more fuel consumption among others *(World Bank, 2002*).

First: the causes of vehicles traffic congestion are many and interrelated factors, like rapid urbanization that concentrates peoples and economic activities in urban areas or cities. Second; because of different dispersed, but interrelated land use patterns or specializations of the urban areas in some activities, for instance, workforce concentrated in some areas, residential and recreational areas also in other far place that make people to move between them. Third; a mismatch between supply and demand, the problem is sever in peak hours in specific as most people start and end their work at the same time-in the mornings and evenings *(Alan, 1995).*

Due to numerous factors, congestion is becoming more serious problem in Addis Ababa city from time to time, such as population growth- in addition to natural growth, pull factor that immigrate people from different part of the country to the city in searching for livelihood. To sustain the city, it is clear that these added portions of the society also need transport service to attain their day to day activities. However; the city is unable to cope with the existing high transport services demand. In addition, inefficient land use planning, poor infrastructure, and absence of well traffic management are the major reasons for the problem of traffic congestion.

As a result, it is obvious that to understand the present situation of vehicles traffic congestion is very important area of consideration in order to make the right decision to solve the issue and there by sustain seamless traffic flow to contribute to the economic growth of the city is urgent on the top of ever thing.

Peak hour traffic in Addis Ababa is so overcrowded that the speed/flow relationship is increasingly being affected for the negative. The effect of reduced speed and strained flow on total productivity and energy consumption is high. The load on the existing limited road infrastructure by the coinciding development of different vehicles. The following table show number of vehicles and there seat capacity in Addis Ababa city.

Table 4.1A: Types of Vehicles and seating capacity in Addis Ababa

No.	Types of Vehicles	Total number of vehicles	Seat capacity
1	Minibus Taxis	9,200	12
2	Anbessa City Buses	1,006	100
3	Higer Midi Bus	461	27
4	Star Alliance Buses	25	45
5	Public Buses	219	45
6	Saloon Taxi	4,000	5
7	Supported White Minibuses	4,000	12
8	Supported Cross-Country Buses	400	75
9	Private Vehicles	116,220	-
10	Trucks	104,226	-
11	Passenger Buses entering the city everyday	5,357	-

Source: Addis Ababa Transport Authority

Table 4.1B: Types of Vehicles and Registered in Addis Ababa

No.	Vehicle Type	<2007	2008	2009	2010	2011	2012	2013	Total
1	Motor Bicycle	5,496	787	1,154	1,053	1,464	1,292	1,153	12,399
2	Bus(> 11 Seats)	7,645	297	477	522	674	395	1,109	11,119
3	Bus(< 12 Seats)	15,788	1,115	1,513	1,476	914	1,111	1,418	23,335
4	Field Vehicle	24,376	2,098	2,422	2,005	2,877	1,963	2,768	38,509
5	Dual Purpose Vehicle	16,128	1,590	2,182	2,023	2,611	3,062	1,207	28,803
6	Dry Cargo(>10 Quintals)	40,711	2,847	4,411	4,311	5,222	7,980	8,720	74,202
7	Dry Cargo(<=10 Quintals)	9,774	6,886	2,147	2,525	2,839	2,958	2,895	30,024
8	Automobile	74,121	4,442	6,286	6,123	7,034	8,706	9,508	116,220
9	Tractor	94	63	58	68	92	93	466	934
10	Dozer	4	3	2	1	Null	Null	1	11
11	Grader	2	Null	Null	Null	Null	Null	Null	2
12	Combiner	5	Null	Null	Null	Null	9	Null	14
13	Liquid Cargo	2,367	104	196	326	272	170	176	3,611
14	Trailer	7,207	565	1,060	1,476	463	1,585	405	12,761
15	Vehicle with Machinery	48	8	18	19	22	11	6	132
16	Other	5,059	746	1,252	766	459	1,111	486	9,879
17	Bajaj	374	17	17	1	Null	4	5	418
18	Ambulance	12	1	Null	2	2	1	2	20
19	Leyu Gotach	137	6	58	25	10	15	12	263
20	Yetebelashe mekina Gotach	4	Null	2	Null	Null	Null	Null	6
21	Forklift	6	Null	1	Null	1	2	Null	10
	Total	209,358	21,575	23,256	22,722	24,956	30,468	30,337	36,2672

Source: Addis Ababa Transport Authority

It can be observed from the table 4.1B that the total number of vehicles in the city of Addis Ababa is continuously increasing. This rate of increase in vehicle population of the city is not being matched by investment in infrastructure which results in a decreased rate of urban mobility. Congestion is occurred regularly and the major factor for congestion problem are an imbalance between the current vehicles volume (high traffic volume) and road capacity, fixed work schedule, unavailability of public transport, and poor land-use planning.

4.1.2 Mobility

The urban mobility in the city of Addis Ababa is increasingly becoming less efficient. Mobility may be considered as a system in which the human, the vehicle and the road interact with each other. Mobility is one of the structural elements, which influence the transformation of urban systems. Transport plays probably the most crucial role in shaping the general structure and urban land-use spaces. *(Tatenda Mbara, 2010)*

The growth of Addis Ababa is a combination of three basic processes: rural-urban migration; natural increase, and re-classification of land from rural to urban categories. This growth leads to the mobility of the residents and consequently the demand for public transport for the movement. The trips by public transport to educational institutions, health centers, work places in the city are increasing. There is also high seasonal demand for public transport especially, for religious festival.

4.1.3. Ancillary impacts

I. Accident

Traffic accidents are a major drain on productivity, and reducing this drain requires a concerted effort in education, enforcement and engineering. But the root of the problem may well be institutional in nature. There is often an inability to fund road safety activities in a sustained and effective way. In developed countries one particular government department or agency has tended to take the lead in attempting to improve safety. In the majority of cases this has been the road authority, in which special 'accident investigation units' are set up. These often have officers responsible for publicity and road safety education and, of course, forge strong links and coordinated action with the traffic police. Ideally, the road authority will have an annual budget specifically for safety work, and will have a team of full-time professional staff devoted to accident remedial work who are not diverted by responsibilities for other non-safety related tasks. (*SSATP, 2013)*

Ethiopia has one of the largest traffic accidents in Africa. A recent report by the traffic police indicated that last year 3,000 people were died while 11,000 injured because of traffic accident. The report estimated the property damage cost to reach $25 million. According to the report most of the traffic accidents in the country occur due to the misconduct of the drivers. Many

suggest that changing the culture of the drivers is vital to deal with the problem while supplementing it with a good traffic management system and rules in place. And Car accidents in Addis Ababa are increasing at a very high rate of 12.5 %.*(Federal Traffic Police Office)*

Table 4.1.3: Traffic accident in Addis Ababa from 2004 – 2013G.C

Year/G.C/	Death	Light injury	Fetal injury	Property damage	Total	Estimated cost of property(birr)
2004	320	1,381	731	8,111	10,543	26,268,564
2005	363	1,261	833	8,557	11,014	27,300,115
2006	347	850	640	7,112	8,949	23,049,667
2007	381	735	594	6,459	8,169	29,603,014
2008	371	576	731	5,845	7,523	31,117,838
2009	318	652	626	4,689	6,285	29,345,713
2010	332	831	904	7,067	9,134	45,728,573
2011	369	820	1,190	9,150	11,529	52,013,101
2012	367	1,263	1,336	12,849	15,815	72,687,411
2013	391	1,128	1,484	14,901	17,901	182,815,163
Total No. year	10	10	10	10	10	10
Mean	356	950	907	8,474	10,686.2	76,562,915.9
Minimum	318	576	594	4,689	6,285	23,049,667
Maximum	391	1,381	1,484	14,901	17,901	273,000,115

Source- Addis Ababa Traffic Police Office

According to the table 4.1.3 Traffic accident in Addis Ababa from 2004 – 2013G.C demonstrates the rate of increase of traffic accidents in the city. Traffic accidents are categorized into death, heavy and light injury, and property damage. It can be clearly seen that total number of accidents

is rising in general. The main causes of traffic accidents in Addis Ababa are poor road conditions, poor driving behavior, inadequate traffic management systems, and poor vehicle maintenance upkeep. This can be attributed to some or all of the following factors, poor infrastructure that is unable to support the number of automobiles on the streets, lack of parking space, lack of an encroachments management plan, concentration of economic activities and services in certain areas, inadequate traffic facilities such as traffic lights, signs, crossing marks, inadequate drivers training and vehicle inspection.

4.2. Public transport systems

In Addis Ababa there are different types of public road transport services: The city bus enterprise, shared taxi, higher bus, alliance bus, small (saloon) taxi, and public bus service. Additionally they supported by white minibuses and cross-country buses. The comings soon light rail transit (LRT) will be starting give service to the Addis Ababa people and to solve some problem of transportation at Addis Ababa.

4.2.1. The City Bus Enterprise

History and Background the Anbessa Bus

Addis Ababa City Bus Service Enterprise is the oldest and the only city bus enterprise in the country. Having been established in1943G.C.by collecting and modifying used trucks of them Fascist Italians. In 1959 it was re-established as a share company to conduct city and intercity transport activities, the enterprise was nationalized in 1974 and continued the transport service under the public transport corporation (PTC).

Figure 4.2.1A: The oldest city bus, Addis Ababa, in the 1850's

Figure 4.2.1B: The oldest city bus, Addis Ababa, in the 1930's.

Figure 4.2.1C: The oldest city bus, Addis Ababa, in the 1970's.

Source, www.anbssacitybus.org.et

In 1994 anbessa city bus enterprise was re-established as autonomous business enterprise by the council of ministers regulation No. 187/1997. In 2011 the enterprise was transferred to the Addis Ababa city government. Since the city travel demand revised additional public transport, the enterprise was able to buy five hundred new buses with a grant from the city administration. An

agreement was made between the enterprise and the metals and engineering corporation with regards to the supply of the new buses.

A technical specification was prepared by the enterprise and some modern feature like Air conditioning, Euro three emission standard, electronic equipments, route indicators, were included. Out of the total five hundred buses one hundred are articulated, and four hundred are standard rigid buses.

Figure 4.2.1D: The new Rigid Bishoftu City Bus

Figure 4.2.1E: The new articulated Bishoftu City Bus

4.2.2. City Bus Transport System of Addis Ababa

Addis Ababa city bus enterprise is the main public mass transport system in Addis Ababa which is run by a public agency. With a fleet of 1006 buses it operates on 121 routes and transports about 600,000 passengers per day. In addition to these, peak hour services are operated on 34 routes, out of the above 121 routes. On average a City bus covers about 33,361,802 km per day and makes 16.471 trips. The bus stops, about 1440 in number. It utilizes buses that have high passenger carrying capacity 100 (30 seated & 70 standing passengers). These buses cover a collective distance of 54,000km daily and provide their service to 210 million people. The fare system is flat but varies on different routes. *(Addis Ababa City Bus Enterprise, 2014)*

The enterprise gives three types of public transport service. These are:-

I. Regular scheduled service

It is a service given by the enterprise to the commuters based on time table with 121 fixed routes. The services are operated by three depots (Yeka, Shegole and Mekanissa).Four bus terminals in Legehar, Merkato, Menilik square and Megenanga. Twenty eight check points (destination), one thousand four hundred fourteen bus stops.

Figure4.2.2: Regular scheduled service at Legehar

II. Premium Service

It is a service given by the enterprise to government or nongovernment organizations, schools and other institutions. It is based on distance covered and agreed with the user ahead of time.

III. Special Service

It is a service given when special occasion occurs like mourning, meeting and festivity based on kilometer and duration of service.

4.2.3. Depots and their Locations

The City Bus Enterprise head office and depots are located in three localities

i. The City Bus Enterprise head office is located at Yeka, in a spacious premise of over 70,000 square meters, with workshop facilities that are equipped with machines, garage equipment and special tools. Yeka Depot has an operating fleet strength of about 428 buses.

ii. The City Bus Enterprise also owns the Shegole Depot, located in the northwestern part of Addis Ababa, lay on a land covering an area of 53,996 square meters. This facility has a satellite spare parts store, satellite fuel station, greasing and washing bay, in addition to light machines garage equipment and special tools. This 'Depot has an operating fleet of 360buses.

iii. The depot at Mekanissa which is in the southern part of Addis Ababa covers an area of 72,861 square meters and there are about 218 buses that run their operation from this depot.

Figure4.2.3: The City Bus Enterprise head office, Yeka Depot

Table 4.2.3: Depot and their fleet size

No.	Depots	Types of bus and fleet size			
		DAF	Rigid	Articulate	Total
1	Yeka	202	142	84	428
2	Shegole	167	130	63	360
3	Mekanissa	92	78	48	218
Total		461	350	195	1006

Source: Addis Ababa City Bus Enterprise

There are only three depots in the whole city and has resulted in a 'negative traffic', that is, empty buses are forced to travel long distances in some cases, to get to the origins of their trips, this also happens at the end of the day when empty buses travel from the end point of their last trips to their bases. The total fleet strength of the depot shows about 1,006 buses but not all of

these buses are operational; only about 700 of them are dispatched in average for daily route service.

4.2.4. Terminals

Addis Ababa city bus enterprise has 4 major terminals, for its city bus operations such as minor maintenance and checkups. These major terminals are located at Addis ketema (Mercato), Legehar, Megenagna and Menilik II square. The enterprise has also other minor Terminals for its operations, which are located at Sidist kilo, Arat kilo, Saris Abo, Ayer Tena, Shiro Meda, Menilik Hospital, Bole Michael, Kera, Balcha Hospital and Gerji.

Table 4.2.4: Distribution of Buses, Trips and Routes on each Terminal

No.	Terminal	No. Of Routes operated	No. Of Buses operated
1	Legehar	21	112
2	Mercato	39	156
3	Menilik II Square	13	64
4	Megenagna	13	53
5	Minor Terminals	33	131
Total		119	516

Source: Addis Ababa City Bus Enterprise

As can be seen from Table 4.2.4 distribution of buses, trips and routes on each terminal about 75% of the total routes are operated from terminals while about 25% of the total routes operate without terminal.

4.2.5. Route

The bus routes of Addis Ababa city bus enterprise are both radial and tangential, which most of them are radial starting from the centre and extends out wards. Due to the increasing demand of the customer the number of routes and route length served by anbessa increases from time to time. Currently they have reached about 121 routes and a total route length of more than 1739.60 km. The longest route is route number 91 which runs from Addis Ketema (Mercato) to Teji (52 km) and the shortest route is route number 72 which runs from Hanna Mariam to Saris Abo (4.9km). The average waiting time for the service of Addis Ababa city bus vehicles is in between 30-90 minutes. An average of 62.89 trips is made daily on a route with a maximum of 136 trips

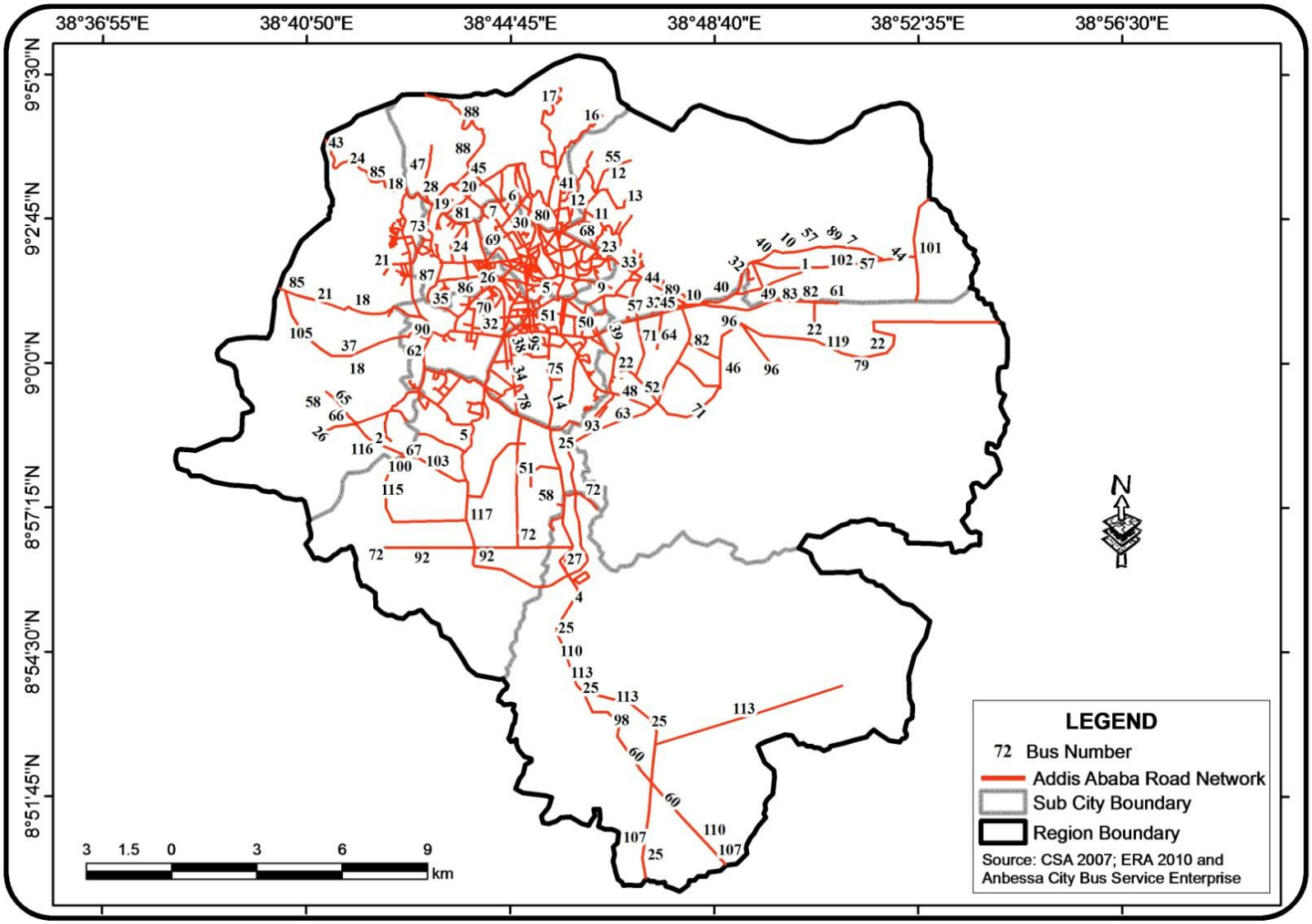
and minimum of 12 trips. The travel time ranges from 24 minutes to 161 minutes for a single trips based on the route length and topography.

Table4.2.5: Route Information of Addis Ababa City Bus Enterprise

Parameters	No. of buses planned	Route length (km)	Tariff	Travel time /single trip	Daily trip Per route	Trip/ buses
Maximum	10	52	12:00	161	180	34
Minimum	2	4.9	1:00	24	12	6
Total	517	1,739.60	348.80	6,755	7,610	1,726
Average	4.27	14.38	2.88	55.83	62.89	14.26

Source: Addis Ababa City Bus Enterprise

According to the table 4.2.5 route information of Addis Ababa city bus enterprise are based on the demand pattern each route has its own traditionally assigned number of buses to serve the passengers and on average a city bus covers an average of 62.89 km per day and makes 14.26 trips per day. The following maps show the buses network of Addis Ababa city bus route:



Map 4.2.5: The location of the buses network Addis Ababa city bus enterprise routes and map, Addis Ababa

Bus Stop

Bus stops are where passenger boarding and alighting takes place and are linked together to form a route with origin and destination. Each route has different number of bus stops based on their length which is spaced at a distance of 350-500 meters unless policy and topographic restriction exists. There are about 1,400 bus stops currently served by the Addis Ababa city bus service enterprise. The routes with less length have more bus stops than the routes with longer distance. This may be due to topographic location the routes, demand characteristics of the route and policy headway of the routes.

4.2.6. Bus Operation Characteristics

Scheduled Operations

1. Addis Ababa city bus enterprise has two types of schedules for operation, i.e.

A**.** Basic schedules, where the bus operates for two shifts, about fifteen hours a day, starting from morning 6:15AM to evening 21:00 PM.

B. Peak hour services, which operate only for seven to eight hours during a day, utilizing only one set of crew, duly splitting the operation into two spells, one during morning peak hours and second spell during the evening peak.

2. The Peak Hour Services are scheduled on 121 routes, covering 75% of basic routes.

The schedule of Addis Ababa city bus enterprise shows fixed number of buses throughout the day. During the peak periods most of the buses at every bus routes are highly crowded and sometimes about 150 passengers per bus and during off-peak periods the number of passengers on a bus is very low and increase empty travelling cost or dead mileage. The working time of Addis Ababa city bus enterprise starts at 6:15 in the morning and end service at 21:00. In this working time there is a time table for each route which shows the starting and ending time of all trips to be made on the route. This time table includes tea break and lunch break time. The travel time is assumed to be constant throughout the working day, but the travel time of buses may not be the same during peak hours and off-peak hours due to congestion and traffic lights. And due to this the scheduled time tables is just a time table not the actual time which shows the exact time at which a given bus is on the scheduled destination. The schedule is violated throughout the days and due to this the passenger arrival rate doesn't depends on the time table. Passengers arrive at bus stops independent to the bus schedule and this increase the waiting time.

Quality Control

The quality control section strives to ensure that all the revenue is collected by the conductors from passengers and remitted to the enterprise. The section allotted twenty six line controllers for each of the three terminals i.e. Mercato, Lagehar & MenilikII Square. These twenty six controllers are organized into two shifts, and each line controller is expected to check a minimum of twenty four buses during his duty of eight hours. The work of the line controllers is supervised by a special controller, posted at each of the major terminals. All these line controllers are expected to conduct about 50,000 checks on the conductors to prevent any possible mishandling of revenue. It is thus clear that such manual collecting mechanisms are subjected to human errors which then cast a negative impact on the efficiency of the services resulted by the city bus enterprise.

Free pass

Free travel passes are granted for employees and three family members of them, old patriots and Korean veterans of war are also privileged with free travel pass. The following figure is free passes card given by anbessa city bus enterprise:

Figure 4.2.6: Free passes of Addis Ababa city bus enterprise

4.2.7. Organizational Structure

Anbessa is highest governance body, which is assigned by the city government, is the board of management. It is a policy making and direction giving body. The enterprise is organized into two core processes and eight support processes under the direction of the general manager. The

three depots (Yeka, Shegole and Mekanissa) are organized by depot managers who are responsible for conducting and coordinating the transport operation within their area of responsibilities. The organizational structure of Addis Ababa city bus enterprise is given in the figure below:-

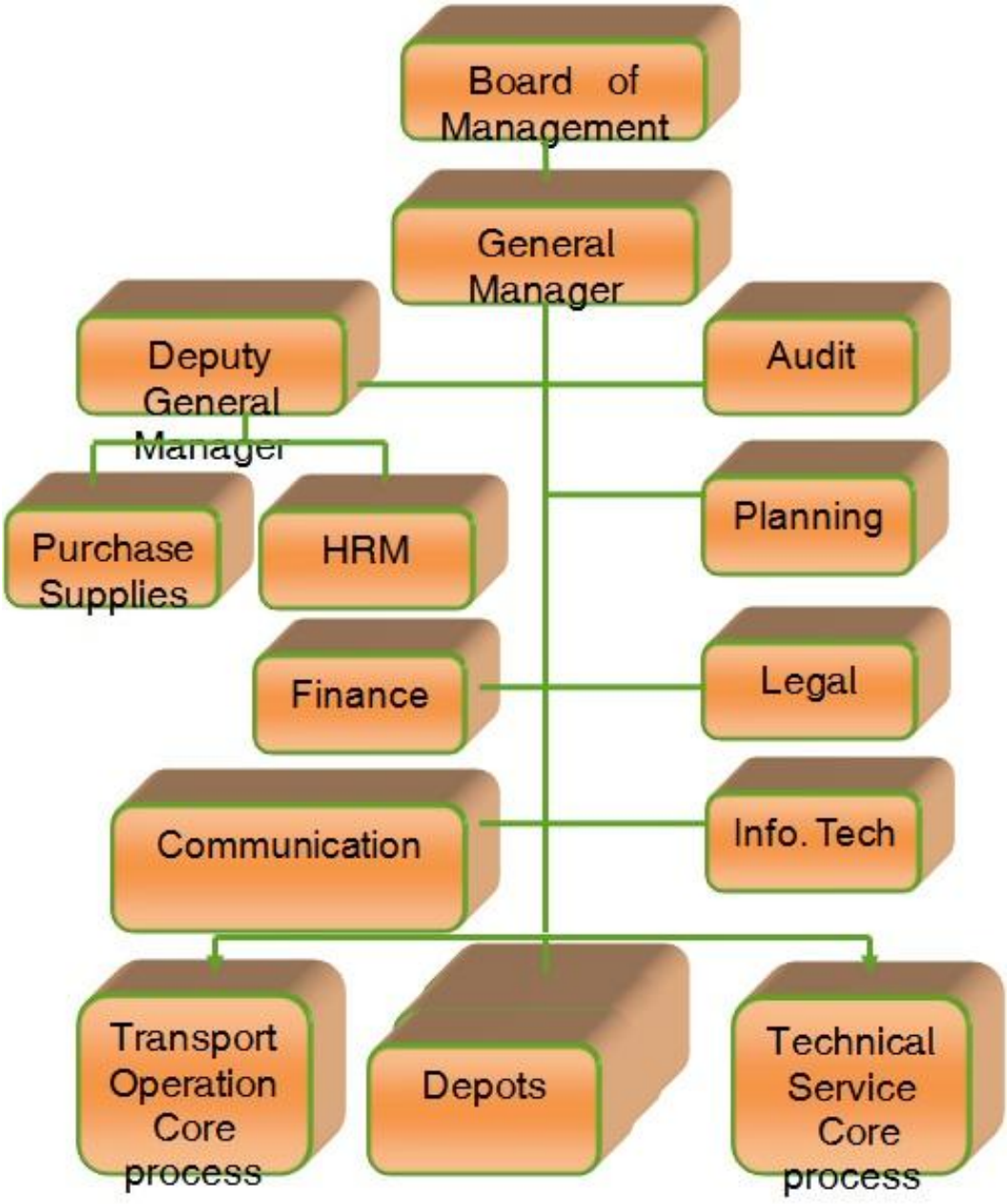


Figure 4.2.7: Organizational structure of Addis Ababa city bus enterprise

4.2.8. Number of Employees in the City Bus Enterprise

Table 4.2.8: Number of employee in Addis Ababa city bus enterprise

No.	Employee	Number	Employees Per vehicles
1	Drivers	1,673	1.7
2	Cashier	1,673	1.7
3	Operation Officer(Supervisors)	303	0.3
4	Auto technicians	908	0.9
5	Auditory, Finance and secretary officers	433	0.4
6	Manger, deputy mangers and others	108	0.1
Total		5,098	-

Source: Addis Ababa city bus service enterprise

4.3. Shared Taxis

The transport authority, which registers the vehicles in Addis Ababa, registers all taxis under one category. However these taxis can be broadly categorized in to two classes: -

I. Mini-bus taxi (12 seats) and

II. Small taxi, also called saloon taxi (4 seats)

I. Mini Bus Taxi

Table 4.3: Number of mini bus taxi

No.	Routs		Total No. of Taxi planned	Total No. of Taxi properly working on the routs	Total No. of Taxi Student service	Total No. of Taxi absence on the routs
	Addis Ababa City Administration/Sub City/	Total No. of Taxi routs				
1	Akaki Kality	18	606	447	68	81
2	Nefas Silk -Lafto	33	1,336	1,101	216	270
3	Kolfe Keraniyo	44	523	532	181	-
4	Gulele	27	949	866	67	-
5	Lideta	34	404	398	117	-
6	Kirkos	33	811	618	-	-
7	Arada	59	998	501	-	-
8	Addis Ketema	22	637	743	43	-
9	Yeka	55	1,458	1,336	155	-
10	Bole	39	1,087	961	104	-
Total		364	8,809	7,494	951	351

Source: Addis Ababa Transport Authority

According to table 4.3 About 8,809 mini bus taxis operate in the city of Addis Ababa, which has a seating capacity, is of 12 passenger's but7, 494 mini bus taxis properly working on the routs. Most of these vehicles are old in age. These minibus taxis operate on five zone and 364 routes and carry more than 1.1 million passengers per day. The mini bus system provides employment opportunities to a large number of people direct and indirect. The fares are regulated by the city government; however they are usually two to three times more expensive than that of city bus fares. The presence of shared taxi service in Addis Ababa is very high. Most of the shared taxi operators own a single vehicle generally the vehicles are operated by hiring personnel, that is, drivers and their aids. On average a mini bus taxi covers about 138 km per day and makes 15 trips. Most of the passengers belong to low and medium income groups.

Figure 4.3 A: Mini bus taxis Addis Ababa

Figure 4.3B: Mini bus taxis operate in the city of Addis Ababa

II. Small (Saloon) Taxi

This sub group can further be categorized into two sub-classes: -

A. Yellow Taxis and

B. Blue Taxis

The yellow taxis predominantly serve the airport passengers, and also make a significant presence at prestigious hotels (para transit) while blue taxis serve the regular commuter traffic. To estimate the ratio of mini bus taxis and small taxis out of the total volume of taxis registered in transport authority, discussions were held both with taxi association people and transport authority. The opinion was that 80 to 90% are mini bus taxis, and the figure was verified with others in the industry. Yellow taxis are expensive and they charge for a short ride at least two or three dollar. Blue taxi is found all over Addis, they are mostly age old lada cars, painted blue and white. Prices are negotiated at the start of the journey.

4.4. Higer Midi Bus

Table 4.4: Number of higer bus (midi bus)

No.	Association of Higer Midi Bus	Total No. of Higer Midi Bus routs	Total No. of Higer Midi Bus planned	Total No. of Higer Midi Bus properly working on the routs	Total No. of Higer Midi Bus absence on the routs
1	Degien	12	153	132	21
2	Enguday	14	133	118	15
3	Negati	11	175	161	14
Total		37	461	411	50

Source: Addis Ababa Transport Authority

About 461 higer midi buses planned in the city of Addis Ababa, which has a twenty five seating capacity, while, 411 higer buses properly working on the routs .Most of these vehicles is out of market in a short period of time because of their quality is very low. These higer midi buses operate on three zone and thirty seven routes and carry more than 700,000 passengers per day. The higer midi bus system provides employment opportunities to a large number of people direct and indirect.

Figure 4.4: Higer midi bus operate in the city of Addis Ababa

4.5. Star Alliance Bus

Figure 4.5: Star alliance bus operate in the city of Addis Ababa

Alliance transport service S.C was established in 2009 and has 2,100 shareholders with 35 million birr in paid - up capital, bought twenty five buses, at a cost of 36 million birr, before taxi. Half of the cost was financed through a loan from dashen bank, according to Adil Abdela, chairperson of alliance's board of directors. Alliance is the first and only private city bus to join the sector, and deliver transportation services for five different routes in the city. Star alliance buses transport 25,000 travelers every day as data from the AATB in 2014 indicate. The buses have a GPS online tracking system to increase efficiency.

4.6. Public Bus

Figure 4.6: Public bus operate in the city of Addis Ababa

Transportation service for federal and Addis Ababa city civil servants was launched 199 and adding twenty buses from bishoftu automotive and locomotive industry of the planned 410 buses, which transport civil servants to and from work, provide a paid service for the general public during the rest of the day. Lack of transportation service has been a critical problem in Ethiopia's capital city, Addis Ababa. It is very common to see people queuing up for a long time on the main roads of Addis as they try to race for time. This was particularly a source of worry for civil servants who had to report at their offices on time and provide services to clients waiting for them.

As the construction of the Addis Ababa light railway and other projects geared towards sustainably solving the problem continues, the government started a new transportation service for civil servants. The transportation service will alleviate the transportation problem in the city, beneficiaries said. It will save time that could have been lost due to lack of transportation. It enables civil servants to be in office on time. It will be helpful because civil servants can use their office hours properly. According Taye Tilahun, deputy general manager of civil service transport agency, transportation service, which for now is being launched as a pilot project, will

be available for all civil servants in the near future. “We plan to give transportation service to 40,000 civil servants. And this will enable the civil servants to be punctual and give proper service to their customers. Besides, it will ease the jam in public transportation service,” said Taye.

4.7. Supported white minibuses and cross – country buses

Table 4.7: Number of supported white minibuses and cross – country buses

No.	Planned		Temporary paper Tapela given car		
	Addis Ababa City Administration/Sub City/	Total No. of routs.	OR (Oromia)	D/H(Southern Nations, Nationalities and peoples)	AM (Amhara)
1	Akaki Kality	25	398	11	11
2	Nefas Silk -Lafto	31	392	29	19
3	Kolfe Keraniyo	29	251	4	31
4	Gulele	24	384	51	76
5	Lideta	55	591	83	5
6	Kirkos	17	385	5	18
7	Arada	33	298	20	3
8	Addis Ketema	22	431	4	4
9	Yeka	18	377	46	-
10	Bole	22	115	58	4
Total		276	3,622	311	171

Source: Addis Ababa Transport Authority

According to table 4.7 About 4,104 supported white minibuses and cross – country buses operate in the city of Addis Ababa, which has a seating capacity, are from 12- 100 passenger’s, from Oromia there are 3,622, from southern nations, nationalities and peoples there are 311, and from Amhara there are 171 mini bus taxis and cross – country bus give a support properly working on the 276 routs. But all these means of transportation are not quite enough to fulfill the ever growing demand that is seen in the city.

Figure 4.7A: Demand of people keeping Public mode of transportation in the city of Addis Ababa

Figure 4.7B: Demand of people keeping Public mode of transportation in the city of Addis Ababa

4.8. Transport infrastructure

4.8.1. History of Addis Ababa City Roads Development

The Ethiopian road system has a close connection with Italians. Before the brief five year Italian occupation from1936 - 1941. Ethiopian had no modern roads. Vehicles were not known by the majority of Ethiopians. Addis Ababa with the history of 129 years looked like a wider rural village with grass top houses, commonly called gojo bets at that time. Mules and horses were the

major means of transportation available to the masses. Even Europeans working in diplomatic missions such as Italy, France, Great Britain, U.S.A, and Germany were using mules and horses to go from one place to another.

Addis Ababa city was founded by Minellik II and Empress Taitu Betul in 1887. The history of the city‘s road development also begins from the inception of the city. Minellik II constructed the first ever two roads in the city as well as in the country that stretch from Addis Ababa to Addis Alem and from his palace to British embassy in 1902. In 1904 the first roller was imported by the emperor and was being pulled by many people for its operation. After some roads were constructed, two cars were imported. That brought a sensation in Addis Ababa. *(AACRA, 2014)*

The then Fascist Italian began constructing roads after they controlled Ethiopia in 1936. At the time, it was not possible to transport their armed divisions from Maichew to Addis Ababa. The gravel roads, the high ways of the time, from Asmara crossing Mekele and Dessie to Addis Ababa and from Addis Ababa to Wellega, Jimma, Elubabor and Harar were paved in the span of five years. In the five year occupation period under the rule of Italians significant roads were paved in Addis Ababa. The car population dramatically increased. But massive urban road constriction in Addis Ababa began right after independence in 1941.Long and big bridges were also built. Emperor Minellik was also believed to be the first in importing cars in Addis Ababa and introduced the car technology in the city for the first time in 1907. The country’s modern road construction is highly interlinked with Emperor Haile Sellase’s ruling period.

During the regime of Haile Sellase a number of contractors were organized to carry out road construction. The first one to be established by the government to construct roads was public works department. It was established to construct roads in Addis Ababa and in its surrounding. After a few years this department was raised to a minister level and Addis Ababa also got the chance to establish its road development organizational structure. When it was decided for Addis Ababa to have a mayor and a council in 1942, the city roads construction and maintenance was organized under the municipality. To fulfill the road construction activities together with building works the “road and building works” department was established. This department

stayed till the replacement of the Haile Sellase regime by the Derge regime performing its duties. But no fundamental organizational change of the department was observed in the Derg regime.

In 1993 the existing government (EPRDF) has established regional governments and gave them power to administer their regions with autonomy. During this time Addis Ababa was also established as one of regions. The Addis Ababa administration during this period established the "bureau of works and urban development" and the bureau organized a department under it to carry out the road construction and maintenance works. The newly established road department constructed and maintained the city road till the establishment of the Addis Ababa city roads Authority in march 15,1998 by regulation no 7/1998 to be administrated by board of directors to construct, maintain and administer the road works in Addis Ababa by the city administration.

The total length of road constructed in the city till the establishment of the authority in March 15, 1998 was 1,300km of which 900 km was gravel road and the remaining 400 km was Asphalt surfaced road. The Addis Ababa city roads authority has done remarkable progress in the city roads expansion and upgrading in the last eleven years since its establishment. Today the city roads length reached 4,148k.ms the road net work coverage has reached 17.3% compared with the developed area of the city. In 2020 G.C. according to the authority GTP plan will meet the city road network reach to 20%.

4.8.2. Addis Ababa City Roads Network

The road network of the city Compared to the built up area is as follows:

a) Total Area of Addis Ababa 54,000 hectare
b) Total Length of Road Network with 7 Meters width 4148 km.
c) Total built up area 16,902 hectare or 169.02 km2
d) Road density about 22.07 k.ms/km2 of the built up area.

4.8.3. Road Construction

4.8.3.1. Existing Road Reconstruction

AACRA has successfully upgraded roads within the city. The roads upgraded according to master plan. The authority has redesigned to upgrade the existing old roads which served the dwellers for long decades. It has been successfully upgraded including the first ever two roads in which emperor Menelik II constructed equal with the foundation of Addis Ababa, Addis Alem to

his grand palace and English Embassy- his palace. The upgraded existing roads were so narrow and can't accommodate the transportation demand. To date over 4,148 km of Asphalt surfaced roads with 7meter width has been implemented in areas identified as mayoral priorities, i.e. Kality-Mesqel Square, Pushkin Square, Gotera Interchange, Gofa, Bus three terminal tele to Dese Hotel, Asko Sansusi winget, Arat Kilo Genfele Menelik, Yekatit 12 Hospital Semen Hotel…so on. In addition the existing local roads which were gravel surfaced reconstructed again with cobblestone creating new jobs for enterprises and youths and women's for more than 60 thousand unemployed within four years beside to upgrading the main roads.

Figure 4.8.3.1: Road construction in Addis Ababa Gotera Interchange

4.8.3.2. New Road Construction

Besides to the reconstructions of the existing roads in the city many roads has been designed and constructed in the new extension developed areas connecting to the center, at the center new short access roads were done successfully.

Figure 4.8.3.2: New road construction in Addis Ababa at Megenagna

A. Roadways

The road ways is the most out left work particularly the sidewalks way and the storm water systems management in line with city not changed equally with the society economical and social progress. According to the mandate in terms of March 15, 1998 by regulation no 7/1998 AACRA is responsible to design, construct, maintain and administer infrastructure networks associated with roads, roads reserves, storm water, footways, traffic signs and lights and so on. Including managing storm water either side in side kerbs and outside the kerbs are the side walkways for pedestrian comfort and safety, street light poles, traffic signals and so on. The side walk ways varies in width from 3.4, upwards up to seven meter wide. Major roads have dual carrier ways each seven meter wide accommodating two lanes in each direction. The high ways is the highest form of roads with in the road hierarchy. The Authority manages 4,148 k.ms total lengths of roads until July 6, 2013/14.

B. Rainstorm

The authority provides a schematic storm water system that consists of the roadways and its kerbs which stand as the first gathering point of the storm water. Grid inlets provided on the roadways are designed to sweep away water from the road. These inlets are connected to the

underground pipe network and culverts which take the flow into nearby rivers. The Authority manages 1,596k.m of drainage line on both sides of the road until July 6, 2013/14.

C. Bridges

Building bridges in various places is the critical strategic part of Addis Ababa Roads Authority's infrastructure development scheme of the roads to service delivery excellence program. AACRA built pedestrian over pass bridges at Arat Kilo to protect pedestrians from traffic accidents. Other such pedestrians over pass bridges were already constructed with the ring roads to free the high ways from crossing the road. Other bridges like Shegole, bridges and other constructed to connect the neighbors and districts make short accesses and enhance the road networks of the city. Currently AACRA manages around 285 bridges in the city until July 6, 2013/14.

4.8.4. Strategy to expand and improve the Road Network

I. Near Future Goal

Construct additional roads to increase the road network coverage to 20% of the built up area of the city- by 2020. Actions to realize this goal are:-

i. Complete the designing of the road network as per the master plan – up to 2015.
ii. Expand and rehabilitate the road network
iii. Primarily those which are connecting to the Ring Road
iv. Rehabilitate and upgrade the major city roads as per the master plan
v. New access roads to the new Industrial and Expansion areas.

II. Medium Term Plan

i. Keep on outsourcing all design works
ii. Outsource all new road construction works
iii. Carry out preparatory works towards the possibility of outsourcing road maintenance works

III. Long Term Plan

i. Outsource all construction works including maintenance works
ii. Organize the current own force departments into an independent commercial enterprise
iii. Make the function of the Authority a lean regulatory and contract administration body

CHAPTER FIVE: THE CASE STUDY PROJECT, DATA ANALYSIS, DISCUSSION AND EVALUATION

5. Case Study

The analysis of the results from this survey has been summarized as follows:-

Data analysis

A survey was conducted with the aim of covering users (300 in number) of the existing public transport modalities, namely the city bus, shared taxi, higer bus, and star alliance bus. It was undertaken throughout the different locations mentioned earlier in the introduction.

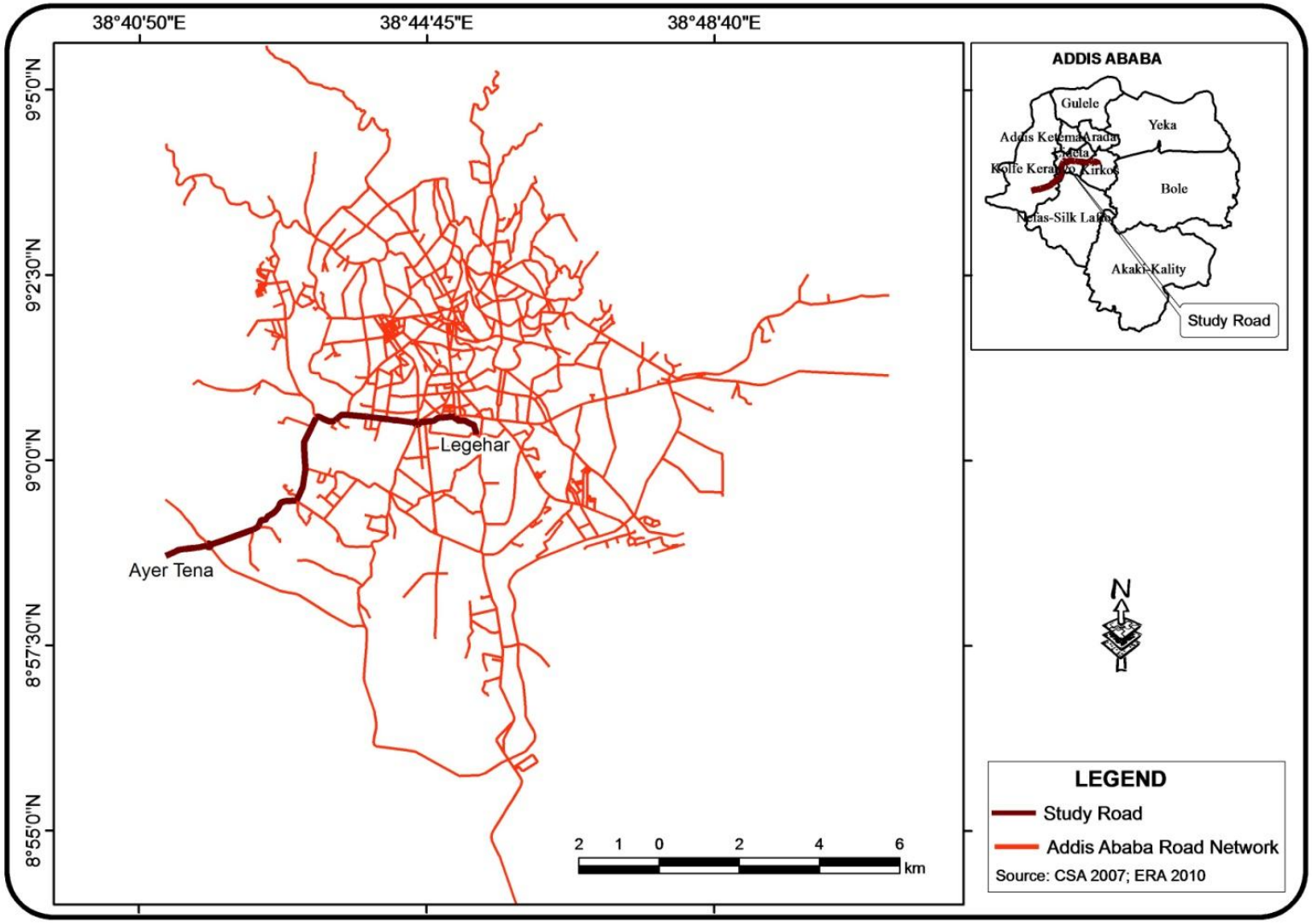
Sample Survey by Destination

Table 5.1: Sample survey at various locations on the East-West Axis

Destination	Ayer Tena	Zeneba Werk	Total(Sosti Kuter Mazory)	Tore Hailoch	Lideta	Mexico	Leghar	Total
No. people	87	40	27	42	29	26	49	300
Percent	29	13	9	14	10	9	16	100

Source: survey data, 2015

In table 5.1 is representation of the destinations of the subjects of the sample survey at various locations on the east-west axis. The sample survey is taken from passengers of the city buses, higer bus, star alliance bus and shared taxis on route to their various destinations. This is shown by the following study map:-



5.1: Map of Addis Ababa road network and study area from Ayer Tena to Legahar

A. Demographic Characteristics of Respondents

5.2. Sex of Respondents

One of the variables used to discuss the demographic characteristics of the respondents is gender. As presented in table 5.2 among the respondents 59.3%were male whereas females comprise only 40.7%. There were more male respondent in the study than female because of most of the female respondent were inconvenient at the time of data gathering. The male respondents were found more active in this study.

Table 5.2: Percentage distribution of respondents by gender

Gender	Number	Percent
Male	178	59.3
Female	122	40.7
Total	400	100

Source: Survey data, 2015

According to the table 5.2 which indicate 178(59.3%) of respondents are male and 122(40.7%) of the respondents are female which the sample survey is taken from passengers of the city bus, shared taxi, higer bus, and star alliance bus on the route to their various destinations.

5.3. Marital status

Table 5.3: Percentage distribution of respondents by marital status

No.	Marital Status	Frequency	Percentages
1	Married	89	29.7
2	Divorce	5	1.7
3	Single	205	68.3
4	Widow	1	0.3
Total		300	100

Source: primary data, 2015

In the table 5.3 indicate the marital status of respondent, out of them 29.7% were found that married ,1.7% divorced ,68.3% are single, and the rest 0.3% was widow. The majority of the respondent found in this study was single.

5.4. Educational level of the Respondents

Table 5.4: Percentage distribution of respondents by educational level

No.	Educational level	Frequency	Percent
1	Basic education	4	1.3
2	Primary education(1-8)	81	27
3	Secondary education(9-12)	65	21.7
4	Certificate	17	5.7
5	Diploma	40	13.3
6	Degree	72	24
7	Above degree	21	7
Total		300	100

Source: primary data, 2015

The distribution of respondent according to their educational level is presented in table 5.4. The higher proportion 27% and 21.7% of respondent completed some attended primary, and secondary school, respectively. 5.7% and 13.3% respondents attained college certificate and Diploma. And 31% completed Degree and above. The rest small proportion distribution of respondent 1.3% was basic education. The result shows that most of the respondent had attained secondary and primary education. Because most of them using transportation for educational and working purpose.

5.5. Family size and Mode of their Transport frequently used

Table 5.5.1: Percentage distribution of respondents by family size

No.	Family size	Frequency	Percent
1	<4	70	23.3
2	4 and 5	155	51.7
3	6 and 7	32	10.7
4	8 and 9	12	4
5	≥10	7	2.3
Total		276	92
Missing System		24	8
Total		300	100

Source: survey data, 2015

According to the table 5.5.1.which indicate 70(23.3%) have less than four family members, 155(51.7%) have four up to six family size, 32(10.7%) have six and seven family size, 12(4.0%) have eight and nine family size, 7(2.3%) have greater than or equal to ten family members, and 24(8%) did not answer the questions during data collection.

Which transport mode do your family members usually use?

Table 5.5.2: Percentage distribution of respondents by mode of their family members transport frequently used

No.	Mode of Transport	Frequency	Percent
1	walk	27	9
2	Taxi	142	47.3
3	Bus	54	18
4	Higer Bus	12	4
5	Star Alliance Bus	7	2.3
6	Other(specify)	58	19.3
Total		300	100

Source: survey data, 2015

As shown in table 5.2.2, 27(9%) walk, 142(47.3%) by taxi, 54(18%) by bus, 12(4%) by higer bus, 7(2.3%) by star alliance bus, 7(2.3%), and 58(19.3%) by others transportation mode. According to the above respondent the highest percentage around 47% of the family members use shared taxi (mini bus), 19.3% uses privet car and 18% use the city bus as their primary choice of transport which the sample survey is taken from passengers of the city bus, shared taxi, higer, and star alliance bus on the route to their various destinations.

5.5.3. Average family size vs. mode of transportation family members usually use

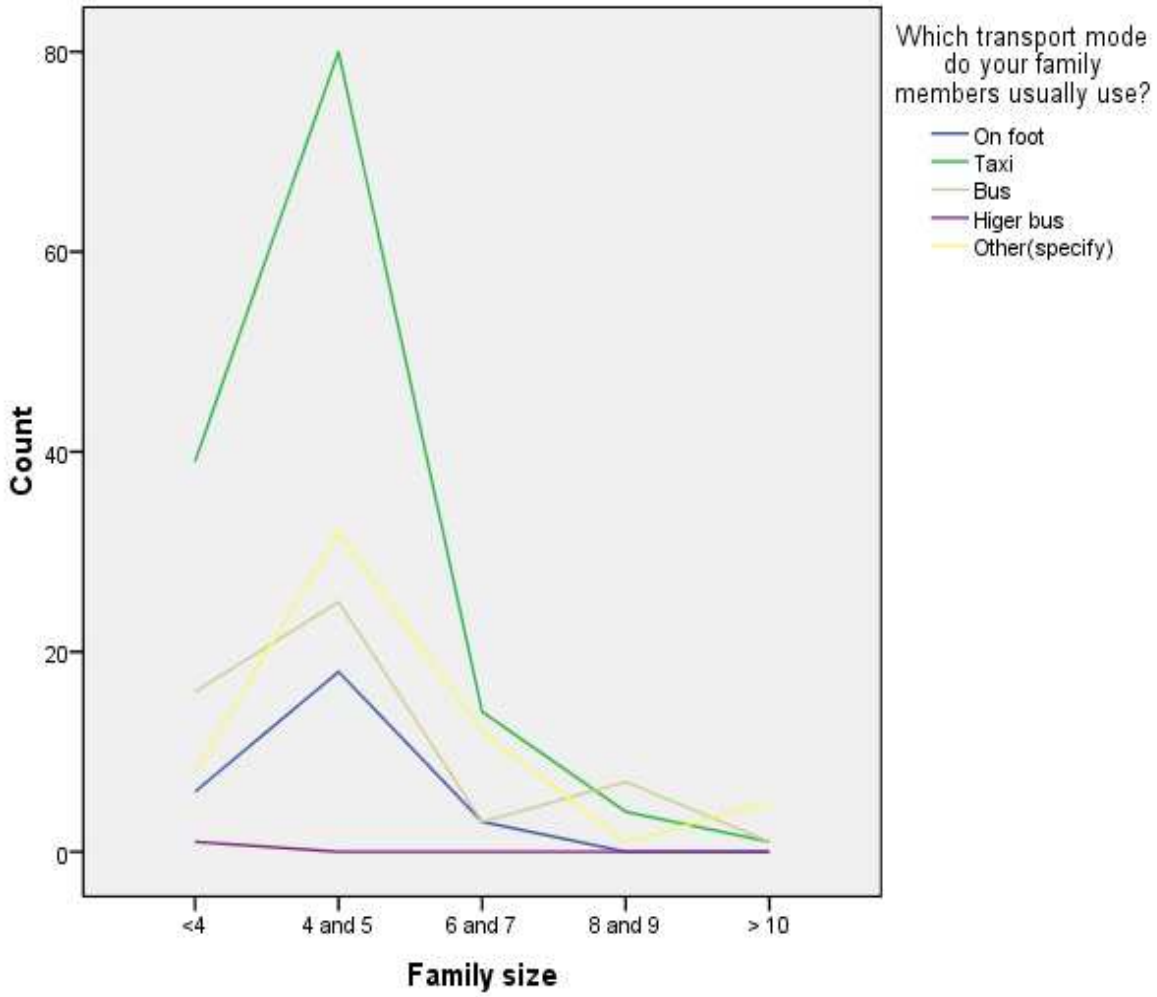


Figure 5.5.3: Percentage Distribution of Respondents by Average Family Size vs. Mode of transportation family members usually use

This graph shows that the highest percentage around 47% of the family members use shared taxi (mini bus), 19.3% uses privet car and 18% use the city bus as their primary choice of transport which the sample survey is taken from passengers of the city bus, shared taxi, higer bus, and star alliance bus on the route to their various destinations.

5. 6. Purpose of Trips Generated

Table 5.6: Percentage distribution of respondents by purpose of trip generated daily

No.	Occupation	Frequency	Percent
1	Student	121	40.3
2	Employee	179	59.7
Total		300	100

Source: survey data, 2015

According to the table 5.6.which indicate respondents are 121(40.3%) Student, 179(59.7%) Employee, While compiling the data for this set of questions geared toward assessing the travel behavior of the subjects of the study, two broader classifications namely, "employee", and "student" have been used. However it should be noted that under the subgroup of employee we have, business people (self employed), commuters, civil servants and the like, while the "student" subgroup indicates subjects traveling to some sort of educational institute. This shows that the predominant purposes of travel are work or education based.

B. Socio-economic data survey

5.7. Average daily transport expense vs. monthly income

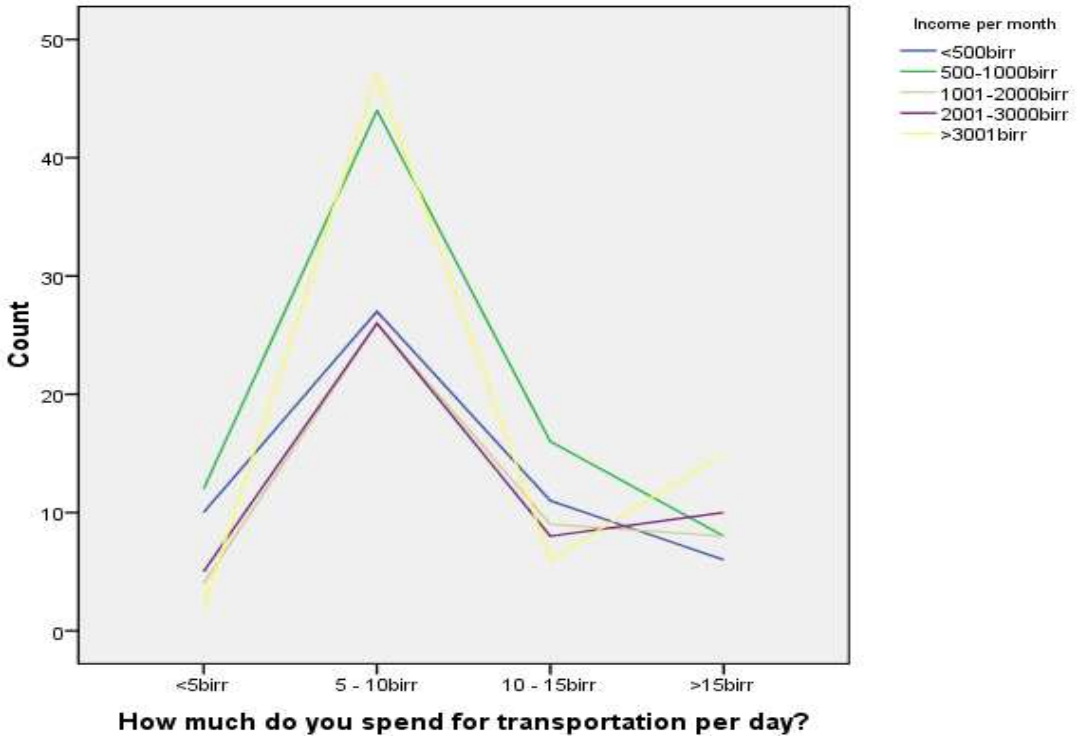


Figure 5.7.3: Percentage distribution of respondents by average monthly income Vs. daily expense of transportation

This graph shows that monthly income is directly proportional to transport expenditure. Furthermore; the survey indicated that on average the respondents spend around 5-15% of their income on transport. True to the current economic reality of the city, the amount of money people spend for transport per day is directly proportional to their rate of mobility income and it further reinforces the significant role played by the public transport in getting people from one place to another in an economically viable way. It was learnt from the survey that the monthly income people earned, had a marked influence on the type of transportation they frequent used, which is also an implication of their daily expense for transport.

5.8. Mode of transport frequently used

Table 5.8: Percentage distribution of respondents according to the modes they use to commute

No.	Mode of transportation	Frequency	Percent
1	On foot	43	14.3
2	Taxi	177	59.0
3	Bus	46	15.3
4	Higer bus	4	1.3
5	Star Alliance Bus	1	.3
6	Other(specific)	29	9.7
Total		300	100

Source: survey data, 2015

According to the table 5.8, 43(14.3%) of respondents commute on foot, 177(59%) by taxi (mini bus), 46(15.3%) by bus, 4(1.3%) by higer bus, 1(0.3%) by star alliance bus, and 29(9.7%) by other transportation mode. The highest percentage around 59% of the respondents are using shared taxi (mini bus), while 15.3% uses the city bus as their primary choice of transport.

5.9. Pay more than the stipulated fare

Table 5.9: Percentage distributions of respondents by pay more than the stipulated fare

No.	Forced to pay more than the stipulated fare?	Frequency	Percent
1	YES	178	59.3
2	NO	122	40.7
Total		300	100

Source: survey data, 2015

According to the table 5.9.which indicate 178(59.3%) said Yes, responded that means they are forced to pay more than stipulated fare, and 122(40.7%) are said No, that means they can pay the stipulated fare.

5.10. Time taken work place from where they live

Table 5.10: Percentage distribution of respondent time taken work place from where they live

No.	Time taken arrive to work place	Frequency	Percent
1	<30 minutes	80	26.7
2	30 minutes - 60 minutes	167	55.7
3	60 minutes - 90 minutes	47	15.7
4	90 minutes - 120 minutes	6	2
Total		300	100

Source: survey data, 2015

According to the table 5.10 which indicate 80(26.7%) take <30 minutes, 167(55.7%) take30 minutes - 60 minutes, 47(15.7%) take 60 minutes - 90 minutes, and 6(2%) take 90 minutes - 120 minutes they take to reach their work place because of congestion the majority or 55.7% reach to their work place from 30 minutes - 60 minutes.

5.11 Trips make per day

Table 5.11: Percentage distribution of respondents by trips they make per day

No.	How many trips they make per day	Frequency	Percent
1	Twice	211	70.3
2	3times	33	11
3	4times	40	13.3
4	5times	5	1.7
5	>5times	11	3.7
Total		300	100

Source: survey data, 2015

According to the table 5.11.it is indicate that 211(70.3%) of the respondents their trips per day is twice, 33(11%) their trips per day is three times, 40(13.3%) their trips per day is four times, 5(1.7%) their trips per day is five times, and 11(3.7%) their trips per day is more than five times, while the majority or 70.3% make trips for education or going to school and employee like civil servants, self employed etc their trips per day is 2times.

5.12. Modes of needs improvement for the public services

Table 5.12: Percentage distribution of respondents by modes of improvement in the services

No.	Modes of transportation	Frequency	Percent
1	Taxi	103	34.3
2	Bus	49	16.3
3	Higer bus	13	4.3
4	Other(specific)	135	45
Total		300	100

Source: survey data, 2015

According to the table 5.12 which indicate 103(34.3%) response that taxi (mini bus), 49(16.3%) response that the city bus, 13(4.3%) response that the higer bus, and 135(45%) response that the other service need to improvement by quantity and quality. On the other hand light rail transit transportation must expand at different parts of Addis Ababa to solve shortage of mass transportation in the city.

5.13. Improvement of public transportation from time to time

Table 5.13: Percentage distribution of respondents by improvement of public transportation from time to time

No.	Is there improvement of public transportation from time to time?	Frequency	Percent
1	YES	104	34.7
2	NO	196	65.3
Total		300	100

Source: survey data, 2015

According to the table 5.13 which indicate 104(34.7%) responses "Yes" there is improvement but it is not enough, and196(65.3%) responses "No" because there is not improvement of public transportation from time to time the number of population is not much with number of transportation mode. Number of mode of transportation in Addis Ababa increase but the problems seems to get worse instead of better. The streets of Addis Ababa witness a unique sort of battle every morning and late afternoon as the citizens of the city fight for transport.

CHAPTER SIX: SUMMARY OF RESEARCH FINDING, CONCLUSION AND RECOMMENDATIONS

6.1 FINDINGS

The major findings of the research have been summarized as follows:

The first problem is that the city is getting bigger all the time and the transport system has been left behind, the number of population and number of transportation is not in proportion. The total number of Addis Ababa is always increasing from time to time but the mass transportation is left behind. All means of transportation are not quite enough to fulfill the ever growing demand that is seen in the city. I think that the government should allow special incentives for large scale investment in the public transport sector including alternative forms of transport. Like know ongoing railway constriction in the city.

Figure 6.1A: Demand of population to keep bus in Addis Ababa

Figure 6.1B: Ongoing railway construction in Addis Ababa

The second problem is that the poor traffic flow management, road infrastructure and poor maintence, and the unpainted roads are current challenges of the transport system in the city. Water, electricity, telecommunication authorities, and road constructions which are do not work together to solve common problem. Due to that customers may stay long time waiting for buses at stations. Besides, most of the old roads are too narrow and busy.

The third problem is that the acuteness of transportation problem of the city is soaring steadily from time to time. Workers and students always face challenge of transportation shortage, spoiling their morning fresh energy and getting fatigue before they carry out their daily routines work. The transport shortage in rush hours is beyond the capacity of any services providing body, i.e the minibus taxi, higer buses, star alliance buses and anbessa. The distribution of taxis to the city's terminals was done in 2011 and has not yet been revised, from my observation I can see the unbalance of taxi distributions at some area there is large amount of taxi but small number of passenger and the opposite is true, but it will be subject to revision because of the

coming light rail transit (LRT).Taxis that were working on routes in the lines of the LRT will be minimized and distributed to other places where the need for them is high.

Demand overlap: a survey of the purposes of trips taken by the subjects indicated that there are two predominant destinations, educational institutions and work places. In Addis Ababa, currently, the working hours of both these occupations are the same. This results in a phenomenon where by almost all of the residents demand public transport services at about the same time or for the same time period, which creates a demand overlap. Furthermore, it was observed that even residents who rely on private means of transport demand the use of the existing roads with in the same periods of time of the day.

On street parking: even though the east-west axis has the provision for two lanes on each side, it was learned that on street parking dominates throughout its length, literally making it a two lane street. What is more the overflow effect of this pre occupation of the side lane for parking activities is creating traffic jams and congestion.

Socio-economic Dynamics: the growth of Addis Ababa is a combination of three basic processes: rural-urban migration; natural increase, and re-classification of land from rural to urban categories. This growth leads to the mobility of the residents and consequently the demand for public transport for the movement. It has been stated earlier that Addis Ababa is the economic power house city of the country; this fact has several implications in the socio economic make up of the city.

Addis Ababa is the political center, marketing center, educational center, industrial center, health center, head quarters for different organization, cultural center and so on for the our country. All these need transportation in the city. As it has been shown in the population forecast, the urban population is growing continually at an alarming rate. It is obvious that this is directly linked to the fact that rural urban migration is at its highest in the case of Addis Ababa and also urban to urban migration. On the other hand a detailed look at the rate of construction of transport infrastructures in Addis Ababa indicates that the rate of road coverage has been increasing steadily. Even though there still is a lot of work that needs to be done in terms of infrastructure

provision, the capital investment in roads carried out in the city so far, should have had an impact on the level of mobility albeit a small one.

6.2. Addis Ababa City Bus Enterprise (findings)

The accumulated sufferers of the city bus enterprise are mounting up and its future survival is questionable. The gap between the revenue collected and the operating expenses is increasing. And the duration of new bishoftu buses is very low when comparing with the per vies DAF, Volvo, Fiat and Mercedes bus; much of them is stop at Yeka, Shegole, Makanisa and Akaki workshops and deposes (see the following figure). A decrease in the number of users associated with the number of buses in use is other factor. Actual findings indicate that following factors as the principal contributors for the unhealthy status in which the city bus enterprise finds itself today

Figure 6.2: Addis Ababa city bus enterprise, anbessa buses at Yeka depot.

ACBE has 461 DAF brand old buses, of these 118 buses engine have already failed because most of them for worked for many years and hardly functions with frequent maintenance. Sadly most of their parts cannot be produced locally. In fact, the enterprise ordered to get the delivery of genuine part in 2004, but it is evident that the buses are old models and the company that manufactured them has long started producing modern models and their parts. Because of these ACBE has received three hundred fifty rigid and one hundred nine articulated locally assembled

buses from bishoftu Automotive and Locomotive Industry. I think this project is one great leap to achieve the knowledge and technology transfer ambition of the nation. However, the new buses encountered some technical defects on one of its components of gearshift system. ”one important component called Servo, fixed in the system has been found poor in quality. As a result, over two hundred of the new buses have repeatedly failed to operate,” according to Girma.

Share of Subsidy in Revenue Account: there is a deficit in revenue account, as subsidy is reduced at one end while operating cost increase at the other. The enterprise is facing uncertain future due to poor financial health; especially controlling the tariffs and denying the subsidies.

Inadequate transport infrastructure: one of the major constraints of city bus enterprise is the lack of proper and adequate Infrastructure. The bus stops do not have shelters. The terminals do not have proper passenger facilities. There are no proper stopping and terminal points developed. The former one is also destroyed because of the ongoing construction of the thirty four km Light Railway Transit (LRT), which goes from Ayat to Tor Hailoch (east to west) and from Piazza to Akaki (north to south corridor).Therefore the need for standardized development of transport facilities is imperative.

The future plan Vs the existing situation: the city administration developed the Addis Ababa transport plan in 2007 and transport policy of Addis Ababa in 2011 that the rejuvenation of anbessa city bus enterprise, introduction of medium capacity technology comprising Bus Rapid Transit /Light Rail Transit System along major corridors, and promotion of minibus taxi services. However, it remains to be seen whether these two vastly different modes of public transport can be operated side by side and how such a transformation is going to be effectively managed and coordinated.

The number of routes is increasing from time to time because of new expansion areas that are a result of various factors such us urban sprawl, increase in the density of urban population and the like. The trend in population increase within the urban areas indicates that some core inner areas of the city have a marked rate of population growth that is greater than the citywide average. These are usually places where the urban poor dwell, and since residents of such localities depend heavily on the city bus network for their daily movements there is a constant need for an

increase in fleet that serve those localities. This in turn results in an increase in demand vis-à-vis an increase in number of passengers in such specific areas.

Field of route served by the existing public transport modalities: Addis Ababa faces various problems including insufficient and poor quality of public transport. That means the existing public transport system in Addis Ababa is critically inadequate to provide service for the increasing travel demand of the city, because the number of cars providing the service is not sufficient. The city bus network, which is a combination of the bus routes and bus stops, does not have any design or planning features. In fact it follows the existing land use and patterns of earlier settlements, which again is a reflection of the lack of coordinated urban planning as well as designing aspects in Addis Ababa in general.

Controlling mechanism: the city bus enterprise uses manual controlling mechanisms for the operations of the transportation services it provides. This obviously has negative impact on its efficiency, especially when we take into account the added demand for public transport that exists now more than ever before. Furthermore, such services as, ticketing are also done manually, which almost always result in long queues.

Shared Taxi: number of taxi in the city is increasing perpetually; this observation reinforces the fact that the public transport demand is increasing through time. 8,809 mini bus taxis operate in the city of Addis Ababa, which has a seating capacity, is of twelve passenger's but7, 494 mini bus taxis properly working on the routs. Most of these vehicles are old in age. These minibus taxis operate on five zone and 364 routes and carry more than 1.1 million passengers per day.

Lack of empowerment of transport users: In assessing the problems of the urban transport sector, it becomes increasingly clear that the voice of the consumer is not being heard. They forced to pay more than the fixed tariff. They have no representation on development bodies, and are powerless in the face of the operating industry effectively controlled by the marshals. As a result of the latter, they are forced to access services at points that may not be convenient and to use the next available vehicle irrespective of its condition. At times of lower demand, they may be forced to wait an unreasonable time until any service is offered at all.

6.3. CONCLUSION

As it has been discussed in depth in the history of public transport, maximization of mobility in urban areas heavily relies on the capacity of the existing public transport. In light of this fact, it can be said that the ability of the public transport system Addis Ababa as it exists now, to meet this goal of maximizing urban mobility is very limited. As a short - term solution, the transport bureau has distributed supportive buses in 96 major problematic areas and made Anbessa buses work in an additional 34 directions, adding up to 157 lines. According to the literature review that made earlier, it can be concluded that the general causes of public transportation system in Addis Ababa are:-

Specialization: the growth of Addis Ababa is a combination of three basic processes: rural-urban migration; natural increase, and re-classification of land from rural to urban categories. This growth leads to the mobility of the residents and consequently the demand for public transport for the movement, and also the continued growth of the urban population which is largely due to rural urban area migration or the pull effect of the city and changes in land use patterns such as development of business activities in previously residential areas, are generating a continuous demand for travel.

Secondly, the apparent demand overlap which has been discussed in detail in the findings has resulted in high peak hour traffic which in turn causes for shortage of public transportation in the city. The degree of transport provision coverage to the general traveling public is low. This is due to the lack of both effective traffic management measures as well as timely investments on the appropriate infrastructure in the right locations. This problem will be exacerbated in the near future as traffic volumes increase substantially due to the economic and demographic factors noted above. Both traffic volumes and the total amount of time people spend traveling are growing rapidly.

Thirdly, the small-scale transportation cannot solve the problems of the city, than must focus on mass- transportation and there needs to be private sector investment in the transportation business, which will make it more competitive and effective.

6.4. Recommendations

General Recommendations

Based on the results of this study, the following recommendations have to be taken in to consideration. The study identified multitude of factors responsible for public transportation system and its impact on urban mobility: the case of Addis Ababa in the study area. It can be seen that public transportation system and its impact on urban mobility issues in Addis Ababa is a continuing problem until high priorities are given to the situations and addressed according.

i. It is recommended that, immediate action be taken by government, private sectors and society to create awareness and how to develop to re-organize the network according to the new routes and use mass transportation systems.

ii. There is a need for framing a workable public mass transport policy, which is sustainable and which provides not only finances but also sustainable institutional arrangement to meet the future needs of Addis Ababa. Given the existing financial and institutional limitations, in order to get effective mobility and accessibility, have safe, reliable and efficient public transport which meets the demand for its service, guiding principles and a set of implementation strategies should be formulated.

iii. Small-scale transportation not solves the problems of the city, and then must focusing on mass- transportation. Mass transport skills to develop to re-organize the network according to the new routes of BRT and LRT and methodology of organization of the operating of the new mass transportation systems.

iv. **Decentralization:** The fact that Addis Ababa has dominant center and other weak sub-centers has a negative impact on the general level of mobility in the city. Therefore the development of other competent sub centers in the city is a planning alternative that should be looked at. This way we can lessen the strain of peak hour traffic flow into or away from the CBD. Furthermore the possibility of redesigning some of the bus routes that go into the CBD is an area that should be looked into. It can be done in such a way that cyclic routes that circle around this central area can be adopted. This would necessitate walking short distances to and from the inner core to where the routes end, and hence prohibits motorized transport from getting deep into the core, which in turn

would result in a vehicle free, pedestrian friendly center while at the same time avoiding congestion.

v. **Staggered hours:** It was found out from the survey conducted that various institutions demand the provision of public transport system at about the same time, with educational, civil service, financial and other institutions having similar working hours. However it might indeed be a necessary measure to stagger the operating hours of these institutions, there by easing the demand overlap.

vi. **Social responsibility:** Addis Ababa city bus enterprise, as the major operator of public transportation in the city, should attain financial stability and sustainability in order to be efficient. It is of course true that this assessment of efficiency depends on the objectives that we set for public transportation system. In social responsibility, that is, the provision of motorized transport mode in an equitable manner takes the number one priority, while profitability and environmental considerations might be considered. Hence, it is suggested that public transport system should aim for that delicate balance which exists at the intersection of these three important parameters, and the principal development partner in such an undertaking is of course the regional government, and the federal authority by expansion.

vii. **Organizational Structure:** for effective management of an enterprise, the organizational structure plays a vital role. The organizational structure should clearly identify the responsibilities, span of control, delegation of authority; accountability and enforce proper inter relationships between various entities. The appropriate design of this structure is a pre-requisite for the successful operations of any business enterprise. All the concerned institutions and stakeholders dealing with public transportation and urban development, such as: traffic police, Addis Ababa city roads authority, Addis Ababa transport authority, master plan office, Addis Ababa city bus enterprise, federal transport authority and the like should channel their efforts toward increasing urban mobility in Addis Ababa and create a medium that would allow for a smooth flow of information both at political and technical levels.

viii. **Parking and stopping places provisions:** most other aspects of urban transport and road network have been subjects of various studies at one point or another, but in depth researches and studies about the provision or the lack of parking facilities are lacking. Proper supply of parking facilities, especially in transit areas is a measure that should be taken, so as to avoid the spillover effect of the public transport. On street parking should be avoided on peak hours. Add more parking fee on private cars to discourage them from spending so much time on the street, which will help to minimize congestion. As a result people would be forced to move quickly, which would make the traffic flow smooth.

ix. **Inbound and Outbound traffic:** According to the survey that has been made and different studies made by different professionals, the main congested areas in the peak hour are found along the major east west axis road and in the main center of the city. And the roads which lead to the main centers from the four direction of city are congested in the mornings which is called in- bound-traffic (incoming traffic is high in the morning) and on the contrary the opposite lane is congested in the afternoons, which is called outgoing traffic or outbound traffic. We can recommend here, the use of more number of alternative lanes in the direction where there is higher traffic to minimize congestion.

x. **Transport infrastructure:** Similarly, in the urban road network of Addis Ababa, intersections and drainage together with the existing road infrastructure implementation problems should be given proper attention. Lack of alternative routes, and unchannelized road functions to accommodate traffic have aggravated the road network problem. Therefore, it is firmly believed that step - by- step improvement plans must be devised to mitigate design and implementation problems of the road network.

xi. In general, it has been stated in the beginning that transport is an engine for development, hence the significant role that urban transport system plays in bringing about a sustainable development and poverty reduction in the urban context cannot be overstated. It should be mentioned here too that, as it has been clearly stated in the concluding remarks, the realm of public transport in Addis Ababa is entangled with other multifaceted transport related as well as social issues. Thus the need for comprehensive studies in all the respective fields is of great importance. Such areas of interest as traffic management, transport infrastructure, transport systems and need to be studied in depth.

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Other Resources

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http://www.jstro.org

Internet from different web site

www.aarodtransport.gov.et

www.anbssacitybus.org.et

APPPENDIX I

ADDIS ABABA UNIVERSITY

COLLEGE OF SOCIAL SCIENCES,

Department of Geography and Environmental Studies

Questionnaire Survey

Dear respondents:

This questionnaire is designed to gather data on the overall on **Public transportation system: The case of Addis Ababa** to achieve this purpose and to deeply investigate the case, your response to the questions given below has a crucial value. Therefore, you are kindly requested to read the questions carefully and give accurate and real data which exists on the ground. The response that you reply will not be used for any other purpose other than this research work, so be free and give your honest and genuine response.

Thank you in advance for your Cooperation!

Instruction: Circle the letter of your choice or fill the blank spaces for the following questions. You may respond more than one answer if it is necessary.

Part I Background Information of Sample Respondents and socio-economic status

1. Sex A. Male B. Female

2. Occupation

A. Student C. Unemployment

B. Employee D. Other (specify)

3. Marital Status

A. Married C. Single E. Other (Specify)

B. Divorced D. Widowed

4. Educational level

A. No Schooling (illiterate) E. above Secondary Education

B. Basic education F. Diploma

C. Primary education G. Degree

D. Secondary Education (grade 9-12) H. Other (specify)

5. Income per month

A. <500birr B.500 – 1000birr C.1001 – 2000birr D.2001 – 3000birr E.>3000birr

6. Which transport mode do you usually use?

A. Walking D. Higer Bus

B. Taxi E. Star Alliance Bus

C. Bus F. Other (specify)

7. Family size

A. <4 B.4 – 6 C.7 – 8 D.9 – 10 E.>10

8. Which transport mode do your family members usually use?

A. Walking C. Bus E. Star Alliance Bus

B. Taxi D. Higer Bus F. Other (specify)

9. Working hour from ---------- to ----------

A. 1:00 – 8:00 C. 2:30 – 11:00

B.2:00 – 10:00 D. 3:00 – 12:00

10. How much do you spend for transportation per day?

A. <5birr B. 5 – 10birr C. 11 – 15birr D. >15birr

11. Origin of trip ----------Destination ----------

12. At what time of the day do you get transportation easily?

A. 12:00 - 1:00AM C. 2:00 – 3:00 AM

B. 1:00 - 2:00AM D. 3:00 – 4:00AM

13. Are there any instances where you are forced to pay more than the stipulated fare?

A. Yes B. No

14. How long does it take you to reach your work place from where you live, at peak hours?

A. < 30minutes C. 1hour – 1:30minutes E. > 2:00hours

B. 30 – 60minutes D. 1:30 – 2:00hours

15. How many trips do you make per day?

A. Twice C. Four times F. >Five times

B. Three times D. Five times

16. What areas of improvement in the services rendered by particular mode of transportation that you are using?

A. Taxi C. Higer Bus E. Other (specify)

B. Bus D. Star Alliance Bus

17. is there improvement of public transportation from time to time?

A. Yes B. No

APPPENDIX I

Interview Guide

Dear Sir/ Madam

My name is Mulu Eshete. I am undertaking a study on the *Public Transportation System: the case of Addis Ababa.* I kindly request that you answer these simple questions honestly; the information you give is strictly for academic purposes and will be treated with maximum confidentiality.

Questions for the city bus enterprise, shared taxi association, higer bus association, and star alliance bus, case study interview:

I. The Interview questions listed below are guiding questions. There will be probing questions based on the answers that would be provided by the Interviewee to get more information associated with the study.

II. These interview questions will be translated into Amharic. When the Researcher gets the permission of the interviewee the interview will be tape-recorded. Then the researcher will transcribe the interview and his field notes first in Amharic, then after will summaries /narrate the Amharic transcribed document into English.

III. If the interviewee is not comfortable with tape-recording, the researcher will use his field notes to transcribe the interview.

1. The number of buses (since 1990 – the latest)?
2. Types of vehicles?
3. How many people does a single bus carry per day on average?
4. How many trips does one bus make per day?
5. What is a typical workday like? How many hours does it include from start to finish?
6. How long does it take for a single bus to go from one station to the next (on average)?
7. What is the average distance from the generation point to the termination point of a single route?
8. What is the average distance from one bus stop to the other?
9. What is the maximum and minimum number of stops in one route?

10. How are the individual routes laid out? What are the factors taken in to consideration?

11. What are the areas where there are larger numbers of people that use the bus?

12. The route map of Anbessa bus?

13. Cleaning, checking, and maintaining process….?

14. What is the future plan or proposal to make the system efficient?

15. How much revenue does it collect? Is it a self sustaining system or does it get government subsidies?

16. The number of employees?

17. History of the city bus enterprise?

18. Does the number of the city bus users increase from time to time or not?

19. What are the company's vision, mission and goal? And is the system accomplished the goal or is it on the process to achieve that goal? Any obstacles ?

20. For how many years can a single bus operate on average?

APPPENDIX III

አዲስ አበባ ዩኒቨርሲቲ

ማህበራዊ ሳይንስ ኮሌጅ

የጂኦግራፊና የአካባቢ ጥናት ትምህርት ክፍል

በአዲስ አበባ የህዝብ ትራንስፖርት ችግሮች በሚል ሀሳብ ዙሪያ የተዘገጁ መጠይቆች እኔ በአዲስ አበባ ዩኒቨርስቲ የምማር ተማሪ ሲሆን የአዲስ አበባ የህዝብ ትራንስፖርት ችግሮችን ጥናት የማደርግ ተማሪ ነኝ። የዚህ ጥናት ዋና አላማ የአዲስ አበባ የትራንስፖርት ችግሮች መዳሰስና በጥናቱ ዙሪያ የሚያጋጥሙ ችግሮችንና መፍትሄዎቻችውን በመረዳትን ለተጠቀሰው ችግር መፍትሄ መፈለግ ነው። ለዚሁም የምትሰጡት መልስ ለጥናቱ ውጤታማነት ከፍተኛ አስተዋፅኦ ያለው መሆኑን አስገነዝባለው። ስለዚህም መጠይቁን ሙሉ በሙሉ በተቻለ መጠን አቅንነትን በመልካም ፍቃደኝነት መመለሳችሁ የጥናቱን አላማ ለማሳካት እንዲያስችለኝ በትህትን እገልፃለሁ። እዚህ ላይ የተመለከቱት መረጃዎች ለትምህርታዊ ጉዳይ አላማ ብቻ የሚውሉ በመሆናቸው በከፍተኛ ታማኒነት መልሳችሁን እንዲትሰጡኝ እጠይቃለሁ።

የመላሾች ሚስጥራዊነት የተጠመቀ ነው። በመሆኑም ሰም መፃፍ አያስፈልግም

ክፍል 1 የግል መረጃ

መጠይቁን የሚሞላው ግለሰብ መሰረታዊ መረጃ። የሚከተሉትን ጥያቄዎች በተሰጠው ሳጥን ☑ በማድረግ እና በጹሑፍ እንዲሞሉት በትህትና እንጠይቃለን።

1.ጾታ፡- 1.ወንድ ☐ 2.ሴት ☐

2.ስራ፡- 1.ተማሪ ☐ 2.ሰራተኛ ☐ 3.ስራ አጥ ☐ 4.ሌላ.....

3.የጋብቻ ሁኔታ ፡-1.ያገባ/ያገባች ☐ 2.ፈታ/የፈታች 3.ያለገባ/ያላገባች ☐

4.የሞተባት/የሞተችበት ☐ 5.ሌላ.....

4. የትምህርት ደረጃ፡-1.የልተማር ☐ 2.መሰረታዊ ትምህርት የተማረ ☐

3.አንደኛ ደረጃ (1-8) ☐ 4.ሁለተኛ ደረጃ (9-12) ☐ 5.ሰርተፍኬት ☐

6.ዲፕሎማ ☐ 7.ዲግሪ ☐ 8.ሌላ.....

ክፍል 2

2.እባኮዎትን በመረጃ መሰረት ተስማሚ የሆነ መልስ የጭረት ምልክት በማድረግና በፅሑፍ በአጭሩ ይመልሱ፡፡

5. ደሞዝ (አማካኝ) 1. <500ብር ☐ 2.501-1000ብር ☐ 3.1001-2000 ብር

4.2001-3000ብር ☐ 5.>3000ብር ☐

6. የሚጠቀሙት የትራንስፖራት አይነት፡- 1.በእግር ☐ 2.ታክሲ 3.ባስ ☐

4.ሀይገር ባስ ☐ 5.እስታር አልያንስ ባስ ☐ 6.ሌላ.....

7.የቤተሰብ ብዛት፡-1.<4 ☐ 2.4-6 ☐ 3.7እና8 ☐ 4.9እና10 ☐ 5.>10 ☐

8.የቤተሰብ አባላት የሚጠቀሙት የትራንስፖራት ዓይነት፡- 1.በእግር ☐ 2.ታክሲ ☐

3.ባስ ☐ 4.ሀይገር ባስ ☐ 5.እስታር አልያንስ ባስ ☐ 6.ሌላ.....

9. የስራ ወይም የትምህርት መግቢያና መውጪያ ሰዓት፡- 1.1፡00 — 8፡00 ☐

2. 2፡00 — 10፡00 ☐ 3.2፡30 — 1፡00 ☐ 4.3፡001 — 2፡00 ☐ 5.ሌላ.....

10. ለትራንስፖራት በቀን ስንት ያወጣሉ? ፡- 1. < 5ብር ☐ 2. 5ብር -10 ብር ☐

3.11 ብር 15 ብር ☐ 4.>15 ብር በላይ ☐ 5.ሌላ.....

11. ከየት ተነስተው ወደት እየሄዱ ነው? መነሻ.....

መድረሻ .....

12. ትራንስፖራት ለማግኘት በስንት ሰዓት ቢወጡ በቀላሉ ያገኛሉ? ከረፈደስ?

1.ከጠዋቱ12፡00 - 1፡00 ☐ 2.1፡00 -2፡00 ☐ 3.2፡00 -3፡00 ☐ 4.>4፡00 ☐

5.ሌላ.....

13. ታክሲ በትክክለኛ ታሪፍ ነው የሚያሳፍሩት? 1.አዎ ☐ 2.አይደለም ☐

ካልሆነስ ስንት ይጨምራሉ?.....

14. ከሚኖሩበት ስፍራ ወደስራ ቦታ ለመሄድ ስንት ጊዜ ይፈጅቦታል በስራ ሰዓት?

1. ከ30 ደቂቃ ባነሰ ☐ 2.30 - 60 ደቂቃ ☐ 3.ከ60- 90 ደቂቃ ☐

4.90-120 ደቂቃ ☐5.ሌላ……..

15. በቀን ውስጥ ስንት ጊዜ ታክሲ ወይስ ባስ ይጠቀማሉ? 1. ሁለት ጊዜ ☐2. ሶስት ጊዜ ☐

3. አራት ጊዜ ☐ 4. አምስት ጊዜ ☐ 5. ከአምስት በላይ ☐

16. እንዲሻሻል የሚፈልጉትን ሁኔታ ወይም እንዲቀየር የሚፈልጉት ነገር ካለ /ትራንስፖራትን በተመለከተ/ 1. የታክሲ ብዛት ቢጨምር ☐ 2.የባስ ብዛት ቢጨምር ☐

3.የሀይገር ባስ ብዛት ቢጨምር ☐ 4.የእስታር አልያንስ ባስ ቢጨምር ☐ 5. ሌላ…….

17.ከጊዜ ወደ ጊዜ እየተሻሻለ የመጣ ነገር አለ ወይንስ የለም / ትራንስፖራትን በተመለከተ/?

1.አለ ☐ 2.የለም ☐ 3.ሌላ…….

APPPENDIX IV

Route Information of Addis Ababa City Bus Enterprise

No of route	Origin-Destination	No of buses planned	Km	Tariff	Travel time/ single trip	Daily trip Per route	Trip/ buses
1	Megenagna- Karalo	4	7.7	1.60	33	96	24
2	Kore Mekanissa- Addis Ketema	4	11.1	2.25	54	62	16
3	Ayer Tena- Menelik Squar	8	10.8	2.25	60	107	13
4	Kalite-Addis Ketema	6	19.4	3.75	80	61	10
5	Koer Mekanissa - Menelik Squar	3	12.7	2.75	53	48	16
6	Kera –Semen Gebeya Squar	8	9.9	2.25	52	118	15
7	Megenagna-Aleltu	3	49	12.00	100	22	7
8	Kechene - Addis Ketema	3	9.4	1.60	38	64	21
9	Bole Brass Clinic -Piassa	3	10.5	2.25	49	48	16
10	Kotebe College -Piassa	6	12.7	2.25	53	92	15
11	Kolfe Efoyeta –Menelik Hospital	4	10	2.25	49	64	16
12	Gurara Ferensay Kela-Addis Ketema	6	9.9	2.25	44	108	18
13	Italy Embassy – Addis Ketema	3	9.9	2.25	48	50	17
14	Saris Abo - Menelik Squar	6	12.3	2.75	60	79	13
15	Megenagna - Addis Ketema	4	10.4	2.25	53	64	16
16	Kidanimihret- Addis Ketema	8	7.9	1.60	42	154	19
17	Kusqum- Addis Ketema	6	9.1	2.25	49	98	16
18	Keraniyo- Addis Ketema	8	7.3	1.60	48	138	17
19	Sansusi -Piassa	5	12.8	2.25	48	70	14
20	Dil Ber- Addis Ketema	3	8.6	1.60	41	60	20
21	Felidoro- Addis Ketema	5	8.6	1.60	52	63	13
22	Summit-Legehar	6	14.3	2.75	58	80	13
23	Lamberet- Addis Ketema	3	12	2.25	53	48	16
24	Dire Soloiya- Addis Ketema	4	15.9	3.00	70	48	12
25	Legehar-Akaki	4	19	3.75	80	41	10
26	Addis Ketema- Sebeta	3	25.5	5.50	74	31	10
27	Legehar -Kaliti	8	14.9	2.75	65	90	11
28	Asko Sansuzi- Addis Ketema	5	11.1	2.25	51	64	13
29	Saris Addisu Sefer - Addis Ketema	6	12.7	2.75	58	84	14
30	Sululta - Addis Ketema	5	25.8	5.50	70	32	6
31	Legehar –Shiro Meda	8	7.4	1.60	35	180	23

32	Hana Mariam-Legehar	6	10.6	2.25	51	97	16
33	Kotebe Gebriel-Arat Kilo	5	11.4	2.25	40	102	20
34	German Squar- Addis Ketema	3	9.8	2.25	52	48	16
35	Lebu Muziqa Sefer- Addis Ketema	3	15	2.75	60	42	14
36	Kara Kore- Legehar	4	11.7	2.25	55	60	15
37	Keraniyo -Menelik Squar	4	12	2.25	60	52	13
38	German Squar –Sidist Kilo	4	11	2.25	60	52	13
39	Bole School- Addis Ketema	3	9.6	2.25	52	48	16
40	Karalo- Addis Ketema	3	17.9	3.00	70	36	12
41	Eyesus - Addis Ketema	5	8.5	1.60	46	88	18
42	Megenagna- Legehar	3	9.8	2.25	50	50	17
43	Menagesha- Addis Ketema	2	30.2	5.50	85	20	10
44	Legedadi - Addis Ketema	2	30.4	5.50	91	16	8
45	Legehar- Dil Ber	6	8.6	1.60	46	102	17
46	Gerji – Arat Kilo	6	11.2	2.25	55	86	14
47	Yenegew Fire School- Addis Ketema	3	6	1.60	41	59	20
48	Bole Michael- Menelik Squar	6	10.9	2.25	49	89	15
49	Chefe Ayate;- Megenagna	6	11	2.25	40	108	18
50	Ayer Tena- Megenagana	4	14.9	2.75	62	52	13
51	Bethel Hospital- Addis Ketema	4	10.9	2.25	51	48	12
52	Gerjl- Addis Ketema	8	14.1	2.75	70	96	12
53	Bole Mlchael-Shiro Meda	4	11.5	2.25	52	60	15
54	Lafto- Legehar	4	9.5	2.25	57	58	15
55	Legehar- Gurara Ferensay Kella	4	9.5	2.25	45	72	18
56	Saris Abo- Shiro Meda	6	14.2	2.75	51	91	15
57	Kara – Legehar	4	14.4	2.75	60	56	14
58	Legehalr-Alem Bank	3	12	2.25	52	48	16
59	Bethel Hospital- Menelik Squar	6	11.5	2.25	54	88	15
60	Debr Zeit- Legehar	10	47.2	9.00	100	60	6
61	Chefe Ayate - Legehar	6	18	3.00	65	72	12
62	Sebeta -Legehar	3	23.8	4.25	80	30	10
63	Addis Ketema- Mikililand	3	9.1	2.25	47	54	18
64	Sidist Kilo –Megenagna Gorf Aswegaj	4	9.5	2.25	46	64	16
65	Addis Ketema –Alem Bank	3	11	2.25	48	50	17
66	Addis Ketema-Kara Qorre	4	10.5	2.25	50	64	16
67	Legehar – Jemmo Mekanissa	8	10.6	2.25	48	130	16
68	Menelik Hospital –Tore Hailoch	6	10.2	2.25	46	100	17
69	Lome Meda - Merkato	3	5.9	1.60	41	58	19
70	Aware Squre – Ayer Tena	4	12	2.25	52	59	15

71	Gerji - Balcha Hospital	3	10.9	2.25	60	42	14
72	Hana Meriam - Sari Abo	4	4.9	1.00	24	136	34
73	Legehar Ring Rode Vs Winget	6	10.2	2.25	60	77	13
74	Cmc Square - Addis Ketema	6	14.2	2.75	60	82	14
75	Sidist Kilo – Qera	4	10.4	2.25	47	72	18
76	Megenagna- Kalitl	3	18.2	3.00	70	36	12
77	Kera	2	5	1.00	35	48	24
78	Megenagna- Gofa Condiminium	3	12.4	2.75	60	42	14
79	Arat Kilo – Semit Condiminium	4	14.7	2.75	53	62	16
80	Semet Gebeya Squar - Megenagna	6	12.4	2.75	59	82	14
81	Sidist Kilo - Sansusi	3	11.1	2.25	54	46	15
82	Goro Adebaby – Balcha Hospital	6	14.6	2.75	59	81	14
83	Chefe Ayate – Sidist Kilo	6	18	3.00	60	78	13
84	Kolfe Efoyta - Legehar	3	9.5	2.25	54	48	16
85	Addis Ketema- Holeta	2	45	9.00	90	16	8
86	Ayer Tena- Korki	4	12.3	2.75	55	45	11
87	Winget Vis Ring Road- Ayer Tena	7	10.5	2.25	42	109	16
88	Addis Ketema - Chancho	3	40	9.00	90	23	8
89	Addis Ketema - Sendafa	3	44	9.00	110	20	7
90	Betet Hospital - Legehar	6	10	2.25	55	87	15
91	Addis Ketema - Teji	2	52	12.00	125	12	6
92	Hana Mariam Ring Road- Balcha	4	9.6	2.25	41	79	20
93	Bole Bulbula - Megenanga	4	15.2	2.75	55	60	15
94	Piassa- Mikililand	4	9.9	2.25	44	76	19
95	Addis Ketema- Addis Alem	3	47	9.00	100	22	7
96	Megenagna- Goro Sefera	3	9.2	1.60	31	80	27
97	Megenagna- Legetafo Mission	6	15.8	2.75	58	78	13
98	Dukem- Saris Abo	3	26.3	5.50	70	35	12
99	Ayer Tena- Alem Gena Michael	3	9.4	2.25	36	69	23
100	Addis Ketema Jemo	4	14.5	2.75	51	48	12
101	Megenagna – Aba Kirros Squar	6	12	2.25	43	105	18
102	Kara - Legehar	6	13.7	2.75	52	92	15
103	Jemo - Piassa	6	12.2	2.75	59	80	13
104	Werku Sefer - Kera	2	8.3	1.60	35	48	24
105	Anfo Meda- Legehar	4	12	2.25	55	56	14
106	Goro Adebabay- Sammit Megenagna	3	10.8	2.25	50	46	15

107	Saris Abo- Akaki Qorqoro	3	11.4	2.25	50	44	15
108	Asko Addisu Sefer -18 Sq Uar Menelik Squar	3	9.3	2.25	50	50	17
109	Saris Abo-Tulu Dimetu Square	3	12	2.25	45	52	17
110	Sidist Kilo- Tulu Dimetu Square	3	24.9	5.50	85	27	9
111	Dire Sololiya- Piassa	4	16.6	3.00	71	34	9
112	Circular Route With In Ring Road 4 Turning Points	6	47.3	2.00	161	120	20
113	Kaliti Total – Feche Koye	2	8.1	2.25	45	16	8
114	Gelan Condiminium –Saris Abo	2	7.9	2.25	35	13	7
115	Lebu Muziqa Bet – Mexico Square	2	9.4	2.25	45	19	10
116	Mekanissa Michael Squar - Jemo No_2	2	5.6	1.00	25	33	17
117	Kotabi Condiminium – Mexico Square	2	9.2	2.25	35	22	
118	Merkato – Tateq Kella	2	18	3.00	70	12	6
119	Megenagna – Summit Condiminium	3	9.2	2.25	35	23	8
120	Burayu Keta - Tore Hiloch	2	12.1	2.00	45	36	18
121	Jemo Qedus Gebreal – Mexico Square	2	10	2.00	45	38	19
TOTAL		517	1,739.6	348.8	6,755	7,610	1,726
AVERAGE		4.27	14.38	2.88	55.83	62.89	14.26

Source: Addis Ababa City Bus Enterprise

Average daily expense for transportation

No.	Amount of birr	Frequency	Percent
1	<5birr	33	11
2	5 - 10birr	170	56.7
3	10 - 15birr	50	16.7
4	>15birr	47	15.7
Total		300	100

Source: survey data, 2015