ADDIS ABABA UNIVERSITY

ADDIS ABABA INSTITUTE OF TECHNOLOGY

SCHOOL OF CIVIL AND ENVIRONMENTAL ENGINEERING

GRADUATE STUDIES

EVALUATION OF INTER-CITY BUS TERMINALS AND INTER-CITY BUS SERVICE:

A CASE STUDY ON KALITY AND LAMBERET BUS TERMINALS

By

Robel Samson

A Thesis Submitted to the School of Civil and Environmental Engineering of Addis Ababa Institute of Technology in Partial Fulfillment of the Requirements for the Degree of Master of Sciences

In

Civil Engineering

(Road and Transport Engineering)

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Addis Ababa University (AAU), Addis Ababa Institute of Technology (AAiT)

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Evaluation of Inter-City Bus Terminals and Inter-City Bus Service: A Case Study on Kality and Lamberet Bus Terminals

Advisor: Dr. Alemayehu Ambo, School of Civil and Environmental Engineering, Addis Ababa

Key Words: Inter-city Bus Transport, Inter-city Bus Terminals, Quality of Service, Passenger Satisfaction, Tariff

Dedication

….. To my Mom Amelework Tolla (ኦማ) …..

I dedicate this dissertation to my mother, Amelework Tolla, without whom none of this would have been achievable.

Thank you for all the years of guidance, encouragement and unyielding support.

Thank you for being my source of strength in turbulent times.

It is my prayer and hope that I get to do all that you have done for me and then more.

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First and most of all, “Thank you God Almighty!!” “እግዚአብሔር ሆይ ተመስገን!!”

I would like to thank the Ethiopian Roads Authority (ERA) for providing this precious opportunity and for the sponsorship to continue for my Masters study in the field of Road and Transport Engineering.

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ABSTRACT

This research aims at evaluating the intercity bus terminals and the intercity bus services by assessing the passengers' level of satisfaction on two intercity terminals, Kality & Lamberet. The basic evaluation criteria considered were: terminal location and accessibility, terminal information system, service facilities at the terminal (such as passenger waiting place, ticket place), safety and other passenger amenities (such as cafeteria and restrooms).

The results showed that the two terminals have significant differences with respect to terminal facility. When the overall level of satisfaction of passengers at Kality terminal is assessed, 12.9 percent were very dissatisfied and 67.7 percent were dissatisfied while the remaining 19.4 percent were moderately satisfied. Concerning the Lamberet terminal, 50 percent were satisfied and 26.7 percent were average while only 23.3 percent were found to be dissatisfied.

Focusing on the intercity bus transport services, the main indicators for evaluating the performances and quality of service of a transportation services are availability and adequacy of vehicles, user comfort and safety, travel time savings, service reliability, tariff affordability and passengers' baggage handling and payment. The findings indicate that passengers are dissatisfied in the service and delivering intercity bus transportation service needs improvement in each of the basic evaluation criteria to increase the level of satisfaction of passengers.

The other main focus of the research was related to intercity bus tariff establishment. This was intended to compare the current transportation tariff with a newly developed tariff based on the actual vehicle operating cost of vehicles (VOC). In this regard, it was found that the VOC of the transportation vehicles is higher than their revenue that is collected from the tariff. Based on the research results, the average amount of tariff per person-km for long distance buses on asphalt road is 0.3253 Birr based on the VOC. The current tariff applied for the same vehicle type is 0.3050 Birr per person-km which is about 90 percent of the operating costs.

In conclusion, proper consideration of input parameters is required when setting tariff for intercity transportation in relation to the ability of passengers to afford the tariff. It is also important to include different fare structures such as classifying tariff based on affordability of passengers, age of users and time of traveling in respect of peak time travelers' costs and non-peak period travelers' costs. This will help in creating equilibrium between the tariff affordability and its sufficiency to make operators profitable so that the industry can be balanced and sustainable in both regards.

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LIST OF ABBREVIATION

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RSDP:	Road Sector Development Program
FDRE:	Federal Democratic Republic of Ethiopia
LDBs:	Long Distance Buses

CHAPTER 2

TCQSM:	Transport Capacity and Quality of Service Manual
TCRP:	Transit Cooperative Research Program
FTA:	Federal Transit Administration
APTA:	American Public Transportation Association
TTI:	Texas Transportation Institute
GAO:	U.S. General Accounting Office
IBT:	Intercity Bus Terminals
BPG:	Best Practices Guidebook
RTD:	Transport Research and Technological Development
UPT:	Urban Public Transport
CSI:	Customer Satisfaction Index
VOCs:	Vehicle Operating Costs
HDM:	Highway Design and Maintenance Model

CHAPTER 3

ERA:	Ethiopian Roads Authority
EFTA:	Ethiopian Federal Transport Authority
UNESCECA:	United Nation Economic and Social Council Economic Commission for Africa
GDP:	Gross Domestic Product
RTA:	Road and Transport Authority

CHAPTER 1

INTRODUCTION

1.1. Background

The term transportation refers to the movement of people, goods and services from one location to another by fulfilling safety, comfort, convenience, cost-effectiveness, time saving and environmentally friendliness. Passengers can move within a city and outside of a city or between different cities in the country. Movement within a city is called intra-urban movement while movement between cities is known as inter-city movement. It can cover short distances as well as longer distances. The nature of short distance movement does not usually require passengers to do intensive preparations such as buying tickets and large baggage handling. It should be noticed here that some urban transportation services require buying tickets for a single trip.

In Ethiopia, whether it is urban or inter-city, road transportation is the dominant mode of movement from one location to another. According to the FDRE, RSDP (Road sector development program), 1997-2007, Surface transport comprises road and rail transport, and is the most dominant mode, contributing about 99.5 percent of the total domestic passenger and cargo traffic delivered by motorized transport. Road transport alone accounts for over 97 percent of the total domestic traffic carried by motorized transport.

1.2. Research Problem

The intercity bus service always involves a very important element in the process called terminals. Passengers traveling to different parts of the country should come to these terminals to board on the vehicle they choose. There are different types of vehicles in the terminals that are waiting for passengers. These vehicles are categorized into three levels based on their performance. When passengers want the service of transportation, there is some level of service quality which they always expect to receive.

There are six intercity public transport terminals in Addis Ababa, the Capital city of Ethiopia. Almost all of these terminals are below the standard of service provision when seen in the eyes of the customers or passengers. Most of them don't fulfill the basic requirements of passenger transport terminals. A terminal should encompass at least the following facilities in it.

- ✓ Passenger waiting areas
- ✓ Standard ticketing system;
- ✓ Travel Information center; and
- ✓ Proper rest rooms.

In addition, since passengers' living place is different; the location of the terminal should be central and convenient for them to have easy access. Passengers usually complain about terminals and the intercity public transport service in general. Some of the common issues they often complain about include; transportation tariff, baggage handling and tariff, shortage of vehicles, behavior of drivers and assistants, wastage of time as a result of poor service, vehicle comfort, traditional ticketing system, lack of information, safety while travelling, lack of security in the terminals, the location of the terminals, passenger waiting areas and etc. these issues are the main concerns which lower the satisfaction level of passengers on the intercity public transport services. Another problem is that there are no alternative service providers in the case of shortage of vehicles. Due to this, passengers are always prone to many inconveniences, including theft and robbery.

1.3. Research Objectives

The general objective of this study was to evaluate the intercity terminals and the overall intercity public transport services in two intercity bus terminals (Kality and Lamberet). In this regard, both the existing condition of the terminal facilities and the quality of service provision will be assessed with respect to pre-defined parameters.

The specific objectives were:

- ➢ To evaluate the quality of services of intercity public transport expressed in terms of passenger satisfaction based on the selected two terminals;

- To assess the virtues and shortcomings of the transport operations in the selected terminals as well as identification of the main problems of the intercity public transport sector; and
- To assess the existing transportation tariff establishments, develop an alternative and compare the current tariff with the one developed in this research. The tariff issue is important for both transport operators and passengers which needs considerable attention when establishing it. Therefore, the research also observes the basic consideration in tariff establishment.

1.4. Research Questions

Within the view of accomplishing the above mentioned objectives, the following questions will be raised and possibly addressed using pertinent research instruments:

1. What is the current situation in the intercity public transport industry and what does the service provision looks like?
2. What are the main problems and challenges of the sector?
3. What is the level of satisfaction of passengers regarding both the terminal facilities and the intercity transport services?

1.5. Scope and Limitation

The study covers the existing situation of two terminals (Kality and Lamberet) which are selected for case study out of the total intercity bus terminals in Addis Ababa. The remaining terminals will be mentioned in relation to these two terminals. Generally, due to time and budget constraints, the primary focus of the study will be on Kality and Lamberet terminals. Additionally, the research will not cover the condition in other intercity bus terminals located around other parts of the country. Therefore, it only represents the case of intercity terminals in the capital city.

1.6. Envisaged Research Contribution

After fulfilling the objectives stated previously, this research will contribute a number of advantages on the Ethiopian public transportation industry for a better performance of the sector. Some of the benefits of potential outputs of the research are presented below:

1. The research findings are envisaged to contribute in enhancing intercity passenger transport operations in Ethiopia and so are expected to be used as an input for transport policy makers.
2. It will help the transport authorities to solve emanating major problems regarding intercity public transportation operations in Ethiopia.
3. It will provide inputs for the development and preparation of manuals and standards concerning intercity bus terminals.
4. The research can be used as a reference for other similar studies which will be conducted in the future by interested organizations or individuals.
5. It will provide future areas of studies that need serious attention for the improvement of intercity public transportation services.
6. The research will indicate the level of satisfaction of passengers on the current intercity transport services and how their satisfaction affects the industry.

1.7. Research Outline

This thesis is organized into seven chapters each of which discusses different topics. It can be divided in to three parts as part 1 which encompasses chapter one through chapter three and it is an introductory chapters, part 2 which include chapters 4, 5, and 6; these chapters can be considered as the main body of the thesis and finally part 3 including the chapter 7 which draws conclusions and recommendations based on the preceding chapters.

The first chapter is an introduction which focuses on giving background for the study such as research problem, objectives of the study, the outcomes and contributions of the research. Chapter 2 presents related studies and the theoretical background of the thesis. In this chapter key definitions of different terms will be also given. Chapter 3 discusses the methodology used to do the research and what method of data collection and analysis was chosen.

Chapter 4 is a case study chapter where the selected cases (intercity bus terminals) will be discussed separately. In chapter 5, analysis results and discussions will be presented. This chapter supports the issues raised in the previous section (chapter 4) by analyzing the questionnaires distributed in accordance with the interviews and the observations made. The next is chapter 6 which concentrates on transportation tariff in the intercity transportation industry.

The chapter presents the topic in relation to the existing situation of the sector. Chapter 7 is the final section of the thesis which presents the conclusion and recommendations on the central points of the research. The following chart summarizes the thesis outline.

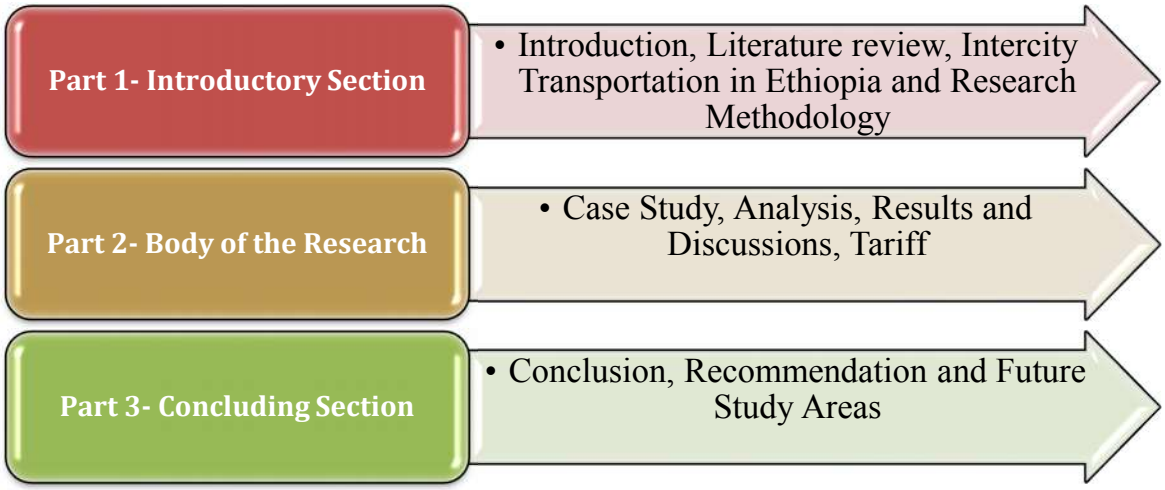


Figure 1.1: Thesis Outline

CHAPTER 2

LITERATURE REVIEW

2.1. Introduction

For as long as the human race has existed, transportation has played a significant role by facilitating trade, commerce, conquest, and social interaction, while consuming a considerable portion of time and resources. The primary need for transportation has been economic, involving personal travel in search of food or work, travel for the exchange of goods and commodities, exploration, personal fulfillment, and for improvements of societies or nations. The movements of people and goods, which is the basis of transportation, always has been undertaken to accomplish those basic objectives or tasks that require transfer from one location to another. Transportation system is an aggregation of vehicles, guide ways, terminal facilities, and control systems that move freight and passengers. These systems are usually operated according to established procedures and schedules in the air, on land, and on water (Garber & Hoel, 2009).

In this chapter, different theoretical concepts of public transport will be discussed. Specifically, the intercity public transport service will be of the major concern. Public transport can be divided as intra-city or inter-city. Intra-city public transport refers to movements within a city while inter-city public transport indicates the movement of people from one place to another by traversing significant distances. The intra-city type does not involve a special stopping places rather it involves random vehicle stops within short distances. In the case of inter-city public transport, on the other hand, there should be interchange points where passengers can board on to the type of transporting vehicle of their choice. Usually these locations are referred to as terminals or stations which are located within longer distances. This is the focus of this literature review. In addition, previous researches concerning evaluation of transport terminals and intercity public transport services will be discussed.

Public transport services are main aspects of the customer satisfaction system, because they are evaluated by travelers (Hart, 2012). Therefore, the quality of service provided in public transport industry will also be discussed in terms of customer/passenger satisfaction.

According to Ettema et al. (2010) as stated in Hart (2012), customer satisfaction with public transport is the degree to which an individual positively evaluates the overall quality of a public transport service delivered by a public transport operator and authority.

2.2. Definition of Important Terms

Some definitions pertaining to intercity bus services and terminals are provided below:

Public transport: 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.

Intercity bus service: The Federal Transit Administration (FTA) in the United States has defined intercity bus service as:

> *Regularly scheduled bus service for the general public which operates with limited stops over fixed routes connecting two or more urban areas not in close proximity, which has the capacity for transporting baggage carried by passengers, and which makes meaningful connections with scheduled intercity bus service to more distant points, if such service is available (RLS & ASSOCIATES, INC., 2009)*

Transport demand: An expression of the mobility and accessibility needs to production, exchange and consumption of services and opportunities of the population living on a certain area. It is a schedule of different quantities of services that users will purchase at different prices at a given time and place. (Yusuf Ahmed, 2014).

Transport supply: An expression of a complex set of resources (infrastructure, transport means, organization and information system) set up and managed to satisfy the transportation demand to the best. It is a schedule of different quantities that will be offered for sale at different prices at a given time and place. The service offering is as seen through the eyes of the shipper or traveler.

Service Quality: Quality is the extent to which the service, the service process and the service organization can satisfy the expectations of the user (Onael Walter Mushi, 2013).

Lovelock and Wright (2002) define quality as the degree to which a service satisfies customers by meeting their needs, wants and expectations. Litman (2015) described Service Quality as how transit is perceived by users. A variety of measures of level of service can be identified that are important to the traveler. These include: measures of time, loss and damage or safety and transport tariff rates (Yusuf Ahmed, 2014). Reasonable availability of bus terminal is also a measurement of level of service.

Service reliability: Turnquist and Blume (1980) define transit service reliability as "the ability of the transit system to adhere to schedule or maintain regular headways and a consistent travel time". Similarly, Beirao and Sarsfield-Cabral (2007), stated that the lack of control due to the uncertainty of the vehicle arrival makes the service unreliable. A study proposed by Eboli and Mazzulla (2010) confirmed that service reliability is one of the most important service aspect for the users.

Customer satisfaction: is defined as a judgment that a product or service provided a pleasurable level of consumption related fulfillment (Oliver, 1997, 2010). There are two levels of individual consumers' satisfaction: transaction-specific satisfaction and cumulative satisfaction. Transaction-specific satisfaction or encounter satisfaction is identified as a fulfillment response to a single transaction or encounter, whereas cumulative satisfaction is a judgment based on many occurrences of the same experience and not just one-time experience. For both cases, satisfaction is either defined as an overall judgment of satisfaction or decomposed into satisfaction with performance or quality attributes (Cronin & Taylor, 1992).

Terminals: according to TCQSM (2013), Transit stops; stations, and terminals are the locations where passenger board, alight from, and transfer between transit vehicles. Terminals refer to a transit center which provides key transfer between transit modes. They range in size and complexity from simple street side bus stops to large intermodal terminals which may combine local bus services, intercity bus or rail, and associated services such as taxi stands and ticket sales. These types of facilities are normally located wholly or partially off-street and frequently include a more elaborate and extensive shelter and more passenger amenities than ordinary bus stops.

Transport tariff: It is the amount of money charged for the transportation service which is provided by the transport service provider. It is also defined as fare which is the money that a passenger on public transport has to pay for a journey.

Transport operators: These are companies or associations which provide transportation services for passengers. They are responsible for the safe and convenient movement of travelers and their baggage.

2.3. Key Role of Public Transportation

Public transportation is an important element in the lives of human beings as it plays many key roles. The benefits and importance of public transportation impact everyone, even those who may never board a train or bus. An important social role played by public transport is to ensure that all members of society are able to travel, not just those with driving licenses and access to automobiles but including groups such as the young, the old, the poor, those with medical conditions, and people banned from driving. Additionally, public transportation opens to its users the possibility of meeting other people, as no concentration is diverted from interacting with fellow-travelers due to any steering activities. Furthermore, public transportation provides people with mobility and access to employment, community resources, medical care, and recreational. It benefits those who choose to ride, as well as those who have no other choice. So, public transportation provides a basic mobility service for each one of these persons (FHWA, 2002).

APTA (2007) describes public transportation that it is critical to a nation's transportation system and is essential to the economic and social quality of life of its citizens. Transportation is the backbone of a strong and prosperous economy, and investments in public transportation generating significant economic benefits. Areas with good public transit systems are economically thriving or growing and offer location advantages to businesses and individuals choosing to work or live in them (FHWA, 2002).

According to APTA report (2007) public transport has the following major benefits.

- Enhances Business
- Creates and Sustains Employment
- Enhances Personal Economic Opportunity, Saves Individuals Money
- Reduces Congestion and Travel Time, Protects Mobility
- Provides access for all age

Additionally according to Ragnar Norbäck (CEO, Nobina Group), public transportation has the following advantages:

- Enables all people to travel without owning a car, at stable price and timetable;
- Makes residential areas accessible;
- Reduces negative impact on environment such as air pollution due to congestion;
- Reduces road congestion, fuel consumption and saves travel time; and
- Reduces the need for parking places.

2.4. Intercity Bus Transportation

As defined in previous sections, intercity bus transport is a service provided for moving long distance traveling passengers from their origin to destination. Unlike a transit bus service, which has frequent stops throughout a city or town, an intercity bus service generally has a single stop at one location in or near a city, and travels long distances without stopping at all. Intercity bus services may be operated by government agencies or private industry, for profit or otherwise. The intercity bus transportation lines are one of the important sectors of public transport. Consequently any defect in the operation of buses, causes lower levels of service and less demand for them which in a long run can lead to excessive exploitation of resources.

FTA (The Federal Transit Administration) provides the following characteristics of intercity bus transportation service: (RLS & ASSOCIATES, INC., 2009)

- ✓ Regularly scheduled bus service;
- ✓ Available to the general public;
- ✓ Makes limited stops;
- ✓ Operates on fixed routes;

- ✓ Connects two or more urban areas not in close proximity;
- ✓ Predominantly passenger service (any package /goods service incidental); and
- ✓ Not air, water or rail service (bus only)

Additionally, the U.S. General Accounting Office (GAO) has defined intercity bus service as regular-route service that meets the following criteria:

- ✓ Operates between two or more cities, towns, or isolated clusters;
- ✓ Operates on a fixed schedule;
- ✓ Carries the general public; and
- ✓ Does not operate wholly within urbanized areas.

2.5. Intercity Bus Terminals (IBT)

Bus terminal, or terminus, is defined as the point where a bus route starts or ends, where vehicles stop, turn or reverse, and wait before departing on their return journeys. It's also where passengers board and alight from vehicles. Intercity bus terminals (IBT) follow the definition given to intercity bus services. Intercity bus terminals are places where long distance traveling vehicles load and unload passengers traveling to different cities, towns and other populated areas. IBT can be any location where passengers either originate or terminate in the transportation process. They are central and intermediate locations in the movements of passengers (Jean and Brian, 2006). Intercity terminals are the location of urban and suburban transportation mode change and have a major role in intercity exchanges (Mehrdad et al, 2015).

The bus stopping place with a heavy passenger density usually has a terminal structure that is capable of handling batch flows between the various access/egress modes and the line haul vehicles. The terminal usually provides passenger holding (waiting) areas and processing (e.g. ticketing) facilities which permit reduction of bus loading time. Frequently the terminal also functions as a dispatching point and freight loading station. (Cuylits, 1966). According to Jean and Brian (2006) three major attributes are linked with the importance and the performance of transportation terminals:

- ➢ **Location:** The major location factor of a transport terminal is obviously to serve a large concentration of population and/or industrial activities, representing a terminal's market

area. New transport terminals tend to be located outside central areas to avoid high land costs and congestion.

- **Accessibility:** Accessibility to other terminals (at the local, regional and global scale) as well as how well the terminal is linked to the regional transport system is of importance.
- **Infrastructure:** The main function of a transportation terminal is to handle passengers and transporting vehicles. Therefore it needs to be a good infrastructure.

2.6. Criteria for Intercity Terminal Location

Mehrdad et al, (2015) discussed the concept of intercity terminal location in their case study titled 'Optimum Locations for Intercity Bus Terminals with the AHP Approach – Case Study of the City of Esfahan' that was published in 2015. AHP stands for The Analytic Hierarchy Process which is a multi-criteria decision-making approach and was introduced by Saaty T.L, (1990). It is a decision support tool which is able to solve complex decision problems.

As stated in the case study, it is essential that terminals are not only constructed to a suitable design and with adequate capacity, but also that they are suitably located. The selection of an appropriate location for any activity requires precise evaluation from different perspectives. One of the most important infrastructural elements is intercity bus terminals. Any shortcomings in the location finding of these terminals can lead to problems in the surrounding traffic and land uses and an appropriate approach for identifying the location of these terminals results in convenient access, reduced fuel consumption and less pollution (e.g. air and noise) (Mehrdad et al, 2015).

Afandizadeh et al, (2006) considered the traveler access time for locating optimum locations of bus terminals. With the growing population and increased demands for traveling, the importance of the location of bus terminal becomes more crucial. Factors such as convenient access, socio-economic parameters, environmental regulations and traffic regulations are the most primary features in determining the optimum location for bus terminals. As Cuylits (1966) stated early bus terminal location was usually determined by individual operators who recognize the importance of passenger destinations. As most of these destinations were in the city core, central or near central location for terminals were common.

The near central location was preferred as high land cost and congestion problems could be overcome without appreciably lengthening the access/egress journey times, while permitting reductions in line haul travel times.

As Cuylits (1966) further stated, with the development of inter-city public transportation, fixed stopping places became established, where passengers could gather and board the inter-city vehicle. Early stopping places for such inter-city modes as the stage coach required no particular structures; passengers pick up along the road way was possible. In urbanized areas these points were well advertised and often located at cafes, taverns, or at the carrier's offices. The railway, with its more sophisticated technology required elaborate stopping places and frequently specific structures. Terminals or stations were built to permit access to the transport vehicles. Similarly, airports were developed. Thus, the single stopping place became a specialized structure housing the many and varied activities. For operational efficiency and passenger convenience and safety, all bus termini and public transport interchanges should be located off-street as far as possible

Cuylits (1966), in his Master thesis titled 'inter-city bus terminal location criteria', also described the situation in North American cities as:

> *"For inter-city ground transport, the stopping points In the larger North American cities have traditionally been at a central location and many still have these central terminals for rail and bus modes. These central locations were considered central locations for rail terminals frequently resulted from the growth of cities around and away from these facilities. These central locations were considered optimal as urban public transport, which provided the main mode of transport in cities, frequently converged on the city center. However, increasing automobile ownership has diminished the dependency on local public modes and has permitted greater individual choice in residential location away from the transit routes.*
>
> *The resultant dispersal of urbanized areas into the countryside, while inter-city bus and rail terminals have tended to remain in the city centers, raises the question whether or not this traditional location is still optimal".*

The inter-city journey itself can be analyzed as a one having three basic segments as:

1. The *access* journey from the point of origin to the main inter-city mode;
2. The *line haul* journey on the inter-city mode; and
3. The *egress* journey from this mode to the ultimate destination.

Frequently, the first and last segments of the journey occur within metropolitan areas. The points where these various journey segments meet and where transfer is made, can be considered the interchange or transfer point. As depicted in Figure 2.2 below, it schematically represents the typical inter-city journey. The figure was taken and edited from the paper written by Cuylits, (1966).

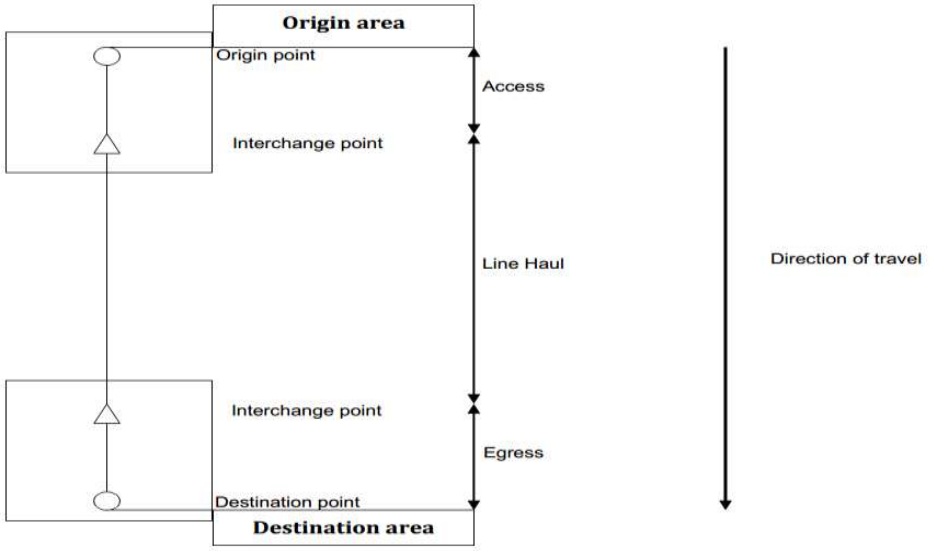


Figure 2.1: Inter-city Journey

The location of the interchange point or terminals for some inter-city modes can be variable (e.g. roadside stopping places for buses) within the urban setting. Also, several points may exist within the urbanized area serving the same mode (e.g. a mode having both central and suburban stations).Usually at least one of the points has a specialized structure or terminal capable of handling large volumes of passengers and facilitates interchange.

According to Cuylits (1966), major factors for locating terminals are related to:

- ✓ Congestion,
- ✓ Land economics, and
- ✓ Terminal operating revenues.

The concern for congestion has been suggested as the initial reason for the establishment of bus terminals and it originates from early loading practice. The earliest terminals were, in effect, street loading facilities at designated drug stores, hotels, cafes, or carrier offices where passengers could gather before loading buses at these points added to the congestion and city ordinances were devised in many cities to prohibit this practice in downtown areas. As the bus operators recognized a need for a downtown terminal location, off street facilities quickly developed.

In this case congestion was found to be an important factor in determining location.

According to H.S. Pack (1941) the role of land economics was of great concern to terminal developers and operators. As the core places or center areas were usually compact, any location for a terminal that was within walking distance of a large portion of this core place was considered satisfactory to the majority of passengers. As main street locations were expensive, a near main street location having the just mentioned requirements was often considered desirable.

> *"A site convenient to, but not on a main street has definite advantages. First costs and taxes can be reduced. There should be no decrease in business. Locations just around the corner should make little difference to city patrons."*(H.S. Pack, 1941)

When it comes to terminal operating revenues, the rent ability of terminal space was an additional economic factor in terminal location. This is especially true for smaller terminals where bus ticket revenues and bus related income could not support the terminal and additional rental space had to be provided. Most terminal designs predating the Second World War provide evidence of this fact and include restaurants/coffee bars, shoe shines, book stalls etc.

A location on a major through street or as close to the center as economically as possible would result in higher rental income from this space in terminals (Greyhounds, 1954).

Generally the evaluation of a particular location for a terminal serving particular mode must take into account its effects on the urban area in which it is situated and the location must be economically feasible for the operation of that mode (Cuylits, 1966).

2.7. Basic Requirements of Terminals

An integral factor improving a transport system's success is the quality of convenient transfers and the movement of passengers within terminal spaces. Planning and designing terminals must consider two perspectives: the operator's and the users. A high level of service entails a safe and permeable environment outside the terminal and convenient movement within. According to TCQSM (2003) any terminal as an important facility for the intercity transport service, should encompass some basic requirements for providing the intended service for passengers. There are five considerations when designing a good terminal and these are:

- ✓ Terminal capacity,
- ✓ Passenger level of service,
- ✓ Accessibility,

- ✓ Commuter (traveler) safety, and
- ✓ Passenger amenities.

This translates into an environment that facilitates quick, comfortable, and safe movement of people within and around terminals. The following table was directly adapted from TCQSM, 2003. It described the five components of good terminal design.

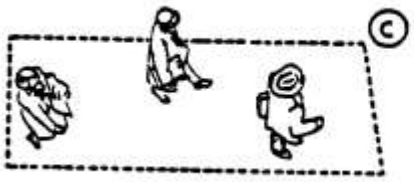
Terminal Capacity	the number of bus berths that need to be planned to cater to projected peak-hour demand
Passenger level of service	the level of service a passenger receives on the journey between the entry/exit points of the terminal and boarding platforms
Accessibility	Accessibility for buses entails the location of entrance and exit points, ensuring convenient and unhindered access to the terminal facilities that propagate unobstructed, convenient, and universal accessibility while boarding and alighting at platforms
Commuter Safety	the design of high visibility spaces to minimize pedestrian vehicle points of conflict, particularly the high occurrence of conflict during platform transfers
Passenger Amenities	the provision of facilities such as toilets, payphones, drinking water, and visible signage to add to passenger convenience

Table 2.1 Five components of good terminal design

Planning for transport infrastructure does not just encompass the larger terminals, but also mid-route, on-street facilities. It is sometimes preferable to have an interchange on-street for routes to start and terminate at an on-street location (The World Bank, 2011). These facilities are generally required at intermediate points, where bus services intersect or user travel patterns change significantly. Due to space restrictions and the need for seamless transfers, providing for large terminals at these points is not possible.

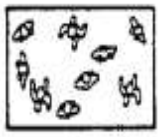
The function of these facilities is similar to off-street terminals. Intermediate facilities provide sufficient space for the safe turnaround of buses or termination of routes that culminate on the street. This minimizes any impacts of bus movements on general traffic. To measure the convenience factor of the facility, a level of service (LOS) calculation is useful.

This calculation considers the pedestrian space, average speed, and flow. It is desirable that the design process includes adequate space and the appropriate facilities for the projected peak pedestrian demand. A LOS measurement process estimates capacity based on the relative scale of pedestrian comfort and convenience. As per the IRC requirement, walking and waiting areas within a terminal must adhere to a C grade LOS or higher (The Indian Roads Congress, IRC, 1988).



LEVEL OF SERVICE C
Walking speeds freely selected; passing is possible in unidirectional streams; minor conflicts for reverse or cross movement.

Figure 2.2: LOS for passenger walkway



LEVEL OF SERVICE C
Standing and restricted circulation through the queuing area by disturbing others is possible; this density is within the range of personal comfort.

Figure 2.3: LOS for passenger waiting area

2.8. Evaluation Criteria of Transit Service Quality

Evaluation is the process of judging or calculating the quality, importance, amount or value of something. As presented in the Best Practices Guidebook (BPG) by Litman, (2015), AARP (2005); Dhinghi (2011); Hale (2011); Kenworthy (2008); Kittleson & Associates (2013); Litman (2008 and 2014); Marsden and Bonsall (2006); Stradling, et al. (2007); TRB 2010; Tomer, et al. (2011); and Tumlin, et al. (2005); provide guidance on evaluating transit service quality from various perspectives, including the following:

- **Availability** (when and where transit service is available), and **coverage** (the portion of a geographic area, or the portion of common destinations in a community, located within reasonable distance of transit service;
- **Frequency** (how many trips are made each hour or day);
- **Travel speed** (absolute and relative to automobile travel);

- **Reliability** (how frequently service follows publish schedules);
- **Integration** (ease of transferring within the transit system and with other travel modes).
- **Price structure** and **payment options**;
- **User comfort** and **security**, including riding on, walking to, and waiting for transit;
- **Accessibility** (ease of reaching transit stations and stops, particularly by walking);
- **Universal design** (ability to accommodate diverse users including people with disabilities, baggage, inability to understand local languages, etc.);
- **Affordability** (user costs relative to their income and other travel options);
- **Information** (ease of obtaining information about transit services);
- **Aesthetics** (appearance of transit vehicles, stations, waiting areas and documents) and;
- **Amenity** (extra features and services that enhance user comfort and enjoyment).

Transit service quality (travel speed, comfort, affordability, etc.) can be quantified using Level-of-Service (LOS) rating from A to F.

2.9. Transport Fares / Tariff

A fare is the fee paid by a passenger for use of a public transport system such as rail, bus, taxi, etc. Fare structure is the system set up to determine how much is to be paid by various passengers using a transit vehicle at any given time. The fare paid is a contribution to the operational costs of the transport system involved, either partial, as is frequently the case with publicly supported systems, or total. The rules regarding how and when fares are to be paid, for how long they remain valid are many and varied. Where the fare can be generally predicted in advance such as fixed fare systems, fare is usually collected in advance; this is the usual practice of rail and bus systems, which usually require the payment of fares on or before boarding.

In the case of taxis and other vehicles for hire, where the total fare will not be known until the trip is completed, payment is normally made at the end of the ride. Some systems use a hybrid of both, such as a rail system which requires prepayment of the minimum fare in advance and collecting amounts above the minimum or if the net cost of the trip exceeds the minimum fare at the end of the trip. Some systems allow free transfers i.e. a single payment permits travel within a particular geographical zone or time period.

Such an arrangement is helpful for people who need to transfer from one route to another in order to reach their destination. Sometimes transfers are valid in one direction only, requiring a new fare to be paid for the return trip. As explained in TCRP Report 10, the primary parameters of a transit agency's fare system are the following: (TRCP, 2003)

- ✓ Policy
- ✓ Structure, and
- ✓ Technology and these parameters are closely interrelated.

A transit agency's fare policy establishes the principles and goals which underlie and guide the agency's pricing related decisions. While some agencies establish formal fare policies that govern fare related decisions, most agencies' fare system changes are made in response to a particular issue or problem (e.g., a revenue shortfall or, possibly, introduction of a new mode). According to the American Public Transportation Association (APTA), Fare changes can be made either on a regularly scheduled basis or only as needed (APTA Fare Summary Report, 1994). It is also explained in TCRP Report 10 that fare structure consists of three basic elements:

- Fare strategy,
- Payment options, and
- Pricing levels.

TCRP (2003) defined each of these basic elements of fare structure and it is presented below.

Fare strategy refers to the general type of fare collection and payment approach. Basic fare strategies fall into two general categories: *flat* and *differentiated*. In a flat fare structure, riders are charged the same fare, regardless of the length of the trip, time of day, speed, or quality of service. Alternatively, fares can be differentiated by one or more of those parameters, resulting in:

- Distance-based or zonal fares,
- Time-based differential (e.g., peak/off-peak) and/or
- Service-based differential (e.g., express surcharge or bus-rail differential).

Each of these approaches has certain advantages and disadvantages, mainly related to relative ease of use and administration versus impact on ridership and revenue. However, the principal arguments in favor of differentiation have focused on issues related to efficiency and equity.

In particular, it has been argued that a higher fare should be charged to cover the higher operating costs associated with serving longer trips, operating peak period service and providing premium service, such as express bus or rail. Differentiated fares are also seen more able to generate greater revenues than lower flat fares, since the users of the higher cost services (e.g., longer distance) have often been found to be less price sensitive than those using the lower cost services.

The other key fare strategy element is transfer pricing and policy. Many systems are designed so as to require many riders to transfer either between bus routes or between bus and rail. Thus, the pricing rules and policy regarding transfers are fundamental aspects of an agency's fare structure.

Payment options: The other major element of the fare structure is the payment options that are available. As described in TCRP Report10, the basic types of payment options are:

- Single-ride ticket
- Multi-ride ticket
- Period pass
- Stored value/ ride fare card
- Post payment.

These generic payment options can be in the form of various fare instruments or payment media, including:

- Cash
- Token
- Paper ticket
- Magnetic stripe ticket or fare card
- Smart card
- Credit/debit/ATM card
- Transit voucher

While most of these payment media are used for actual payment of the fares, several (i.e., credit/debit/ATM cards and transit vouchers) are primarily used to purchase a fare instrument. The final piece of the fare structure is the actual **pricing levels** of each payment option, including percentage discounts (if any) for prepaid options.

Type of fare collection

Type of fare collection refers to the manner in which fares are paid or inspected; the basic options are as follows: (TRCP, 2003)

- **Barrier** (i.e., pay on entering and/or exiting a station or loading area): Involves turnstiles, fare gates, and ticket agents or some combination of all three. It may also involve entry control only or both entry and exit control, particularly for a distance-based system.
- **Pay on boarding** (i.e., on entering the vehicle): Typically involves a fare box or a ticket or card processing unit.
- **Self-service**/barrier free or proof-of-payment (POP): The rider is required to carry a valid ticket or passes when on the vehicle and is subject to random inspection by roving inspectors. It involves ticket vending/ validating machines.
- **Conductor validated**: The rider can either prepay or buy a ticket onboard from a conductor.

Each fare collection approach has become closely associated with a particular mode of transportation. The table below is directly adapted from TRCP report 94, 2003. It shows the use of fare collection approach by mode.

Approach	Light Rail	Heavy Rail	Commuter Rail	Bus Rapid Transit	Bus
Proof of payment	√	√	√	√	√
Barrier	√	√		√	
Pay on Boarding	√			√	√
Conductor Validated			√		

Table 2.2 Fare collection approach by mode of transportation

In general, the design and the level of fares influence the passenger volume and consequently, the revenue of a public transport system. Therefore, they are an important instrument to improve the profitability of the public transport system or to achieve other goals, e.g., to provide access to public transport for the general public.

In the Ethiopian context, the Federal Transport Authority is responsible for establishing and setting tariff only for the long distance bus services (cross-country traveling buses). The tariff for small and medium buses which give intercity transport service is established by the Regional Transport Bureaus.

According to AACCSA (2009) From January 2001 to December 2003, fares were set at Birr 0.09195 per passenger-km on asphalt roads, and Birr 0.1145 per pass-km on unpaved roads. In January 2004, these rates were revised upwards by just over 10 percent to Birr 0.1095 and Birr 0.1265 respectively. The tariffs were revised again in September 2006 by increasing between 9 and 10 percent, to Birr 0.1200 and Birr 0.1380 on asphalt and unpaved surfaces respectively. According to operators in 2007, this increase was insufficient to compensate for the rises in the price of fuel in that period (AACCSA, 2009).

2.10. Service Quality and Passenger/Customer Satisfaction

Lovelock and Wright (2002) define customer satisfaction as a sort of emotional reaction that arose from an actual experience. Satisfaction can be defined as an experience of fulfillment of an expected outcome. Satisfaction is the customer's evaluation of a product or service in terms of whether that product or service has met the customer's needs and expectations (Bruhn and George, 2006).

According to Truong and Foster (2006) customer satisfaction takes place in two situations.

i. The result of a product or actual service meets the customer's expectations and
ii. The result exceeds the expectations.

Dissatisfaction will occur when the actual service is below the expected level. So, satisfaction and dissatisfaction are the outcome of a subjective evaluation process.

Customer satisfaction research literature agrees that service quality is a measure of how well the service level delivered matches customer expectations. Delivering quality service means conforming to customer expectations on a consistent basis.

The relationship between service quality and customer satisfaction is still a mystery, whether customer satisfaction is an antecedent of service quality or vice versa. Several researchers suggest that customer satisfaction leads to service quality (Lee & Yoo, 2000). However, an approach most frequently applied in the commercial sector suggests that customer satisfaction with a service is related to the perceived discrepancy between actual and ideal levels of service delivery.

If experience of the service greatly exceeds the expectations that clients had of the service, then satisfaction will be high and vice versa (Mori, 2002). Service quality is seen as an antecedent of customer satisfaction (Brady et al, 2002). Customer satisfaction is usually related to the quality of services and the same is true for public transport industry. Studies revealed that customers want the best service quality and responses as well to what they want (Zheng & Jiaqing, 2007).

According to Anderson et al, (2007) which affects customers' satisfaction is the operation failures of the services such as delay of transportation. This creates bias to customers, resulting in dissatisfaction. Friendliness of the personnel especially bus driver behavior in relation to service frequency has an impact on customer satisfaction. Friendliness behavior of the bus driver can satisfy customers by developing better communication and knowledge of its customers' needs (Disney, 1998). Additionally, Andreassen (1995) claimed that customer dis-satisfaction in public transportation is also related to the layout of the platform or the station, especially for buses. Reliability, convenience and responsiveness are also considered to be important in customer satisfaction (Cavana & Corbett, 2007).

Quality is adherence to customer specifications which sought to meet the criteria that customers want (Parasuraman et al., 1988). Measuring the quality of service is important to ensure that customers continue to visit the business for repeat purchases. Similarly in the transport business, if the customer is satisfied with the performance of the bus, the customer will return and use the same bus. Also likely customers will continue to use the bus service which they feel will satisfy their need.

Waiting time for long, failure to provide information of occasional delays and lack of good waiting environment are other factors which causes of customer dissatisfaction (Bielen and Demoulin, 2007).

Quattro (1998) was a research project carried out under the transport research and technological development (RTD) program of the EU's fourth framework program for RTD and demonstration. This research developed a specific quality management tool called the UPT (Urban Public Transport) quality loop. The report describes the quality loop to be based on four distinctive benchmarks. These are: expected quality, targeted quality, delivered quality and perceived quality. Figure 2.3 below depicts the Urban Public Transport Quality Loop as revealed in Quattro, 1998. Explanations for quality management tool are provided below.

Figure 8
The Urban Public Transport Quality Loop.
Source:
QUATTRO taken from TCRP 2010

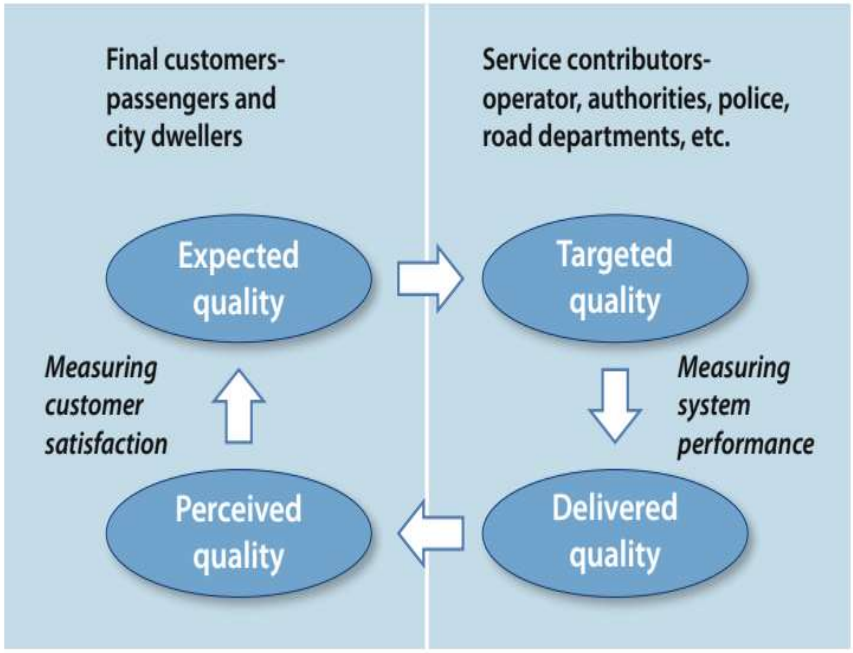


Figure 2.4: Urban Public Transport Quality Loop as revealed in Quattro, 1998

1. Expected quality: this is the level of quality demanded by the customer/passenger. It can be defined in explicit and implicit expectations. Tools for evaluation are revealed and stated preference methods.
2. Targeted quality: this is the level of quality that the transport undertaking aims to provide for its passengers.

It should be defined according to the level of quality expected by the passengers, external and internal pressures, and budgetary constraints and competitor/ market performance. Tools for evaluation are customer charters and guarantees of service, partnership agreements, quality standards and certification, quality contracts, quality tender and evaluation procedures.

3. Delivered quality: this is the level of quality that is achieved on a day-to-day basis under normal operating condition. Disruptions to service, whether they are the faults of the undertaking or not, are considered. Tools for evaluation are: compensation schemes for the benefit of users, reward/penalty schemes concerning operators and authorities, internal quality measurement, self-assessment methods.
4. Perceived quality: this is the level of quality perceived by passengers during their journeys. Tools for evaluation are customer satisfaction index (CSI) and customer feedback systems.

2.11. Determinants of Service Quality

Exploratory investigation suggests that, within most service industries, consumers use basically similar criteria in evaluating service quality. These criteria seem to fall into 10 key categories labeled "service quality determinants". These determinants are listed below. (TCRP Report 47, 1999)

1. **Reliability:** involves consistency of performance and dependability.
2. **Responsiveness:** concerns the willingness or readiness of employees to provide service. It also involves timeliness of service.
3. **Competence:** means possession of the required skills and knowledge to perform the service.
4. **Access:** involves approachability and ease of contact.
5. **Courtesy:** involves politeness, respect, consideration, and friendliness of contact personnel.
6. **Communication:** means keeping customers informed in language they can understand and listening to them. It may mean that the company has to adjust its language for different consumers — increasing the level of sophistication with a well-educated customer and speaking simply and plainly with a novice.

7. **Credibility:** involves trustworthiness, believability, and honesty. It involves having the customer's best interests at heart.
8. **Security:** is the freedom from danger, risk, or doubt.
9. **Understanding/knowing the customer:** involves making the effort to understand the customer's needs.
10. **Tangibles:** include the physical environment and representations of the service.

2.12. Vehicle Operating Costs (VOCs)

Vehicle operating costs refer to costs that vary with vehicle usage, including fuel, tires, maintenance, repairs, and mileage-dependent depreciation costs (Booz Allen & Hamilton, 1999).

Vehicle Costs include direct user expenses to own and use private vehicles. These can be divided into fixed (also called ownership or time-based, which are unaffected by the amount a vehicle is driven) and variable (also called operating, marginal or incremental, which increase with vehicle mileage/kilometerage). Some costs are generally categorized as fixed, such as depreciation and insurance, actually increase with vehicle mileage.

Factors Affecting Vehicle Operating Costs

The following factors affect vehicle costs (Booz Allen & Hamilton, 1999; Litman 2009; Polzin, Chu and Raman, 2008):

1. **Vehicle Type**: Ownership and operating costs vary by vehicle size, class, and other characteristics. Trucks typically have much higher vehicle costs than cars.
2. **Vehicle Speed**: it is the dominant factor affecting vehicle operating costs. Typically operating costs decrease with increasing speed to a certain point, and then begin to increase with increasing speed.
3. **Speed Changes**: Changes in speed, also known as speed cycles, increase vehicle operating costs. This added cost is higher when speed cycling occurs at higher speeds.
4. **Gradient**: Grades can be either positive (uphill) or negative (downhill). Positive grades are more demanding on vehicle engines and require greater fuel consumption.

This leads to an increase in operating costs. Negative grades may reduce operating costs, but may also increase wear on brakes.

5. **Curvature**: A highway curve requires a greater output of energy from a vehicle to counter the centrifugal force. This, combined with additional wear on the vehicle's tires, leads to an increase in operating costs.
6. **Road Surface**: The roughness of the road surface can affect vehicle operating costs by affecting rolling resistance. Rough surfaces can reduce speed, require greater fuel consumption, increase wear on tires, and increase maintenance costs.
7. **Altitude:** Average elevation of the road above sea level has effects on air resistance impacting the driving power-limited constraint speed, fuel consumption and tire consumption

When tariff is established for public transportation, vehicle operating costs are usually the main input. Therefore careful determination of vehicle operating costs is very critical. There are known model that helps the calculation of vehicle operating cost. RED and HDM-VOC are the ones.

2.13. Map of Intercity Bus Services in Ethiopia

Intercity bus service has a significant role in the linkage of the city with other major towns and contributes a lot to the metropolitan linkage of the nation. In addition to major cities, minor cities and towns can be connected to larger city centers. This gives many social, economic and political advantages for the people living in small rural areas and towns.

Addis Ababa, the capital city of Ethiopia, is one of the major points of attention when talking about intercity bus service linkage. The city has a number of intercity transport outlets in different directions. There are at least five major outlets or routes that can link Addis Ababa with the hinterland. They include Debremarkos, Nekemte, Jimma, Modjo, Adama and Dessie outlets that interlink the city with all outward and inward directions of the nation. The Modjo outlet has a route which is located on the south and east lines which connects Addis Ababa with major towns located in the southeast direction (there is a new direct link between Addis and Adama through the expressway). The Dessie route links the north central part of Ethiopia with the capital city.

The Gojam and Nekemte lines create a connection between the northwestern and western parts of the. Finally, The Jimma route leads to the southwestern part of the nation (Fikadu Kassa, 2015).

According to the study of Fikadu Kassa (2015) on the major role of long distance bus transport, the Modjo out let is the busiest route where there is a large flow of buses. However, there is new direct link between Addis Ababa and Adama through the Expressway bypassing Modjo. The main reason for this is that it is the line for Ethio-Djibouti corridor through Modjo and then Adama (old route) and the Ethio-Kenya corridor through Modjo which are known for their highest economic activity corridors in Ethiopia. The Dessie outlet is the second busiest corridor, with long distance bus transport next to Modjo. The other outlets like Jimma, Gojam and Nekemte get the lowest flow of long distance bus (LDB) activities.

Figure 2.5 below is depicted illustrating the map of main outlets of intercity bus transport which is adopted from Fikadu Kassa (2015) and edited for this research purpose. It should be noted in this map that the major towns are located on the map and are visible while the other small towns are not visible but can be observed along the ways while traveling to the major towns.

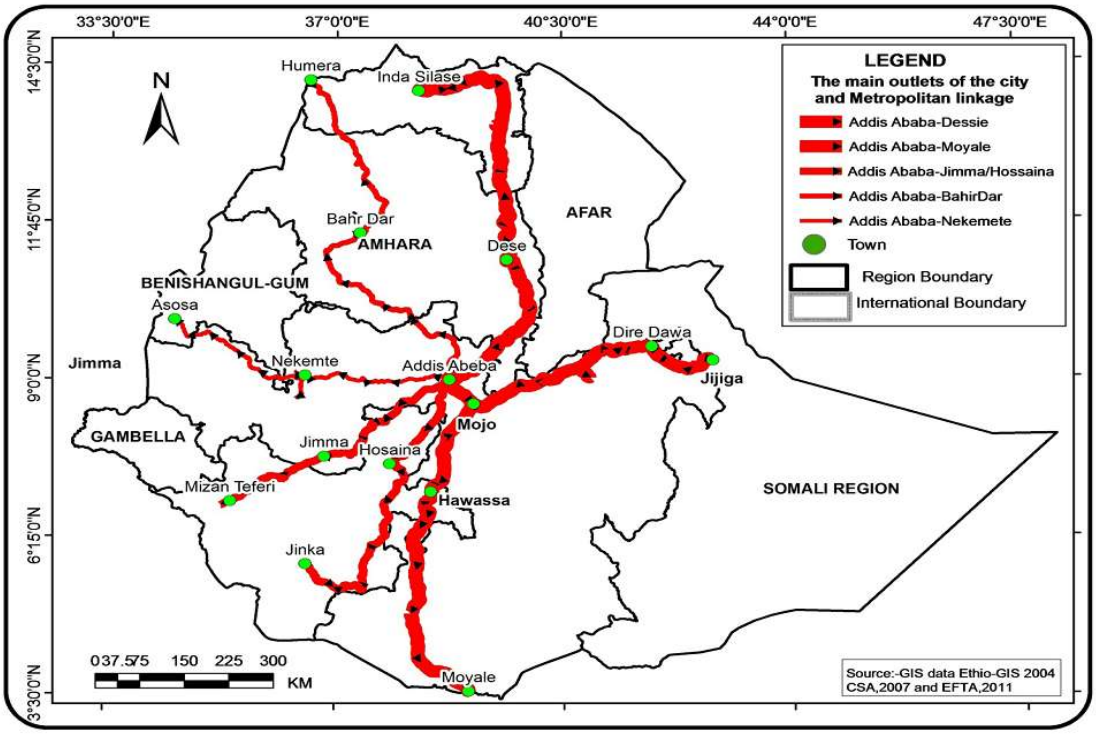


Figure 2.5 The Main Outlets of Intercity Bus Transport as adopted from Fikadu Kassa, 2015

2.14. Major Intercity Bus Terminals in Ethiopia

In Ethiopia, all regional centers and towns have terminals serving as points of passengers' departure, arrival and transfer, regardless of size and standard of the terminals. Most of these terminals are constructed and controlled by the Transport Authority. Specifically, the intercity bus terminals in the capital city are categorized within this group.

Currently, there are six main terminals located at different parts of Addis Ababa serving passengers for boarding and alighting purposes and facilitating travels to different parts of the country. These terminals are: Adisu Gebeya, Asko, Ayer Tena, Kality, Lamberet and Mercato terminals. Map of the intercity bus terminals in Addis Ababa is presented in Figure 2.6 below. The figure is directly adopted from Fikadu K (2013) and no change has been done since it remains the same.

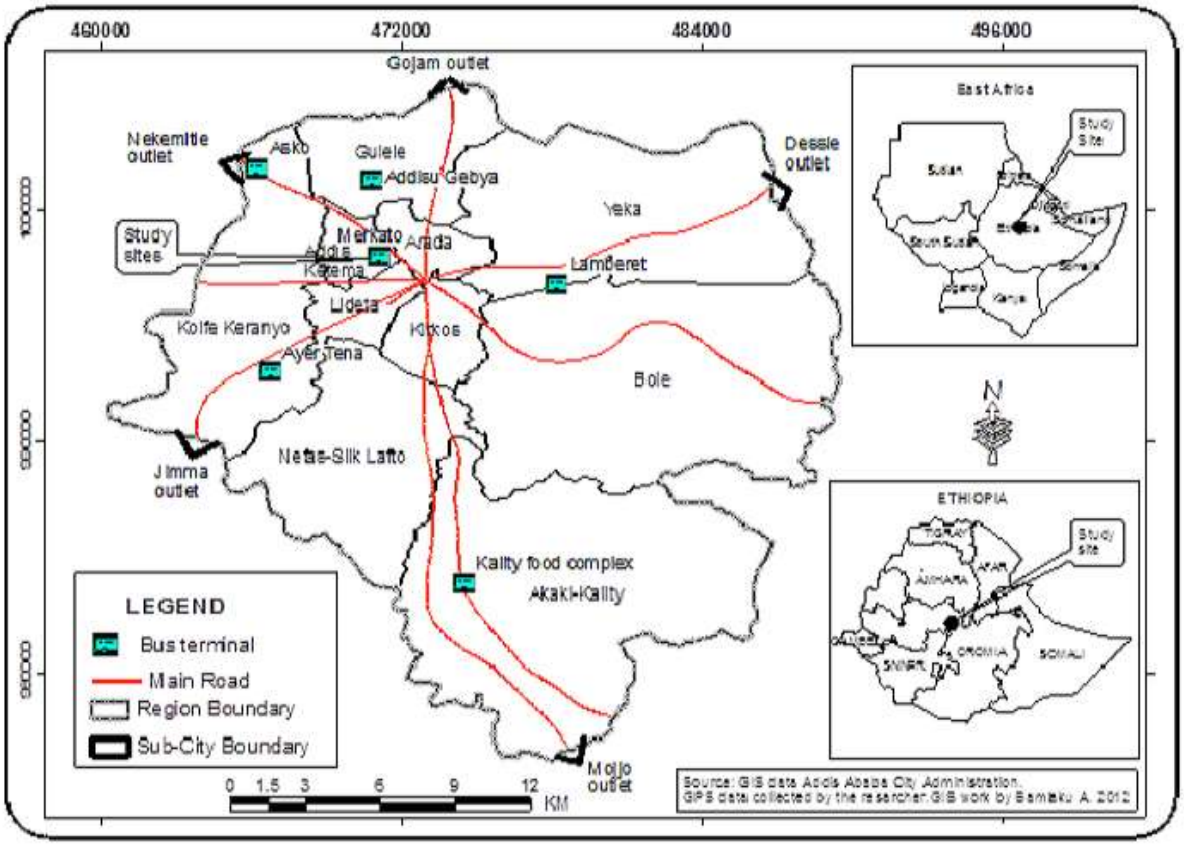


Figure 2.6 Intercity Bus Terminals in Addis Ababa

CHAPTER 3

RESEARCH METHODOLOGY

3.1. Introduction

The methodology describes the practical way in which the whole research project has been organized (Oliver, 2004). Methodology is a plan of action that shows how the problems will be investigated, what information will be collected using which methods, and how this information will be analyzed in order to arrive at conclusions and develop recommendations. Research follows some steps and procedures when conducted. Once the problem statement has been formulated, it should become evident what kind of data will be required to study the problem, and also what kind of analysis would be most appropriate to analyze the data (Walliman, 2005). This chapter presents the methodology adopted and identifies the tools and techniques employed in conducting this study.

3.2. The Study Approach

The methods of data collection have impact on the analyses, results, conclusions, values and validity of the study at the end. A research can be qualitative, quantitative, or both. In this regard, this research is both qualitative/unquantifiable and quantitative. It is qualitative because it focuses on users and operators to obtain their perception on current situations concerning the intercity bus terminals and intercity public transport services. Qualitative data such as opinion of passengers on the quality of service provided by the intercity transport terminals will be used to assess their satisfaction level. On the other hand, the study can be quantitative because it also focuses on determination and comparison of the intercity public transportation tariff. In this section, different parameters which should be included when setting transportation tariff will be discussed and calculated. One of these parameters is operating cost of vehicles.

3.3. Population and Sampling

The population in this particular research can be defined as a large population. It is a combination of both passengers and drivers. The main purpose of preparing questionnaire for drivers is to collect supportive data concerning the vehicle operating expenses of their vehicle. Passengers who are using both terminals are of larger amount. The average number of daily travelers at Kality terminal is about 13,093 and it is about 5,213 travelers at Lamberet terminal. This figure indicates the large number of travelers using each terminal. Before conducting the final data collection, a pilot survey was conducted and the following important outcomes were obtained.

- Redundancy of information from respondents was observed; and
- Additional thoughts were obtained to include on the questionnaire;

The following histogram graphically shows the frequency distribution of the data collected during the pilot survey.

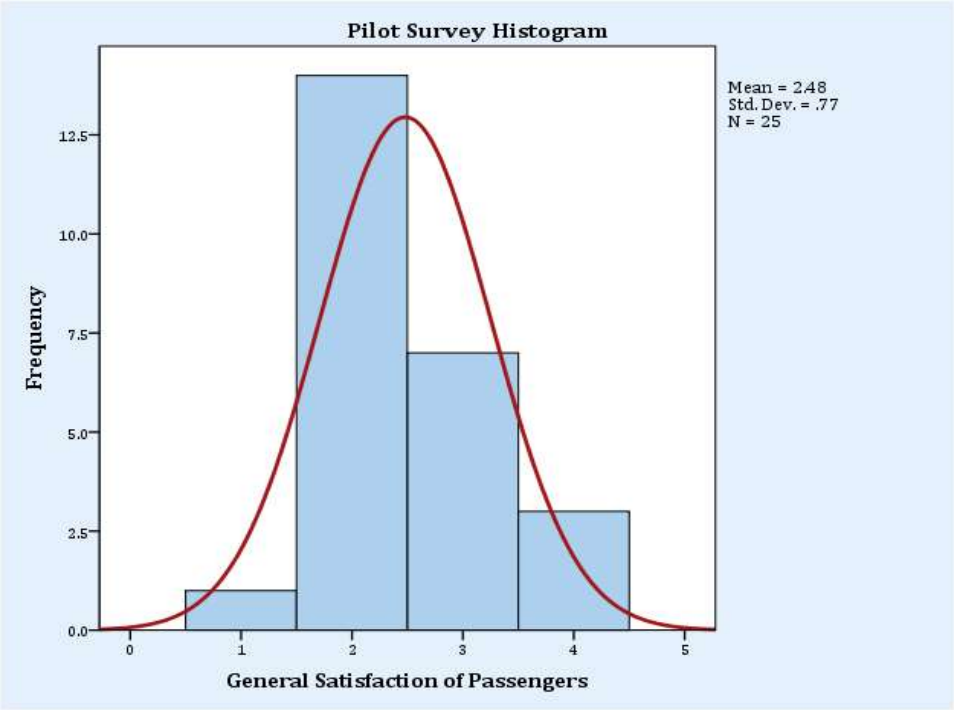


Figure 3.1 Histogram showing frequency distribution of Pilot survey data

Sample size calculation was done to determine the minimum recommended sample size for the study. The main considerations taken into account for the calculation are:

- 10% margin of error (confidence interval) was taken; it is because most of the passengers' responses were repetitive and closeness was observed in their opinion
- 90% of confidence level was taken as it is usual to take values between 90%, 95% and 99% for sample size calculation

Passenger Terminal	Population	Minimum Sample Size
Kality	13093	96
Lamberet	5213	68

Table 3.1 Minimum Sampling Size required for the given population

Location and Attributes	Average Daily Traveler	Sample Size Chosen		
		1%	4%	8%
Lamberet Drivers	374			30
Kality Drivers	895		36	
Lamberet passengers	5213	52		
Kality passengers	13093	131		

Table 3.2 Sampling Size used for data collection

Probability sampling, also known as random sampling, was used for sample selection. This means, every member of the population has a chance of inclusion in the sample. This sampling method has been used for both passengers and drivers. The table below shows the sampling size used for this research.

3.4. Description of Study Area

This research was conducted on two selected intercity public transport terminals. The two terminals are:

- ✓ Lamberet Terminal; and
- ✓ Kality Terminal

3.4.1. Lamberet Bus Terminal

The recently opened Lamberet Bus Terminal, one of the six terminals in the capital city, is located at Dessie Ber, in Yeka District. The terminal lies on 22,053 square meter lot.

According to Addis Fortune Magazine website report, 2014, there are 55 long distance buses and 130 medium and small buses operate at the terminal on a daily basis.

These vehicles cross three regions; during their operations: Amhara, Oromia and Tigray. It provides services for mobility of passengers from Addis Ababa to some cities located in the northern part of the country such as: Sheno, Debre Berhan, Shewarobit, Tarmaber, Debre Sina, Desse and Mekele. The eight million Birr terminal was built by the Nega Mamo Construction Company which is equipped with spaces for passengers awaiting buses, access for the disabled, baggage trolleys and toilets for passengers (Addis fortune, 2014)

3.4.2. Kality Bus Terminal

The Kality bus terminal is another terminal which is controlled by the Federal Transport Authority. It is located in Kality District on Sierra Leone Street (Debre Zeit Road). The total area of the terminal is 29,000 square meter. It gives service for passengers and vehicles moving on the Addis Ababa- Dire Dawa route which is the national eastern route. It also serves some parts of the southern route. Previously before relocation, the service for the eastern and some parts of southern routes were provided at La Gare on Ras Mekonen Street. But it was moved to the current location on June, 2011 (Hadra Ahmed)

3.5. Data Collection Methodology

The task of data collection begins after a research problem has been defined. While deciding about the method of data collection to be used for the study, two types of data are considered: primary and secondary data. The primary data are those which are collected afresh and for the first time, and thus happen to be original in character. The secondary data, on the other hand, are those which have already been collected by someone else and which have already been passed through the statistical process (C.R. Kothari, 1990).

In this research, all the necessary data were collected as both primary and secondary. Since this research is a descriptive type of research, Primary data was gathered directly from the original source through:

- ✓ Questionnaire;
- ✓ Interview; and

- ✓ Observation

In addition, secondary data were obtained from pertinent sources such as previous studies, different journals and magazines, report papers published by different organizations and from websites.

3.5.1. Questionnaire

A questionnaire consists of a number of questions printed or typed in a definite order on a form or set of forms. The questionnaire for this research was prepared by giving the required care. Proper considerations were taken into account while constructing the contents of the questionnaires. It was prepared for both passengers and drivers. For passengers, all the questions were multiple choice or closed-ended questions while for drivers all of the questions were open-ended questions.

Additionally, an evaluation questionnaire was prepared for passengers, so that they can give a score for different lists of indicators. The score ranges between 1 and 5. Each number represents a particular level of satisfaction for the given indicator. The following table shows the interpretation of the score.

Score	1	2	3	4	5
Interpretation	Very Dissatisfied	Dissatisfied	Neutral	Satisfied	Very Satisfied

Table 3.3 Score values and interpretation

Before starting the main survey, a pilot study was conducted to check the questions and to incorporate any additional ideas to strengthen the final questionnaire.

3.5.2. Interview

The interview method of collecting data involves presentation of oral-verbal stimuli and reply in terms of oral-verbal responses (C.R. Kothari, 1990). This method was used for gathering primary data from the following parties:

- ✓ the management head of Lamberet and Kality terminals;
- ✓ the representatives of transport associations; and
- ✓ the transport authority personnel;

The interview for these data sources was carried out in a structured way. Such interviews involve the use of a set of pre-determined questions and of standardized techniques of recording. As it is described earlier, this research is a descriptive type. According to C.R. Kothari (1990) standard interviews are often used for descriptive studies.

In addition to the structured interviews, some unstructured interviews were conducted to add up on the information gathered about the current situation of intercity bus terminals. It was a random interview undertaken with random passengers by asking their opinions informally. These types of interviews are characterized by a flexibility of approach to questioning.

3.5.3. Observation

Under the observation method, the information is sought by way of investigator's own direct observation without asking from the respondent. It can be structured or non-structured type of observation (C.R. Kothari, 1990).

In this research, unstructured observation type was used for assessing the intercity bus services and terminal facilities. The main reason observation was used during data collection is that sometimes the information provided by some drivers, passengers and even terminal administration staffs may be somehow exaggerated or partially difficult to represent the actual condition. In this respect, the observation helps by providing visible information which strengthens the data collected by the other methods.

3.6. Data Analysis Methodology

After all the necessary data have been gathered, the next step is processing and analyzing the collected data. Data processing involves editing, coding, classification and tabulation (C.R. Kothari, 1990).

In this research, the data was analyzed by using a statistical analysis tool called SPSS which stands for statistical package for social sciences. Following editing and selecting incomplete questionnaires, the data was inserted into the software for further analysis.

The main focus of this research was to determine the level of satisfaction of passengers in the two terminal facilities and in the general intercity transport services. In order to examine the customer's satisfaction, basic check lists or performance indicators were used. These are summarized below.

For a terminal facility:

- Terminal capacity (including passenger waiting area);
- Ticket and information system;
- Location and Accessibility;
- Safety in the terminal; and
- Passenger amenities which includes provision of toilets, payphones, cafeteria, drinking water etc…

For intercity transport service:

- Affordability and traveling tariff;
- Service reliability;
- Travel time saving;
- Comfort of vehicles; and
- Safety while travelling

These indicators are taken from the Transit Capacity and Quality of Service Manual (TCQSM) and modified in the context of our situation. The TCQSM is intended for use by a range of practitioners, including transit planners, transportation planners, traffic engineers, transit operations personnel, design engineers, management personnel, teachers, and university students. The quality of service section of the manual is intended to provide a comprehensive look at transit quality of service from a passenger's point-of-view, and a set of performance measures are provided. These measures can be applied to assess existing and projected quality of service as an aid in identifying transit service, facility, and system performance and improvement needs (TCRP, 2003).

Therefore, these parameters were mainly given the greater attention in the analysis. Satisfaction was expressed in terms of these indicators. The respective responses for all of the parameters stated above were introduced by using Likert type Scale. In this scale, five responses presented for each particular measure. All the input data was used in SPSS to analyze the existing situation in intercity bus terminals and in the intercity transport services. So that, based on the result obtained it will be possible to draw conclusion about the selected passenger terminals and the general intercity transport services.

3.7. HDM-4

The Highway Development and Management (HDM-4) system is a software tool that is used to appraise the technical and economic aspects of road investment projects. It consists of different sections for determining necessary parameters.

Road User Effect (RUE) is one of the outputs obtained from the model. This comprises vehicle operating cost (VOC) and travel time cost (TTC) for both motorized transport (MT) and non-motorized transport (NMT), and Accident cost. The total road user cost is the sum of these costs. Therefore HDM-4 model will be used for determining the operating costs of the inter-city transportation vehicles and this vehicle operating cost will be used to establish the inter-city transportation tariff. The VOC of non-motorized transport (NMT) will not be considered as it is difficult to obtain the data related to NMT. Additionally, travel time cost is not included due to the difficulty to find necessary data.

CHAPTER 4

CASE STUDY

4.1. Introduction

Passengers usually start journey from their home or living places. When they prepare to travel from one city to another, they choose the convenient way of reaching their destination. Generally, vehicle owners do not use short haul intercity public transportation services. Some people choose to travel by air when the mode is available on the route they are travelling.

In Ethiopia, large portion of the population chooses to travel by intercity public buses. Usually, passengers first travel to intercity bus terminals where they board the vehicles or buses. As it was discussed in previous chapters, the buses which transport passengers are organized under different public transport associations. These associations are administered by the Federal Transport Authority so that they can provide the transportation service for the general public efficiently and cost-effectively. Each association comprises different number of vehicles involved under its umbrella. The associations are usually based (set office in) at the intercity bus terminals.

There are also other private long distance transportation providers which are categorized under unique transport associations in Ethiopia such as Selam Bus, Sky Bus, and Limalimo. Although these transport companies do not have fixed off-street terminals, the services they provide are considered to be of better quality and standard as compared to the services provided by the associations which are based at the intercity bus terminals.

In some of the previous chapters, the major terminals in Addis Ababa were discussed in generality. This chapter only concentrates on the two intercity bus terminals which are selected for the case study in this thesis. Accordingly, the current services at these terminals will be discussed in this chapter.

Additionally, the human resource organization and service facilities in each terminal will be assessed. These terminals are: Kality terminal and Lamberet terminal, both operating under the Federal Transport Authority.

4.2. Kality Passenger Terminal

4.2.1. Location

Kality terminal is located around Kality on the road to Debre Zeit. It is located about 17 km from the center of Addis Ababa which is the capital city of Ethiopia. Mainly, it is a center for arriving, departing and transferring passengers who travel to / from the eastern and southern corridors of the country. According to the information obtained from head of the terminal, it has been five years since the terminal started giving services for the public. Before relocation, the eastern and southern routes were using Lagahare location as a terminal point. From the pattern of the city's traffic flow, Lagahare is ideally located at the intersection of the two main high traffic densities of Kality-Lagahare and Hayat Old Airport routes (AACCSA, 2009). Due to the high traffic congestion in the area by the time, it was decided to change the point of transfer to the current place, Kality.

4.2.2. Operation Routes

The main directions or routes of travel of vehicles from Kality Terminal are: Debre Zeit, Modjo, Adama, Meki, Zeway, Assela, Shashemane and Hawassa. All these movements are covered by small and medium buses. Additionally, there is only one destination that is covered by long distance bus (LDB) or cross-country bus and it is from Addis Ababa to Semera. There is only one Level 1 cross-country bus that transports passengers in this route and it can hold up to 60 passengers on average. This long distance trip takes place once every day. Table 4.1 below presents distances, surface types and conditions of the routes that arrive from or depart to from Kality Terminal.

No.	Road Segment	Distance (Km)	Road Surface Type	Average Road Roughness (IRI)	Road Condition (ERA)
1	Debre Zeit	31	AC	3.1	Good
2	Modjo	57	AC	3.1	Good
3	Adama	82	AC	3.0	Good
4	Meki	134	AC	2.4	Good
5	Zeway	147	AC	2.75	Good
6	Assela	159	AC	2.52	Good
7	Shashemane	235	AC	2.48	Good
8	Hawassa	257	AC	2.2	Good
9	Semera	588	AC		

Note: AC stands for asphalt concrete and IRI stands for international roughness index.

Table 4.1: Major traveling routes to / from Kality terminal

4.2.3. Vehicles and Passengers

Road vehicles are requirements for passengers / freight mobility and they are the backbone of the transportation services. Without capable and accessible vehicles there cannot be adequate and satisfactory services for the general public. There are a number of vehicle types at this terminal. Currently, the major vehicle types involved in the intercity transport service are shown in Table 4.2 below by their local name.

Category	Small Vehicles	Medium Vehicles	Long Distance Bus
Name	5L Mini Bus	Lonchin (ISUZU KitKit)	Cross country bus
	Standard Mini Bus		
	Dolphin		
	Highroof		

Table 4.2: Classification of intercity transport buses

Each vehicle is categorized into three levels as: Level 1, Level 2, and Level 3. The levels are assigned to the vehicles based on their ages or models and the existing service capacity of vehicles. The quality of vehicles reduces from level one to level three. Passengers usually use this criterion for choosing the type of vehicles they want to travel with.

Although it is a good way to help passengers choose the vehicles they can afford, some problems occur when giving the right levels for vehicles. Most drivers complain that sometimes vehicles with good status may be categorized in inappropriate level or category and vice versa. The Federal Transport Authority is responsible for designating these levels.

On the average, there are a total of 1,382 vehicles operating at the Kality Terminal Of these vehicles, 29.74% is Level 1, 35.17% is Level 2 and 35.09% is Level 3. Below, the table presents vehicle data in Kality terminal. Table 4.3 below presents vehicles with respective levels and percentages.

Vehicle Category	Level 1	Level 2	Level 3	Sum
No. of Vehicles	411	486	485	**1,382**
%	29.74	35.17	35.09	**100**

Table 4.3: Number of vehicles in Kality Terminal categorized by level

4.2.4. Transport Associations

As it was defined previously, transport associations are institutions which encompass vehicle owners and/or drivers all together for the purpose of providing transport services. It is through the transport associations that vehicle owners and/or drivers communicate with the Federal Transport Authority. They are generally responsible to voice every issue of their members that is related to the intercity bus services. Transport associations have offices at each terminal so that they can be able to follow the services provided by their members. At Kality terminal, there are a total of 53 transport associations which also consists of many vehicles under each category. The table below shows, the number of associations and the number of vehicles categorized by level in each association.

	LV 1	LV2	LV3	Total
Associations	18	20	15	53
vehicles	411	486	485	1382
Percentage (%)				
Associations	33.96		37.74	28.30
Vehicles	29.74		35.17	35.09

Note: LV stands for level.

Table 4.4: Number of transport associations with respective vehicles.

4.2.5. Service Facilities

The major service facilities which should be included in a terminal for providing satisfactory services to passengers are:

(i) Passenger waiting area;
(ii) Parking area;
(iii) Ticket offices/ Ticket selling places;
(iv) Offices; and
(v) Others: include toilet, cafeteria, shop, etc.

The above facilities, in the existing situation at the Kality Terminal, are discussed below.

4.2.5.1. Passenger waiting area

Usually, when there is high transport demand or until transporting vehicles arrive to the place of passengers loading, users needs to wait sitting at some comfortable places. These places are called passenger waiting areas. These areas should be capable of accommodating the need of a significant number of users with sufficient sitting places. The following picture was taken at some working day at Kality Terminal.

Figure 4.1 Passenger waiting area at Kality terminal

As seen in the picture, the waiting area is not that much comfortable for passengers. It doesn't contain proper sitting benches. This is the only waiting place at the terminal. Users also complain on the adequacy and standard of the area. This picture was taken at a time when there was normal number of passengers. But during the peak season, this place is not adequate to receive a lot of users at once. During peak periods, the demand for intercity transportation services increase and the supply decrease. The actual number of vehicles is the same as the other time but not enough to provide the required services due to the increasing demand of users.

It is in this time of higher demand that the passenger waiting area should be adequately available. Therefore, it needs to be designed for the peak seasons.

4.2.5.2. Parking area

It is in the parking area that vehicles stop and load the passengers. These places should be easily seen or recognized by passengers as there are different routes of travel. There should be some visible sign to locate these parking places to give passengers adequate information on where each vehicle is loading its passengers to a specific route. Currently, passengers by default know where to find transporting vehicles or they should ask other people if they are new for the terminal.

At Kality terminal, parking areas are difficult to differentiate due to the congested environment. The terminal do not possess adequate land to give the required service. This can be one factor which can affect passengers' satisfaction on services. Figure 4.2(a) shows vehicles parked at the back side of the Kality Terminal and Figure 4.2(b) shows vehicles waiting to load passengers.

Figure 4.2(a) Vehicles parked at the back side of the Kality Terminal

Figure 4.2(b) Vehicle waiting to load passengers

4.2.5.3. Ticket Selling Place

At Kality Terminal, there is no specific ticket selling place for most of the vehicles categorized under the small and medium buses category. The only pre-travel ticket office is available for the long distance bus which transports passengers from Addis Ababa to Semera and it is the only long distance route. For the remaining routes, ticket selling takes place when loading passengers or inside the vehicles after the journey is started. Furthermore, the driver assistants don't sell tickets for passengers at all. According to the head of one association (state the name of the association), this kind of system of selling ticket in place is used for one reason that is to allow passengers to choose the vehicle they want to travel with. As stated, in other terminals, the ticket should be provided at the terminal entrance. This, many times affects the passengers' freedom to choose vehicles. In this kind of system, passengers don't have a chance to see the vehicle type in which they are traveling with but rather they are told by the assistances who sell the tickets. Sometimes, the sellers inform passengers by exaggerating the quality of their vehicles. This will later create dispute between passengers and assistants.

On the other hand, avoiding ticketing system will create an environment that is prone to charge the passenger more than the actual traveling tariff set by the transport authority. This only helps the drivers and it is one of the main reasons for disagreement between passengers and operators. Travel ticket preparation is one of the major tasks accomplished by transport associations. Transport associations are supposed to print and provide tickets for each member. But under current situation, they are not doing what they are obliged to do.

4.2.5.4. Offices

One of the basic requirements that any public service providing organizations need to have is a suitable working rooms and offices for staffs. An organized work room is necessary for a better service provision.

At Kality terminal, all the offices are built on a temporary basis. These offices don't include the necessary office furniture and materials in the required number. There is too much sound pollution coming to the offices from the surrounding areas because of the location of the offices is close to the passenger boarding area.

4.2.5.5. Others

Others include amenities such as: restrooms, cafeterias and shopping centers. When passengers need to use these amenities, it should be easily available and accessible.

The Kality terminal contains these basic amenities but it is not in the required satisfaction of the passengers. For instance, there is one restroom at the terminal which is located far from passenger gathering area. Many passengers do not even know where they can access the restroom. Additionally, it is not something which is comfortable for use with regard to quality. Therefore, users choose other alternatives where they can access outside of the terminal. The figure below represents the situation discussed.

Figure 4.3: Passenger restroom at Kality Terminal

Concerning cafeterias and shopping centers, passengers can get what they want outside of the terminal. The terminal has a cafeteria service but not of the good standard. This service is given in a 'house' that is covered by plastic and it is not preferable by most users. There are a collection of shopping centers surrounding the terminal. Most of these places sell items which are required by passengers during their journeys such as water, soft drinks and different cookies and snacks. Passengers do not have problems with regard to obtaining these items.

4.2.6. Problems at Kality Passenger Terminal

During the study, the following major problems were noticed at Kality terminal.

- The terminal was not designed in a standard way;
- The area of the terminal is not enough to provide the required services. Some portion of the terminal area is used for Police station and for the city buses which provide intra-city passenger transportation services.
- The required facilities at the terminal such as: restrooms, passenger waiting area, ticket offices and administration offices are not to standard and these facilities are not with enough quality;
- Delay of construction of the terminal;
- Loading of passengers outside of the terminal area is common risking the safety and security of travelers;
- Poor handling of passengers;
- Lack of proper information provision for travelers;
- Problems related to items carried by passengers;
- The data management and organization system is traditional or manual;
- Etc.

4.3. Lamberet Passenger Terminal

4.3.1. General

The Lamberet terminal is one of the six major terminals in Addis Ababa which is controlled by the Federal Road and Transport Authority. It is located in the North Eastern part of the capital city specifically at Yeka district. The passengers who want to travel to some of the cities located in the northern part of Ethiopia need to use the service from this terminal. The terminal started its service in recent years. According to the terminal management head officer, Lamberet terminal commenced its services in April, 2006 Ethiopian calendar.

Before the start of the terminal, all the northern route transportation services were provided at the Merkato terminal. Merkato is the area known for being the heart of most commercial activities of the city and therefore it is a highly congested area. Due to this reason, long distance travelers were not usually comfortable and secured by using the Merkato terminal.

Additionally, according to Fekadu, 2015, the route by itself is the second busiest route in the movement of large number of passengers. As a result, the Ethiopian Federal Transport authority decided to change the location of the terminal to the current place. On the other hand, after it was planned to change its location, the Lamberet terminal was turned into a camp for the Federal Police forces between May 2005 and January 2006.

There are a total of 13 employees working at the terminal on a permanent basis. They are involved in the management and supervision of daily deployment of buses. There are also about 68 loading / unloading workers in the cross-country transportation division and four in the small-medium distance transportation division.

The workers in the cross country section are not only working at Lamberet terminal but also at other two terminals, Asko and Merkato, by rotating in different shifts. There are a total of 86 security controllers. Half of them are working on the cross-country transport section and the remaining half on the small and medium transport section.

The security controllers are mainly responsible for:

- Preventing disturbances in the terminal
- Solving issues related to the turn of vehicles to load passengers
- Facilitate the safety of passengers within the terminal
- Providing information for passengers

4.3.2. Operation Routes

The direction of travel of vehicles in Lamberet terminal is to the northern part of the country. The major operation routes are: Aleltu, Sheno, Debre-Berhan, Debre-Sina, Shewarobit, Kombolcha, Dessie, Woldia and Mekele. There are also other small towns in between these major towns where many passengers travel to. Table 4.5 presents traveling routes from Lamberet terminal with distances, road surfaces and road conditions.

No.	Road Segment	Distance (Km)	Road Surface Type	Average Road Roughness (IRI)	Road Condition (ERA)
1	Sheno	78	AC	2.1	Good
2	Debre-Berhan	130	AC	2.1	Good
3	Debre-Sina	190	AC	2.2	Good
4	Shewarobit	222	AC	2.53	Fair
5	Kombolcha	376	AC	2.55	Good
6	Dessie	401	AC	2.88	Fair
7	Woldia	521	AC	3.14	Fair
8	Mekele	783	AC	3.14	Fair

Note: AC stands for asphalt concrete and IRI stands for International Roughness Index

Table 4.5: Travel routes from Lamberet terminal

4.3.3. Vehicles and Passengers

Most of the vehicles that operate in the intercity bus transport are similar. The difference lies in the number of vehicles. Previously, as it was discussed in section 4.2.3, the same types of vehicles provide service at Lamberet terminal. According to the data obtained from the terminal personnel, the average number of vehicles in the small-medium bus category which transport passengers to their destination per day is 475 to 530. Drivers or vehicle owners usually choose their traveling or working route to obtain the most profit they can possibly get. If the one route they are working on becomes less profitable, they want to change to other routes. Therefore drivers have the right to work in different alternative routes which gives them an opportunity not to stick only on a specific route. The variation on the number of vehicles is a result of this situation. This condition, on the other hand, create problem in the intercity transportation.

These vehicles transport about 9,306 passengers to different destinations per day on average. When long distance travelers are included, the average number of passenger becomes about 12,096 per day. Concerning the cross country buses or LDBs, there are about 1,100 vehicles as Level 1 category; 250 vehicles as Level 2 category and about 48 vehicles a Level 3 category. All the above information was obtained from the terminal's personnel orally.

Table 4.6 presents the average vehicle data and the number of transported passengers in the month of April, 2016. This data were obtained from the terminal department which records the daily travel data of vehicles and passengers. It can accurately represent the daily activity at Lamberet terminal. It is a sample taken for this research.

Vehicle Type	No. of Vehicle				No. of Passenger			
	Level 1	Level 2	Level 3	**Total**	Level 1	Level 2	Level 3	**Total**
Small- Medium Bus	132	133	109	**374**	2043	1737	1432	**5212**
Long distance bus (LDB)	35	9	2	**46**	2123	497	82	**2702**
Total	**167**	**142**	**111**	420	**4166**	**2234**	**1514**	7914

Table 4.6: Daily Average number of vehicles and passengers for the month of April, 2016

4.3.4. Transport Associations

The transport associations that are working at Lamberet terminal have the same organization and obligation to that of the Kality terminal. Any transport association is formed according to the Federal Transport Authority rule and regulation. Therefore, all associations at each federal terminal have similar structure and system.

4.3.5. Service Facilities

Facilities necessary to deliver the required service for passengers in any terminal were mentioned in section 4.2.5. These facilities have important roles for satisfactory service provision. Passengers expect terminals to include these important facilities for their basic requirement while staying until they board their buses. The Lamberet terminal encompasses these basic service facilities within it designated area. Recalling the basic facilities:

(i) Passenger waiting area;
(ii) Parking area;
(iii)Ticket offices/ Ticket selling place;
(iv)Offices; and
(v) Others: include toilet, cafeteria, shop …

4.3.5.1. Passenger waiting area

The passenger waiting area at Lamberet terminal can be considered as a good one. It is well constructed and provided with proper sitting benches. As it can be seen in Figure 4.4, there is sufficient space between the benches.

This can make passengers comfortable while sitting and waiting for buses. Passengers are well protected from sun and rain in this area. These facilities are located at two positions inside the terminal.

Figure 4.4 Passenger waiting area at Lamberet Terminal

4.3.5.2. Parking Area

At Lamberet terminal, there are two parking areas. The first one is for the vehicles that transport passengers and the second one is for other public and government buses. In addition to this, there is a separate parking place for the long distance buses, other than the small and medium buses. The vehicle arrangement is organized such that passengers can easily move to the buses they choose. Information plates are provided at the parking area to notify travelers where they can board on the vehicle which transports them to the places of their destinations. These plates also help the drivers to park their buses at designated places.

4.3.5.3. Ticket Offices

At Lamberet terminal, the ticket selling process takes place at the main entrance of the gate. There are a number of windows where ticket sellers wait for passengers. These windows are painted with three different colors of Green, Blue and Yellow. These colors represent the levels of the vehicles. The Green color is for Level one (LV1) vehicles, the Blue color is for Level two (LV2) vehicles and the Yellow color is for Level three (LV3) vehicles.

For instance, the driver's assistant who is providing service on at LV1 vehicle sells ticket at the Green window and are the same for the Blue and Yellow colors. Therefore, passengers can easily identify the vehicle category and make their choices. The ticket price is dependent on the level category of vehicles. Vehicle under the LV1 category charge more fare than the vehicle under the LV3 category. This type of ticket selling applies for small and medium buses and the ticket selling is done for passengers who travel same day. Therefore, operators sell tickets for passengers in a free competition basis.

For the long distance buses, tickets are sold one day before the actual day of travel. Long distance passengers need to buy their ticket before one day and on the next day; they bring with them to board the buses. The long distance buses (LDBs) are also categorized into three levels as the same as small and medium buses. Additionally, the ticket offices are also painted with three colors to identify the vehicle levels of the operators.

4.3.5.4. Offices

As offices are necessarily important for any service provision, the Lamberet terminal is well organized with respect to basic facilities. There is a graceful building which consists of the terminal administration and the data recording offices. All transport associations working at the terminal have their offices within this building. This building is located at an area that is well separated from the vehicle parking and passenger boarding places. Therefore, the offices are comfortable to work in. In other words; sound pollution is restricted as a result of the building location. The offices are provided with necessary furniture and office materials such as adequate chairs and tables, computer and printers.

4.3.5.5. Others

Other passenger amenities are also discussed in the context of the Lamberet terminal. The basic user amenities are: restroom, cafeteria and shopping centers for passengers. Lamberet terminal is considered to be the model intercity passenger terminal for other terminals in Addis Ababa. During their waiting times at the terminal, passengers can access these amenities within a close radius.

The restroom at Lamberet terminal can be considered as good for fulfilling the needs of passengers. It is located at a place that any user can access and it is also clean. There is a separate restroom for people with disabilities so that they can be able to use it comfortably.

The restrooms are located at two different places for ease of accessibility. The terminal also consists of a cafeteria service for all users of the terminal. Though there is a cafeteria inside the terminal, people tend to use other hotels and restaurants around the terminal. As it is observed during the study, the main reason for not being preferred by users is that the meal obtained there is not as good as the one that is obtained outside.

Concerning the shopping centers, many are located around the terminal. These shops provide for the users travel requirements of water and other soft drinks including cookies and snacks. There are also some shops that provide vehicle spare parts. Therefore, the terminal is surrounded by different activities which complement the intercity transportation services.

4.3.6. Problem in Lamberet Terminal

The Lamberet terminal has a lot of positive aspects as a passenger terminal which most users agree on. There are also some problems in the terminal which should be given proper attention to meet the required level of service for passengers. Some of these are discussed below.

- Information

One of the aspects that affect transportation service quality is linked to the availability of information pertinent to the planning and execution of a journey. Passengers need to know how to use transit service, where the facilities /amenities are located, where to get off at the proximity of their destinations, whether any transfers are required, and when transit services are scheduled to depart and arrive (TRB, 2003a).

At Lamberet terminal, access to information is almost none. It is always noticed when passengers face problems in obtaining the information they want. The information can be either travel information or general information about the intercity transportation services at the terminal. There are no organized means of obtaining information. For travelers who are using the terminal for the first time, getting the right information is very challenging.

There are informal ways through which passengers are directed to the service they would like; but as a significant passenger terminal, there needs to be a well-structured system of providing information on the following important matters.

a. Travel information: this is information about the time the bus starts journey and at what time it will arrive at the place of destination. Information related with travel schedules, routes, tariffs and available transportation buses are also included in travel information.
b. Place indicators: this is information related to where passengers can access different needs. This can be offices, bus stops, waiting areas, restrooms and cafeteria and parking lots for people with private vehicles.

CHAPTER 5

ANALYSIS OF DATA, RESULTS AND DISCUSSIONS

5.1. Introduction

As described under the methodology of this research, the data were collected through questionnaires, interviews and observations. The prepared questionnaires were distributed and interviews were conducted with different persons at pertinent transportation sub-sectors. Additionally, observations were made at the two sample terminals to further collect reliable data. In this chapter, data collection, analyses and findings are discussed.

5.2. Questionnaire

Primarily, the respondents of the questionnaires were passengers who use Kality and Lamberet terminals frequently and drivers providing service in the two terminals. The questionnaires were not distributed for these passengers to fill them up. Each questionnaire was filled by the researcher. The main reason for this was that the responders are travelers and it is not comfortable for them to fill the questionnaires they are given in that rush time. They prefer to answer questions in the questionnaire and their responses were recorded on the question paper by the researcher. In addition to this, it was observed during the pilot study that it is difficult to distribute the questionnaires and collect again because of the movement in the terminal. Passengers who are given with the questionnaire could take the questionnaire without returning it due to start of a journey. As a result, filling the questionnaires by the researcher was chosen as a better way to communicate with the responders for data collection.

The questionnaire that was prepared for passengers was of two types. The first one contains 14 multiple choice questions which mainly focuses on the following main points for the research:

- demography of the respondents (age and gender);
- frequency of terminal use;
- trip purpose;
- vehicle choice and reason for choosing;

- passenger waiting time inside vehicles;
- preferred time and day of travel;
- problems usually faced by passengers when traveling from home to the terminal; and
- Opinion of passengers concerning the behavior of drivers and assistants.

The second questionnaire was prepared so that passengers can rate the different services in the terminal and the general intercity transportation services according to their perception. This questionnaire is called an evaluation questionnaire. It is divided into two parts. The first part consists of measuring indicators to evaluate the terminal according to its facility and services. The second part of the questionnaire consists of indicators that help to evaluate the general intercity bus services. These indicators generally define the existing situation of the intercity transport service. The indicators are obtained from the transit capacity and quality of service manual of the United States, Transit Cooperative Research Program (TCRP). According to Transit Cooperative Research Program (TCRP), the main indicators for evaluating the performances and quality of service of a transportation services are the following:

- Availability and adequacy of vehicles;
- User comfort and security, including riding on, walking to and waiting for service;
- Safety while traveling;
- Travel time savings;
- Service reliability;
- Traveling tariff and affordability; and
- Passengers' baggage handling and payment.

Therefore, passengers are given a chance to evaluate the terminals and the intercity bus services by giving scores from 1 to 5; where 1 indicates low level of satisfaction and 5 indicates high level of satisfaction.

The main purpose of passenger questionnaire is to determine the level of satisfaction the users have on the services they perceive which is called customer satisfaction survey. Analysis and discussion of results of questionnaire data for both Kality and Lamberet terminals is presented in the next sub-sections respectively.

5.3. Data Collection and Analysis

5.3.1. Kality Terminal

At the Kality terminal, 132 questionnaires were distributed. Out of this, 100 questionnaires were multiple choice types and 31 were of evaluation type. The following states on respondents characteristics.

5.3.1.1. Demographic characteristics of respondents

At the Kality Terminal, 100 questionnaires were distributed for passengers who frequently use the terminal for transportation purposes. Regarding gender, 59% of the responders were male and the remaining 41% were female. Figures 6.1 and 6.2 present respondents in respect of gender and age. As presented in Figure 6.1, more than half of the sampled passengers were male. This seems because most women stay in the vicinity of their dwellings on family engagements while men travel to generate income for the family. As presented in Figure 6.2, 70% of the respondents are between the ages of 25 and 44; 21% are less than 25 years of age and the remaining 9% are between the ages of 45 and 64. Similarly here, larger numbers of the responders are young who travel more than other group of people for many purposes.

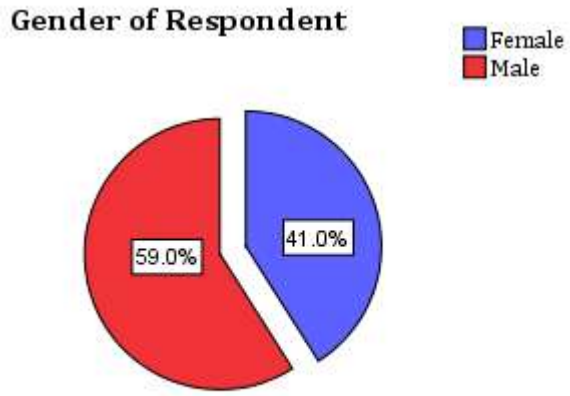


Figure 5.1: Respondents by gender

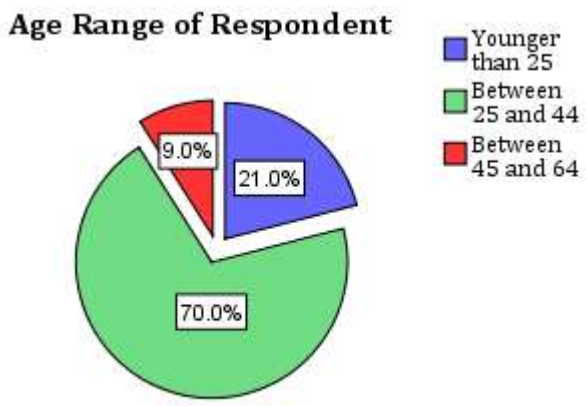


Figure 5.2: Respondents by Age

Figure 6.3 illustrates the frequency of the Kality Terminal usage. As shown in the Figure, almost half (48%) of the respondents are passengers who regularly use the terminal; more than a third (36%) use the terminal sometimes and about one-sixth (16%) use the terminal rarely.

Those respondents with frequent usage of the terminal can provide realistic opinions on the condition of the terminal due to their repeated exposure to the terminal. On the other hand, those responders with infrequent exposure to the terminal may provide limited opinion regarding the condition of the terminal. However, the consideration of the opinions of all types of respondents will provide significant information to assess the terminal's prevailing situation and whether there are continuous improvements or not. The conclusion that can be drawn from such data is likely to be reliable and representative.

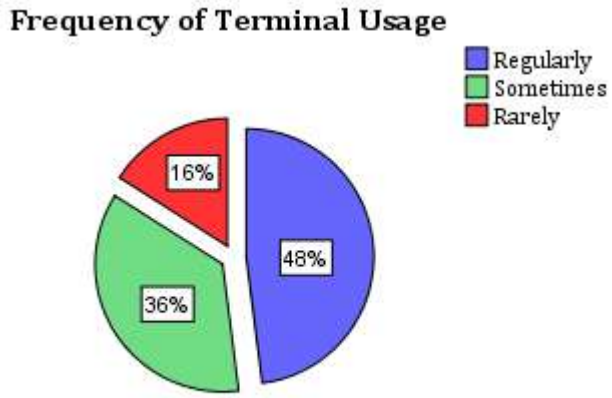


Figure 5.3 the terminal usage frequency of responders in Kality terminal

5.3.1.2. Trip purpose and preferred time of travel

Based on the sample of passengers selected for the study, the purpose of trips made by most travelers is identified. There are about five possible trip purposes defined and these are:

- ✓ School or educational purpose trips;
- ✓ Business or job trips;
- ✓ Trips related to religion;
- ✓ Leisure trips; and
- ✓ Trips made to visit family;

As shown in Figure 6.4 below, 46% of the total trips are business or job related trips; next is family visit with 27% of the trips; 19% are educational trips; and the remaining 5% and 3% are leisure and religious trips respectively.

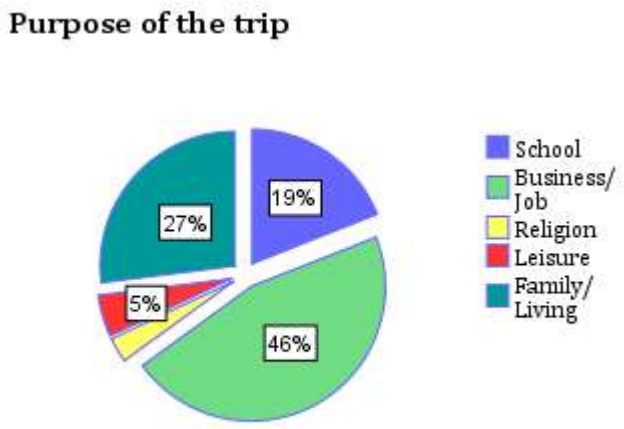


Figure 5.4: Purposes of trips made by passengers at Kality Terminal

It is usually believed that the population between the ages of 15 and 60 years are the most productive work force of a country. As we combine the age and trip purposes of the selected sample passengers, most of the traveling are made by younger people for the purposes of businesses.

When it comes to the time and day of travel, the following have been obtained: 52% travel during weekends and the remaining 48% tend to travel on week days. On the other hand, the time of the day on which many passengers prefer is also assessed and generally, there is a high passenger movement in the morning period, 80% of passengers. This period refers to early morning (5am to 9 am) and late morning (9 am to 11 am). Therefore, the peak travel demand occurs in the morning period of the day and at weekends.

As most movements are business or job related, people want to utilize their early morning time to travel from one location to another where their business activities are centered. These passengers want to save time they spend while traveling to arrive to work places as early as possible.

The components of times a passenger can spend traveling include:

- The time it takes to travel from home to terminal location;
- The time it takes to process the intercity transport service which mainly encompasses ticket purchasing and payment, baggage loading and waiting time in vehicle until the journey starts;

- The time in traveling after leaving the bus terminal until it reaches its destination; and
- Finally, the end travel time of the passenger from the destination bus terminal to a specific place which is determined by the purpose of the trip.

One of the qualities of the service aspect is travel-time-saving; therefore, passengers give great attention to obtain a satisfactory service in this regard.

5.3.1.3. In-Vehicle waiting time of passenger

Passengers were asked how long it usually takes for buses to finish boarding travelers and start journey. This was done to know the average time that passengers have to wait until the buses start movement. Accordingly, 37% of the respondents said it takes between 10 and 20 minutes; 26% said it takes less than 10 minutes; 15% said it usually takes 20 to 30 minutes; 10% said it takes 30 to 45 minutes and 12% said it takes 45 minutes to 60 minutes.

The medium bus (vehicles locally known as Lonchin) is the one that needs to stay for a longer period of time to start journey. This is because of the vehicles' (medium buses) sitting capacity (28) is more than that of the smaller buses which is about 12 seats on average. The waiting time varies depending on the number of seats. During peak demand periods, the waiting time decreases and increases otherwise. The maximum sitting capacity of small buses is 14 seats; therefore, these vehicles need less time to board passengers and start journey. It can be concluded that most of the passengers waiting longer time in the vehicle are those who travel using medium vehicles. Table 5.1 below shows in-vehicle waiting times of passengers at the Kality Terminal.

In-Vehicle Waiting time (min)	Passengers (%)	Cumulative (%)
< 10	26	26
10<20	37	63
20<30	15	78
30<45	10	88
45≤ 60	12	100
Total	100	

Table 5.1: In-Vehicle Waiting time of Passengers at the Kality Terminal

5.3.1.4. Distance between home and terminal, problems when traveling from home to terminal

The terminal location is another very important aspect of the intercity passenger transport. When traveling from home to terminal, the distance covered by the passengers can range as follows:

- Very far (> 15 km);
- Far (8 to 15 km);
- Average (5 to 8 km);
- Near (2 to 5 km) and;
- Very near (< 2 km).

The responses obtained from passengers are presented as follows:

- 47% of passengers need to travel more than 8 km to reach to the intercity bus terminal and of this, about 14% travel more than 15 km using intra-city transportation.
- The above is challenging for passengers to reach the terminal and the problem even get worse since the urban transportation itself has so many problems.
- There are many problems faced by users such as:
  - ✓ Unavailability of urban transportation that carry passengers to the terminal;
  - ✓ Theft and robbery on the way;
  - ✓ The urban transportation operators charge more than the actual transportation tariff set by the transport authority when there is high travel demand and low service supply and;
  - ✓ Generally, the time which passengers want to minimize in traveling increases through all these inconveniences.

Sampled passengers were asked which problems they usually face when they travel from home to the terminal:

- 57% responded unavailability of taxis to the terminal;
- 17% responded they were charged illegal tariff;
- 47.1%responded they usually face all of the problems;
- 35% responded they didn't have any problem to get to the terminal due to the location of their houses which are close to the terminal.

Figures 5.5 and 5.6 present home to terminal distances and problems encountered while traveling to terminal respectively.

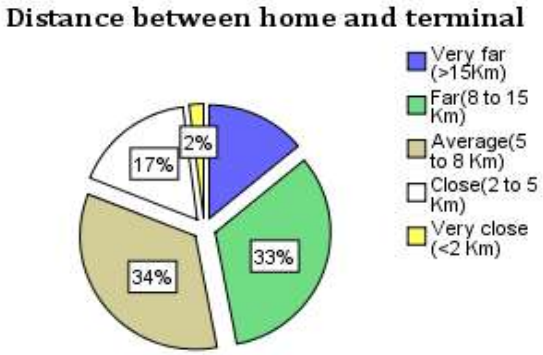


Figure 5.5: Home – Terminal Distance

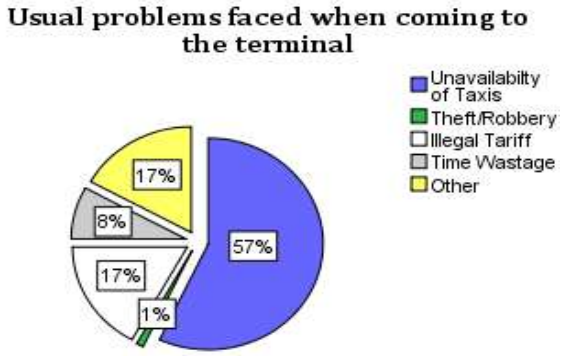


Figure 5.6: Problems while traveling to Kality Terminal

5.3.1.5. Behavior of Drivers and Assistants

The other major question asked was concerning the behavior of actual service providers that is drivers and their assistants. In relation to their behavior, opinions of passengers on the drivers are negative regarding their respect of the road transport rules and traffic regulations. The following frequency tables depict outputs from the statistical analysis software SPSS which shows the responses obtained from the respondents.

Behavioral Attributes	Passengers' opinion on Drivers' behavior (%)	Cumulative Percent (%)
Very bad	3.0	3.0
Bad	40.0	43.0
Average	54.0	97.0
Good	3.0	100.0
Total	100.0	

Table 5.2: Passengers Response on Behavior of Drivers and Assistants

Responses	Percent (%)	Cumulative Percent (%)
Yes	34.0	34.0
No	66.0	100.0
Total	100.0	

Table 5.3 Passengers' Opinions towards Driver's Submissiveness to Road Transport Rules and Regulations

According to the observation of passengers, most drivers are not concerned to respect road transport rules and regulations. These rules and regulations can help by making transportation services safe with reduced number of accident occurrences. If drivers are not giving the necessary attention for safety and accident reduction, it will become difficult for passengers to build their trust in the transportation services. The above tables only represent drivers at Kality Terminal and it was based on the opinions of sample passengers who use the terminal frequently.

5.3.1.6. Level of Passenger Satisfaction

Assessing the general service provision of the Kality Terminal, the level of satisfaction of sample passengers is determined. Out of the total responses:

- 21% expressed very dissatisfied;
- 45% expressed dissatisfied; and
- Generally, about 66% of the passengers at Kality Terminal were more than dissatisfied while 32% were neutral.

It is an indication that the expectations of passengers are not fulfilled in the required condition. The service they perceive is less than their expectation. Table 5.4 below shows the rates of passenger satisfaction Figure 5.7 illustrates the same graphically.

Satisfaction Attributes	Passengers' satisfaction on Terminal Service (%)	Cumulative (%)
Very Dissatisfied	21.0	21.0
Dissatisfied	45.0	66.0
Neutral	32.0	98.0
Satisfied	2.0	100.0
Total	100.0	

Table 5.4: Passengers' Satisfaction on Kality Bus Terminal Service

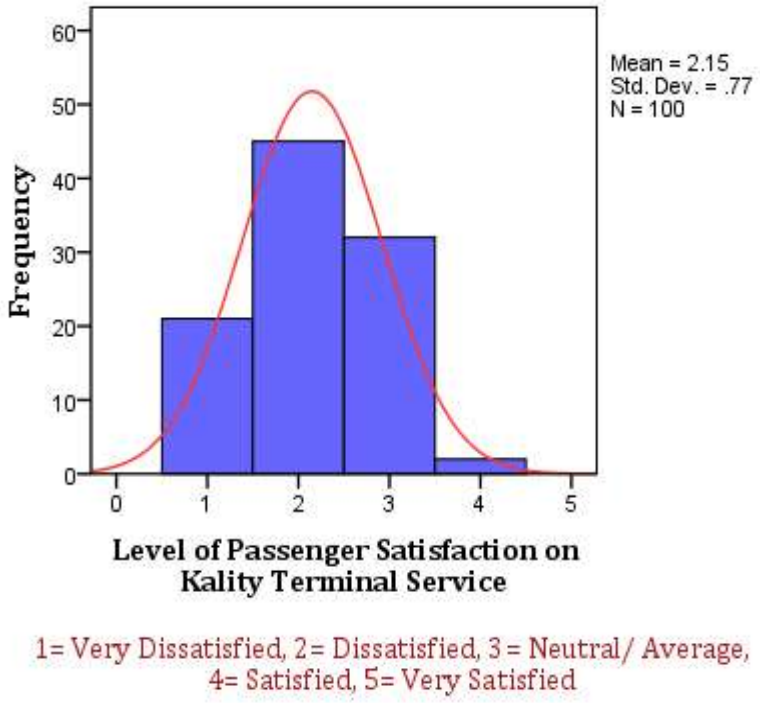


Figure 5.7: Graphical Representation of Passengers' Level of Satisfaction at Kality Terminal

5.3.1.7. Kality Terminal Evaluation Questionnaire

This questionnaire was needed mainly to assess the terminal facilities and services by giving score for each facility and service. This was done by the passengers themselves. The score defines points from 1 up to 5 which is translated to the passengers' satisfaction.

Before starting, they were provided with a general instruction as how to give score for each indicator or item. The evaluation was done to assess the existing situation of the terminal regarding the provided facilities and the service offered to passengers. For Kality Terminal, 31 passengers were given the questionnaire and based on the evaluation these passengers did, the following points regarding gender and ages were extracted in summary.

- 13 were female and 18 were male; and
- 71% of them were between the ages of 25 and 44.

There are no many facilities in the terminal. Respondents were asked to rate the restroom and the passenger waiting area. Following, the responses obtained are presented below.

I. Restroom and Passenger waiting area

For the restroom at Kality terminal, 54.84% of the respondents gave a score of 2 which shows dissatisfaction and 29.03% gave a score of 1 which indicates that they are very dissatisfied with the existing condition. These scores are reasonable as the condition is presented in the case study chapter in Figure 5.3. This represents the poor condition of the restroom facility and that it is not suitable for passengers to use. It does not also consider people with disabilities.

Regarding the passenger waiting area; 41.94% of the responses resulted in dissatisfaction and 25.81% resulted in very dissatisfaction. Passenger waiting area is important in the time of peak demand when passengers have to wait until the transporting bus is coming. The questionnaire is distributed during this peak transportation demand period and passengers indicated all the inconveniences and discomforts in the terminal. The following table summarizes results of the discussions regarding restrooms and passenger waiting area facilities.

Satisfaction Attributes		%	Cumulative (%)
Table 5.5 (a)	Very Dissatisfied	29.1	29.1
	Dissatisfied	54.8	83.9
	Average	12.9	96.8
	Satisfied	3.2	100
	Total	100	

Satisfaction Attribute		%	Cumulative (%)
Table 5.5 (b)	Very Dissatisfied	25.8	25.8
	Dissatisfied	41.9	67.7
	Average	25.9	93.6
	Satisfied	3.2	96.8
	Very Satisfied	3.2	100
	Total	100	

Tables 5.5 (a) and (b): Responses obtained on restrooms and passenger waiting area at Kality Terminal

II. Terminal Location and Accessibility

The other important evaluation criteria that were included in the questionnaire were the location of the terminal and its accessibility. Accessibility refers to the easiness to travel to the terminal with regard to availability of taxis, the road and the road traffic condition.

When passengers give the score for location of the terminal, they try to consider points such as the area around the terminal whether it is central and very congested area or not and the traffic condition in relation to the urban transportation services. Similarly, evaluation was done and the results are as follows.

Regarding the Kality Terminal's location, 35.5% respondents were dissatisfied and 48.4% of the respondents have an average opinion and concerning accessibility of the terminal, 16.1% of the respondents were very dissatisfied and 22.6% were only dissatisfied. Additionally, more than half of the responders (51.6%) have average opinion. Passengers usually relate the location and accessibility of a terminal to the location of their houses. Even though most responders thought it was average, the dissatisfaction on the terminal's location and accessibility needs to be given a great attention. The following graphs (Figures 5.8 and 5.9) illustrate the above discussions.

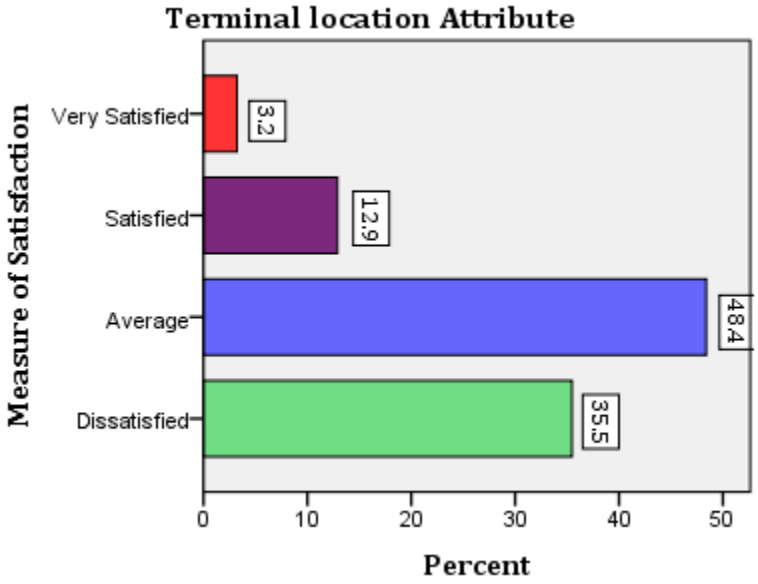


Figure 5.8 Passengers' Level of Satisfaction on Kality Terminal Location

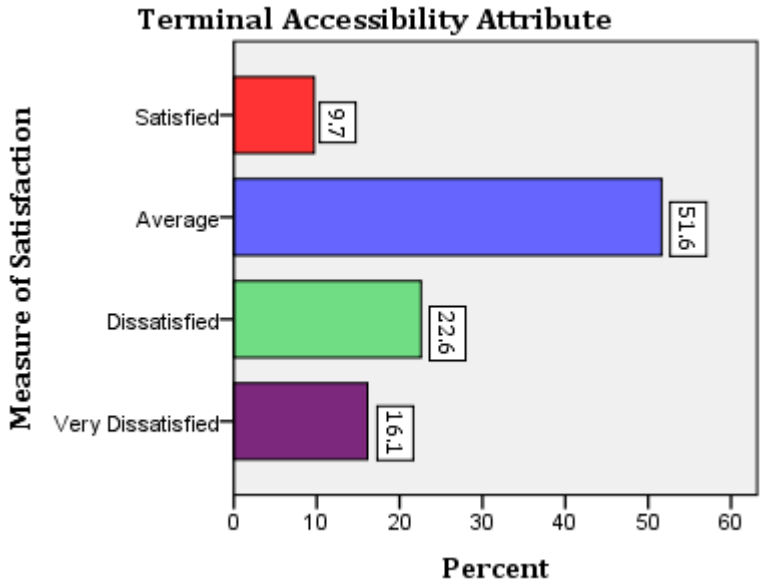


Figure 5.9 Passengers' Level of Satisfactions on Kality Terminal Accessibility

III. Terminal Services and Passengers' Satisfaction

The other basic question for passengers was concerning the service they obtain from Kality Terminal and the approach of the staff while providing service. This includes ticketing system, travel information and behavior of terminal staffs.

The level of satisfaction of passengers in these three attributes was assessed and the results are summarized in Figure 5.10 below.

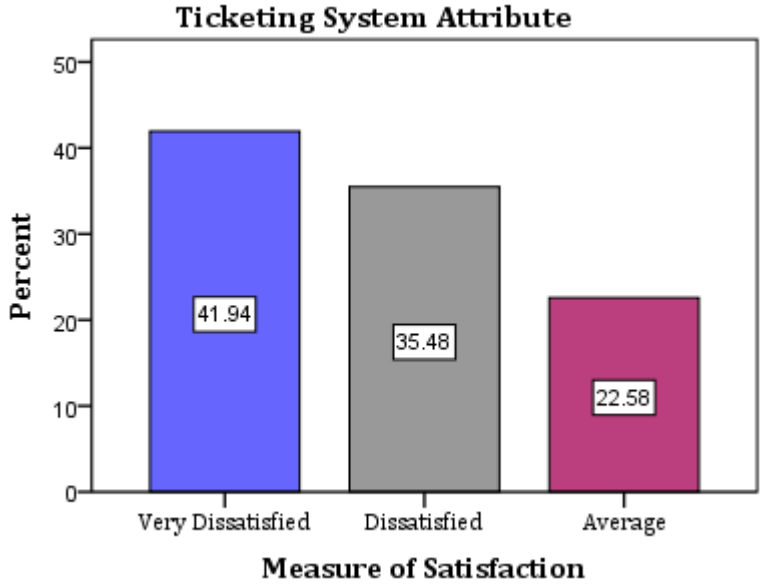


Figure 5.10 Passengers' level of Satisfaction on the Ticketing System

As Figure 5.10 shows, higher portions (41.94%) of respondents are very dissatisfied in the ticketing system and 35.48% are dissatisfied while about a quarter (22.58%) remain on the average corner. Under the current condition, ticket is provided for few routes including the long distance transportation services. According to the observation made in the terminal, there is no specific place prepared for passengers to purchase ticket, even for these few routes. The only exception is regarding the cross-country bus service for which there is a ticket office where passengers purchase ticket one day earlier before travel. For the remaining services, ticket selling takes place in vehicles and sometimes after the journey has started. Based on the opinion of passengers obtained through informal discussion, tickets are not issued for passengers most of the time and, many passengers are used to this process. Figure 5.11 shows passengers' level of satisfaction regarding the Kality Terminal information provision system.

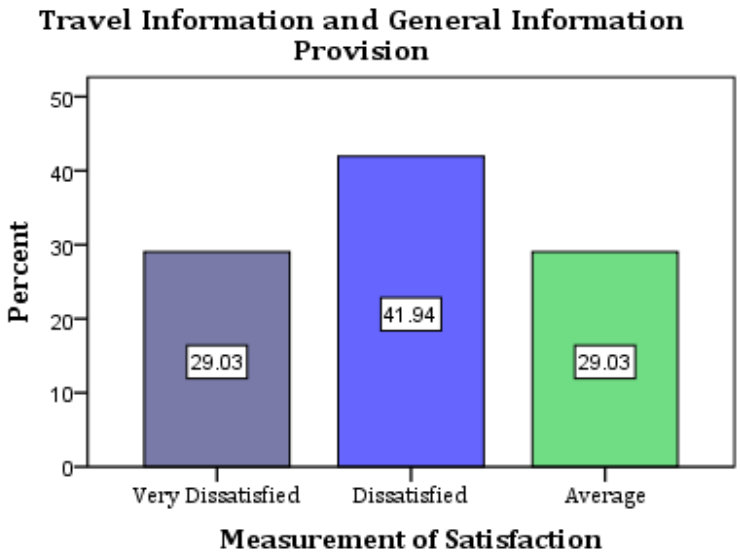


Figure 5.11 Passengers' Level of Satisfaction on Terminal Information Provision

Concerning provision of travel and other necessary information, passengers' responses are summarized. As shown in Figure 5.11 above, dissatisfaction was observed on 41.94% of the respondents; 29.03% of the respondents were very dissatisfied and the same number (29.03%) were dissatisfied. According to the terminal administration personnel, there are equipment such as microphone and sign plates which facilitate the information provision for terminal users. But the result indicates that there is no adequate information system for travelers.

Service is given by people who are available in the service provision center. The staffs' behavior at Kality Terminal was also assessed through customers' responses. Based on the result, 29% of passengers were very dissatisfied, 22.6% of passengers were dissatisfied and about 35.5% remain on average side. On the other side, 9.7% and 3.2% of the respondents were satisfied and very satisfied respectively. Figure 5.12 below shows level of satisfaction regarding the staffs' behavior.

Attributes of Level of Satisfaction	Passengers' response on staff behavior (%)	Cumulative (%)
Very Dissatisfied	29.0	29.0
Dissatisfied	22.6	51.6
Average	35.5	87.1
Satisfied	9.7	96.8
Very Satisfied	3.2	100
Total	100	

Table 5.6 Level of satisfaction on the behavior of staffs

IV. Safety and Security of the Kality Terminal

Passengers were asked to give opinions on their level of satisfaction regarding the security and safety condition of the Terminal that they have experienced through repeated visits. As observed, the majorities (58.1%) were dissatisfied; 19.4% were very dissatisfied while 22.6% of the passengers were with average satisfaction. Figure 5.12 summarizes the passengers' responses.

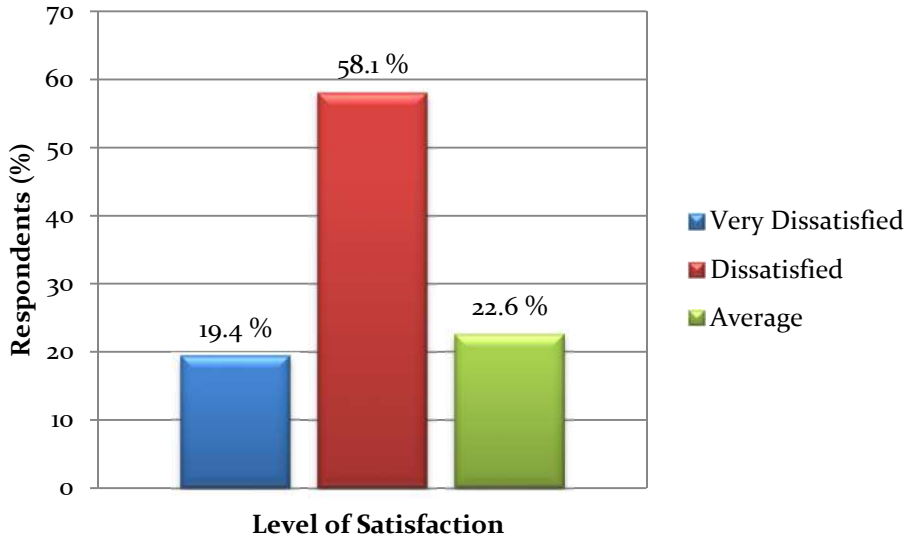


Figure 5.12: Passengers' level of satisfaction on security of the Kality Terminal

V. Overall Terminal Evaluation

The Kality Terminal was assessed in accordance to many attributes and criteria as stated under the preceding sub-topics. Finally, the overall level of passenger satisfaction was assessed. In this regard, passengers were asked as to how they evaluate the overall service of the terminal and its facilities. The responses were obtained as presented below:

- 67.7 %were dissatisfied;
- 12.9% were very dissatisfied; and
- 19.4% were on the average.

Figure 5.13 shows the result obtained from overall assessment of passenger level of satisfaction at Kality Terminal. The terminal has many challenges in delivering the required services under the existing condition.

Based on the combined data obtained through questionnaire, observation, formal interview and informal group discussions, the terminal needs major attention to change the current service provision. Figure 5.13 shows the overall level of satisfaction.

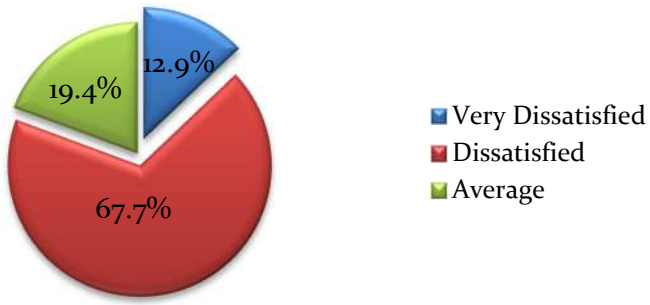


Figure 5.13 Overall level of satisfaction of passengers of the Kality Terminal

5.3.2. Lamberet Terminal

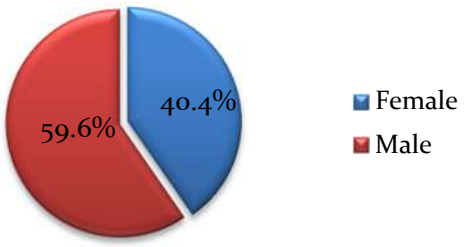
The other terminal that was selected for the case study is Lamberet terminal. The questionnaire that was distributed for users of Kality terminal was also distributed for passengers at Lamberet Terminal. It contains the same number and kind of questions. A total of 82 questionnaires were distributed out of which 52 were of multiple choice questionnaires and 30 were evaluation questionnaires. Similar technique was followed during the data collection stage as of Kality Terminal.

The respondents were passengers who frequently use the terminal but some passengers who have few experiences were also involved in responding to the questionnaire. The responses are dealt with as follows:

5.3.2.1. Demographic characteristics of respondents

When we look at the gender distribution of the respondents, 59.6% were male and the remaining 40.4% were female. Here also, men are the most traveling parties of a family for different reasons. The result from age classification shows that 65.5% of the passengers were between 25 and 44 years of age while 21.2% responders were younger than 25 years of age and the remaining 13.5% were between the ages of 45 and 64. This suggests that the traveling pattern of passengers decreases with increasing age of travelers.

Additionally, younger age men travel more than women for different purposes. Figure 5.14 and 5.15 shows gender and age distributions respectively.



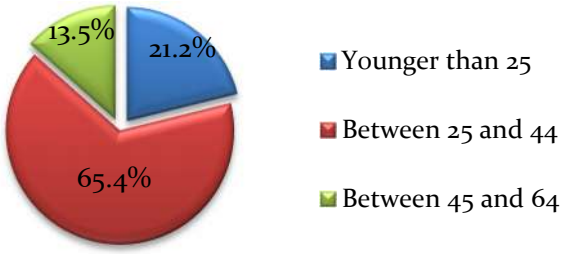


Figure 5.14: Respondents' Gender distribution Figure 5.15: Respondents' Age distribution

5.3.2.2. Frequency of terminal usage

The frequency of terminal usage of passengers at the Lamberet Terminal is the first assessment done through a questionnaire. This is mainly helpful to know the information obtained is whether reliable or not and to know how well it represents the existing situation of the terminal in terms of facility and services. Accordingly, the results of the analysis of the passengers' responses disclosed as follows: 40.4% of the respondents were regular users;

- 36.5% of the respondents use the terminal sometimes; and
- 23.1% of the respondents were rare users.

Regular users are students, business people, and people with a kind of job that makes them travel between their home and work place on regular basis.

Passengers who use the terminal repeatedly can provide their opinions out of their exposures. On the other hand, it will be possible to include the opinions of those who are rare users. Frequency of passenger usage at the Lamberet Terminal is depicted in Figure 5.7 below.

Frequency Attributes	Opinion of Passengers on Terminal Usage Frequency (%)	Cumulative (%)
Regularly	40.4	40.4
Sometimes	36.5	76.9
Rarely	23.1	100.0
Total	100.0	

Table 5.7: Passengers' usage frequency at Lamberet Terminal

5.3.2.3. Trip purpose and Travel time

Passengers were asked about their trip purpose and the time at which they usually prefer to travel. Regarding the purposes of travel, the following were obtained:

- 44.2% of passengers travel for business or job related purposes;
- 40.4% of passengers travel to visit families and for living related purposes;
- 13.5% travel for educational or school purposes; and
- 1.9% of respondents travel related to religion;

Regarding the preferred time of travel, the following were obtained:

- 57.7% of passengers expressed preferred time to travel is in the early morning that is 5 am to 9 am;
- 19.2% of passengers expressed preferred time of travel at late in the morning that is 9 am to 11 am;
- 9.6% of passengers expressed preferred time of travel in the afternoon that is 11 am to 2 pm;
- 7.7% of passengers expressed preferred time of travel at late in the afternoon that is 2 pm to 5 pm; and
- The remaining 5.8% of passengers expressed preferred time of travel at night that is 5 pm to 8 pm

Based on the results from questionnaires, both weekdays and weekends were subjected to similar movement of travelers.

These figures strengthen the data obtained from the terminal management personnel through interview about the pick period where there is higher transportation demand. According to the personnel, early morning is the peak time for intercity bus transportation services. Figure 5.16 shows the summary of the results of the above discussion.

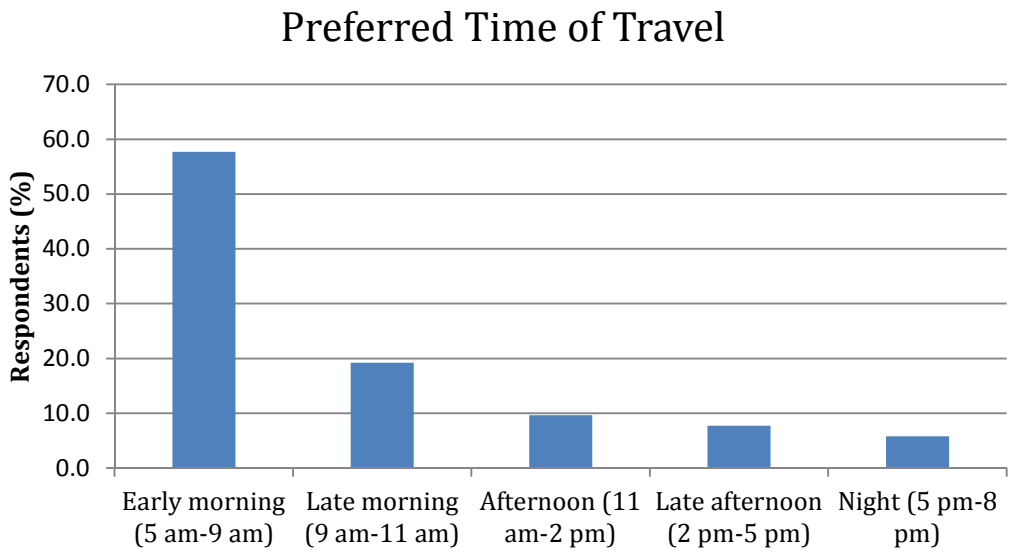


Figure 5.16 representation of passengers' travel time choice based on Lamberet terminal

5.3.2.4. In-Vehicle waiting time of Passengers

The waiting time of passengers in vehicle before starting journey was assessed according to the passengers' responses at the Lamberet terminal. The results disclosed the following:

- 46.2 % of the responders think they wait between 10 and 20 minutes;
- 30.8 % responders said they wait between 20 and 30 minutes;
- 11.5% respondents said they usually wait 45 minutes to an hour;
- 5.8% said they wait between 30 and 45 minutes;
- 3.8% said they wait less than 10 minutes; and
- 1.9% of the respondents said they usually wait more than an hour.

Table 5.8 below shows in-vehicle waiting time of passengers at the Lamberet Terminal.

In-vehicle waiting time (min)	Percentage of passengers	Cumulative (%)
< 10	3.8	3.8
10 ≤ 20	46.2	50
20 ≤ 30	30.8	80.8
30 ≤ 45	5.8	86.5
45 ≤ 60	11.5	98.1
> 60	1.9	100
Total	100	

Table 5.8 In-Vehicle waiting time of passengers at Lamberet terminal

5.3.2.5. Distance between home and terminal, problems faced when coming to the terminal

The distances traveled by passengers to come to Lamberet Terminal was assessed and the following were obtained:

- 30.8 % of the respondents stated the distance between their home and the terminal is very far (> 15km);
- .12% of the respondents live at on average distance from the terminal (5 to 8km);
- 17.3 % respondents were located far from the terminal(8 to 15 km);
- 15.4% of the respondents live within close radius of the terminal (2 to 5km); and
- 13.5% live very close to the Lamberet terminal (< 2km)

The distance between intercity bus terminal and home of passengers has a significant effect on passenger traveling time. Under the current condition in Addis Ababa where most of the passengers are located very far from the terminal, the following major challenges can occur:

- Intra-city transportation challenge: due to the lack of appropriate integration between the intercity and intra-city transportation, passengers can be subjected to different problems such as shortage or unavailability of vehicles which transport them to the terminal area;
- Time wastage: due to the road traffic condition or high movement pattern to the direction of the terminal, vehicles may become stuck in the middle of traffic congestion and as a result, the passenger time will be wasted on the road before reaching the terminal;
- Illegal transportation tariff: prevalently, when vehicles are unavailable, operators increase tariff exorbitantly charging passengers unreasonably higher than they should as set by the transport authority. This incurs unnecessary cost on passengers.

This condition was assessed based on the responses of passengers. The passengers explain the major problems which challenges them when traveling from home to Lamberet Terminal. The result is stated as follows:

- 40.4% of the respondents said they usually face unavailability of transportation vehicles and are forced to pay very high illegal tariffs;
- 25% of the respondents said they were charged more than the tariff set by the transport authority (illegal tariff).
- 26.9% of the respondents said they had not faced such problems. This is because; their living places are located within close distance from the terminal.

  Figure 5.17 illustrates major problems encountered by passengers during home to terminal travels at the vicinity of the Lamberet Terminal.

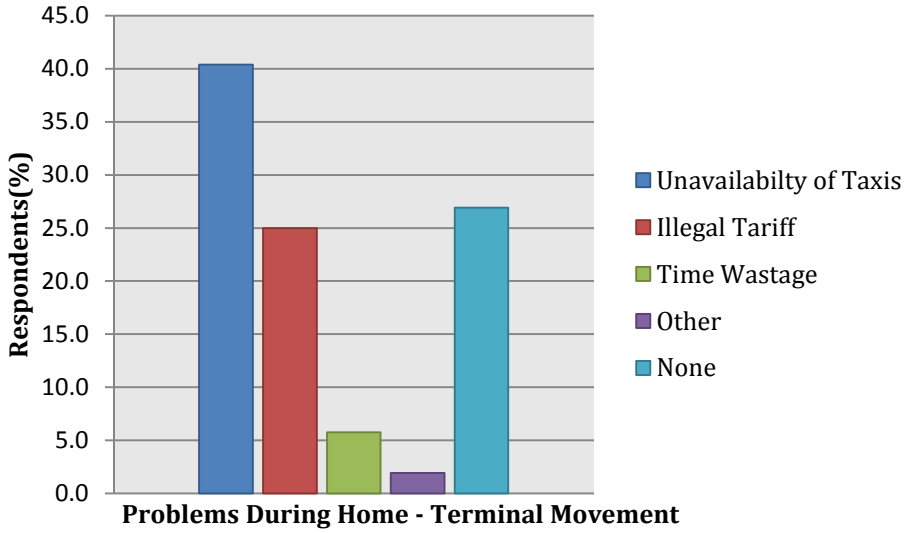


Figure 5.17: Illustration of major problems faced by bus passengers during home to terminal travel at the vicinity of the Lamberet Terminal

5.3.2.6. Behavior of drivers and assistants

The assessment concerning the behavior of operators (divers and assistants) gave the following results:

- 65.3% of the respondents said that the drivers and assistants have reasonable behaviors;
- 21.2% said they have bad behaviors; and
- 13.5% said they have good behaviors.

The behavior of drivers and assistants is related with their ability to handle the customer in a way that satisfies users. Passengers' satisfaction is always affected by the service they obtain and the service delivery should be well enough to the passenger. Table 5.9 presents passengers opinions on drivers and assistants.

Behavioral Attributes	Passengers' opinion on drivers' behavior (%)	Cumulative (%)
Bad	21.2	21.2
Average	65.3	86.5
Good	13.5	100.0
Total	100.0	

Table 5.9: Passengers' opinion on behaviors of drivers and assistants at Lamberet Terminal

The other related issue with drivers' behavior is their submission for traffic rules and regulations. The passengers were asked concerning this and their responses are presented as follows:

- 48.1% of the total respondents said that drivers respect road traffic rules and other related regulations;
- 36.5% said they do not respect rules and regulations; and
- 15.4% said 'Sort of'.

5.3.2.7. Level of passenger satisfaction

The questionnaire with multiple choices was used to assess the level of passenger satisfaction. Table 5.10 below shows passengers' level of satisfaction at Lamberet Terminal

Attributes of Satisfaction	Passengers' Level of Satisfaction (%)	Cumulative (%)
Dissatisfied	3.8	3.8
Neutral	38.5	42.3
Satisfied	57.7	100.0
Total	100.0	

Table 5.10 Passengers' Level of Satisfaction at Lamberet Terminal

As it is shown in Table 5.10, more than half (57.7%) of the respondents were satisfied and only 3.8% were dissatisfied while the remaining 38.5% passengers were neutral.

5.3.2.8. The Lamberet Terminal Facilities Evaluation

In this regard, fifteen indicators were used to evaluate the Lambert Terminal facilities. Sampled passengers were asked to rate based on their observations.

The measuring indicators include terminal facilities and different services provided within the compound of the terminal. The results are discussed below.

I. Restroom and Passenger waiting Area

Passengers were asked to provide their opinions and the responses are as follows:

- 50%the respondents said the restroom gives them average satisfaction under the current condition;
- 20% of respondents said they were satisfied;
- 10% said they were very satisfied; and
- 13% said they were dissatisfied; and
- 7% said they were very dissatisfied.

It needs to be noted that at the Lamberet terminal, the restrooms are well constructed and prepared for the use by passengers. As it was observed during the study, it also accommodates people with disabilities. The above figures generally indicate this condition where 30% of the respondents were above satisfied while half of the respondents want a better facility than the current one. The main opinion of most of the respondents was that they want more restrooms and to be clean.

Regarding the passenger waiting area, the following were obtained from the respondents:

- 37% were satisfied;
- 23% were reasonably satisfied;
- 20% were dissatisfied; and
- Another 20% were very dissatisfied.

According to the observation, the Lamberet Terminal possesses a well-constructed passenger waiting area In this regard too sampled passengers were asked to score the adequacy of the passenger waiting area. During peak period, it is very crowded that a lot of passengers stay at other places in the Terminal. Thus, passengers asked were to rate the location of these passenger waiting places.

It looks to be provided at an inconvenient place from where transportation vehicles load and unload passengers. The terminal area coverage gives enough space for the provision of additional passenger waiting facilities at convenient places for users. Tables 5.11 (a) and (b) below summarizes the responses in respect of the restroom and the passenger waiting area facilities.

Attributes of Satisfaction		% of Responses	Cumulative Percent
Table 5.11 (a)	Very Dissatisfied	6.7	6.7
	Dissatisfied	13.3	20.0
	Average	50.0	70.0
	Satisfied	20.0	90.0
	Very Satisfied	10.0	**100.0**
	Total	**100.0**	
Attributes of Satisfaction		% of Responses	Cumulative Percent
Table 5.11 (b)	Dissatisfied	20.0	20.0
	Average	23.3	43.3
	Satisfied	36.7	80.0
	Very Satisfied	20.0	**100.0**
	Total	**100.0**	

Table 5.11 (a) and (b) Responses obtained for restroom and passenger waiting area at Lamberet Terminal

II. Terminal Location and Accessibility

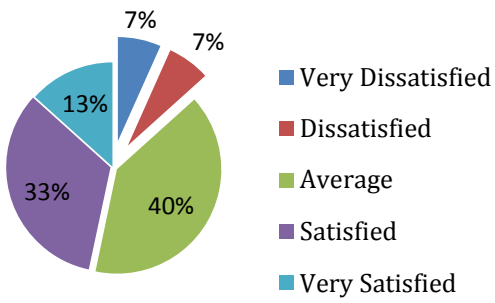
The other important attributes to be evaluated are the terminal location and its accessibility. The passengers who were asked for their opinions on these matters responded the following: regarding the location of the Lamberet terminal; 46% of the passengers were over satisfied, about 40% were on the average and a total of 14% were both dissatisfied and very dissatisfied.

Most passengers who had an average satisfaction regarding the terminal location identified t the main shortcoming that the road is usually congested with a number of vehicles running on both directions. This makes passengers' movements very difficult for a significant period of time. Therefore, most of them think that if the terminal is located at an area that is free from high traffic movement, then it would be very easy for them to save traveling times.

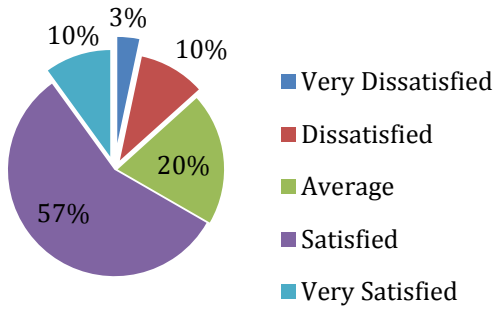
Regarding the accessibility of the terminal, 57% of the respondents were satisfied; 20% have an average opinion; 3% were very dissatisfied; and 10 % were dissatisfied.

Most of the respondents expressed that the Lamberet Terminal is located at a convenient area and is also accessible. According to a group discussion done between passengers, the terminal can be easily accessed from different directions the city and it is not difficult to get local transportation to and from the Terminal.

This condition made most users to be satisfied with the location and accessibility of the Lamberet Terminal. Figures 5.18 (a) and (b) illustrate passengers' satisfaction regarding the location and accessibility of the Lamberet Terminal respectively.



(a)



(b)

Figures 5.18 (a) Passengers' Satisfaction on the Location and Figures 5.18 (b) Accessibility of the Lamberet Terminal respectively

III. Passengers' satisfaction on Terminal services

Passengers were asked on how much they were satisfied with the Terminal services during their exposures and the way services are provided including, terminal staffs and personnel. The main services evaluated were: ticket selling, travel information and staff behavior. The results are stated below:

- about 33% of the respondents were dissatisfied; and
- 27% expressed satisfaction;

- another 27% expressed normal; and
- 13% were very dissatisfied.

The problem that most passengers agreed on is that usually the driver' assistants are in charge of selling tickets for travelers. These assistants sell tickets at the entrance of the terminal.

When they do so, some give false or exaggerated information about the types of the transporting buses.

They tell the passengers about good conditions and the comforts of their buses which are exaggerated. Many times, passengers found these vehicles opposite to what they were told. Due to this, there usually happen disagreements between drivers and passengers.

In view of the above, sampled passengers were asked concerning the travel information provision in the terminal and the following were obtained;

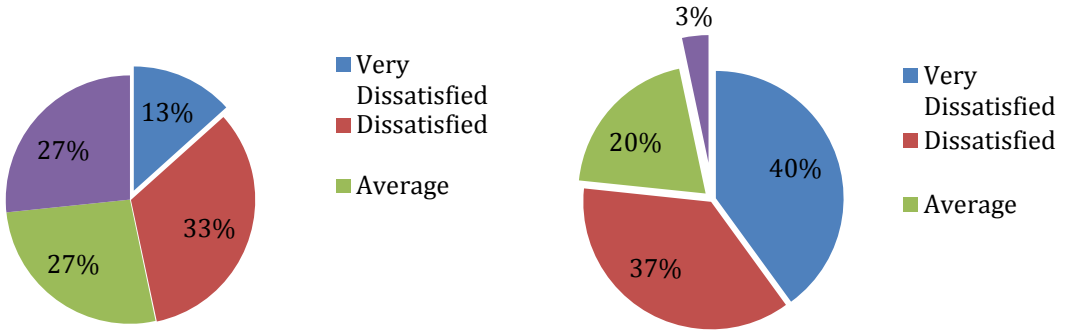
- 40% said they were very dissatisfied;
- 37% said were dissatisfied;
- 20% were satisfied; and
- 3% were very satisfied.

As indicated above, the terminal is poor with respect to providing travel information for passengers. Through discussion, it was found that there are some informal ways of providing general information at the terminal and according to one terminal personnel, there are some traditional methods of announcing and informing passengers at the terminal by microphone. During the terminal visit, it was observed that many passengers were not aware of getting information through any means. When they feel they need information, they simply ask passersby in the terminal. But information is a necessary component of the intercity transportation services and has to be provided by the service suppliers whenever it is required of them.

The final attribute on which passengers were asked for their opinion was the behavior of staffs and terminal personnel. Accordingly, the following were obtained from the respondents:

- 44% of the respondents said the staffs display average behavior;
- 23% said they were satisfied;
- another 23% of respondents said they were dissatisfied; and
- 10% of the respondents said they were very dissatisfied.

The above findings indicate that behavior and approach of staffs affect the level of passengers' satisfaction Figures 5.19 (a) and (b) illustrate passengers' satisfaction on tickets issuing system and provision of travel information respectively at the Lamberet Terminal.



(a) (b)

Figure 5.19 (a) Passengers' Satisfaction on the Ticketing System and Figure 5.19 (b) Travel Information provision in Lamberet terminal respectively

IV. Safety and Security of Terminal

Safety and security of a terminal is another important attribute which should be given of great attention. Sample of passengers were asked about their satisfaction concerning the safety and security at the Lamberet Terminal and the following were obtained:

- 30% said they were satisfied;
- 43.3% said they were on the average satisfied; and
- 26.7% said they were dissatisfied.

Among the passengers who were dissatisfied, there were some who had experienced robbery at the terminal and those happened while they were boarding the buses. According to these passengers, the times of the robberies were at peak periods with increased demand of transportation services. During peak periods such as Holidays and class starting times where universities call their students for academic year registration, that is when there will be a lot of passengers at the terminal waiting for transportation services. Passengers get troubled since they carry personal effects.

This usually makes them prone to theft and robbery. Although there are security guards at the terminal, it is difficult for them to handle a large number of travelers during peak periods. The positive aspect at the Lamberet Terminal is that its entrance is well guarded and the fence is also well constructed.

In addition to this, there are no vehicles who board passengers outside of the terminal compound. This can protect users from robbery and other security concerns. Figure 5.20 illustrates passengers' satisfaction regarding safety and security at the Lamberet Terminal.

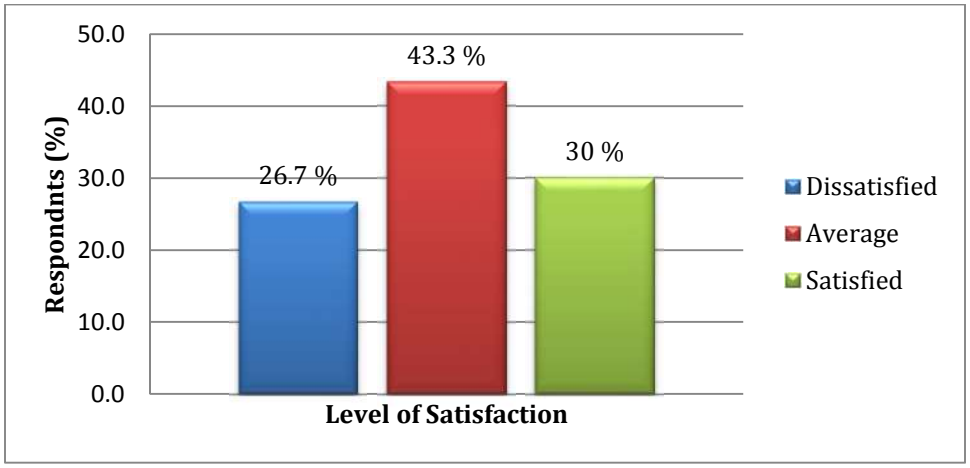


Figure 5.20 Passengers' satisfaction on safety and security of Lamberet terminal

V. Overall the Lamberet Terminal Evaluation

The Lamberet passenger terminal is generally evaluated with respect to the provision of standard services and facilities. An overall assessment based on passenger satisfaction was done and the results are summarized below:

- 50% of the respondents were satisfied by the current service and condition of the Lamberet Terminal;
- 26.7% of the respondents had an average level of satisfaction; and
- 23.3% were dissatisfied.

The Lamberet terminal can be considered as a better terminal among the intercity bus terminals in Addis Ababa; specially, in respect its infrastructure.

Though most of the responders were satisfied, the terminal needs to deliver additional quality services for passengers in many aspects such as ticketing system and information provision.

Figure 5.21 below illustrates the overall passenger satisfaction at the Lamberet Terminal.

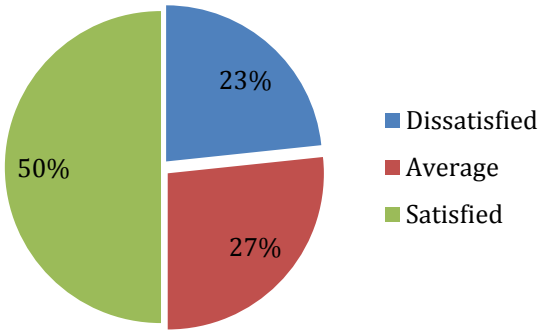


Figure 5.21 the overall passenger satisfaction on the Lamberet terminal

5.4. Passenger Satisfaction in the Intercity Transportation Service

5.4.1. Introduction

The current intercity transportation service was assessed based on the satisfaction level of passengers. The questionnaire included questions which help to evaluate the passengers' level of satisfaction on the existing situation of the intercity transportation. The questions were intended to obtain the opinion of users in this regard. The basic measuring indicators or criteria are defined in the literature review chapter and are also mentioned here. These are:

- Availability and coverage
- Frequency of trip and travel speed
- Reliability of transit service
- Integration with other transport options
- Price structure and payment options
- Affordability
- User comfort and safety

These aspects generally show the quality of service of an intercity transportation. Based on the above transit service quality evaluation aspects, the questionnaire included the following related criteria in the Ethiopian context.

- Tariff structure and options: this includes the traveling tariff, percentage increase in the original tariff and affordability of transportation tariff.
- Service reliability
- Travel time saving
- Passenger luggage handling and payment for extra weight
- Safety
- Vehicle availability, Vehicle comfort and vehicle status (age)

Therefore, the questionnaire responses are analyzed and presented as follows. The questionnaire is distributed in both Kality and Lamberet terminals. It is known that these two terminals are selected for the case study in this research. The responses of randomly selected passengers from the two terminals will help in comparing the situation based on the two terminals and draw conclusion for the entire intercity transportation service.

Kality Terminal

The total number of respondents selected was 31 from this terminal

1. **Tariff and Affordability**

Concerning the current tariff of transportation and its affordability, the following responses are obtained. Of the total respondents, the largest numbers (42%) are dissatisfied and about (16%) of the respondents were found to be very dissatisfied. Additionally, 39% of them agree that the tariff is average for many people while only 3% are satisfied and totally agree with the current tariff. According to informal discussions with the respondents, the major cause of dissatisfaction for many of them is that they believe they are not getting a transportation service which balances the tariff charged by the operators. One example given by the respondents is the traveling time. Accordingly, the operators waste passengers' time doing unnecessary things after loading travelers such as stopping on road and talking to friends on their way. Sometimes the drivers enter to gas stations to fill fuel for the vehicle.

In addition to this, some drivers pay the money they are punished if the traffic offices are on the way to their destination. These are the main reasons which dissatisfy passengers.

Related to tariff affordability, about 32% of the respondents agree that the tariff is affordable by the average number of passengers. 26% are very dissatisfied and 23% are dissatisfied users who do not think the tariff is affordable by passengers. These respondents suggest tariff revision to lower the current tariff so that it can be affordable by travelers. The following charts describe this situation.

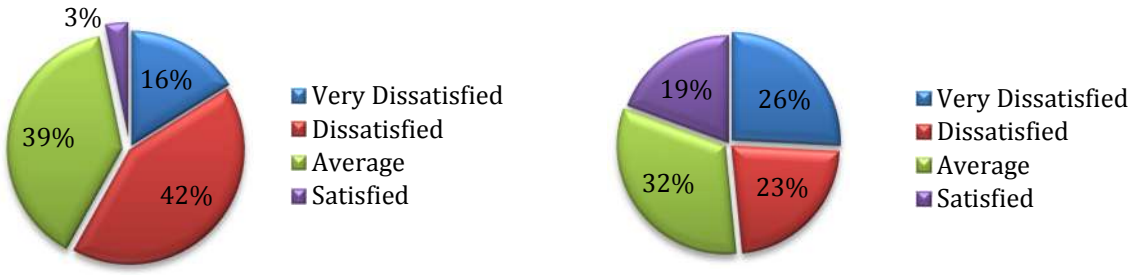


Figure 5.22 Passengers' Satisfaction on Intercity Tariff and its Affordability

The other issue passengers were asked about is the level of agreement they have on the percentage increase in the travelling tariff during peak periods. According to their response, about (39%) of them strongly disagree while the same percentage (39%) of respondents disagree on the situation. The remaining (16%) respondents have average opinion and only (6%) agree when traveling tariff is increased by some percent during peak periods. In the intercity transportation, if the transportation demand exceeds the available supply there will be an increase in usual transportation tariff that was set by transport agency. Usually there will be from 35% – 50% increase in the tariff. According to the opinion of some passengers, this increase in tariff is usually unaffordable and it increases the travelers' expense for transportation. Most of the passengers complain on the amount of increase that it is higher.

Figure 5.23 passengers' opinion on the tariff increase

2. Service Reliability and Travel Time Saving

As it is defined in Chapter 2, Service reliability is mostly related to schedule adherence (Strathman, 1999 and Kimpel, 2001). In the existing intercity service, this concept of scheduling is not known or not given of the proper attention. It is one of the basic aspects to measure the service quality of transportation. The responses of passengers are presented as follow. Accordingly, 48.4% of respondents are dissatisfied with the service reliability and other (6.5%) are very dissatisfied. About 19% respondents are on the average side being neutral while about 26% respondents are satisfied. As seen from the numbers, almost half of the respondents (passengers) are beyond dissatisfied in general. On the other hand, reliability is also related to travel time saving and the time that passengers spend in the vehicle until it load full number of travelers based on its seat capacity. If passengers spend longer time in the terminal until the journey starts, then it will waste their additional time in waiting. This affects the traveling schedule on a specific route.

The following chart shows the satisfaction level of passengers on three aspects mentioned before (service reliability, travel time saving and time spend in waiting).

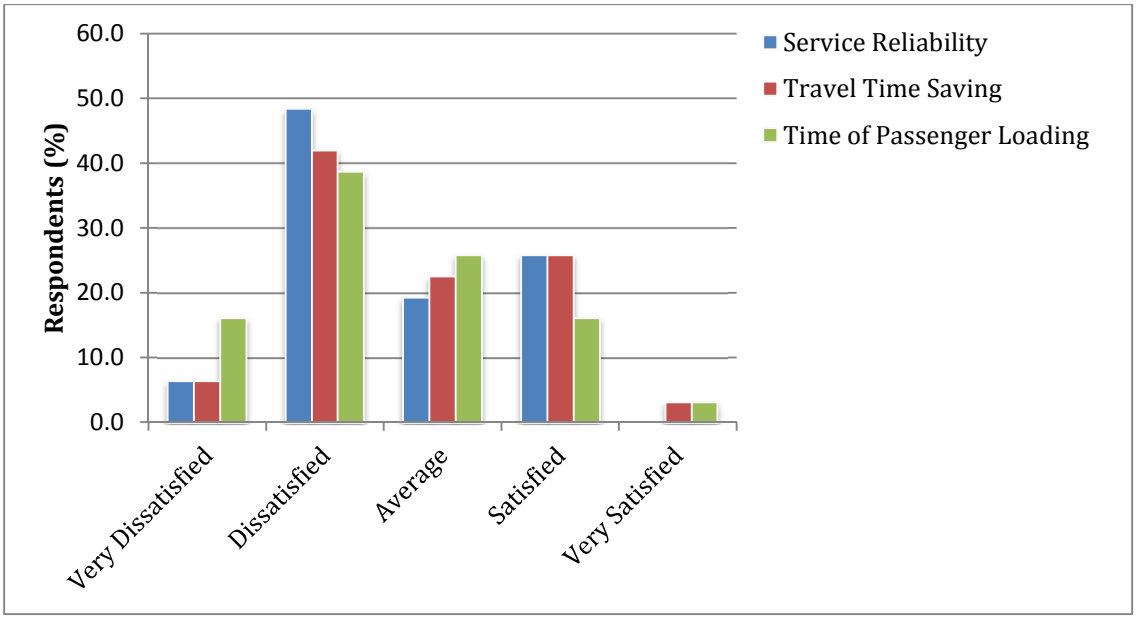


Figure 5.24 Passengers' Satisfaction on Service reliability, Travel time saving and Time of passenger loading

Concerning travel time saving, about 42% of the respondents are dissatisfied and 25.8% are satisfied while 22% are neutral. The main reason passengers give for not being satisfied is that they spend longer time in the vehicle without starting journey while waiting for the vehicles until loading full seat. Recalling table 6.1, the average in-vehicle waiting time of passengers and its percentage in Kality terminal is given. Accordingly, 37% of passengers (of who filled the questionnaire) spend up to 20 minutes waiting for the start of the journey and another 15% passengers spend up to half an hour just waiting in a vehicle. As it is shown on the chart, about 38.7% respondents are dissatisfied with this situation while 16% are very dissatisfied. This indicates that the relationship between these quality aspects is very important in the intercity transportation industry. Therefore, If there exists a scheduled service (which is an indication of service reliability), then passengers will become satisfied with the other two aspects of service quality.

3. Passenger Luggage Handling and Payment

When passengers travel from one location to another, they usually have luggage and different items with them. There needs to be a proper way of handling these items. Passengers were asked of their opinion in these regard (luggage and items handling). Their response is presented here as follow.

Concerning luggage and items handling, 26% of the respondents are very dissatisfied and most of them (35.5%) are dissatisfied while 29% remain average. Only 9.7% are satisfied in this regard. During the data collection period, observation was made to assess how luggage is handled for transportation. Accordingly, it is poor and sometimes passengers are forced to hold their luggage on them. The major luggage placing spots are at the top of the vehicle for the mini buses and a separate compartment at the back of the vehicle for the medium and large buses. The long distance buses (LDBs) handle passenger luggage and items in a good way as compared to the other vehicles because they cover longer distances.

Concerning the amount of payment charged by operators for these services, passengers' satisfaction was assessed. Of the total respondents, more than half (58%) are very dissatisfied and 35.5% respondents are dissatisfied while only 6.5% remain average (neutral).

The main problem related to service (Luggage and items) payment is that there is no fixed amount set by the transport authority. The only regulation in this regard is that passengers are allowed to carry items weighing up to 25kg without any charge and if the weight is more than 25kg, passengers should pay for the extra weight. But currently, there is no established tariff per kilogram for the extra weight which passengers carry. Due to this reason, it is usual to see problems occurring between passengers and operators. The basic complain of travelers is that the operators charge them for every single item they carry other than their luggage regardless of its weight and the amount they ask is more than that is necessary. According to transport authority personnel, the agency is in the process of establishing tariff for passengers' items. The following chart presents the above discussion based on the questionnaire distributed for passengers (i.e. the level of satisfaction of passengers in the current luggage or items handling and related tariff).

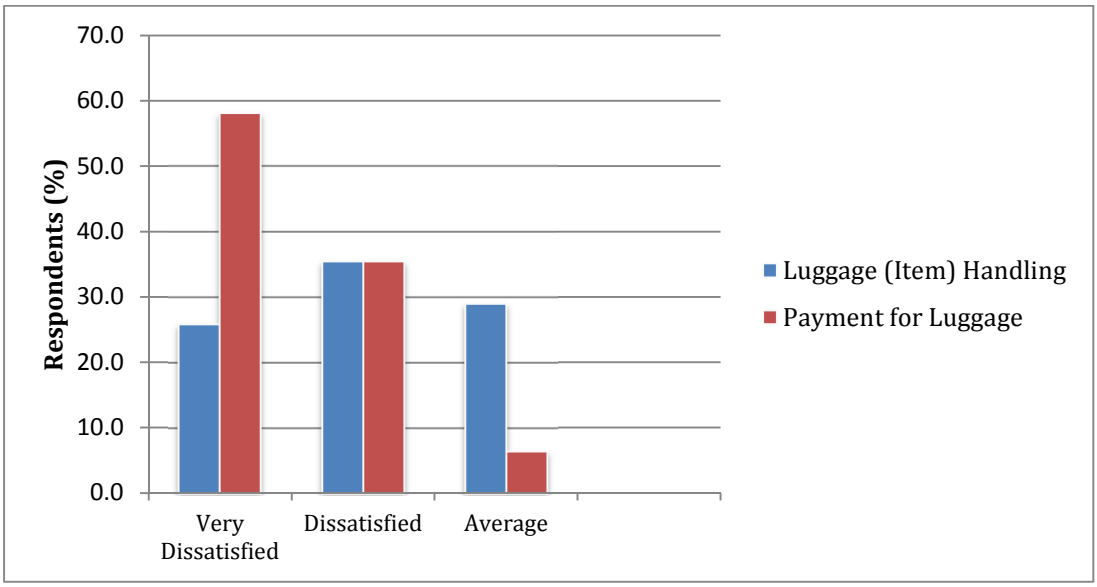


Figure 5.25 Passengers' level of satisfaction on luggage handling and payment

Lamberet Terminal

Similarly as the Kality terminal, there were 31 questionnaires distributed for passengers in Lamberet terminal. The detailed discussion of results obtained through the questionnaires is presented below.

1. Tariff and Affordability

Concerning the current transportation tariff per trip per person in the intercity transportation sector, (33 %) of the respondents were dissatisfied and (23.3%) were very dissatisfied. About (17%) of the respondents were found to be satisfied and only (6.7%) were very satisfied while 20% remain to be average. In general, the issue of tariff is of the highest concern for travelers as well as operators. It is also related to the ability of passengers to pay that amount of money which indicates affordability of tariff. In this regard, larger portion (67.4%) of the respondents who fill the questionnaire in Lamberet terminal were more than dissatisfied (i.e. both dissatisfied and very dissatisfied) and they question its affordability. Only 3.3% were satisfied while the remaining 33.3% remain to be average (neutral).

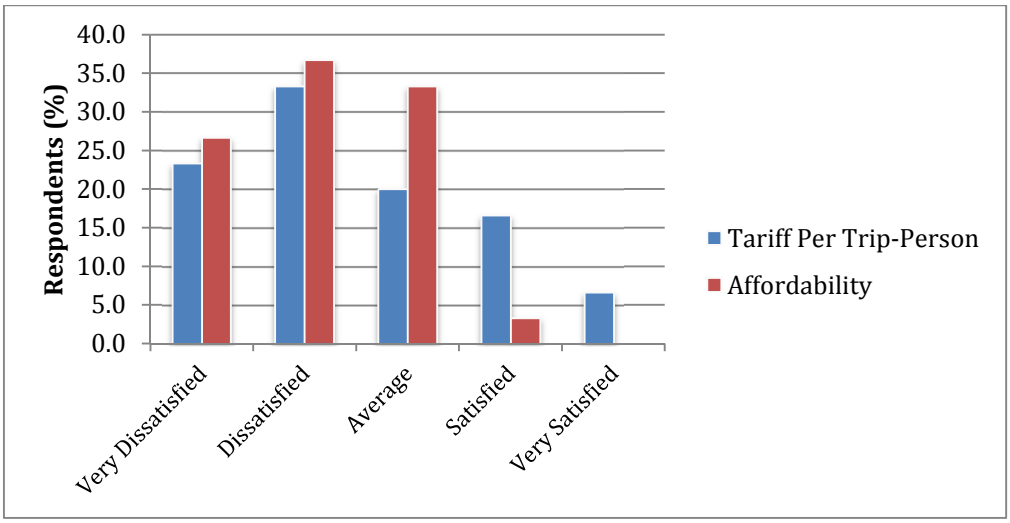


Figure 5.26 Passengers' Satisfaction on Tariff and its Affordability (Lamberet Terminal)

2. Service Reliability and Travel Time Saving

The same question was asked to passengers in Lamberet terminal concerning the reliability of intercity bus service and the saving in travel time. According to their response, half (50%) of them were dissatisfied and about 23% were very dissatisfied. Other 23.3% remained neutral while the remaining (only 3.7%) were satisfied. During informal discussions, these passengers mentioned that the intercity bus service is not a scheduled service that it serves in a traditional way. They believe that if there is a structure to provide service according to a preset schedule, the quality of service will improve.

The other related aspect with service reliability is saving in travel time which indicates the ability of transport service to save the passengers' traveling time by avoiding unnecessary delays in the terminal and on the route. Assessment of passengers' level of satisfaction in this regard indicates that 53.3% respondents were dissatisfied and 16.7% were very dissatisfied. Another 16.7% respondents were satisfied while only 13.3% were remained average. As it is clearly noticed from the above numbers, most of the passengers were dissatisfied in travel time saving of the service. Total travel time increases when the processing time in the terminal increases. Processing time refers to the time for which passengers stay in the terminal while preparing to travel (i.e. starting from purchasing ticket to waiting in the vehicle until the journey starts).

When we look at table 6.8, about (42%) passengers agree that they have to wait up to 20 minutes sitting in the buses to start movement and (30%) passengers wait up to half hour. on the other hand, only 3.8% passengers agree that the waiting time in vehicle is less than 10 minutes. Additionally, most (46.7%) of the respondents were dissatisfied by the time they spend in the buses. the following chart illustrate the passengers' satisfaction on the above quality of service aspects which are related to one another.

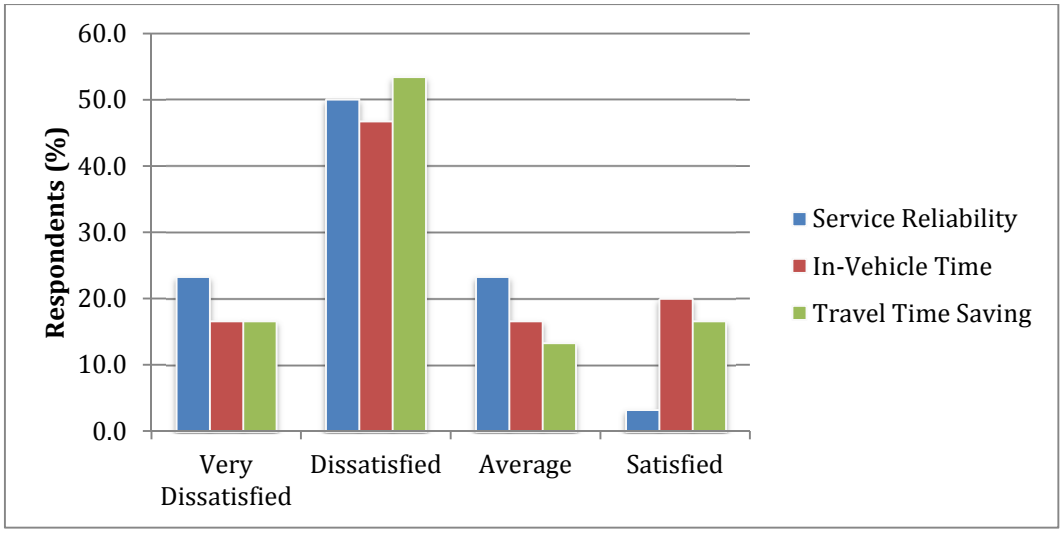


Figure 5.27 Level of Passenger Satisfaction in service reliability, travel time saving and in-vehicle time (Lamberet terminal)

3. Passenger Luggage Handling and Payment

Concerning passenger luggage handling, most (47%) responders were dissatisfied and 23% were very dissatisfied while 13% were found to be satisfied in the way their items are being handled. As it was discussed in the case of Kality terminal, there is poor passenger item handling in the intercity bus service. In addition to this, the tariff charged by operators for this poor handling is not reasonable.

They decide random amount of charge by just looking the items. Based on one terminal personnel, there are simple weighing machines in the terminal used for this purpose but it is not practicable (no one cares to measure the items weight and decide the charge). According to the opinion of some drivers, measuring the weight of items for every passenger is difficult task for them to do and also time wasting. This is one major gap in the intercity transport service. The problem can be solved if there is an appropriate department to check the luggage and items of passengers.

Concerning the tariff for passenger items, the following responses were obtained. Accordingly, 43.3% respondents were very satisfied and another 36.7% were dissatisfied while 20% remained average. The chart below represents the satisfaction of passengers in these regards. Generally, to solve these basic problems in the intercity transportation industry, the transport agency or authority needs to consider establishing appropriate tariff structure for items carried by passengers.

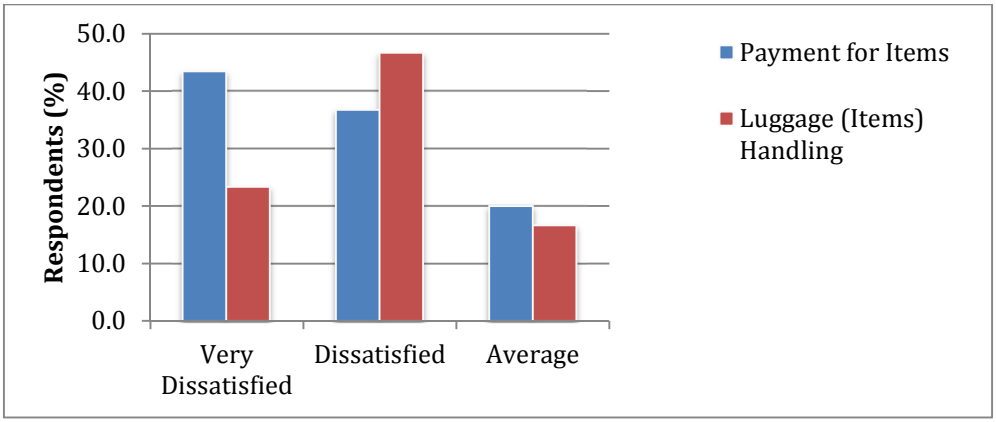


Figure 5.28 Passenger Satisfaction on luggage (Item) Handling and Payment for extra item weight (Lamberet Terminal)

CHAPTER 6

INTERCITY TRANSPORTATION TARIFF

6.1. Introduction

According to the Consolidated Road Transport Laws of Ethiopia (CRTLE), 2012, Tariff or fare shall mean rent or price paid to public commercial road transport services. Any transportation service has its own tariff set by the authorities. The tariff is paid by customers or passengers, in the context of transportation, to the operator. It is an essential source of revenue for transport operators and for the transportation sector. The body that is responsible for general administration of the transportation sector in Ethiopia is the Federal Road and Transport authority. The authority has regional representatives which run according to the regulation of the Federal Transport Bureau where their responsibility is restricted in that region. One of their obligations is establishment of tariff for vehicles that transport travelers. Except the long distance buses which covers longer distance to transport passengers, the regional transport offices set tariff for small and medium vehicles or buses. The federal transport bureau establishes the tariff for long distance or cross country buses. In this chapter, tariff is the main discussion point and passenger tariff is the only issue that is considered here. Questions such as:

- How is tariff currently set by the transport authority?
- What are the main considerations in establishing transportation tariff?
- What component of cost should be taken to set tariff?
- What is the current tariff condition in the intercity transportation section? And
- What does comparison of the current industry tariff and the tariff established in this research contribute?

Will be discussed and presented. In relation to that, the significance of tariff improvement in the transportation industry will be also discussed in the context of our country, Ethiopia.

6.2. Transportation and Tariff

Passenger transportation is an important part of the movement of people from one place to another. If there is demand of a certain service, there should also be supply of that service. Transportation service is demanded by users who want to travel from place to place and the service is delivered by different transportation operators. These transport operators are the actual service providers who need to collect revenue that can cover all the operating costs. The major way of obtaining revenue in the transportation service is the fare that is regularly collected from passengers. Tariff also includes a reasonable amount of profit for the operators. This profit can help the transport operators to stay in the market and compete for a better service.

Therefore it is not possible to separate transportation and tariff where both go hand in hand. The amount of revenue collected can influence the transportation sector. When transport operators and companies obtain the profit they need from supplying transportation service, they become to be able to improve their service through time to time. Improvement of service affects the satisfaction level of users in a positive way. When there are many competitors in the service provision, it will give another alternative for passengers to choose the one that can deliver better service. One way of strengthening the public transportation sector comes from building the financial capacity of the transport firms or transport operators. Strong fare system can create this capacity of firms. This includes the tariff establishment system. In depth study is needed before setting transportation tariff. This will be discussed in the next sub topics.

Generally, the increase in public transportation users (increase in ridership) also increases the revenue that can be collected. Similarly, when the revenue increases, the network of transportation service coverage will also increase which additionally increase the service revenue.

6.3. Tariff Establishment

Tariff establishment is the process of developing, organizing and setting transportation fares to be charged by transport operators for the service they provide to customers. Tariff is established for both freight and passenger. The focus of this research is on passenger tariff.

When passengers travel from one place to another, they pay for the service they are obtaining. The amount of payment that they need to be charged for the service is set by the responsible body of the transportation. Road and transport authority is the responsible organization for doing so in Ethiopia. Though the responsibility that the organization has, it does not decide the fare for each transportation services. Focusing on the intercity bus services, the Authority sets the tariff only for the long distance buses. Recall that the transportation buses are categorized under two categories as:

- Small and Medium buses;
- Long distance buses

According to the intercity transportation regulation, the small buses are limited to travel only up to 150km per trip and the Medium buses are restricted not to travel beyond 250km per trip. Distances more than 250km are covered by the long distance buses (LDB). The tariff for the small and medium buses is established on the basis of zonal boundary. Tariffs are calculated by the zonal transport authority based on a common ground that is primarily set by the Road and Transport Authority. There are two opinion raised by transport operators regarding the intercity transportation tariff. These are:

- The tariff is not enough to continue provision of transportation service; and
- The tariff should be the same no matter where journey starts

The above comments and complains are usually heard from transport operators. The main reason they put as a proof for this is that the vehicle operating cost is way greater than the actual revenue they collect. Additionally, there are other overhead costs paid by transport operators mainly:

- Payment for vehicle stopping place (at night) or terminal service fee
- Payment when buses exit from terminals (Exit Payment)
- Payment for loading/ unloading workers

According to the information obtained from drivers and terminal personnel, the average amount of money paid for the above services is about 30 (ETB) per day for vehicle stopping place, about 20 (ETB) per trip of terminal exit fee and a maximum of 15 (ETB) for loading/ unloading workers.

The second issue they complain on is the case of tariff variability in different zones or regions. To compensate this difference or variation in tariff, transport operators usually refuse to give passengers their change or they charge beyond the official tariff established by the authority. This always creates disagreements between passengers and driver assistants and/ or drivers.

6.3.1. Considerations in Tariff Establishment

There are many factors which should be included or considered to establish and set transportation tariff. Currently in Ethiopia, the Road and Transport Authority (RTA) consider the following factors to decide the tariff on transportation services. These tariff components are used as the basic fare decision guidelines for public transportation.

- Vehicle operating costs (VOCs): are costs which are required to run the transporting buses. The main components of VOCs are fuel and oil costs, tire and tube costs, maintenance and repair costs, spare parts, direct labor costs and etc…

In Ethiopia, price of fuel is the main criteria to revise and establish the intercity transport tariff. When the fuel price is considerably increasing or decreasing in the world's market, then tariff will be revised accordingly. The availability of spare parts is also another important factor which affect tariff establishment.

- Distance in Km covered by buses: this is also included when deciding transportation tariff. The cost that the vehicles have to spend to cover the distance is considered here.
- Passenger load factor (load factor): it is the measure of capacity utilization of public transport services such as intercity bus transport which generally used to assess how efficiently a transport provider fills sits and generates fare revenue.

As transportation vehicles are more highly loaded or in other words, when the passenger load factor increases, the fuel consumed per passenger drops. Therefore fully loaded transport vehicles can be very fuel efficient. Efficient fuel consumption can help transport operators. It is another component in fare or tariff establishment.

- Average weight of passengers;
- Service life of vehicles;
- Others costs such as price of the vehicle, Insurance payment, Interest and depreciation;
- Miscellaneous which include expenses for loading/unloading workers and security guards and;
- Profit margin for transport operators which is usually (5% to 25% depending on the vehicle type as larger for long distance buses);

The above important factors should be considered and included in the establishment of passenger transportation tariff. Of all the components, vehicle operating cost has the most crucial effect on fare establishment. It is considered to be the variable cost component of the total cost. The total cost is the sum of fixed and variable costs. Costs which should be included in fixed costs category are:

- Purchase or vehicle ownership and financing
- Insurance
- Registration fees

6.3.2. Vehicle Operating Cost (VOC) Determination

The vehicle operating cost is determined by using software called HDM-4. It requires some inputs from which the model calculates VOC. The basic input data are:

- New vehicle price
- New tire price
- Fuel and lubricant price
- Cost of maintenance labor
- Crew wage
- Annual kilometer driven

- Annual hour driven (working hour)
- Average service life of vehicle
- No. of passengers (seat capacity)
- Weight of vehicle
- Wheel and axle of vehicle
- Passenger car equivalent

These are the basic input data necessary for the calculation of vehicle operating cost using the HDM-4 model. It requires two types of costs; economic and financial, although the economic costs are those generally used in analyses. The financial costs are the market costs. The economic costs are the market costs excluding taxes and subsidies (R. Bennett, D.O. Paterson, 2000).

The HDM-4 model requires definition of components for VOC determination. These are:

- Road networks;
- Vehicle fleet;
- Work standards;
- Projects;
- Programs; and
- Strategies

Of which only four of the first are important to obtain the vehicle operating costs.

1. Road Networks: two road networks are defined for the purpose of this study. These are Addis – Hawassa and Addis – Woldia road networks. The road networks are divided by section to properly consider the road conditions. The networks are selected on the basis of the terminal points. Vehicles that transport passengers on Addis – Hawassa route base the Kality terminal while vehicles transporting passengers on Addis – Woldia route bases the Lamberet terminal. Therefore, the vehicle operating costs are determined for vehicles traveling in these two routes and tariff is also established for these routes. The basic input data in defining road network are: section name, section length, AADT, road class and surface class, traffic flow pattern, altitude, climate zone, and road condition data.

Following are tables which present the road networks created in the HDM model to be used for the determination of vehicle operating costs.

	Network ID	Description	Length (Km)	AADT	Surface Type	Traffic flow pattern
1	AADB	Addis Ababa - Debre Berhan	130	1944	AC	Inter – Urban
2	DBDS	Debre Berhan - Debre Sina	60	558	AC	Inter – Urban
3	DSSR	Debre Sina - Shewa Robit	32	543	AC	Inter – Urban
4	SRC	Shewa Robit – Combolcha	154	1601	AC	Inter – Urban
5	CD	Combolcha – Dessie	25	1878	AC	Inter – Urban
6	DW	Dessie – Woldia	120	1087	AC	Inter – Urban

Table 7.1 Addis – Woldia Road Network defined in HDM

	Network ID	Description	Length (Km)	AADT	Surface Type	Traffic flow pattern
1	AAM	Addis Ababa – Modjo	57	44799	AC	Inter – Urban
2	MZ	Modjo – Zeway	90	2084	AC	Inter – Urban
3	ZS	Zeway – Shashemane	22	2007	AC	Inter – Urban
4	SH	Shashemane – Hawassa	88	3562	AC	Inter – Urban

Table 7.2 Addis – Hawassa Road Network defined in HDM

2. Vehicle fleet: in this section the vehicles which transport passengers on the road network are defined. These are: small vehicles, medium vehicles and long distance vehicles. These are the common types of vehicle in the intercity transportation service. The basic physical and utilization characteristics are inserted in to the model for each vehicle. Additionally, the economic and financial cost of vehicle operating items is also inserted.

Vehicle Characteristics		
Physical	**Utilization**	**Loading**
➢ Passenger Car Equivalent	➢ Annual Km	➢ No. of Passengers
➢ No. of wheel	➢ Annual Working Hour	➢ Operating Weight
➢ No. of Axle	➢ Average Life	
	➢ % Private Use	

Table 7.3 Vehicle characteristics inputs required in HDM-4

Vehicle Characteristics	Vehicle Type			
	Mini-Bus/ Standard Mini-Bus/Dolphin	Highroof	Medium Bus	Heavy Bus/LDB
Passenger Car Equivalent	1.2	1.2	1.5	1.6
No. of Wheel	4	4	4	6
No. of Axle	2	2	2	2
Annual Km	91000	91000	91000	180000
Annual Working Hour	2920	2920	3470	3600
Average Service life	8	8	12	14
No. of Passengers	12	14	29	60
Operating Weight (tones)	1.5	1.5	6	10
% Private use	(*)	(*)	(*)	(*)

(*) % Private use is assumed to be 0 for all types of vehicle

Table 7.4 Vehicle characteristics data for the intercity transportation vehicle

	Vehicle Type			
	Mini-Bus/ Standard Mini-Bus/Dolphin	**Highroof**	**Medium Bus**	**Heavy Bus/LDB**
Economic Cost				
New Vehicle	751000	914000	590600	703100
Replacement Tire	2417	2417	6667	6667
Fuel	14.4	14.4	14.4	14.4
Lubricating Oil	55	55	55	55
Maintenance Labor	37.51	37.51	37.51	43.95
Crew Wages	57.14	57.14	57.14	53.84
Annual Overhead	15534	15534	26893	153814
Annual Interest	15	15	15	15
Financial Cost				
New Vehicle	1025000	1088000	1650000	2650000
Replacement Tire	2900	2900	8000	14600
Fuel	17.75	17.71	17.75	17.75
Lubricating Oil	73.21	73.21	73.21	73.21
Maintenance Labor	41.27	41.27	41.27	48.35
Crew Wages	62.86	62.86	62.86	59.22
Annual Overhead	17864.6	17864.6	30927.2	176886
Annual Interest	15	15	15	15

Table 7.5 Economic and financial costs of intercity transportation vehicles

N.B. the annual km coverage is calculated by assuming that the vehicles transport passenger every day for the whole year (365 days). This was assumed to consider the maximum distance they will cover if they work each day and to calculate the maximum amount of their expense. For all the other attributes it is also assumed the same (365days)

3. Work standards: it consists of two standards; maintenance standard and improvement standard. Generally, road work standard refers to the targets or levels of conditions and responses that the road management organization aims to achieve (G.R. Kerali, 2000). Maintenance standard is defined for the two road networks and assumptions are made while setting the standard. Two routine type maintenances are defined for the existing road condition in assumption to be used as a ‘ Base case’ or ‘ without project case’ .These are:
    - Asphalt patching (seal coat) for the carriageway; and
    - Shoulder blading for the shoulder ;

Additionally, periodic maintenance is defined to be used as a ‘with project case’ in the analysis. For both maintenances (i.e. routine and periodic), the current unit costs that are actually used by the Ethiopian Roads Authority (ERA) are used. The Base case (Without project case) refers to an existing road condition without any improvement or new construction and the ‘With project case’ refers to a condition on which the road is undergoing through massive improvement, upgrading or new construction. The two cases used to assess the ‘before and after’ performances of a road network. Table 7.5 presents the current actual costs for maintenance operations used by the Ethiopian Roads Authority (ERA).

Maintenance Type	Economic Cost (ETB per Unit)	Financial Cost (ETB per Unit)	Maintenance Level
Patching (Seal Coat) in m^2	62.22	71.55	Routine
Shoulder Blading (Km)	1165.59	1340.43	Routine
DBST (m^2)	106.73	122.74	Periodic
Crack Sealing (Lm)	48.69	55.99	Routine

Note: DBST stands for Double Bitumen Surface Treatment and ETB for Ethiopian Birr

Table 7.6 Maintenance Operation Costs by ERA

4. Projects: two projects are defined here for the two road networks separately. This is the section of the model (HDM) where the analysis is done and report is generated including the vehicle operating costs. It consists of four sub sections and these are:
   - Define project details;
   - Specify alternatives;
   - Analyze Projects; and
   - Generate reports;

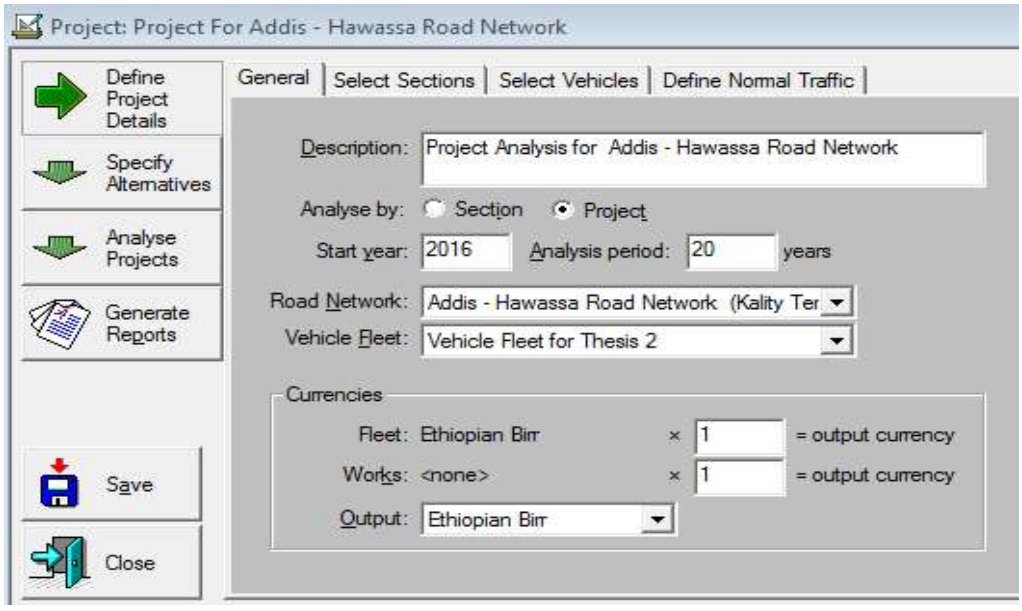


Figure 6.1 Project section of HDM model

Project analysis is generally concerned with evaluation of one or more road projects or investment options. The application analyses a road section with user selected treatments, with associated costs and benefits, projected over the analysis period (G.R. Kerali, 2000).

Assumptions:

- The analysis period is taken to be 20yrs;
- Traffic growth rate to be 5% ; and
- Discount rate as 10%

After the project analysis is finished, the reports are generated to obtain the outputs. The basic output necessary or significant for this study is the vehicle operating cost (VOC) of each vehicle for the whole analysis period.

6.3.3. Calculated Vehicle Operating Cost

The HDM-4 model generates many reports on different analyses. Vehicle operating cost is of the major interest for this study. Accordingly, it is obtained from the model and presented below. It is given for all sections of the road networks defined previously.

1. Addis – Woldiya Road Network

This road network is divided into six sections as:

- Addis – Debre Berhan;
- Debre Berhan – Debre Sina;
- Debre Sina – Shewarobit;
- Shewarobit – Combolcha;
- Combolcha – Dessie; and
- Dessie – Woldiya;

The vehicle operating costs for each vehicle type by section is given below. It is calculated for a 20 years period of analysis and below is presented only for the year of 2016. The whole output is given in the annex section. The model gives the annual average vehicle operating costs in terms of vehicle – kilometer and vehicle – trip. The seat capacity of vehicles was given in Table 7.5 therefore the cost per person – kilometer can be obtained by dividing the cost per veh-km by the number of seats of the vehicle. N.B. each component of vehicle operating costs per 1000 vehicle-km can be obtained. The entire amount of money is given in Ethiopian currency (ETB).

ADDIS ABABA - DEBRE BERHAN SECTION		
	VOC for 2016 (ETB)	
Vehicle Type	Per Vehicle-Km	Per Person-Km
Mini - Bus/ Standard/ Dolphin	5.39	0.4492875
High Roof	5.96	0.458519231
Medium Bus	6.07	0.209322414
LDB	10.37	0.235619318

Table 7.7 (a) VOC for Addis Ababa – Debre Berhan Road Section

DEBRE BERHAN - DEBRE SINA SECTION		
Vehicle Type	VOC for 2016 (ETB)	
	Per Vehicle-Km	Per Person-Km
Mini - Bus/ Standard/ Dolphin	5.39	0.449229167
High Roof	5.96	0.458472308
Medium Bus	6.07	0.209307241
LDB	10.37	0.235698182

Table 7.7 (b) VOC for Debre Berhan – Debre Sina Road Section

DEBRE SINA - SHEWA ROBIT SECTION		
	VOC for 2016 (ETB)	
Vehicle Type	Per Vehicle-Km	Per Person-Km
Mini - Bus/ Standard/ Dolphin	5.66	0.471909167
High Roof	6.29	0.483683846
Medium Bus	6.42	0.221477241
LDB	11.32	0.257203409

Table 7.7 (c) VOC for Debre Sina – Shewa Robit Road Section

SHEWA ROBIT - COMBOLCHA SECTION		
	VOC for 2016 (ETB)	
Vehicle Type	Per Vehicle-Km	Per Person-Km
Mini - Bus/ Standard/ Dolphin	5.40	0.449848333
High Roof	5.97	0.4591
Medium Bus	6.08	0.209690345
LDB	10.40	0.236314773

Table 7.7 (d) VOC for Shewa Robit – Combolcha Road Section

COMBOLCHA - DESSIE SECTION		
	VOC for 2016 (ETB)	
Vehicle Type	Per Vehicle-Km	Per Person-Km
Mini - Bus/ Standard/ Dolphin	5.68	0.473603333
High Roof	6.32	0.486163846
Medium Bus	6.45	0.222526207
LDB	11.45	0.260283182

Table 7.7 (e) VOC for Combolcha – Dessie Road Section

DESSIE - WOLDIYA SECTION		
	VOC for 2016 (ETB)	
Vehicle Type	Per Vehicle-Km	Per Person-Km
Mini - Bus/ Standard/ Dolphin	5.65	0.4704675
High Roof	6.27	0.482045385
Medium Bus	6.40	0.220857931
LDB	11.26	0.255966136

Table 7.7 (f) VOC for Dessie – Woldiya Road Section

2. Addis – Hawassa Road Network

This road network is divided in to four sections as:

- Addis – Modjo
- Modjo – Zeway
- Zeway – Shashemene
- Shashemene – Hawassa

For these sections, the vehicle operating cost for 2016 is given in the following tables.

ADDIS ABABA - MODJO SECTION		
	VOC for 2016 (ETB)	
Vehicle Type	Per Vehicle-Km	Per Person-Km
Mini - Bus/ Standard/ Dolphin	7.24	0.603518333
High Roof	8.02	0.616855385
Medium Bus	8.10	0.279292069
LDB	13.65	0.310209091

Table 7.8 (a) VOC for Addis Ababa – Modjo Road section

MODJO - ZEWAY SECTION		
	VOC for 2016 (ETB)	
Vehicle Type	Per Vehicle-Km	Per Person-Km
Mini - Bus/ Standard/ Dolphin	5.39	0.449520833
High Roof	5.96	0.45877
Medium Bus	6.07	0.209467241
LDB	10.38	0.235981591

Table 7.8 (b) VOC for Modjo – Zeway Road Section

ZEWAY - SHASHEMENE SECTION		
	VOC for 2016 (ETB)	
Vehicle Type	Per Vehicle-Km	Per Person-Km
Mini - Bus/ Standard/ Dolphin	5.22	0.435286667
High Roof	5.79	0.445435385
Medium Bus	5.85	0.201724828
LDB	10.04	0.228078409

Table 7.8 (c) VOC for Zeway – Shashemene Road Section

SHASHEMENE - HAWASSA SECTION		
Vehicle Type	VOC for 2016 (ETB)	
	Per Vehicle-Km	Per Person-Km
Mini - Bus/ Standard/ Dolphin	5.22	0.435113333
High Roof	5.79	0.445293077
Medium Bus	5.85	0.201672759
LDB	10.04	0.228075909

Table 7.8 (d) VOC for Shashemene – Hawassa Road Section

The above tables gives the vehicle operating costs of transporting buses (small, medium and LDBs) for both road networks. Once the cost per person-km is determined, the total amount of tariff which should be charged by transport operators can be obtained by multiplying the distance traveled by the passengers with the unit cost per person-km. an example computation is given below.

- Let's take the road network from Addis Ababa to Woldiya and the first section of this road network, Addis Ababa – Debre Berhan
- The small and medium buses only travel up to 250 km and Debre Berhan is 130km to the north from Addis Ababa.
- The vehicle operating cost per person-km is given as: 0.4492875Birr/person-km for Minibus, 0.458519231Birr/person-km for Highroof and 0.216798214Birr/person-km for medium buses. the amount to be charged will be calculated as:

For Mini-bus/ Standard Bus/ Dolphin Mini- Bus

Tariff (T) = VOC (Birr/person-km) * Distance (D) (km)

= 0.4492875 Birr/person-km * 130 km

= 58.41 Birr/person

Assuming a 20% of the tariff as a profit to be added on the operating cost, the total tariff for a single trip per person will be

Profit (P) = 20% * 58.41

= 11.70 Birr/person

Total Tariff = (58.41 +11.70) Birr/person

= 70.10 Birr/person

N.B The 20% profit assumption is taken based on the actual practice implemented by the Road and Transport Authority when establishing tariff. The authority usually uses a profit margin between 5% and 25%.

For Highroof

Tariff (T) = VOC (Birr/person-km) * Distance (D) (km)

= 0.458519231Birr/person-km * 130 km

= 59.61 Birr/person

Profit (P) = 20% * 59.61

= 11.92 Birr/person

Total Tariff = (59.61 + 11.92) Birr/person

= 71.53 Birr/person

For Medium Bus

Tariff (T) = VOC (Birr/person-km) * Distance (D) (km)

= 0.216798214 Birr/person-km * 130 km

= 28.18 Birr/person

Profit (P) = 20% * 28.18

= 5.64 Birr/person

Total Tariff = (28.18 + 5.64) Birr/person

= 33.82 Birr/person

Long Distance Buses

For the Long distance buses, the distance coverage is significantly more than the other intercity buses. Unlike the small and medium buses, these cross country buses are not restricted in kilometer. That is they can travel more than 250km. therefore the profit margin will be maximum. Assuming the profit to be 25% of their operating cost, let's calculate the tariff which should be charged according to this research.

The vehicle operating costs calculated by section is different for each section. Therefore it is good check the long distance traveling tariff for different cases. Let's choose to calculate the tariff from Addis Ababa to Woldiya which is 521km in the north.

Case 1: Minimum VOC

- The minimum operating cost is found in the Addis – Debre Sina section which is 0.235619318 Birr/ person-km.

Tariff (T) = 0.235619318 Birr/ person-km * 521 km

= 122.76 Birr/ person

Assuming a 25% profit,

Profit (P) = 0.25* 122.76 Birr/ person

= 30.69 Birr/ person, adding this to the tariff based only on VOC we obtain,

Total Tariff = (122.76 + 30.69) Birr/ person

= 153.45 Birr/ person

Case 2: Maximum VOC

- The maximum operating cost is 0.260283182Birr/ person-km

Tariff (T) = 0.260283182Birr/ person-km * 521 km

= 135.61 Birr/ person

Profit (P) = 0.25* 135.61Birr/ person

= 33.91 Birr/ person,

Total Tariff = (135.61 + 33.91) Birr/ person

= 169.52 Birr/ person

Case 3: Average VOC

- Sum of the vehicle operating costs for all section is 1.481085 Birr/ person-km and the average will be (1.481085)/6 which equals 0.246848 Birr/ person-km

Tariff (T) = 0.246848 Birr/ person-km * 521 km

= 128.61 Birr/ person

Profit (P) = 0.25* 128.61 Birr/ person

= 32.15 Birr/ person

Total Tariff = (128.61 + 32.15) Birr/ person

= 160.76 Birr/ person

By using similar procedures, the tariff can be calculated for each road section and length. The table below presents the total tariffs for each section in the road networks.

	Mini-Bus	**High-Roof**	**Medium Bus**
	Addis Ababa - Debre Berhan (130 km)		
Tariff	58.41	59.61	28.18
Profit	11.68	11.92	5.64
Total Tariff (Birr/ person)	70.09	71.53	33.82
	Debre Berhan - Debre Sina (60 km)		
Tariff	26.95	27.51	13.01
Profit	5.39	5.50	2.60
Total Tariff (Birr/ person)	32.34	33.01	15.61
	Debre Sina - Shewa Robit (32 km)		
Tariff	15.10	15.48	7.34
Profit	3.02	3.10	1.47
Total Tariff (Birr/ person)	18.12	18.57	8.81
	Shewa Robit – Combolcha (154 km)		
Tariff	69.28	70.70	33.54
Profit	13.86	14.14	6.69
Total Tariff (Birr/ person)	83.13	84.84	40.13
	Combolcha – Dessie (25 km)		
Tariff	11.84	12.15	5.76
Profit	2.37	2.43	1.15
Total Tariff (Birr/ person)	14.21	14.58	6.91
	Dessie – Woldiya (120 km)		
Tariff	56.46	57.85	27.45
Profit	11.29	11.57	5.49
Total Tariff (Birr/ person)	67.75	69.41	32.94

Table 7.9 Tariff for the road sections in Addis – Woldiya road network

	Long Distance Buses (LDB)		
	Minimum	**Maximum**	**Average**
	Addis Ababa - Shewa Robit (222km)		
Tariff	52.32	57.10	54.71
Profit	13.08	14.27	13.68
Total Tariff (Birr/ person)	65.41	71.37	68.39
	Addis Ababa - Combolcha (376km)		
Tariff	88.62	96.71	92.67
Profit	22.16	24.18	23.17
Total Tariff (Birr/ person)	110.78	120.89	115.83
	Addis Ababa - Dessie (401 km)		
Tariff	94.51	104.37	99.44
Profit	23.63	26.09	24.86
Total Tariff (Birr/ person)	118.14	130.47	124.31
	Addis Ababa - Woldiya (521 km)		
Tariff	122.80	135.61	129.20
Profit	30.70	33.90	32.30
Total Tariff (Birr/ person)	153.50	169.51	161.50

Table 7.10 Tariff for Long distance buses for the Addis – Woldiya road network

Similarly for the other road network i.e. Addis – Hawassa road network, the tariff can be determined. It is given in the following tables for each vehicle type (buses)

	Addis Ababa – Modjo		
	Mini Bus	**High Roof**	**Medium Bus**
Tariff	44.06	45.03	21.12
Profit	8.81	9.01	4.22
Total Tariff (Birr/ person)	52.87	54.04	25.34
	Modjo – Zeway		
Tariff	40.46	41.29	19.53
Profit	8.09	8.26	3.91
Total Tariff (Birr/ person)	48.55	49.55	23.43
	Zeway – Shashemene		
Tariff	38.31	39.20	18.39
Profit	7.66	7.84	3.68
Total Tariff (Birr/ person)	45.97	47.04	22.06
	Shashemene – Hawassa		
Tariff	9.57	9.80	4.60
Profit	1.91	1.96	0.92
Total Tariff (Birr/ person)	11.49	11.76	5.51

Table 7.11 Tariff for road sections in Addis – Hawassa road network

	LDB		
	Minimum	**Maximum**	**Average**
	Addis Ababa - Shashemene (251km)		
Tariff	57.25	77.86	67.56
Profit	14.31	19.47	16.89
Total Tariff (Birr/ person)	71.56	97.33	84.44
	Addis Ababa - Hawassa (273km)		
Tariff	62.27	84.69	68.41
Profit	15.57	21.17	17.10
Total Tariff (Birr/ person)	77.83	105.86	85.51
	Addis Ababa - Semera (588 km)		
Tariff		182.40	
Profit		45.60	
Total Tariff (Birr/ person)		228.00	

Table 7.12 Tariff for long distance buses for Addis – Hawassa road network

In the above Table 7.12, tariff for the route from Addis Ababa to Semera is determined. Semera is the only destination covered by long distance buses from the Kality terminal. The tariff was determined by using the unit cost of Addis – Modjo road section because it was not possible to obtain the road data for the Addis – Semera road network and it is rough estimation. It can be the maximum tariff based on the VOC.

6.4. Comparison of Tariff

The tariff established by the transport authority is compared to the tariff established for this study. As it was discussed in the preceding sections, the transport authority establishes tariff only for long distance buses (LDBs). The tariff for the small buses is established by regional transport bureaus. The comparison here is with the tariff established by the authority and also by regional bureau. The tariff for the small buses is obtained from the two terminals and it is the tariff that is under use in the intercity bus transport service. The tariff for the LDBs is obtained from the transport authority.

The following table presents the two tariffs in comparison. Based on the comparison, the tariff set by the transport authority is lower than that of the calculated. This can support complain of drivers that their expense to operate the vehicles is greater than the revenue they obtain from tariff. The new tariff is calculated based on the vehicle operating cost of each transportation bus.

No.	Road Section	Tariff by the Authority and Region Bureau (Birr/ Person-Trip)			Tariff Calculated Based on VOC (Birr/ Person-Trip)		
		Mini Bus	Medium Bus	LDB	Mini Bus	Medium Bus	LDB
1	Addis Ababa - Debre Berhan	54.80	37.53		70.09	33.82	
2	Addis Ababa - Shewa Robit	93.59	64.09		120.55	58.24	
3	Addis Ababa – Combolcha	158.52	108.55	114.69	173.17	83.87	120.89
4	Addis Ababa – Dessie			122.31			130.47
5	Addis Ababa - Woldiya			158.92			169.51
6	Addis Ababa – Modjo	35	32.46		52.87	25.34	
7	Addis Ababa – Zeway	72.48	49.72		94.51	48.77	
8	Addis Ababa - Hawassa	108.05	90.47		158.87	76.35	
9	Addis Ababa - Semera			220			228

Table 7.13 comparison of calculated tariff and tariff established by transport authority and regional bureaus

As it is shown in the above table, the tariff calculated for this research is greater than the tariff established by the transport authority for all vehicle types except the medium buses for which it is the reverse. For each vehicle, the tariff is calculated only for the distance they cover. The small buses are limited to travel up to 150 km and medium buses are allowed to travel up to 250 km and the LDBs cover more distances. That is the reason in the above table some boxes are left empty.

In general, this is just the tariff based on the vehicle operating cost and it doesn't mean that this tariff should be applied in the industry. It is to indicate that thorough consideration of factors is necessary. To implement the established tariff into practice, its affordability should be well studied. Assessment of passengers' income is also necessary.

CHAPTER 7

CONCLUSIONS AND RECOMMENDATIONS

7.1. General

The intercity bus transportation services in Ethiopia have many challenges. As important components of the transportation service, terminals are the main area where challenges arise. In this final chapter, conclusion from the analysis done is drawn and also some recommendations are presented concerning the improvement of the intercity transportation service.

7.2. Conclusions

Based on the discussions and assessments done in previous chapters, the following major points can be raised as a conclusion concerning the intercity bus terminals and the intercity transportation services. As it was discussed under the case study chapter, the gap in the level of services between Kality and Lamberet terminals is visible.

Concerning Kality Terminal

- The terminal area is divided and used for other purposes such as police station and intra city buses and taxis;
- The terminal location is not suitable for many passengers that it is difficult for accessing from different directions. The traffic in the area makes it difficult for passengers to come to the terminal at the time they want. Passengers are usually charged unfair tariffs by urban transportation vehicles (taxis) to reach the terminal.
- The terminal is not well constructed and unsuitable for passengers;
- the terminal lacks the necessary service facilities such as ticket selling places, passenger waiting area, restroom, offices for bus associations and terminal staffs;

- Problem of boarding by passengers outside of the terminal compound;
- Security problems (theft and robbery) of passengers due to lack of control over the outside boarding areas;
- Poor passenger handling by the staffs , drivers and assistants; and
- Lack of sufficient information provision for passengers in the terminal and while boarding.

Generally, the Kality terminal can represent the other terminals located at different spots in the capital city such as Adisu Gebeya, Asko, Ayer Tena and Mercato. According to the Transport Authority personnel, the current condition in all of these terminals, except that of Lamberet terminal, is similar with Kality terminal.

Concerning Lamberet Terminal

- The terminal possesses a better land and well-constructed infrastructure. The service facilities are properly provided but insufficient to accommodate a large number of passengers during peak period. Additionally, the vehicle parking areas and passenger loading areas are set apart for providing easy access of buses for passengers as compared to the Kality terminal;
- There is no place outside of the terminal compound where buses board passengers depriving the safety of passengers.

Generally, concerning the intercity bus transportation system, the following can be concluded:

- There is lack of appropriate integration between the intra-city and inter-city transportation system. The vehicles which transport passengers to and from the terminals are not sufficient in number. Additionally, the urban transportation has its own challenges related to traffic management;
- The intercity bus transportation services lack proper trip scheduling and travel management;
- There is poor passenger and luggage item handling including no structured tariff establishment for these services. In addition, the prevailing passenger tariff structures are not based on detailed study of the intercity transportation industry. Tariff revision mostly considers the fluctuation of fuel price in the world market.

- Established tariffs are not consistent in different regions of the country. This is because of the flexibility of setting tariff regionally.

  The federal transport authority sets passenger tariff only for the long distance buses and the responsibility of setting tariff for small and medium buses is given for regional transport bureaus.

7.3. Recommendations

Concerning the intercity terminals and the service provision, there needs to be a detailed standard of design and construction of passenger terminals for the travelers which should include the following important attributes:

- A terminal facility should include: suitable passenger waiting area, ticket purchasing offices, luggage and item checking spots, administrations offices for staffs and other passenger amenities such as proper rest rooms, cafeteria, etc… Design and construction of a terminal facility need to consider different groups of the society such as children, elderly people, people with disabilities and different difficulties. This can also be done by referring related manuals and standards of other countries and tuning it in the Ethiopian context.
- It is obvious that the locations of intercity bus terminals affect passengers' movements and related to location; accessibility also has a very important role. Terminals should be located based on a detailed study which also considers future changes and developments. Before deciding the location of a terminal, the city master plan should be well observed so that to assess possible ways of integrating the urban transportation and intercity transportations together. Additionally, the land demarcated for a terminal on the guiding master plan should not be shared for other unrelated purposes.
- In relation to the study of optimum intercity terminals location, other important studies need to be considered to support decisions related to transportation. These studies are household surveys, origin – destination studies, population growth and transport demand and supply studies.
- Pertinent amenities need to be available within the terminal; such as: cafeteria, ATMs, first-aids; etc.

- To improve the service quality of the existing terminals, studies on the location, size and design aspects can be performed. If, for instance, relocation of the terminal is necessary, it is important to relocate it to a place that can be more accessible by users. When locating a terminal, it is important to consider the situation of the area if there are higher commercial activities in the vicinity, if there are public organizations in the area to and from which travelers emerge such as educational centers (colleges and universities), hospitals and government institutions, major recreational destinations in the area and trade centers.
- Additionally, it is important to study the movement pattern of vehicles assessing the peak periods in the terminal. This will help to optimize high, medium and low demand periods and control the demand and supply conditions.
- As a recommendation for the intercity transportation industry, it will be good to arrange or organize large transportation companies which hire operators (drivers and assistants) under their umbrellas for giving adequate and satisfactory services for passengers; that is, companies with modern route assignment, travel scheduling system and transportation management system. This will increase the travelers' alternatives to go to different places or destinations. Increasing the alternatives will lead to competition between transportation companies which can ultimately help in delivering a better intercity transportation service for passengers.
- Concerning transportation tariff of passengers, proper attention should be given to establish tariff by studying the actual vehicle operating costs of vehicles. The practical industry situation of VOC should be seriously taken into considerations. For the transport operators to continue in the service provision, they should be profitable. Therefore, it is important to establish tariff by considering the industry practice. The other point related to tariff is that it is important to make the tariff structure variable based on different considerations such as:
    - age characteristics of travelers (children, young, old)
    - season of transportation (peak season or high demand seasons, normal or low demand seasons)
    - travelers status (students, workers, business persons)

- Tariffs for passenger items and luggage should be established. It is also necessary to implement the rules concerning tariffs for items and luggage above the allowed weight.

7.4. Future Research Areas

In this research, the major concern or focus area was made assessing the intercity bus terminals and the intercity transportation services according to passengers' satisfaction on the existing situation. During the course of this study some necessary research areas were identified and are presented as follows:

- One of the important components in the intercity bus transportation service which was identified in this study is related to information provision for passengers in the terminal. It will be important if there is some kind of system in the intercity transportation industry to provide the necessary information about the whole transportation process in which they are going to follow. This also includes real time information at the destination place of passengers. It can be done by connecting different terminals located in the same travel network in the country with a common information system. For instance considering the Lamberet terminal, it will help travelers to destinations such as: Debre Berhan, Shewarobit, Combolcha, Dessie, Woldiya and Mekele, to provide them with full information about their destination; how and where they can obtain other transfer vehicles when they reach at the destination terminal and so on.
- Second, deciding the location of a terminal is important factor. It needs a detailed study of optimum location. Therefore, topics on determining the optimum intercity terminal location, what should be considered to identify this optimum spot, how to determine the size of a passenger terminal in the Ethiopian context can be studied further.
- Third, transportation tariff is another important issue in the intercity bus transport industry. In this thesis, the tariff established by road and transport authority and the tariff established based on the vehicle operating costs calculated by the HDM-4 model were compared and presented.

In addition to this, it can be possible to compare the above two tariffs with a new tariff that can be established based on the actual industry vehicle operating costs. This requires daily recording of vehicle operating expenses by type of buses for some significant period of time and then analyzing the annual VOC to check that operators are getting appropriate profit.

- Fourth, assessment of the ability of passengers to afford transportation related payments can be another focusing area to discuss and do research on.
- Fifth, the vehicles or buses in the intercity bus transportation industry of Ethiopia usually serve more than the service life set by manufacturing companies. Most of the vehicles on the roads are above their service lives. When the age of a vehicle increases, it is believed that its operating cost also increases and its impacts on the environment will be countless. Therefore it can be important to analyze this situation and the impact on the transportation industry by doing detailed studies.
- Finally, the integration of inter-city and intra-city bus transportation services can be another important issue to do further study.

Generally, one of the challenges when doing this study was unavailability of written documents, previous studies and related materials which would be supportive concerning the intercity transportation terminals and intercity bus transportation in Ethiopia.

The study areas mentioned above can be very good areas of focus for interested researchers or any group of people related with the Ethiopian bus transportation service. If any of these topics are considered for further study, it will contribute to strengthening the whole transportation industry.

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APPENDICES

APPENDIX – A – QUESTIONNAIRES FOR PARTICIPANTS

Passengers' Questionnaire (Both Kality & Lamberet Terminals)

Questionnaire ID _____ **Terminal** _____

Gender _____ **Date** _____

1. How old are you?

   a) Below 25 **b)** 25 – 44 **c)** 45 – 64 **d)** Above 65

2. How often do you use the terminal?

   a) Regularly **b)** Sometimes **c)** Rarely **d)** It is my first time

3. Which type of vehicle do you usually prefer?

   a) Mini - Bus **b)** Highroof **c)**Dolphin **d)** Lonchin

   e) Cross-country bus

4. Please mention the reason why you prefer this type of vehicle

   a) For Safety **b)** To Save Time **c)** Comfort Issue **d)** No Reason

   e) Other

   If other, please mention _____

5. What is the purpose of your trip usually?

   a) School **b)** Business/Job **c)** Religion trip

   d) Leisure **e)** Family Visit

6. How long do you usually wait until the journey starts after boarding passengers?

   a) less than 10 min **b)** Between 10 – 20 min **c)** Between 20 – 30 min

   d) Between 30 – 45 min **e)** Between 45 – 60 min **f)** More than an Hour

7. What is your preferred day of travel?

a) Weekdays (Monday - Friday) b) weekend (Saturday – Sunday)

8. What is your preferred time of travel?

a) Early Morning (11-3) b) Late Morning (3-5) c) Afternoon (5-8)

d) Late Afternoon (8-11) e) Night (11-2)

9. How long do you come from home to use this terminal?

a) Very far (>15km) b) Far (8 to 15km) c) Average (5 to 8km)

d) Close (2 to 5km) e) Very Close (<2 km)

10. What problem do you face when you come to the terminal?

a) Unavailability of Taxis b) Theft/Robbery c) Illegal Tariff

d) Time Wastage e) other

If other, please mention_____

11. What do you think about the transport demand and supply most of the time?

a) The demand is greater b) The supply is greater c) Balanced

d) Don't know

12. Do you think most drivers and assistants respect traffic Rules and regulation?

a) Yes b) No c) Sort of

13. What do you think about the behavior of drivers and assistants?

a) Very Bad b) Bad c) Average

d) Good e) Very Good

14. Generally, what is the level of satisfaction you have by the service provided in the terminal?

a) Very dissatisfied b) Dissatisfied c) Neutral

d) Satisfied e) Very satisfied

Terminal Evaluation Questionnaire

- **N. B. This questionnaire is to be filled by passengers at Kality and Lamberet Terminals to obtain their evaluation concerning the two terminals and the intercity bus service.**

Use the symbol '**X**' on the space provided for giving score for each item.

Questionnaire ID_____ **Terminal Name** _____ **Date** _____

Gender of Respondent _____ **Age** _____

Item No.	Evaluation Attributes	Score					Remark
		1	2	3	4	5	
1	Cafeteria service						
2	Clinical Service (Emergency aid)						
3	Toilet (restroom)						
4	Shower						
5	Financial institutions (Banks)						
6	Terminal location (Central)						
7	Terminal Accessibility(vehicles moving to the terminal)						
8	Passenger Waiting Area						
9	Ticketing System						
10	Travel Information (information provision)						
11	Terminal Staffs behavior(guards, assistants, drivers & others)						
12	Terminal security against theft and robbery)						
	Overall Terminal Evaluation						

Table A-1 Terminal Evaluation Questionnaire

Intercity Transport Service Evaluation Questionnaire

- **N. B. This questionnaire is to be filled by passengers at Kality and Lamberet Terminals to obtain their evaluation concerning the two terminals and the intercity bus service.**

Use the symbol **'X'** on the space provided for giving score for each item.

Questionnaire ID_____ **Terminal Name** _____ **Date** _____

Gender of Respondent _____ **Age** _____

Item No.	Evaluation Attributes	Score					Remark
		1	2	3	4	5	
13	Vehicle Availability						
14	Comfort of vehicles (e.g. cleanness)						
15	Vehicle Status (age)						
16	Traveling Tariff						
17	Affordability						
18	% Increase in tariff when there is high travel demand						
19	Travel time saving						
20	Time spending in the vehicle while loading passengers						
21	Service reliability (Intercity Transport)						
22	Baggage Handling						
23	Payment for extra weight						
24	Safety while traveling						
	Overall Intercity Transport Service Quality						

Table A-2 Intercity Transport Service Evaluation Questionnaire

Drivers' Questionnaire

Questionnaire ID _____ **Terminal** _____ **Date** _____

Gender _____ **Age** _____

1. How many years did you drive?
   a) Below 2yrs b) 2-5yrs c) 5-8yrs d) 8-11yrs e) above 11yrs
2. Did you drive another intercity transport vehicle before?
   a) Yes b) No
3. What is the type of vehicle you are driving now?
   a) Standard Mini -Bus b) Highroof c) Dolphin d)5L Mini Bus
   e) Isuzu KitKit f) Cross country Bus
4. Are you a vehicle owner or employee?
   a) Owner b) Employee
5. If you are employed, what is your salary range (ETB)?
   a) Below 500 b) 500-1000 c) 1000-1500 d) 1500-2000 e) above 2000
6. How long does it usually take for you to complete a full journey? (from origin to destination)
   a) 2-4 hr b) 4-6hr c) 6-8hr d) 8-10hr e) 10-12hr
7. What is the average number of return trips ('Biajo') you do per day?
   a) 1 b) 2-3 c) 3-4 d) 4-5
8. What is the type of road for longest distance of traveling?
   a) Paved b) gravel
9. What is your opinion on the tariff (Driver Perspective)?
   a) Very expensive b) Expensive c) Fair d) Cheap e) Very cheap
10. At what interval do you have serviced your vehicle?
    a) Every week b) Every two weeks c) Once a month d) Once in six month
    e) Once a year
11. How long do you drive in a single trip? _____km
12. Do you collect enough revenue per day to cover your costs? _____
13. Do you pay for membership in the association? _____ If yes, How much? _____
14. What are your major expenses per day?
15. General comments

APPENDIX – B – HDM-4 VOC OUTPUT

The tables below presents the VOC obtained from HDM-4 model. It is given as a sample for years 2016 through 2020.

Year	Addis – Modjo					Modjo - Zeway			
	Average Speed (Km/hr)	VOC	Travel Time	Road User Cost		Average Speed (Km/hr)	VOC	Travel Time	Road User Cost
2016	46.34	7.24	0.00	7.24		97.80	5.39	0.00	5.39
2017	48.99	7.35	0.00	7.35		97.79	5.39	0.00	5.39
2018	48.62	7.57	0.00	7.57		97.78	5.40	0.00	5.40
2019	45.54	8.01	0.00	8.01		97.76	5.40	0.00	5.40
2020	39.43	8.65	0.00	8.65		97.73	5.41	0.00	5.41

Table B-1 a) VOC (Mini- Bus) for Addis – Modjo Section and Modjo – Zeway Section

Year	Zeway – Shashemene					Shashemene - Hawassa			
	Average Speed (Km/hr)	VOC	Travel Time	Road User Cost		Average Speed (Km/hr)	VOC	Travel Time	Road User Cost
2016	99.87	5.22	0.00	5.22		99.64	5.22	0.00	5.22
2017	99.85	5.22	0.00	5.22		99.58	5.22	0.00	5.22
2018	99.84	5.23	0.00	5.23		99.51	5.22	0.00	5.22
2019	99.82	5.23	0.00	5.23		99.42	5.23	0.00	5.23
2020	99.78	5.23	0.00	5.23		99.26	5.23	0.00	5.23

Table B-1 b) VOC (Mini- Bus) for Zeway – Shashemene Section and Shashemene – Hawassa Section

Year	Addis - Modjo		Modjo – Zeway		Zeway - Hawassa	
	Average Speed (Km/hr)	VOC	Average Speed (Km/hr)	VOC	Average Speed (Km/hr)	VOC
2016	46.34	8.02	97.80	5.96	99.87	5.79
2017	48.99	8.15	97.79	5.96	99.85	5.79
2018	48.62	8.42	97.78	5.97	99.84	5.79
2019	45.54	8.96	97.76	5.97	99.82	5.80
2020	39.43	9.72	97.73	5.98	99.78	5.80

Table B-2 VOC (High Roof) for Addis –Hawassa Road Network

Year	Addis - Modjo		Modjo - Zeway		Zeway - Hawassa	
	Average Speed (Km/hr)	VOC	Average Speed (Km/hr)	VOC	Average Speed (Km/hr)	VOC
2016	46.30	8.10	90.18	6.07	92.59	5.85
2017	48.31	8.25	90.18	6.07	92.56	5.85
2018	48.07	8.55	90.14	6.08	92.52	5.85
2019	45.25	9.12	90.10	6.08	92.48	5.86
2020	39.35	9.91	90.05	6.09	92.41	5.86

Table B-3 VOC (Medium Bus) for Addis –Hawassa Road Network

Year	Addis - Modjo		Modjo - Zeway		Zeway - Hawassa	
	Average Speed (Km/hr)	**VOC**	**Average Speed (Km/hr)**	**VOC**	**Average Speed (Km/hr)**	**VOC**
2016	46.28	13.65	86.29	10.38	86.85	10.04
2017	47.90	14.11	86.29	10.39	86.84	10.04
2018	47.86	14.92	86.29	10.39	86.84	10.05
2019	45.14	16.37	86.28	10.40	86.83	10.05
2020	39.23	18.24	86.27	10.42	86.82	10.07

Table B-4 VOC (LDB) for Addis –Hawassa Road Network

Year	Addis - Debre Sina		Debre Sina - Shewa Robit		Shewa Robit - Combolcha		Combolcha - Dessie		Dessie - Woldiya	
	Average Speed (Km/hr)	**VOC**	**Average Speed** (Km/hr)	**VOC**	**Average Speed** (Km/hr)	**VOC**	**Average Speed** (Km/hr)	**VOC**	**Average Speed** (Km/hr)	**VOC**
2016	97.81	5.39	96.95	5.66	97.76	5.40	97.05	5.68	97.03	5.65
2017	97.82	5.39	96.80	5.69	97.77	5.40	96.76	5.72	96.87	5.68
2018	97.81	5.39	96.62	5.72	97.76	5.40	96.39	5.76	96.63	5.72
2019	97.79	5.39	96.39	5.75	97.74	5.40	95.92	5.80	96.33	5.76
2020	97.78	5.39	96.07	5.79	97.73	5.41	95.35	5.85	95.96	5.80

Table B-5 VOC (Mini-Bus) for Addis – Woldiya Road Network

Year	Addis - Debre Sina		Debre Sina - Shewa Robit		Shewa Robit - Combolcha		Combolcha - Dessie		Dessie - Woldiya	
	Average Speed (Km/hr)	**VOC**	**Average Speed** (Km/hr)	**VOC**	**Average Speed** (Km/hr)	**VOC**	**Average Speed** (Km/hr)	**VOC**	**Average Speed** (Km/hr)	**VOC**
2016	97.81	5.96	96.95	6.29	97.76	5.97	97.05	6.32	97.03	6.27
2017	97.82	5.96	96.80	6.32	97.77	5.97	96.76	6.37	96.87	6.31
2018	97.81	5.96	96.62	6.36	97.76	5.97	96.39	6.42	96.63	6.36
2019	97.79	5.96	96.39	6.40	97.74	5.97	95.92	6.47	96.33	6.41
2020	97.78	5.96	96.07	6.44	97.73	5.98	95.35	6.52	95.96	6.46

Table B-6 VOC (High Roof) for Addis – Woldiya Road Network

Year	Addis - Debre Sina		Debre Sina - Shewa Robit		Shewa Robit - Combolcha		Combolcha - Dessie		Dessie - Woldiya	
	Average Speed (Km/hr)	**VOC**	**Average Speed** (Km/hr)	**VOC**	**Average Speed** (Km/hr)	**VOC**	**Average Speed** (Km/hr)	**VOC**	**Average Speed** (Km/hr)	**VOC**
2016	90.26	6.07	88.87	6.42	90.11	6.08	88.90	6.45	88.94	6.40
2017	90.27	6.07	88.69	6.46	90.13	6.08	88.59	6.50	88.75	6.45
2018	90.25	6.07	88.47	6.49	90.10	6.08	88.19	6.55	88.46	6.50
2019	90.23	6.07	88.20	6.54	90.07	6.09	87.71	6.61	88.12	6.55
2020	90.20	6.07	87.86	6.59	90.04	6.09	87.15	6.67	87.72	6.60

Table B-7 VOC (Medium Bus) for Addis – Woldiya Road Network

Year	Addis - Debre Sina		Debre Sina - Shewa Robit		Shewa Robit - Combolcha		Combolcha - Dessie		Dessie - Woldiya	
	Average Speed (Km/hr)	VOC	Average Speed (Km/hr)	VOC	Average Speed (Km/hr)	VOC	Average Speed (Km/hr)	VOC	Average Speed (Km/hr)	VOC
2016	86.29	10.37	86.07	11.32	86.28	10.40	86.09	11.45	86.08	11.26
2017	86.30	10.36	86.02	11.41	86.28	10.40	85.99	11.59	86.04	11.39
2018	86.30	10.37	85.96	11.52	86.28	10.40	85.84	11.74	85.96	11.53
2019	86.29	10.37	85.88	11.64	86.27	10.42	85.64	11.90	85.85	11.67
2020	86.28	10.38	85.75	11.77	86.27	10.43	85.37	12.06	85.70	11.82

Table B-8 VOC (LDB) for Addis – Woldiya Road Network

APPENDIX – C – VOC COMPONENTS

Components of the VOC as directly obtained from the HDM-4 Model are given in this part of the Appendix.

- N.B. all the values represent monetary values for each component and are given in the Ethiopian currency (ETB)

C – 1 – VOC Component for Addis – Hawassa Road Network

Road Section		**Addis – Modjo**							
Vehicle Type	**Year**	**VOC Components**							
		Fuel	**Lubricating Oil**	**Tires**	**Spare Parts**	**Maint. Labor**	**Capital**	**Crew**	**Overhead**
Heavy Bus/ LDB	2016	3,538.39	165.88	533.38	3,752.15	493.16	2,389.20	1,548.32	1,228.71
	2017	3,567.71	166.12	526.63	4,252.50	526.13	2,346.85	1,520.88	1,206.93
High Roof	2016	1,569.44	53.63	134.02	2,725.45	120.22	1,620.82	1,642.61	152.93
	2017	1,587.66	53.83	134.63	2,912.73	124.67	1,582.43	1,603.71	149.31
Medium Bus	2016	2,016.57	112.42	413.49	1,308.01	311.85	2,071.32	1,642.96	222.84
	2017	2,052.00	112.71	404.78	1,492.01	333.81	2,029.85	1,610.07	218.38
Mini-Bus	2016	1,569.44	53.63	134.02	2,239.40	120.22	1,329.97	1,642.61	152.93
	2017	1,587.66	53.83	134.63	2,393.28	124.67	1,298.47	1,603.71	149.31
Road Section		**Modjo – Zeway**							
Heavy Bus/ LDB	2016	3,810.04	168.06	394.13	3,456.36	472.67	962.82	623.96	495.16
	2017	3,808.76	168.05	394.48	3,459.10	472.86	962.81	623.95	495.15
High Roof	2016	1,823.25	56.35	136.95	2,614.74	117.52	576.53	584.28	54.40
	2017	1,822.83	56.34	137.12	2,615.76	117.55	576.54	584.29	54.40
Medium Bus	2016	2,609.47	117.18	332.17	1,199.24	298.16	798.80	633.60	85.94
	2017	2,608.41	117.17	332.03	1,200.25	298.29	798.86	633.65	85.94
Mini-Bus	2016	1,823.25	56.35	136.95	2,148.43	117.52	473.07	584.28	54.40
	2017	1,822.83	56.34	137.12	2,149.27	117.55	473.08	584.29	54.40

Road Section		Zeway – Shashemene							
Vehicle Type	**Year**	**VOC Components**							
		Fuel	**Lubricating Oil**	**Tires**	**Spare Parts**	**Maint. Labor**	**Capital**	**Crew**	**Overhead**
Heavy Bus/ LDB	2016	3,511.23	165.66	367.40	3,450.36	472.24	956.63	619.95	491.98
	2017	3,513.90	165.68	368.13	3,451.17	472.30	956.66	619.97	491.99
High Roof	2016	1,691.82	54.94	123.92	2,612.49	117.47	564.58	572.17	53.27
	2017	1,692.37	54.95	124.19	2,612.79	117.48	564.65	572.24	53.28
Medium Bus	2016	2,447.97	115.88	312.39	1,197.03	297.88	778.03	617.13	83.70
	2017	2,448.88	115.89	312.51	1,197.33	297.91	778.28	617.33	83.73
Mini-Bus	2016	1,691.82	54.94	123.92	2,146.59	117.47	463.27	572.17	53.27
	2017	1,692.37	54.95	124.19	2,146.84	117.48	463.32	572.24	53.28
Road Section		**Shashemene – Hawassa**							
Heavy Bus/ LDB	2016	3,507.62	165.63	368.09	3,450.44	472.25	957.91	620.77	492.63
	2017	3,510.11	165.65	369.11	3,451.52	472.32	958.20	620.97	492.78
High Roof	2016	1,687.33	54.90	123.85	2,612.52	117.47	565.88	573.49	53.39
	2017	1,687.09	54.89	124.16	2,612.92	117.48	566.22	573.84	53.43
Medium Bus	2016	2,443.41	115.85	312.69	1,197.06	297.88	779.48	618.28	83.86
	2017	2,443.79	115.85	312.92	1,197.46	297.93	780.02	618.71	83.92
Mini-Bus	2016	1,687.33	54.90	123.85	2,146.61	117.47	464.33	573.49	53.39
	2017	1,687.09	54.89	124.16	2,146.94	117.48	464.61	573.84	53.43

Table C – 1 Vehicle operating cost (VOC) components given for the Addis – Hawassa Road Network Defined in the HDM-4 Model

C – 2 – VOC Component for Addis – Woldiya Road Network

Road Section		Addis - Debre Berhan							
Vehicle Type	Year	VOC Components							
		Fuel	Lubricating Oil	Tires	Spare Parts	Maint. Labor	Capital	Crew	Overhead
Heavy Bus/ LDB	2016	3,804.87	168.02	390.65	3,716.31	490.72	896.65	623.93	495.14
	2017	3,801.30	167.99	390.80	3,716.70	490.75	896.55	623.87	495.09
High Roof	2016	1,823.95	56.36	135.68	2,612.23	117.46	576.46	584.21	54.39
	2017	1,823.05	56.35	135.80	2,612.36	117.46	576.41	584.16	54.39
Medium Bus	2016	2,609.42	117.18	332.13	1,552.66	340.75	594.17	633.04	85.86
	2017	2,607.32	117.16	331.86	1,552.83	340.77	594.09	632.96	85.85
Mini Bus	2016	1,823.95	56.36	135.68	2,146.37	117.46	473.02	584.21	54.39
	2017	1,823.05	56.35	135.80	2,146.48	117.46	472.97	584.16	54.39
Road Section		Debre Berhan - Debre Sina							
Heavy Bus/ LDB	2016	3,805.35	168.02	392.12	3,718.05	490.84	896.56	623.87	495.09
	2017	3,800.79	167.99	392.00	3,718.65	490.88	896.50	623.83	495.06
High Roof	2016	1,822.47	56.34	136.17	2,612.84	117.48	576.36	584.11	54.38
	2017	1,821.40	56.33	136.19	2,613.04	117.48	576.29	584.04	54.38
Medium Bus	2016	2,608.11	117.17	331.98	1,553.43	340.84	594.30	633.19	85.88
	2017	2,606.04	117.15	331.71	1,553.69	340.87	594.12	632.99	85.86
Mini Bus	2016	1,822.47	56.34	136.17	2,146.87	117.48	472.93	584.11	54.38
	2017	1,821.40	56.33	136.19	2,147.04	117.48	472.87	584.04	54.38
Road Section		Debre Sina - Shewa Robit							
Heavy Bus/ LDB	2016	3,854.06	168.41	409.97	4,599.99	547.94	899.00	625.57	496.44
	2017	3,856.22	168.43	411.04	4,690.64	553.50	899.46	625.89	496.69
High Roof	2016	1,819.82	56.31	141.81	2,919.26	124.82	581.59	589.41	54.88
	2017	1,817.61	56.29	141.96	2,950.75	125.56	582.43	590.26	54.95
Medium Bus	2016	2,600.66	117.11	331.32	1,944.00	382.75	603.49	642.97	87.21
	2017	2,597.48	117.08	330.95	1,984.14	386.81	604.69	644.25	87.38
Mini Bus	2016	1,819.82	56.31	141.81	2,398.65	124.82	477.22	589.41	54.88
	2017	1,817.61	56.29	141.96	2,424.53	125.56	477.91	590.26	54.95

Road Section		Shewa Robit - Combolcha							
Vehicle Type	Year	VOC Components							
		Fuel	Lubricating Oil	Tires	Spare Parts	Maint. Labor	Capital	Crew	Overhead
Heavy Bus/ LDB	2016	3,817.73	168.12	395.55	3,728.77	491.57	896.80	624.04	495.22
	2017	3,812.10	168.08	395.50	3,733.12	491.87	896.73	623.99	495.18
High Roof	2016	1,824.77	56.36	137.43	2,616.56	117.57	576.72	584.47	54.42
	2017	1,823.35	56.35	137.49	2,618.07	117.60	576.66	584.41	54.41
Medium Bus	2016	2,612.36	117.20	332.55	1,558.18	341.38	595.14	634.08	86.00
	2017	2,609.12	117.18	332.14	1,560.10	341.60	595.04	633.97	85.99
Mini Bus	2016	1,824.77	56.36	137.43	2,149.93	117.57	473.23	584.47	54.42
	2017	1,823.35	56.35	137.49	2,151.17	117.60	473.18	584.41	54.41
Road Section		Combolcha - Dessie							
Heavy Bus/ LDB	2016	3,801.77	167.99	407.10	4,794.10	559.77	898.79	625.43	496.32
	2017	3,798.73	167.97	408.13	4,934.16	568.17	899.83	626.14	496.89
High Roof	2016	1,787.15	55.96	139.36	2,986.70	126.39	580.97	588.78	54.82
	2017	1,780.91	55.90	139.29	3,035.36	127.51	582.68	590.52	54.98
Medium Bus	2016	2,562.83	116.81	326.66	2,029.96	391.40	603.24	642.71	87.17
	2017	2,553.65	116.73	325.57	2,091.99	397.54	605.39	645.00	87.48
Mini Bus	2016	1,787.15	55.96	139.36	2,454.06	126.39	476.72	588.78	54.82
	2017	1,780.91	55.90	139.29	2,494.05	127.51	478.12	590.52	54.98
Road Section		Dessie - Woldia							
Heavy Bus/ LDB	2016	3,861.92	168.48	410.11	4,537.09	544.05	898.84	625.46	496.35
	2017	3,855.58	168.42	410.77	4,667.83	552.10	899.30	625.78	496.60
High Roof	2016	1,821.98	56.34	141.77	2,897.41	124.31	581.08	588.89	54.83
	2017	1,816.84	56.28	141.80	2,942.83	125.37	582.05	589.88	54.92
Medium Bus	2016	2,607.10	117.16	332.13	1,916.15	379.90	602.97	642.42	87.13
	2017	2,598.07	117.09	331.02	1,974.04	385.79	604.28	643.81	87.32
Mini Bus	2016	1,821.98	56.34	141.77	2,380.69	124.31	476.80	588.89	54.83
	2017	1,816.84	56.28	141.80	2,418.01	125.37	477.60	589.88	54.92

Table C – 2 Vehicle operating cost (VOC) components given for the Addis – Woldiya Road Network Defined in the HDM-4 Model