



ST. MARY'S UNIVERSITY

SCHOOL OF GRADUATE STUDIES

DEPARTMENT OF BUSINESS ADMINISTRATION (MBA PROGRAM)

**EFFECTIVENESS OF TOLL ROADS IN ETHIOPIA: A CASE
STUDY OF ADDIS ABABA-ADAMA TOLL ROAD**

Prepared By: Nigist G/Meskel

ID No.SGS/0057/2012A

January, 2022

Addis Ababa, Ethiopia

ST. MARY'S UNIVERSITY

SCHOOL OF GRADUATE STUDIES

DEPARTMENT OF BUSINESS ADMINISTRATION (MBA PROGRAM)

**EFFECTIVENESS OF TOLL ROADS IN ETHIOPIA: A CASE
STUDY OF ADDIS ABABA-ADAMA TOLL ROAD**

**A Thesis Submitted to the School of Graduate Studies of St. Mary's
University for the Partial Fulfillment of the Requirements for the Degree of
Master of Business Administration (MBA)**

Prepared By: Nigist G/Meskel

ID No.: SGS/0057/2012A

Advisor: Tewodros Mekonnen (PhD)

January, 2022

Addis Ababa, Ethiopia

ST. MARY’S UNIVERSITY

SCHOOL OF GRADUATE STUDIES

DEPARTMENT OF BUSINESS ADMINISTRATION (MBA PROGRAM)

The thesis entitled “Effectiveness of Toll Roads in Ethiopia: A Case Study of Addis Ababa-Adama Toll Road” is conducted by Nigist G/Meskel. It is submitted as a partial fulfillment for the requirement for the Master of Business Administration to the School of Graduate Studies of St. Mary’s University. We therefore, testify that the thesis satisfies the standards of the University and henceforth approved by the Members of the Board of Examiners.

Approved by the Members of the Board of Examiners

_____ Signature _____ Date _____

Name of Advisor

_____ Signature _____ Date _____

Name of External Examiner

_____ Signature _____ Date _____

Name of Internal Examiner

_____ Signature _____ Date _____

Declaration

I declare that the thesis entitled “Effectiveness of Toll Roads in Ethiopia: A Case Study of Addis Ababa-Adama Toll Road” is my original work and it is not previously presented in partial or full form for any degree award at any university and/or academic institution. I affirm that all the secondary sources used in the thesis are duly acknowledged.

Name: Nigist G/Meskel

Signature _____

Date _____

Certification of Approval

I attest that the works contained in the thesis entitled “Effectiveness of Toll Roads in Ethiopia: A Case Study of Addis Ababa-Adama Toll Road” are the original works of Nigist G/Meskel and conducted under my supervision.

Supervisor’s Name: Tewodros Mekonnen (PhD)

Signature _____

Date 14th January 2022

Acknowledgement

I would like to express my sincere gratitude to my advisor, for his continuous support, guidance and thorough corrections in doing this study. I would also like to acknowledge the study participants for their cooperation in filling the questionnaires. My appreciation and special thanks also go to all whose moral support and suggestions were so valuable to my study.

Nigist G/Meskel

Contents

Declaration.....	iii
Certification of Approval	iv
Acknowledgement.....	v
List of Acronyms.....	viii
List of Tables	ix
List of Figures.....	ix
Abstract.....	x
Chapter One	1
Introduction.....	1
1.1. Background of the Study	1
1.2. Statement of the Problem.....	2
1.3. Objectives of the Study	4
1.4. Research Questions.....	5
1.5. Significance of the Paper	5
1.6. Scope of the Study	5
1.7. Limitations of the Study.....	6
1.8. Organization of the Paper	6
Chapter Two.....	7
Review of Related Literature.....	7
Introduction.....	7
2.1. Review of Theoretical Literature	8
2.2. Review of Empirical Literature.....	33
2.3. Conceptual Framework of the Study	34
Chapter Three	36
Research Methodology and Methods of the Study.....	36
3.1. Research Approach	36
3.2. Research Design.....	36
3.3. Data Sources and Data Types	36
3.4. Sampling Technique and Sample Size Determination.....	37
3.5. Data Collection Tool.....	37
3.6. Methods of Data Analysis and Interpretation	37
3.7. Ethical Considerations of the Study.....	38

Chapter Four	39
Data Analysis and Interpretation	39
4.1. Introduction.....	39
4.2. Background Summary of Addis Ababa-Adama Toll Road	39
4.3. Factors Related to the Effectiveness in its Condition and Economic Domain.....	40
4.4. Driving Factors to Use Addis- Adama Toll Road.....	41
4.5. Effectiveness of Toll Road in its Condition and Economic Domain	50
Chapter Five	57
Summary, Conclusions and Recommendations	57
5.1. Summary	57
5.2. Conclusions.....	57
5.3. Recommendation	57
References	59
APPENDICES	i
Appendix A: Questions to Stakeholders Interview	i
Appendix B: Questions to Drivers and Public Opinion Interview.....	ii

List of Acronyms

WB	.....	World Bank
ERA	.....	Ethiopian Roads Authority
PPP	.....	Public – Private Partnership
RSDP	.....	Road Sector Development Program
IMF	.....	International Monetary Fund
BOOT	.....	Build, Own, Operate and Transfer
BOT	.....	Build, Own & Transfer (Build, Operate & Transfer)
BTO	.....	Build, Transfer & Operate
BOO	.....	Build, Own & Operate0
DBFO	.....	Design Build Finance Operate System
DBOM	.....	Design Build Operate Maintain System
IRR	.....	Internal Rate of Return
RFA	.....	Road Fund Administration
VOC	.....	Vehicle Operating Cost
HDM	.....	Highway Design & Maintenance
TRL	.....	Transport Research Laboratory
ROW	.....	Right of Way
EU	.....	European Union

List of Tables

- Table 4.1 : Traffic Volume of Addis Ababa-Akaki Section
- Table 4.2 : Traffic Volume of Addis Ababa – Modjo Section
- Table 4.3 : Traffic Volume of Addis Ababa – Adama Section
- Table 4.4 : Estimation of Hourly Income
- Table 4.5 : Estimation of Savings in Travel Time by using the Toll Road
- Table 4.6 : The Effect of Road Roughness on Vehicle Operating Costs
- Table 4.7 : Accident of Personnel by Category
- Table 4.8 : Accident Trend of Ease Shoa Zone
- Table 4.9 : List of Stake Holders Interviewed
- Table 4.10: Public Opinion Survey





List of Figures

- Fig. 1 : Conceptual Frame Work

Abstract

Toll road operation is a business that involves constructing regionally indispensable roads more rapidly than would otherwise be possible, using loans to prevent road construction from being retarded due to financial difficulties in the public works budget. Ethiopia's transport system is one of the lowest in the world and is inadequate to support an efficient production and distribution system. Much of the problem of road construction and maintenance is rooted to the institutional aspects of agencies responsible for roads and the absence of a system ensuring adequate financing for road conservation. Traditionally, the Government has been the great provider of roads, constructing the road network and putting it at the disposition of all citizens and the use of roads has been largely free of charge. Unlike most other types of infrastructure, roads are neither built nor maintained by those who use them to market output or services. Therefore, this study has examined the effectiveness of toll roads in Ethiopia by showing the case of Addis Ababa-Adama express way in order to demonstrate the building of a toll road how it does bring sustainable flow to preserve the road in good condition. In order to address the stated objectives in this paper, mixed research approach was used and data were collected with the help of interviews and document analysis techniques are used. Based on the case study made on Addis Ababa-Adama toll road, results show that toll road system in Ethiopia is effectively implemented so that the vehicles operating costs are reduced which contributes to the national economy by saving extra expenses of imported items like fuel, tire and spare parts, and saving the idle time wasted by travel delay due to traffic congestion and deteriorated road. However, from the case study, it is observed that construction of toll road requires huge fund-raising, so that the public-private partnership will ensure reliable initial fund and efficient toll road management.

Key words/terms:

-  Toll Roads
-  Road Fund
-  Road Construction
-  Addis-Adama Toll Road

Chapter One

Introduction

1.1. Background of the Study

Most developing countries are in urgent need of highway construction programs. The primary objective of road infrastructure development project is to generate benefits to the users, such as, convenience, cost savings, reduced travel time, and thereby accelerating economic development in the influence area of the road project. No infrastructure project should be undertaken unless the economic benefits criteria and economic viability is fully established prior to the decision on investment in road projects (Chakraborty, 1996).

Ethiopia has one of the lowest road densities in Africa. According to the data obtained from Ethiopian Roads Authority (ERA), the classified road network consists of only about 42,429 km of roads, comprising a population of about 100 million, Ethiopia's road density is 40.3 km/1000 sq.km or about 0.56 km per 1000 population, a road network of the lowest density when compared with the Africa's average of over 50 Km/1000 sq. Km. It is estimated that, only about 32 percent of the population is within 5 km of all-weather roads. Road infrastructure in Ethiopia had reached such a level of deterioration by the early 1990s that it had become a serious hindrance to the Government's efforts in reviving the economy. It was estimated that only about 14% of the Federal roads and 25% of the regional roads were in good condition in 1997 (ERA, 2003).

As part of the effort to overcome this problem, the Government of the Federal Democratic Republic of Ethiopia has launched a Road Sector Development Program (RSDP) to be implemented in different phases. The first phase focuses on the rehabilitation, upgrading and backlog clearance of maintenance of the existing road network with external financial assistance from multilateral and bilateral sources and the next phases focused on expansion of network and routine maintenance (ERA, 2007).

After all these efforts and huge amount of money is invested, the conditions of the roads are still not satisfactorily improved at the end of 2007 except in the Trunk Roads². Even these Trunk Roads which have been rehabilitated and/or upgraded to a good condition have started to

deteriorate even before the completion of the program. At the end of RSDP-II (2007), it is estimated that only about 50% of the Federal roads and 46% of the Regional roads are in good condition (ERA, 2007).

Tolls on highways and bridges could increase funds for construction and maintenance of transportation infrastructure, and reduce congestion and air pollution by giving residents incentives to use the highway system more efficiently. Tolls generally take two forms. Flat rate tolls remain constant throughout the day (though they may vary by type of vehicle). Time-varying (congestion) tolls impose higher rates when traffic is heavy, and lower rates during off-peak times. Time-varying tolls may change on a well-defined schedule-for example, a constant high rate during 6:00-9:00 a.m. and 4:00-7:00 p.m. on weekdays and a constant lower rate at all other times (ERA, 2003).

Decisions to implement transportation projects such as toll roads and express lines are generally made through the use of regional travel demand forecasting models and long-range transportation planning. It is also important, however, to empirically monitor and evaluate the effectiveness of toll roads condition and economic domain. In addition, toll roads are required to be evaluated to mitigating traffic congestion and in improving travel times, after the implementation. In this research, therefore, focus is given to analyze the effectiveness of toll roads in Ethiopia considering Addis Ababa-Adama toll road. In addition, the study tried to identify the driving factors to use the toll road as well as factors related to complaints in the toll road system (ERA, 2007).

1.2. Statement of the Problem

Traditionally, highways in Ethiopia have been viewed as a public convenience that must be financed and operated by the public sector. But the Govt. faced funding constraints in later stage development because of chronic budgetary problems. Since then a number of projects have been implemented, particularly with the collaboration of China government. Consequently, it has become increasingly accepted that highways should be built, financed, and operated by different stakeholders and that road user should pay toll for using them. Moreover, users are more likely to accept the concept of paying for roads owned by private sector that builds highways faster and more efficiently than state-owned firms (ERA, 2007). However, the Ethiopian Road Authority (ERA) continues to carry out regulatory functions including monitoring the projects, setting up

quality norms, etc. During the specified period prescribed in PPP contract, the private firm operates and maintains the infrastructure created, thereby assuring road users of adequate quality services, safety, and security standards on the toll way stretches. Thus, the system of toll road has been operating for quite some time in Ethiopia and has benefitted all passengers travelling on toll roads. While the toll collection and recovering the project development costs are the key objectives of private entities, the issues arising out of providing quality services to the toll road commuters is the matter of highest concern and need to be addressed adequately.

It is mandated to ensure that the highway users are provided with quality services for the toll they pay. It ensures that the road contractor and developers maintain the standards that they are supposed to, according to the concession agreement between the contractors and ERA, as after all the commuter is levied toll for not just the highway usage but certain services as well.

The toll road system has been historically accounted for the bulk of the financing of highway network. By building a toll roadway, it is possible to provide a number of improved services to the road users, which can be measured in order to ensure that they deliver the outcomes that are envisaged. Since recent years back toll roads have been gaining popularity in Ethiopia. A few years after the toll road projects are put into operational mode, it is expected to see a lot of traffic every day comprising a variety of vehicles ranging from personal vehicles, light and heavy commercial to multi axle trucks and so on.

Chakraborty (1996) has noted that toll road infrastructure is one of the most strategic transportation infrastructure facilities, therefore the condition of toll road infrastructure must continue to be properly maintained so that the level of road service is maintained. To maintain the condition of the toll road in good condition, a good and comprehensive road management and maintenance system is needed. Maintenance measures and capacity building for toll roads that are carried out regularly and continuously will maintain the quality of the road. However, the pavement that has been traversed by traffic will experience a decrease in quality, both structural and functional. Road maintenance is carried out continuously with good planning and sufficient funding, and selection of the right type of road maintenance is needed to overcome the decline in road quality.

Despite the aforementioned grounds of the study, there are gaps in research related to the implementation and evaluation of toll roads. Specifically, although Ethiopia has been implementing toll roads, there are meager research output in Ethiopian context that assess how toll roads are being constructed, used and evaluated. Besides, there is no effective or widely accepted methodology for evaluating the performance, based on travel time or travel-time reliability indices, of a toll road and roads in its vicinity. Furthermore, the majority of the researches which have been done in the past have neglected the spatial and temporal effects of large-scale transportation projects on the Toll road's traffic and system performance. Given this background, the present research aims to assess how far Addis Ababa-Adama toll road is effective in its road condition and economic domains. It tried to study how the toll road reduces travel time and improving travel time reliability on links within its vicinity, using data for the Addis Ababa-Adama express way, Ethiopia. The purpose of this research therefore, is to examine the effectiveness of toll roads on the region's traffic using travel time and travel time reliability measures, over space and time. In this regards, the travel time reliability-based performance evaluation methodology is a useful tool for practitioners to use in comparing the performance of other toll roads/managed line facilities over years of their operation.

However, the practice of the construction of toll roads in Ethiopia is very limited and no further study was done in this area. Hence this paper will demonstrate the gap and help researchers to enhance an initiation for more study in the topic and this study can be used by other scholars and broad the knowledge in Ethiopia.

1.3. Objectives of the Study

1.3.1. General Objective

The general objective of the study is to examine the effectiveness of toll roads in the case of Addis Ababa-Adama express way, Ethiopia.

1.3.2. Specific Objectives

The followings are the specific research objectives that the study plans to achieve:

1. To identify the driving factors to use Addis- Adama toll road.
2. To examine factors related to existing toll road system.
3. To assess the toll road effectiveness in its condition and economic domain.

1.4. Research Questions

1. To what extent does the Addis Ababa-Adama toll roads' is effective in its the domain of condition and economy?
2. What are the factors that lead to complaints raised in the toll road system in the study area?
3. What are the major driving factors that push user to use Addis Ababa- Adama toll road?

1.5. Significance of the Paper

The findings of the study my benefits different stakeholder involved in toll road management and use. In this regards, the following are the major benefits of the study. Primarily, the findings of the study may help the management of Addis –Adama toll to consider how far the toll road is effective and identify important intervention areas to further increase road the effectiveness of the road. Secondly, the study identified the major sources of complains of road users that the management body of the road must deal with it. Hence, road authorities can be benefited as the fining indicates users complain. The findings of the study can also be an input for making new toll road projects in the country more effective in their management and evaluation. Finally, it is indicated in the review of empirical literature that there are very few studies conducted on the topic before. In this regards, the findings stated in the study can be used as an initiation point to study the topic further by other scholars and researcher and broad the knowledge on the topic in Ethiopia more broad and holistic.

1.6. Scope of the Study

The study is delimited in four areas. Conceptually, the study focused on the assessment of the effectiveness of Addis-Adama toll road in Ethiopia. The study is limited to the Toll road in Ethiopia specifically Addis-Adama toll road and only addresses its effectiveness. Geographically, the study considered Addis Adama Toll road as other toll roads are implemented very recent and could be so early to assess their effectiveness. In time dimension, the study has considered five years data in assessing the effectiveness of the toll roads. Methodologically, the study employed mixed methods research approach as this approach provides a wider perspective to assess the effectiveness of toll road in the case study.

1.7. Limitations of the Study

The study is only limited to Addis- Adama toll road found in Ethiopia. So, all the result of this study is mainly applicable to Addis-Adama toll road but doing further studies it can also be used for other toll roads in Ethiopia. Also, the main objective of the study is its effectiveness which limits the study to only this area neglecting other areas of the toll system.

1.8. Organization of the Paper

This paper is hence organized/composed of five chapters. Chapter one is introduction to the study. It contains background of the study, problem statement, objective of the study, significance of the study, scope of the study, and organization of the paper. Chapter two, deals with the review of related literatures. Chapter three presents the methodology of the study. Chapter four covered data analysis and interpretation; whiles Chapter five contains summary of the study findings, conclusions, and recommendations.

Operational definition of the study

Step 1: I have narrowed-down the driving factors of toll road which might positively or negatively affect the effectiveness. (Background study and Literature review)

Step 2: Examine the severe level of the factors that affect the road in the negative way. Here I have pointed out the factors that have to be dealt immediately to sustain the effectiveness of the road.

Step 3: I have also assessed the connection of those factors to the condition and economic domain of the toll road.

Step 4: Then I have made analysis on the data collected from the participants on the interview and questionnaire.

Step 5: Based on the above procedures I have drawn summary, conclusion and recommendation for the effectiveness o the road.

Chapter Two

Review of Related Literature

Introduction

The literature review began with a search for any resources that had the potential for further review. International experiences on privatizing road infrastructures had been studied and studies about toll roads, especially those conducted by the World Bank (WB) for different developed, developing or transition countries in Asia and Latin America, and Sub-Saharan African Countries have been reviewed. Studies and experiences of establishment of road funds for different countries have also been reviewed. The literature review and sources of data focused primarily on the World Bank practice and experience.

Toll road operation is a business that involves constructing regionally indispensable roads more rapidly than would otherwise be possible, using loans to prevent road construction from being retarded due to financial difficulties in the public works budget. The operator borrows the capital needed to construct and operate the road, and the funds should be repaid with income from users tolls over a definite period -- though exceptionally, there are also cases of permanent toll roads (Kuramani et al., 1999).

According to a study made by the World Bank for Asian Toll Road Development (Kuranami, Winston, Srivier, Iwasaki, & Shigeru, 1999), many developed and developing countries throughout the world have accumulated a wide variety of institutional, regulatory, and financial experience in building and operating toll road systems. The study stated that around the world there's an increase in toll roads because tax financing is not producing good enough highways and taxpayers don't accept tax increment because they don't get highway value for the tax they pay. They are frustrated by congestion on inadequate overloaded roads & tie-ups which cost much in wasted fuel, missed meetings, downtime from work, and unnecessary pollution and accidents.

In many developing countries, financial difficulties in public works are an inevitable fact of life. Especially in the motorway field, demand for main road construction tends to be intensely

concentrated in a short period prior to the people's attainment of a substantial level of income. The degree of financing difficulty in these cases can be acute.

Traditional financing approaches have depended on an all-inclusive system backed by the credibility of the government. As the limits of this approach have become apparent, more and more countries have seen the advantages of converting to new financing systems, where the all-inclusive credit guarantee offered by the state treasury is replaced with limited credit guarantees where investors from the private and public sectors are invited to contribute on the basis of the credit-worthiness of each project. A growing number of countries are seeking to reform their entire system of public finance by using these new approaches that aim to activate private-sector vitality (Fisher & Babbar, 1998). Accordingly, toll roads are an important means to fill the gap between the demand for construction of trunk roads in a given region and the financial ability to meet that demand. (Kuramani et al., 1999).

2.1. Review of Theoretical Literature

2.2.1. Toll Roads

Tolling is a way to build and rebuild roads without having to resort to taxes. Toll roads dip into the capital markets for their funds, not into taxpayers' pockets. It's the fairest system and the most efficient and variable toll rates will allow flexible and responsive pricing of a commodity that is especially scarce in certain times and places. Modern electronics now allow tolls to be collected at highway speed, which is cheaper, cleaner and more convenient than stopping at an old-style toll plaza (Kuramani et al., 1999).

From the very day a road is opened for traffic, its pavement begins deteriorating from the stresses of the weather and the pounding of vehicles. Cracks need filling, surfaces painted, signs and lighting maintained, debris removed, grass mowed, drains unclogged, policing conducted - all the time. Hence, the road users need to pay for the cost. Tolls are not taxes but the price for a service. Now that service may be well or poorly provided. It may, or may not, be considered value for money. But the user-pays principle of tolls - that those who benefit from a road pay directly for its use - is good (Heggie & Vickers, 1998).

On the contrary, roads in the past have been paid for different ways. Highway infrastructure traditionally has been funded through general government budgets and dedicated taxes and fees rather than tolls. In most industrial countries 90 percent or more of highway kilometers are publicly funded; in developing countries governments often bear the entire cost (Poole & Samuel, 2006).

However, the limited resources available through traditional government funding sources has led to increasing interest in private toll roads as an alternative way of meeting highway needs. Several additional factors have contributed to the renewed interest in private tolling, including a worldwide trend towards commercialization and privatization of state-owned enterprises; the success of public toll roads in raising capital; and advances in tolling technology, making tolling more efficient and convenient.

2.2.2. History of Toll Roads

Private toll roads have a long history in the United States and Europe. In the United States the concept of private toll roads is gaining renewed interest after decades of inactivity. In the first half of the nineteenth century, private toll roads outnumbered public roads in the United States. By the mid-nineteenth century more than 10,000 miles of private toll roads were in operation. The public sector provided support through land grants and subsidies, and public roads were built primarily to support the network of private roads.

During the late nineteenth and early twentieth centuries the growth of rail transport and problems with toll evasion caused a decline in private toll roads. In the 1930s, however, some states began developing public toll road programs in response to the growing needs of commerce, the dramatic growth in automobile ownership, and the absence of a major federal highway program (Fisher & Babbar, 1998).

2.2.3. Functions of Toll Roads

Toll roads can be classified as congestion relievers, intercity arteries, or development roads (Estache, Romero, & Strong, 2000). A facility's function is a major determinant of its physical characteristics and cost, as well as its market demand and revenue potential. Congestion relievers are relatively short roads that are constructed to relieve heavy traffic congestion on existing urban routes. Congestion relievers are generally inexpensive to build relative to their revenue potential because they tend to be short and to serve heavy traffic demand.

Intercity arteries are built to improve access between major metropolitan areas. Intercity arteries are generally expensive to construct because they are often long, high-capacity roads. However, they may benefit from heavy traffic in certain corridors.

Development roads link relatively remote areas targeted for economic development with urban centers or major transportation routes. Development roads can provide a significant economic stimulus to the regions they serve. However, they often require future economic development to generate sufficient traffic in order to be economically viable. Thus development roads are often speculative from an economic standpoint.

2.2.4. Advantages and Disadvantages of Tolling

Richard Robinson has put the advantages and disadvantages of tolling roads as follows (Robinson, 2008):

Advantages:

Road Pricing: Costs are charged to users specifically in relation to the use made of a particular facility, and charges can reflect use by different types of vehicle, carrying different loads, at different time of the day. Thus, each class of road user pays in relation to the costs they impose on the road network.

Cost-recovery: It is possible to set a toll to enable not only the recovery of all road costs, including financial costs, but also generate a revenue surplus that can be re-invested in the network.

Quality Management: Potential users of the toll road will pay the toll in addition to all the other taxes and levies that are included in road user charges, but only so long as they consider that improvement in service quality warrants the added expense.

Administration of Toll Roads: Toll facilities may be administered either by public or private sector administrations and agencies.

Disadvantages:

Double-Taxation: The presence of a toll road alongside those that are free ‘implies an element of double taxation. If tolls are imposed without any reduction in the real value of general road users charges, this is tantamount to imposing an additional general revenue taxation on transport.

Regulation: Where there are no free ‘substitutes for the toll road, an effective monopoly may exist that should be subject to regulation. A similar issue may arise if non-tolled roads are allowed to deteriorate, resulting in higher costs to road users. This will then strengthen artificially the position of toll road operators.

Efficiency of revenue collection: Tolling is a relatively inefficient method of revenue collection from the public finance point of view. The application of tolls may also result in cost increase to the road sub-sector. In any case, tolling is only likely feasible on a very small portion of the road network.

2.2.5. Commercialization of Roads

Governments are facing dramatic growth in highway needs, both for new facilities and for maintenance and rehabilitation of existing facilities. This demand is particularly strong in congested urban areas and regions experiencing rapid economic and population growth (Fisher & Babbar, 1998). There is much, and growing, interest in many parts of the world in the use of private capital for the provision and operation of transport facilities. According to the World Bank, there are two main reasons for this (Heggie & Vickers, 1998).

First, changes in fiscal policy are placing increasing constraints on the funds available for investment by the public sector. With taxation revenues constrained by political, economic and social considerations, there has been, and will continue to be, a reduction in public sector expenditure. Many countries are seeking to limit public expenditure, and some are required to do so under support agreements with the International Monetary Fund, the IMF. In many parts of the developing world, the costs of servicing debts have come to account for a major part of national expenditure, leaving little finance available to support new capital investment in infrastructure. Yet there is a continuing need to invest in roads, particularly in those countries enjoying strong economic growth or those with a need to improve accessibility in order to encourage economic growth, and thereby welfare improvements. The use of private finance is seen as an effective way of satisfying both these needs - limiting public sector expenditure while continuing to invest in improved and new roads.

The second reason is a view that the private sector can be more efficient, and innovative, in managing the design, construction and operation of roads, thereby reducing the costs of their provision. Most government departments do not have a commercial orientation, and general

budget financing is a failure for commercial undertakings. Government budgets were not designed to finance a major business. Roads are big business and should be managed like a business. They should be brought into the marketplace and put on a fee-for-service basis. In other words, the road sector should be commercialized. This involves creating an arm's-length agency to manage at least the main road network on a commercial basis, introducing an explicit road tariff, making sure that road users pay for extra spending on roads, depositing the proceeds from the road tariff into a road fund, appointing a representative public-private board to oversee management of the road fund, establishing a small secretariat to manage the day-to-day affairs of the road fund, and ensuring that all works financed from the road fund are subject to rigorous technical and financial auditing (Heggie I. , 1995).

2.2.6. The Four Basic Building Blocks

According to the World Bank Study (Heggie & Vickers, 1998) commercialization requires complementary reforms in four important areas, usually called the Four Basic Building Blocks. The key concept behind the reform agenda is commercialization: bring roads into the market place, put them on a fee-for-service basis, and manage them as a business. But since roads are a public monopoly and their ownership is likely to remain in government hands for some time, commercialization requires complementary reforms in four other important areas, referred to as the four basic building blocks. They focus on:

1. Establishing responsibility for managing roads by clearly assigning roles.
2. Creating ownership of roads by involving users of roads in their management to encourage better management and to win public support for more road funding, while constraining road spending to what is affordable.
3. Stabilizing road finance by securing an adequate, continual flow of funds.
4. Strengthening management of roads by introducing sound business practices and enforcing managerial accountability.

The four basic building blocks are the core of reform. They are interdependent and should be implemented together. If not, reform will be only partly successful. The management and financing of roads cannot be reformed without establishing who is responsible for what. The financing problem cannot be solved without the strong support of road users.

The support of road users cannot be won without taking steps to ensure that resources are used efficiently. And resource use cannot be improved without controlling monopoly power, constraining road spending, and enforcing managerial accountability. The reforms can be introduced in different ways, that is, the content of each building block can differ, depending on country circumstances. They can move sequentially or in parallel, and both the sequencing and the pace of reform can vary. But in the end all four building blocks should be in place to ensure that the reform agenda is sustainable and does not drift back to the status quo ante (Heggie & Vickers, 1998.)

2.2.7. Assigning Responsibility

The first building block concentrates on creating a coherent organizational structure for managing different parts of the road network. This requires clearly assigning responsibility among different government departments, different levels of government, and individual road agencies. The arrangement must be based on an accurate road inventory, functional classification of roads, designation of appropriate road agencies, formal assignment of responsibility to each road agency, and clarification of the relationship between the road agency and the owner or parent ministry. Responsibilities to be assigned include those for operating, maintaining, improving, and developing the road network; for traffic management; for handling general accidents and incidents; for road accidents caused by the road agency's own negligence; and for adverse environmental impacts associated with roads and road traffic.

2.2.8. Creating Ownership

The second building block is concerned with the concept of ownership-building constituencies with a strong vested interest in sound road management. Major policy reforms in the road sector cannot succeed without the active support of a large and vocal constituency willing to argue for better road management and additional, affordable road financing.

The obvious constituents are the stakeholders: road users themselves, together with the business community, farmers, and other people dependent on a well-functioning road network. Given that current financial allocations for roads are erratic and well below the levels needed to keep the road network in stable condition over the long term, strong stakeholder support for more road funding must be built up if reform is to succeed. The usual mechanism for winning their support is by involving them in road management. Stakeholders agree to work in partnership with the

government to strengthen road management and financing in return for a seat at the table where decisions are made about how roads are to be managed and how funds are to be spent.

2.2.9. Ensuring Secure and Stable Financing

The third building block concentrates on establishing an adequate and stable flow of funds. Without ensuring secure and stable financing, none of the above reforms will be sustainable. It is obvious that governments in developing and transition economies are seriously short of fiscal revenues. Budget allocations for road maintenance are much below the optimum requirements, and agreed allocations are often cut with little notice in response to short-term fiscal crises. Funds for road improvement are likewise in extremely short supply, particularly in countries in need of extensive road modernization. Given these fiscal conditions, governments cannot meet financing needs by allocating additional revenues from the consolidated fund. Additional funds must come from heightened revenue mobilization. But if road-user charges are raised, there is no guarantee that the additional revenues will be allocated to roads, nor that they will generate a stable flow of funds. Furthermore, traditional earmarking is not a viable solution. It adversely affects management of the government's overall budget and is rarely sustainable.

An added concern is that existing financing mechanisms do little to strengthen market discipline either by managing demand or by improving the efficiency of the road agency. Solving the financing problem calls for a radically new approach, the concept of commercialization. With strong stakeholder support roads can be put on a fee-for-service basis to generate the added revenues needed to support operation, maintenance, and improvement and to separate road financing from the vagaries of the government's budget.

2.2.10. Introducing Sound Business Practices

The fourth building block focuses on creating a commercially oriented road agency. Road users involved in the management of roads generally press for the introduction of sound business practices to ensure that their constituents get value-for-money from road spending. Road users expect clear management objectives, an effective management structure, competitive terms and conditions of employment, consolidated budgets, commercial costing systems, and effective management information systems. Introducing sound business practices changes managerial incentives. It brings pressure to dispose of in-house plant and equipment (or to use it more efficiently), to arrange for more work to be done under contract, to control vehicle overloading,

and to improve road safety. These issues have become systemic sources of inefficiency in the road sector because current management procedures in most countries provide little incentive to do anything about them.

2.2.11. Private Finance for Roads

In many countries, there has been considerable interest in recent years in the private finance of road infrastructure. The expectation is that involvement of the private sector, on a competitive basis, in the financing and management of roads will bring increased effectiveness and efficiency, resulting in greater value for money (Robinson, 2008).

Private financing includes private concessions, public toll roads, private public partnership, and community fund raising by targeting local taxation. The issue of private financing in the road sector is normally related to concessions. A concession is the award of a right or a license to build, own and operate a public service for a given period. In financial terms, concession financing is the design, arrangement and implementation of a financial package for a major project, in which the developers will consider the future cash-flow of the project (Farrell, 1994).

2.2.11.1. BOOT, BOT, BOO and BTO

There are various structures under which the private sector can participate, as a concessionaire, in the provision and operation of highways. Many different terms are used for private financed road projects as described below (Fisher & Babbar, 1998).

BOT (build, own and transfer or build, operate and transfer) is the most common acronym for the typical approach, in which the private sector finances, designs, builds, maintains and operates a facility for a fixed term before transferring it to the owner (host government).

BOOT (*Build, Own, Operate and Transfer*) scheme is the most common, where a company is awarded a concession to build a scheme for which it obtains the necessary finance, and which it owns, operates and maintains for a finite period. At the end of that period it transfers ownership to a public agency, usually the Principal.

Although BOOT schemes are often referred as BOT, strictly BOT (*Build, Operate, Transfer*) schemes are those in which the private sector has a concession to operate without necessarily fully owning the scheme, possibly because the land is acquired by and remains under the

ownership of a public authority. Under a *Build, Own Operate*, BOO, scheme, the facility remains in the ownership of the concession company, forever.

A further variant is the *Build, Transfer, Operate*, BTO, scheme under which the private sector transfers ownership on completion of the scheme but has a continuing right to operate. The primary reason for such schemes is to protect the concessionaire against some potential liabilities, which can be a particular problem in the USA.

Central to BOOT, BOT and BTO schemes is the principle that the private sector takes its reward through direct user charges, tolls in the case of roads. A second key principle is that at some time the project reverts to the public sector. Although there is no reason why private highway schemes should not remain private in perpetuity, few do; this is in contrast to other utilities or some rail projects. There are a number of triggers for the return. Some relate to financial performance, in such a way that it will revert when all outstanding debt has been repaid. Others revert at a particular point in time - providing, for example, a thirty year concession. Many concession agreements allow for the project to revert to public ownership should the concession company fail.

The key difference with regards to funding, between a BOT scheme and the more traditional government funded approach, is the means by which revenue is raised. A BOT scheme obtains its initial investment through two routes: equity investments (typically between 10% and 30% of project costs) which are raised through shareholder agreements, and debt financing (typically between 70% and 90% of project costs) from commercial sources, which are usually backed by export credit guarantee agencies, and bilateral and multilateral lenders. The return on this investment is made by charging road users a toll during the term of operation. In some cases where tolling might be unacceptable, such as the UK DBFO schemes, a shadow' toll approach is used, in which the government pays the project company a rate for each vehicle which uses the road. (Ethiopian Roads Authority, 2003) With regards to planning, the key difference between a BOT scheme and the more traditional government funded approach is the types of analyses used to justify the project. Government funded schemes will normally use an economic analysis which assesses the project contribution to government development objectives for the whole economy. In order to ensure financial viability privately financed schemes will tend to emphasize financial rather than economic issues, will place a higher emphasis on risks and the cost consequences of

failure. A higher discount rate will also be used in the assessment of a private financed scheme to reflect the increased cost of non-government borrowing. When a new high standard toll road is built the economic return of a road project will, in general, be far higher than the commercial rate of return generated from tolls. This is because the economic rate of return will fully capture benefits on the toll road as well as any benefits resulting from reduced congestion on other roads. In contrast the financial analysis resulting from tolling can only capture part of the benefits from the toll road (tolls have to be set lower than the perceived user benefits otherwise the road will not be used) and there will be no financial benefits collected from reduced congestion on the other non-toll roads.

Most of the private finance used in the road sector in developing countries has been for the provision of very heavily trafficked toll roads (above 10,000 vehicles per day), generally located in the more industrialized countries such as Indonesia, Malaysia and Mexico. It is now recognized that the wider involvement of the private sector in this area may be constrained by a number of factors including the complexity of setting up a BOT arrangement, the perceived risks to the private company and the costs of raising finance. The financial viability of a BOT project over its life must be sufficient to service the project debt and to provide a return on the equity that is commensurate with the long term risks of the equity investors. For externally financed toll road projects the arrangements to increase toll rates with inflation and to deal with the exchange rate risk are of critical importance. (Ethiopian Roads Authority, 2003)

2.2.11.2. DBFO, DBOM

There are two "Design Build" concepts under which the public sector seeks to benefit from private sector efficiencies. The first is the *Design Build Finance Operate*, DBFO, system adopted in the UK, under which the concessionaire has obligations and rights for a fixed period, while ownership is retained by the public authority. As applied in the UK, the DBFO system allows the concessionaire to be paid through shadow tolls and requires him to take the major traffic risks. An alternative arrangement is the *Design Build Operate Maintain*, DBOM, system. The concessionaire takes responsibility for designing, building and maintaining the highway, just as with a DBFO. His reward is usually through a rent, which would be related to the service provided, rather than as a shadow toll. Crucially, relative to the UK DBFO system, the

concessionaire does not take the traffic risk (other, possibly, than as it affects maintenance requirements).

2.2.12. Public Private Partnership

Diminishing general budgetary resources have provided the impetus for governments to explore off-balance sheet methods to raise financing for infrastructure projects, including private toll roads. Before pursuing a private toll road program, however, the advantages and disadvantages of private tolling relative to public funding or public toll roads should be carefully weighed. Assessing the appropriateness of private toll roads is a complex, project-specific process involving numerous economic, policy, and political considerations (Planning Commission, Government of India, 2006).

The primary economic benefits of tolling, public or private are the user-based funds generated to support road development and the ability to influence road use and traffic patterns through road pricing. Although certain traditional sources of public funding, such as gas taxes and registration fees, are also user-based, they are not collected at the point of use and therefore are less effective in managing traffic. The primary economic disadvantages of tolling are the time and cost required to implement toll systems and the potential delays and excessive traffic diversions associated with toll collection. On purely economic grounds, therefore, tolls should be used when the benefits of toll revenues and traffic management exceed the costs of implementation and any delays and excessive diversions caused by the system. The difference between private toll concessions and public tolling is best illustrated by considering the —value chain‡ for toll road development. Links in the value chain include project design, construction, maintenance, toll collection, and financing.

The biggest difference between public and private tolling is in the financing arrangement, since all the other links in the value chain can be contracted to private parties under either a public or a private tolling scheme. The primary economic advantage private tolling has over public tolling is the strong incentive for financial success created by the use of private debt and equity to fund the project. In addition, in some countries a public entity may be unable to attract capital to a project that a private consortium can finance because of the government's weak reputation among investors.

The economic disadvantage of private over public tolling is the potentially higher cost of developing, implementing, and administering a private concession program relative to a public tolling scheme. On purely economic grounds, therefore, private tolling should be used whenever the value of the private sector's financial incentive exceeds the additional costs associated with the private concession process. It is important to note that if investors assume similar project risks, the cost of capital for a specific project should be similar whether it is tolled publicly or privately. Any financing advantage that a public entity may have is due to greater government risk assumption or distortive tax policies, not to an inherent ability of the public sector to access lower-cost capital.

In addition to the economic considerations discussed above, policymakers must consider numerous noneconomic issues when evaluating toll road programs. These include public acceptance of tolling, the equity of charging tolls for road use, and the impact on the government's flexibility in future road development. In particular, public acceptance is one of the overriding issues in toll road development and may be the greatest impediment to tolling. Noneconomic issues tend to be greater impediments to private than to public toll road development. After taking these important noneconomic issues into consideration, policy-makers may make different decisions than those indicated by a purely economic assessment.

When the toll-backed portion of total project capital falls below a threshold amount, the benefits of private tolling may be diluted to the point that they no longer exceed the costs. In that case public tolling may be preferable. Public tolling also may be preferable if noneconomic policy considerations make private tolling unattractive. Public tolling is preferable to general government funding in these cases because of the additional funds generated from the direct beneficiaries of the project and the ability to use tolls to manage traffic. Projects that are unable to generate sufficient revenues to justify the cost of a tolling system and any delays or excessive diversions created by toll collection should be funded by traditional government sources.

2.2.13. Planning and Institutional Issues

Planning and institutional issues are the basic frameworks for the establishment of toll road system in a country. The following points can be discussed under this issue (Kuramani et al., 1999).

i. Need for Strategic Network Planning Framework.

A strategic planning framework incorporating network analysis is important to optimize the benefits and minimize the costs of toll road development. Components of such planning should include: (i) refining the strategic road network and the most appropriate alignments of the key links; (ii) firming up the appropriate timing of construction of individual links based on corridor studies; and (iii) establishing clear economic and financial viability.

ii. Cross-Subsidies for Network Expansion.

Private sectors may not be interested in expanding toll roads in rural areas where the return would not be recoverable or in areas where the road construction would be costly. The Government should set a goal to build a nationwide network expansion that included routes running through rural areas and/or areas with terrain upon which road construction would be costly. To pursue this goal, cross-subsidies were required given a requirement to recover costs with toll revenues. Toll revenue pooling has been utilized for regional toll roads and urban expressways that constitute an integral network. The rationale underlying the system has involved several issues, however, including equity among users, economic inefficiencies that might arise from insensitivity to route or segment profitability, and the determination of routes to be included in the system.

The critical issue raised by such cross-subsidies is whether the social and economic advantages of having an extensive network of high-performance highways rather than a smaller network in which each individual segment is self-supporting justifies the loss of financial discipline and the possible misallocation of scarce resources through the use of such subsidies. In this case, a ceiling is applied to reduce inefficiency; i.e., cross-subsidization for loss-making routes is limited to a maximum of a portion of the total construction cost of the route. The balance must be covered by the toll revenue of the loss-making route or by subsidies from the government.

The critical issue raised by such cross-subsidies is whether the social and economic advantages of having an extensive network of high-performance highways rather than a smaller network in which each individual segment is self-supporting justifies the loss of financial discipline and the possible misallocation of scarce resources through the use of such subsidies. In this case, a ceiling is applied to reduce inefficiency; i.e., cross-subsidization for a loss-making route is

limited to a maximum of a portion of the total construction cost of the route. The balance must be covered by the toll revenue of the loss-making route or by subsidies from the government.

iii. Alternative Form of Operating Entities.

Toll roads may be developed and operated by:

- Government Agency
- Public Corporation,
- Private Sector Concession, or
- Public-Private Partnership.

Each approach presents certain advantages and disadvantages.

Government Agency: A government agency would be established as for the purpose of designing, constructing, and maintaining toll expressways, and collecting tolls from road users. Although there may be theoretical merit to direct execution by government, particularly with respect to planning for network expansion, competing demands for government funds and the difficulty in providing incentives to improve cost effectiveness and operational efficiency have been major issues. There might be also overlapping of responsibilities in charge of regulatory and supervisory functions over the operations of toll road concessions.

Private Sector Concessions: Dating back at least to the 19th century in the United States, private sector concessions have often been favored over government agencies because of their efficiency and market responsiveness. The experience of France suggests that private companies can build highways more efficiently than can public companies. However, private firms may not be able to assume all the risks associated with toll road development, which entails a long-term and large-scale investment. Budgetary dependence on the Government may be substantially reduced in this approach toward toll road development, but a problem with development by the private sector relates to —moral hazard,¹¹ since national toll roads, like banks, are too big and important to let fail.

Public-Private Partnership (PPP) Approach: The PPP approach refers to a commercial company in which both the private and public sectors hold stakes, with managerial control in the hands of the private sector. A PPP may be distinguished from a private-sector concession in that

(i) both private and public interests typically hold equity in a PPP, and (ii) it is more flexible regarding project implementation.

The World Bank Assisted Toll Road Concession project has adopted a PPP approach, instead of a purely governmental approach, (Kuramani et al., 1999) in order to:

- ✚ bring additional resources to the project and complete it in a shorter time, freeing scarce governmental resources for other investments; and
- ✚ Increase the efficiency in construction and project operation, through market discipline, assuring that the project is completed on schedule and within the budget.

2.2.14. Legal and Regulatory Framework

Legal and regulatory frameworks are one of the least visible aspects of toll road development, but are nevertheless vitally important elements (Kuramani et al., 1999) and the following issues are generally included under this category:

i. General Need for Well-Drafted Laws and Regulations.

Irrespective of institutional option, well-drafted laws and regulations have proven necessary for successful toll road development. When the private sector is to be involved in toll road development, concession laws need to be well drafted. The host government must provide the basic legislative and regulatory authority for a given infrastructure project to be built and operated by the private sector; this includes designation of the individual ministries, government agencies, or local governments authorized to grant concessions. The enabling legislation may be general and enable different types of concessions to be granted, or alternatively, it may be specific and provide for a particular concession; either approach should be acceptable provided that, among other things, the right agency is designated as concession grantor and the permitted term of the concession is sufficiently long so that the concessionaire will be able to build and operate the toll road in accordance with its business requirements.

ii. Bidding and Selection Procedures.

Formalized, transparent procedures for dealing with investors prior to and during the bidding process are required. Bidding should be competitive to minimize the level of government support and reduce residual risk bearing by the government. A clear bidding and negotiation process requires that:

- the need for project requirements to be specified closely, to ensure evaluation is of like-for-like;
- clearly defined government support measures in the bidding documents, where necessary as a maximum—rather than held back for negotiation; and
- Simple evaluation criteria—for example, bidding at defined tariffs (to meet government policy objectives) to minimize the level of government investment required.

iii. Security Legislation.

The lack of provisions for the protection and enforcement of security arrangements (e.g., mortgages) in a country's legal system makes bankers extremely reluctant to lend to BOT projects.

iv. Regulations of Foreign Direct Investment.

General laws and regulations concerning foreign investment may provide incentives or disincentives to foreign investment in toll road concessions. Some countries, in pursuit of equity objectives have adopted a National Development Policy with the aim of securing significant portion of the ownership of by local companies. This policy effectively precludes foreign direct investment, but on the other hand has helped to develop domestic private sector.

v. Currency Issues.

The currency used for the pricing of tolls and the ease of its convertibility to foreign currency affect the interest of international investors in toll road projects. To minimize the risk of hard currency investments, some of the toll rate formulas include variables that reflect exchange rate movements. The ability of a foreign-invested highway project to secure adequate foreign exchange payments is therefore subject to risks relating to exchange rates and access and availability of foreign currency.

vi. Dispute Resolution.

Although no one hopes for disputes on a BOT project, the regulatory framework must provide for adequate dispute resolution procedures in event that such disputes occur.

Where there is a contract to which a foreign party is a signatory is a —foreign economic contract and it should be clearly stated whether the parties to such a contract can stipulate arbitration

either inside or outside the country. While there have been difficulties in enforcing foreign arbitral awards rendered in the country in practice, foreign investors require the country is bound under international treaty to enforce foreign arbitral awards rendered in other jurisdictions. In general the dispute resolution clauses should clearly spell out procedures for arbitration and dispute resolution in accordance with international law.

vii. Land Acquisition Law.

The law related to land acquisition and resettlement may affect the implementation of toll road projects. While it is possible that government agencies and public corporations may be authorized to expropriate land under the relevant laws, it is difficult to provide such right to the private sector; this could lead to an increased cost of toll road development.

2.2.15. Concession Contracts

Concession contracts between a grantor and a concessionaire should be unambiguous with respect to the risks involved. Preferably, a model concession contract should be prepared to enhance fairness and the clarity of negotiations between the parties involved, and to improve the efficiency of negotiation by clarifying a starting point of discussion. Sub-issues within this issue category relate to:

i. Grants of Concession

The concessionaire should be granted exclusive use of the toll road right of way, including the right to develop ancillary businesses (e.g., food, service stations), which must be clearly defined by legislation.

ii. Toll Rate Setting and Adjustment.

The concession contract must provide a clear framework for toll setting and adjustment covering topics such as operating cost fluctuations, currency devaluation, and minimum debt service ratios. Such matters are particularly important when revenue guarantees are not in place and the concessionaire bears construction, traffic, and toll collection risks.

iii. Conditions for Contract Termination

In the event that a concession is terminated, whether as a consequence of a default by the concessionaire or the grantor, or as a result of the occurrence of a force majeure event, then the

grantor, or a new entity appointed by the grantor, would take over all ownership rights to the toll road, including the right to collect tolls. The issue as to whether there should be compensation payable by the grantor to the concessionaire and how the project lenders are to be repaid in this situation will need to be addressed. The way that this issue is addressed is usually quite complicated and depends on the stage of the project when the termination event occurs and the cause of the termination event.

iv. Changes in Law

One of the most difficult concession contract negotiation issues relates to changes in law, the occurrence of acts of government interference, force majeure, and other events or circumstances outside the control of the concessionaire that reduce returns for the sponsors or result in the concessionaire's becoming unable to pay the project lenders. In most concession contracts, unless a deficiency guarantee or subsidy is provided such events or circumstances will expressly exclude insufficient traffic or a downturn in usage. There are two stages in the negotiation of this issue. First, from the concessionaire's perspective, the types of such acts, events, or circumstances should, to the extent possible, be well defined or capable of objective determination (with perhaps recourse to a court or independent arbitrators if there is a disagreement). The second stage is to determine the consequences; the ideal position for the concessionaire upon the occurrence of certain circumstances (e.g., a politically motivated strike or the failure by the grantor or a governmental agency to provide related infrastructure) that lead to a reduction in operating revenue would be for the grantor to agree that tariffs could be increased, or the concession period extended. Although rare, in some cases the grantor may agree to pay compensation to the concessionaire.

2.2.16. Government Support

There are a variety of government support measures that can be provided to public corporations or private toll road concessionaires. The degree of support that should be provided to particular toll road operators, however, depends on the political and economic situations of the countries. It is also important for the government to assess critically the possibility of large contingent liability in the case of guarantees such as foreign exchange guarantees, loan/bond guarantees, or equity guarantees. The Government can support the toll road operator in the following areas:

i. Land Acquisition

In most private toll road projects, largely for strategic reasons, the land is acquired and held in the name of the grantor or another governmental authority. The private sector typically would like to avoid the following two situations: (i) large acquisition cost and capital cost during early years of a project when no particular revenue is expected; and (ii) ownership of land that may not be converted into other uses, while various taxes and duties may be imposed on the acquisition and the ownership of the land.

ii. Extension of Concession Period.

Extension of the concession period is a supplemental measure for compensating the loss of profit caused for a variety of reasons. However, cash flow increases in the distant future may not improve a project's immediate profitability and may reduce the residual value of the project. Therefore, governments should be careful in extending concessions when asset valuation and payments to the concessionaire are required with the transfer of the project. Extension of the concession period, a common practice in toll road BOT projects in many countries, may also be granted when a force majeure event causes cessation of toll road operation for a certain period due to the occurrence of war, earthquake, riots, or other events that have been defined in the concession contract.

iii. Construction of Related Facilities.

In addition to land acquisition, the construction of related facilities (e.g., access roads) can be a critical element for a toll road operation. There are three kinds of risk involved in this support: (i) delay in acquiring the necessary land, (ii) delay in construction, and (iii) potential facility defects. The risk of potential defects is generally assumed by the government, but in case of Design, Build, Finance, and Operate (DBFO) projects in United Kingdom, the consortia participating in the bid are obliged to submit a proposal regarding the magnitude and the methodology of the potential defect risk that they are ready to assume.

iv. Shadow Tolls

Shadow tolling is an experiment for introducing the BOT model in the toll road sector, whereby a private sector consortium agrees to finance the construction or upgrade of a stretch of road and, for a concession period such as 30 years, is entitled to operate and maintain the road and receives

shadow toll revenue based on actual levels of traffic. The concept was created for DBFO (Design, Build, Finance and Operate) roads in the *United Kingdom*. The shadow toll is paid to the concessionaire by the government, not charged to motorists. The shadow toll usually consists of two components: an availability payment and a performance/usage payment where the former is paid based on the availability of required capacity (number of lanes) whereas the latter is paid on the basis of vehicle-kilometers achieved. Sponsors of the shadow toll concept argue that because they are paid over time they may be less of a burden to the government than an up-front grant. Shadow tolls may also have the benefit of mitigating market risk to be assumed by the private sector when the motorist willingness to pay is unknown. However, before introduction of the mechanism, the long-term ability of the government to pay shadow tolls, which may increase in amount as the mechanism proliferates, should be closely scrutinized.

v. Foreign Exchange Guarantees

Under an exchange guarantee the government compensates the concessionaire for increases in the local cost of debt service due to exchange rate fluctuations. Because such fluctuations can constitute a significant project risk when foreign capital is involved, government guarantees can have a substantial impact on a project's ability to raise financing with perhaps a lower interest rate. With currency devaluation, the indexation of foreign exchange rate fluctuations to a toll formula would not mean much to concessionaires, because currency devaluation of such magnitude profoundly damages the entire economy of a country and has considerable impact on domestic interest rates; the impact of the —foreign exchange portion of the project is only one of many elements that must be negotiated with the government.

vi. Loan (Bond) Issue Guarantee.

Under this approach the government provides a full guarantee of cash-flow deficiency guarantee for repayment of loans. As with an equity guarantee, a loan guarantee entails no public cost as long as the project generates sufficient cash flow to service debt.

2.2.17. Traffic Forecasting

Traffic forecasting, which involves a great deal of uncertainty, is not an exact science (Kuramani et al., 1999). Factors such as planned land development, population growth along the route, and various economic indicators in forecasting models have inherent uncertainties that affect traffic forecasts. Since project viability is directly related to expected traffic volumes, toll road

operators, grantors, concessionaires, financiers, and investors are all concerned with estimated traffic volumes. There are many cases where consultants have used parameters calibrated elsewhere without evaluating their transferability to the country for which the forecasts were prepared. These problems are partly due to a lack of expertise and budgetary constraints, which relates to the institutional issue. Forecasts of use of existing highway routes are usually more accurate as compared to those for —Greenfield toll road projects. Although accuracy can be improved by refining forecasting methodology, improving the accuracy of estimates of exogenous parameters such as socioeconomic indices, and refining traffic diversion equations, traffic forecasts should be cross-checked by at least one independent consultant or institution.

i. Problem of Less-than-Forecast Traffic

Over-estimation of traffic has commonly occurred with respect to toll road projects in developing or transitioning countries. The demographic and economic conditions and trends influencing travel demand are typically not well identified. In several cases, traffic growth rate assumptions were unrealistic and often data from the Ministry of Communications and Transport might be inadequate or unavailable. These traffic study shortcomings are generally attributed to a lack of expertise on the part of the concessionaires, financiers, and their consultants.

ii. Need for Independent Audits of Traffic Forecasts

Due to possible conflicts of interest or simply poor capability, independent audits of traffic forecasts are advisable. The forecasts which are prepared by the firms involved in the concession company, is a practice that should be avoided as these firms traffic forecasts are usually too high. To avoid such problem, an independent evaluation of traffic and financial forecasts is a critical factor explaining the eventual difficulties experienced by the concession companies, with consequent cost to the Government.

iii. Conflicts of Interest in Contractor-Driven Projects

Since contractors benefit more from the construction of toll roads than from their operation, consortia led or otherwise driven by contractors may produce overly optimistic traffic forecasts. Where construction companies would involve in concessions, inherent conflicts of interest may lead to overestimation of traffic volumes (and under-estimation of construction costs).

iv. Sensitivity Analysis

It is important to conduct sensitivity analyses—with respect to traffic and traffic diversion as well as other key variables (e.g., toll rates, project costs, implementation period, and a combination of these factors)—in order to assess the effects on the rate of return of variations.

2.2.18. Setting and Adjusting Toll Rates

The profitability of a toll road project, especially in inflationary environments, will depend much on the toll level, or increases achievable by the operators. Accumulated world experience suggests a number of general guidelines for setting and adjusting toll rates, and two issues, general guidelines for toll setting and toll adjustment procedures are discussed here.

i. General Guidelines for Toll Setting

General principles suggested by one World Bank report (Kuramani et al., 1999) indicate that (i) tolling is appropriate only when traffic levels exceed 4,000-5,000 vehicles per day; (ii) toll rate levels should not result in excessive traffic diversion—with an upper limit of acceptability considered to be in the range of 10-15 percent; and (iii) under certain conditions, toll rates can be set higher where there is no feasible alternative. It is important to base project revenues on affordable toll rates.

a. Uniform Toll Rate Issue

An important issue is whether toll rates should be set by individual route or set uniformly across the network. The use of uniform toll rates was primarily to cross-subsidize less profitable routes with revenues from more profitable ones. Financial viability is thus to be achieved for the entire network, not by route or by segment. Although cross-subsidization may not necessarily require toll rates to be uniform, different levels of rates across routes or segments within an integral network would create confusion among users, and charging equal levels of rates would be more politically acceptable.

b. Differential Toll Rate by Vehicle Categories

Toll rate setting also involves an issue of specifying the number of vehicle categories to be charged different toll rates and the rate differences across categories. Experience suggests that a larger number of categories tends to enhance the sense of fairness and thus is more politically acceptable. There are, however, cases where a smaller number of vehicle categories would be

desirable, primarily to minimize time and queue length for toll collection. There is no simple equation or a universal theory to determine rate differences across vehicle types. It is often argued in developed countries that commercial vehicles including trucks and buses are favored in terms of the toll levels, compared with the capital and maintenance costs incurred by these vehicles. Some countries, on the other hand, introduced a lower rate for buses as part of a transport policy to support public transport operators and to encourage bus use.

c. Fixed or Distance-Based Toll Rate

Another issue on toll rate setting relates to the choice of distance-based or fixed toll rates. Although a distance-based toll rate system is generally more reasonable as it better reflects the cost of service, it involves two major problems: requirements for large capacity at exits and leakage in toll collection. Since payments in a distance-based system should be made at exits, land and staff requirements could be large. Distance-dependent tolls also create opportunities for users to abuse the system; it may be possible for users running in opposite directions to exchange their tickets on the way and pay less than the actual rates at exits. It is expected that these shortcomings of distance-based toll rates will be eliminated by the introduction of an electronic toll collection (ETC) system.

ii. Toll Adjustment Procedures

One issue is whether toll rate adjustments should be left to a governmental authority's discretion or based on a formula, usually linked to price index changes. In any case, there is a need to follow specified toll adjustment procedures once they have been set; uncertainty creates problems for toll road operators. If the actual traffic level is more than the forecast level at a specified time, the Government could request either the deferral of a toll rate increase or a lowering of the level of toll rate increase. But if the actual traffic is less than forecast, the concessionaire could request to bring forward the timing of toll rate increases.

2.2.19. Financing Structure and Sources

Issues on financing structure and sources are closely related to Government Support issues described above. Sub-issues relate to:

i. Equity Financing

It is relatively easy to attract domestic capital of both debt and equity for smaller projects, say when the capital cost is less than US\$100 million. Moreover, it is very beneficial for a toll road project to obtain domestic financing to avoid the exchange rate risk between local currency toll revenues and foreign currency debt. However, in many developing countries, local capital markets are not sufficiently developed to provide the long-term capital required for toll road projects (Kuramani et al., 1999).

ii. Institutional Investors/Infrastructure Investment Funds

Institutional investors like insurance companies and pension funds can be a good source of financing for toll road projects since the long-term maturity of their funds matches the duration of a toll road concession. However, since institutional investors in developing countries are not active in the infrastructure sector in general, foreign institutional investors from developed countries can play an important role in filling the gap. Institutional investors, especially insurance companies and pension funds in the United States, have been actively pursuing investment opportunities in privately financed infrastructure projects in Latin America and Asia. They have invested in toll road projects directly, through various investment funds, and have purchased debt securities such as 144a 3 bonds in private placement.

iii. Asset Securitization

One innovative approach is the leveraging of existing highway assets to raise new funds in capital markets. This approach can be attractive to private investors, since they need assume only limited construction/completion risks and the transactions offer the prospect of high returns. The approach is also attractive to governments, since it permits them to obtain additional financing with relative ease, including for financially less attractive but still economically desirable projects.

However, there are some concerns with the asset securitization approach such as the possibility of over-leveraging the asset at the expense of the obligation to repay the original loan. Another problem using the capital markets is that the timing and the volume of fund raising is inherently affected to a great extent by prevailing market sentiment. (Kuramani et al., 1999).

2.2.20. Public Acceptance

Public acceptance is an important element in successful toll road projects (Kuramani et al., 1999) as discussed below:

i. Relocation and Resettlement

An important issue regarding the public acceptance of toll road development relates to land acquisition and resettlement. Certain countries could benefit from upgraded institutional capacity and compensation to address the resettlement planning issue. Also worth noting here, risks related to land acquisition are best borne by the Government, not the developer. (Kuramani et al., 1999).

ii. Noise, Air Pollution, and Ecology

Mitigation of the adverse environmental impacts of toll roads must be an integral part of the planning process. (Kuramani et al., 1999).

iii. Community Severance Impacts

With the opening of a toll road which crosses through a heavily residential area, there would be an impact on communities being disconnected and severed. Access needs for both pedestrian and local vehicular traffic should be given high priority. There is often a disparity between the access needs of the roadside communities and the needs of the generally longer-distance through traffic when it comes to the design of express highways. As most highway privatization projects have based their economic and financial viability on their ability to increase the speed and lower the journey time of commuting motorists, their emphasis has generally been on ensuring uninterrupted flow for through traffic and less so on the conflicting needs of neighboring residents for access and community interaction.

iv. Public Relations Campaigns

Effective public relations can foster public acceptance of well-conceived toll road projects. Environmental and community issues must be addressed from the start. This process may involve issues that are most appropriately addressed between the government and its citizens, well before the private sector is introduced. The process often involves achieving consensus on long-range goals and plans for the community—including the overall role of highways in the future transportation and land development plan most desired by local residents. However, the timing for the release of project information to the private sector should be carefully managed,

because of resistance from resident groups related to environmental issues may stall the project. Issues that should adequately be addressed include public perceptions relating to:

- the relationship between toll levels and local standards and ability to pay;
- the perceived unfairness of charging tolls on formerly non-tolled facilities, improvements notwithstanding;
- the impact of diversions to non-tolled local roads; and
- Profits earned by investors.

2.2. Review of Empirical Literature

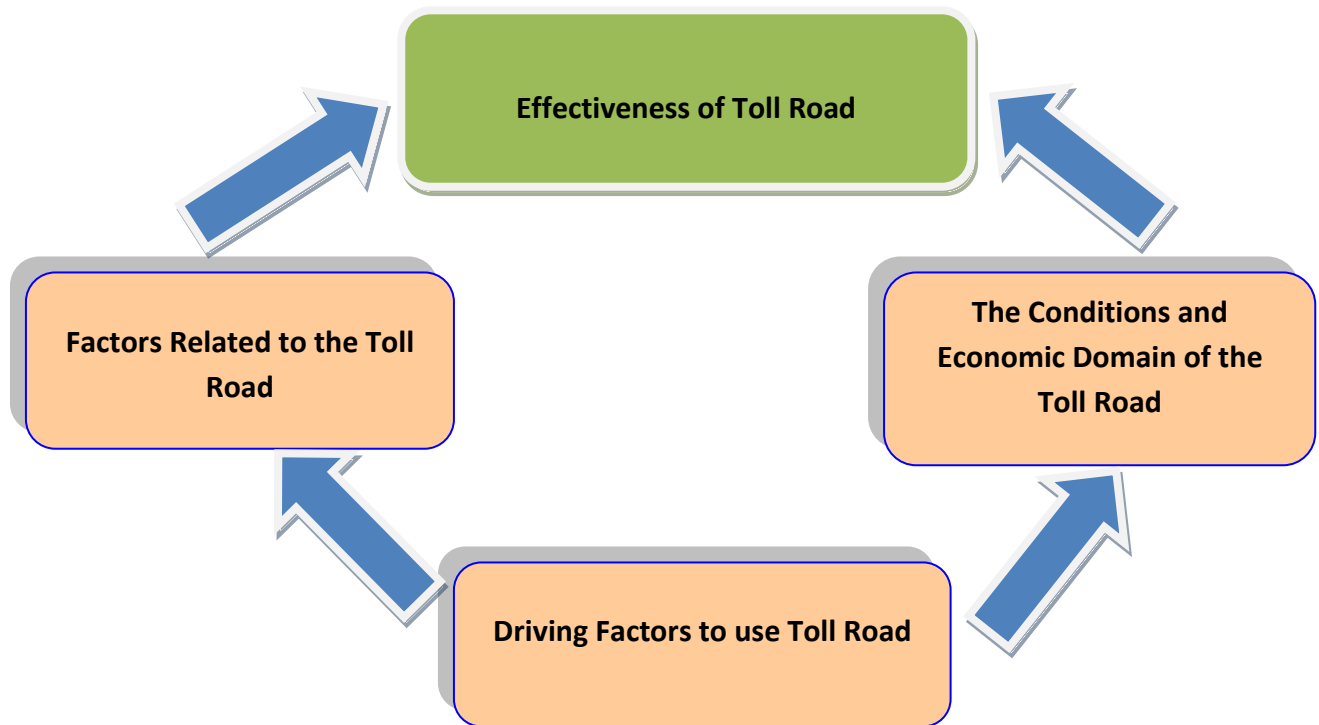
2.3.1. Limitations of Previous Research

Toll road projects are mainly aimed at reducing the demand for transportation on congested corridors, by segregating travelers based on their valuing of time and their need for travel. The success of toll projects depends on the fact that driver's value both their time and their money that these values are commensurable, and that drivers make their driving decisions by comparing these values. However, this is a challenge for transportation planners, because based on the pricing, travelers are free to decide whether to use the toll road or not. Decisions whether to implement toll roads and express toll lanes, and on how to price them, are made through the use of regional travel demand forecasting models and long-term transportation planning process. Since there is no guarantee that real-world results will conform to the projections of such studies, the effectiveness of toll roads in mitigating traffic congestion and improving travel time needs to be monitored and evaluated frequently after the implementation. The spatial and temporal variations in travel demand along the region's traffic network after the deployment of toll roads should also be considered in the performance evaluation process.

Presently, while considering the effectiveness of toll roads, there are many research gaps related to the performance evaluation based on the far fewer research works. To date, there are no effective travel time reliability measures (existing measures) proposed for the assessment of the performance of long-term transportation projects like express lanes and toll lanes. The majority of research has neglected the spatial and temporal dependence of large-scale transportation projects' effects on the region's traffic and system performance. Therefore, the main objective of this research is to evaluate the effect of toll roads on region's traffic using travel time and travel

time reliability measures, over space (proximity to the toll road) and time (years of toll road operation).

2.3. Conceptual Framework of the Study



Source: Researcher's Own Construct based on the review of literature on Toll Roads, 2021

Fig. 1: Conceptual Framework of the Study

Variables of the study (driving factors)

1. Traffic volume forecasting
2. Existing traffic conditions
3. Saving in travel time
4. Saving in vehicle operating cost
5. Reduction in accident cost

The variables stated above affect the effectiveness of the toll road in one or the other way. Let's see it in detail:

1. Traffic volume forecasting: if we can forecast the traffic volume of the road we can arrange our time to use the road or we might not use the road for the day which might affect the economic domain of the road also, this might lead to complain on the road which reduce the effectiveness of the road.
2. Existing traffic condition: knowing the traffic condition also help us to maintain saving our time but if the road is always full of traffic jam this will lead to lower the effectiveness of the road because it leads to complaint on the road.
3. Saving in travel time: this is one of the major objectives of the study so, if the road fails to achieve this it failed to achieve the effectiveness of the road by affecting its economic domain because nobody will pay to waste their time, they pay to save their time.
4. Saving in vehicle operating cost: this is also one major objective which assures the sustainability of the road users because it is directly linked to the condition of the road which is the main wing of assessing the effectiveness of toll road.
5. Reduction in accident cost: a road might not be completely pure of accidents but it must have low rate in accidents. The accident rate has connection with condition of the road and it may affect the economy of the road because no one will use a road full of accidents and risks which in other words affect the effectiveness.

Chapter Three

Research Methodology and Methods of the Study

This chapter highlights the research approach, research design, data sources and types, sampling technique and sample size determination, methods of data analysis and interpretation, and ethical consideration of the study.

3.1. Research Approach

Research approach is plan and procedure for research that span the decisions from broad assumptions to detailed methods of data collection and analysis. The function of research approach is to provide the collection of relevant evidence with minimal expenditure of effort, time, and money (Creswell, 2009). Hence, the I have used a **Mixed-method research approach** in terms of its purpose as it describes and analyzing a phenomenon through identifying and obtaining information on the characteristics of a particular issue through the collection and analysis of both quantitative and qualitative data (Kohtari, 2004).

3.2. Research Design

Research design refers to the arrangement of conditions for collection and analysis of data in a manner that aims to combine relevance to the research purpose with economy in the procedure (Babbie, 2002). In addition Kothari (2004) observed that research design is a blue print which facilitates the smooth sailing of the various research operations, thereby making research as efficient as possible hence yielding maximum information with minimal expenditure of effort, time and money. Accordingly, in this study a **concurrent triangulation mixed methods research design** is adopted as it is useful to answer the research questions posed in chapter one of the thesis.

3.3. Data Sources and Data Types

In order to address the aims of this study, the researcher use both primary and secondary data. Primary data according to Kothari (2004) is the data collected for the first time while secondary data is that data that has already been collected and passed through statistical process. Andre (2004) explains that primary data is data that is used for a scientific purpose for which it was

collected. Structured Interview and review of statistical data were used to come up with primary data. Moreover, secondary data were collected from different published and unpublished materials (i.e. books, archives, articles, and different web based sources).

3.4. Sampling Technique and Sample Size Determination

Target population in statistics is the specific population about which information is desired. According to Ngechu (2004), a population is a well-defined or set of people, services, elements, and events, group of things or households that are being investigated.

The targeted population of the study are peoples who involve in the toll road system. such as:

- ✓ the drivers and passengers who receive the tolling service
- ✓ the employees who give the tolling service.

The sample size of the study is forty since our main sample are divided into two main parts I have chosen equal sample size and since the passengers are additional samples, I have taken lowest possible sample. Those are I selected 15 drivers,5 passengers and 20 employees which totally will be forty. Besides, I took a recent five year statistical data (2009-2013 E.C.) for measuring the effectiveness of Addis Adama toll road from the road authorities.

3.5. Data Collection Tool

In order to collect primarily data, interview guideline techniques are used. The researcher has applied three types of interview guidelines to collect data from three groups of respondents: drivers, passengers and road authority employees. Besides, document analysis technique is used to analysis the statistical data collected form road authority.

3.6. Methods of Data Analysis and Interpretation

After data collection, data analysis and interpretation was done. This process is important as it makes the raw data sensible. Deciding which type of data analysis tool to use depends on the type of data to be analyzed. The quantitative data collected from statistical reports was presented descriptively and analyzed using percentage, ratio, range, mean and other descriptive statistical tools. On the other side, qualitative data gained through interview were thematically categorized and content analysis is used to analyze the data.

3.7. Ethical Considerations of the Study

There are certain considerations made in this study. Primarily, study subjects were included upon their consent. Once this is done, the information they provided through the data collection instruments are kept confidential. Furthermore, their identity is also being kept confidential. Confidentiality of the information was guaranteed by informing respondents not to write their names or anything that makes them is identified by others.

Chapter Four

Data Analysis and Interpretation

4.1. Introduction

This chapter provides the major findings of the study, based on the data obtained through semi-structured interview and analysis of statistical data. The data are presented and organized in a sequential order in line with the specific objectives stated under the first chapter of the thesis. Statistical analysis of quantitative data enshrined in road authority's performance reports and content analysis of interviews conducted with drivers, passengers and the employees were the primarily methods used to arrive at the findings of the study.

The information obtained from interviews and secondary sources were used to explain the study findings and thereby aimed to answer the research questions raised in the first chapter of the study. In doing this, the findings in this section, as best as possible, provided answers to the research questions, and therefore achieved the objectives of the entire study.

4.2. Background Summary of Addis Ababa-Adama Toll Road

The Addis Ababa-Adama toll road is part of the road linking the main road connecting Ethiopia and Djibouti, the highest trafficked road in the country. The road section from Addis-Modjo, which is about 63Km, was rehabilitated and upgraded in the year 2001 as part of Addis-Modjo-Awassa. The section from Modjo-Adama, which is about 17Km, was rehabilitated and upgraded in the year 2003 as part of Adama-Awash Road Rehabilitation Project funded by the EU. The road has a total length of 80Km starting from Kaliti Ring Road Junction, and can be categorized in to three sections based on the road and traffic condition.

Section 1: Kaliti Junction – Akaki

This section is usually considered as inter-urban section though it is administered by the Ethiopian Roads Authority. It starts at Kaliti Round About around Driver's Training Center and passes through congested urban areas. It has approximately about 13Km. The traffic condition is higher than that of the other section as more traffic flows in intercity between the center of the city and southern part of the City.

Section 2: Akaki-Modjo

This section is the second most trafficked road as it is the main access to the southern part of the country in addition to the eastern part. The road starts at the outskirts of Akaki Town, and crosses well developed industrialized areas of newly established Gelan Town, Dukem, up to Bishoftu Town and relatively rural areas between Bishoftu and Modjo Towns of Oromia Region. The road length is approximately about 50Km. This section has less traffic volume than Section 1, but obviously has higher traffic volume than Section 3 as significant traffic from southern part of the country joins the route at Modjo Town.

Section 3: Modjo-Adama

This section is relatively has lower traffic volume than the other sections. It starts at Modjo Town passing through rural areas up to Adama City, and has an approximate length of about 17Km.

4.3. Factors Related to the Effectiveness in its Condition and Economic Domain

Road investment must take into account the need to serve different user groups, including very poor users in rural areas that may not be able to afford the toll levels that are required to allow operators to recover their investments. For a toll road project, an accurate estimate of the amount that the potential users are ready to pay - the willingness to pay - is in theory a prerequisite of toll level setting. In practice, this parameter is very difficult to assess, in particular in countries where the experience of toll networks is limited or simply does not exist. In transition or developing countries, the quick changes occurring in income distribution and overall wealth make willingness to pay even more difficult to estimate over the periods usually considered for economic appraisal. Users' willingness to pay tolls is largely a function of their wealth, the ability to pay – the value they assign to time savings and other toll road benefits, and the cost and quality of competitive alternatives (Galvez & Jara-Diaz, 1998).

Many countries can now count on useful results on the value of time and the willingness to pay for various types of transport service users. These are relevant indications when pricing new services to be provided by private operators. It makes sense to compare the tolls or tariffs

calculated from the cost side with these rough estimates of the willingness to pay for some services.

More generally, the standard assumptions that toll road users are willing to pay high tolls to compensate for reductions in travel time and savings in vehicle operating costs are not as realistic as many academics would like them to be. This is a major problem since the tolls that users are willing to pay for may not be sufficiently high to attract private equity.

4.4. Driving Factors to Use Addis- Adama Toll Road

4.4.1. Traffic Volume Forecasting

Traffic volume forecasts are the most fundamental data in the financial analysis of roads from the planning stage onward. They will influence the fundamental decision on whether the road should be a toll road, and later on they will also influence decisions on the setting and adjusting of toll levels and collection period (Kuramani et al., 1999).

When a new toll road is constructed parallel to an existing toll-free road, the traffic forecast will base on the diverted traffic from the current traffic volume. There might be generated traffic due to the construction of better standard and improve road, but the magnitude is insignificant and hence, only the diverted traffic is considered in the analysis.

There are many factors affecting the amount of diverted traffic among which the toll level, savings in vehicle operation costs (VOC), saving in travel time and reduction of accident costs by using the new toll road are the major ones. The future condition of the existing toll-free road will also influence the amount of diverted traffic to the new toll road. In addition the public perception of implementing new system in tolling the road, the ability to pay and willingness to pay are also affecting the diverted traffic proportion.

4.4.2. Existing Traffic Condition

The current traffic volume of the road for each segment for the last 5 years has been collected from the Ethiopian Roads Authority, as indicated in the following tables, Table 4.1-Table 4.3, by vehicle category.

Table 4.1: Traffic Volume of Addis Ababa-Akaki Section

Vehicle Type	2009	2010	2011	2012	2013
Car	2,246	2,841	2,968	3,225	4,780
Station Wagon	2,781	3,281	3,758	3,968	4,746
Small Bus	3,888	4,102	4,369	4,769	5,778
Large Bus	1,994	2,684	2,997	3,259	3,895
Small Truck	2,011	2,987	3,158	3,225	3,960
Medium Truck	2,425	3,007	3,458	3,727	4,789
Heavy Truck	2,320	2,725	2,987	3,119	3,799
Truck Trailer	2,001	2,098	2,241	2,415	3,478
Total	19,666	23,725	25,936	27,707	35,225

Table 4.2: Traffic Volume of Addis Ababa- Modjo Section

Vehicle Type	2009	2010	2011	2012	2013
Car	1,346	1,555	1,792	1,991	2,413
Station Wagon	1,783	1,984	2,112	2,456	2,958
Small Bus	1,035	1,113	1,322	1,566	1,895
Large Bus	1,119	1,365	1,506	1,774	1,941
Small Truck	837	985	1,095	1,245	1,567
Medium Truck	1,581	1,701	1,898	1,998	2,325
Heavy Truck	1,125	1,320	1,561	1,758	1,995
Truck Trailer	1,445	1,601	1,775	2,102	2,459
Total	10,271	11,624	13,061	14,890	17,553

Table 4.3: Traffic Volume of Addis Ababa-Adama Section

Vehicle Type	2009	2010	2011	2012	2013
Car	1,297	1,301	1,495	1,525	1,752
Station Wagon	1,352	1,441	1,609	1,729	1,996
Small Bus	1,001	1,108	1,228	1,398	1,562
Large Bus	603	711	898	996	1,125

Small Truck	884	998	1,125	1,236	1,428
Medium Truck	994	1,089	1,325	1,442	1,611
Heavy Truck	1,001	1,215	1,458	1,632	1,754
Truck Trailer	1,045	1,302	1,596	1,695	1,801
Total	8,177	9,165	10,734	11,653	13,029

4.4.3. Savings in Travel Time

Travel time is one of the largest transport costs, and travel time savings are often the greatest potential benefit of transport improvements (Department for Transport (DfT), UK, 2009). One of the reasons for the road users prefer the toll road to free road is that there would be a travel time saving principle on toll road. The resulting "time value" puts a cash value on amount of time saved for each vehicle type. Naturally the actual amount of time saved will depend on the individual vehicle, but an average for each type of vehicle is adopted in making the calculation.

The average value of time for working person and non-working could not be available from any sources. It was tried to estimate based on the average income of passengers using the existing road, however such data could not be obtained as most of the interviewee were not willing to respond for such question. On the other hand the effort made to get from the East Shoa Zone Finance and Economic Development Department was not successful as they didn't have such data nor such study was not performed.

The following assumptions were considered in estimating the value of time for different class of road users.

- The average number of passengers is estimated based on the observation at vehicles using the road, and the type of passengers is divided in to 'Working' and 'Non-working' based on the purpose of journey.
- The average monthly salary and number of working hours per month is estimated based on the assumption that:
 - ✓ Car: usually traders and owners of car. Average monthly income is estimated ETB 4,000.00. Working 8 hours per day for 26 days per month including Saturdays-208 hours per month.

- ✓ Station Wagon: usually civil servants, 1 driver and 2 middle level professionals. Average monthly salary is estimated ETB 2,000.00. Working 8 hours per day for 22 days (Monday–Friday) and 4 hours per day for 4 days (Saturdays) per month–192 hours per month.
- ✓ Small Bus: Mix of traders & civil servants, plus 1 driver and 1 helper. Average monthly income is estimated ETB 1,000.00. Working hours per month is considered average of civil servant and traders – 200 hours per month.
- ✓ Large Bus: Mix of traders, civil servants and unemployed or students, plus 1 driver, 1 cashier and 1 helper. Average monthly income is estimated ETB 400.00. Working hours per month same as Car – 208 hours per month.
- ✓ Small, Medium & Heavy Truck and Truck Trailer: 1 driver and 1 helper. Average monthly income is estimated ETB 600.00 – 1,000.00. Working hours per month same as Car – 208 hours per month.

Summary of hourly wage rate for different class of passengers by vehicle type is shown in the following Table 4.4.

Table 4.4: Estimation of Hourly Income

No.	Vehicle Type	Average Monthly Income per person [ETB]	No. of Working Hours per month [Hrs]	Hourly wage rate [ETB]	Wage rate taken for analysis [ETB]
1	Car	4,000.00	208	19.23	20.00
2	Station Wagon	2,000.00	192	10.42	10.00
3	Small Bus	1,000.00	208	5.00	5.00
4	Large Bus	400.00	208	2.00	2.00
5	Small Truck	600.00	208	2.88	3.00
6	Medium Truck	800.00	208	3.85	4.00
7	Heavy Truck	1,000.00	208	4.81	5.00
8	Truck Trailer	1,000.00	208	4.81	5.00

On average the existing free road takes about 90 min – 120 min to travel between Adama and Addis Ababa. The new toll road is proposed to have a speed of 120Km/hr and the travel time is estimated to be less than 60 min. For the purpose of this study an additional travel time of 30 min will be taken in estimating time value of money for cars, Station Wagons and small buses, while an average 45 min delay is considered for large bus and trucks and 60 min (1 hr) is considered for articulated trucks. The average vehicle Working and Non-Working Passengers for each category of vehicle is estimated. The Estimated Hourly Rate is assumed for the average of working time and non-working time by estimating the monthly income of passengers for each category of vehicle.

Table 4.5 below shows the anticipated savings for each category of vehicle as a result of avoiding using the existing congested road using the toll road. The delay in travel time is estimated only for the delay anticipated due to traffic congestion, the delay due to road deterioration is considered with saving in vehicle operating costs. The saving due delay in cargo handling is included in the equipment rate.

Table 4.5: Estimation of savings in Travel Time by using the Toll Road

No.	Vehicle Type	No. of Working Passenger	No. of Non-Working Passengers	Total	Estimated Delay per Trip [Hr]	Extra time due to congestion [Man-Hr]	Estimated Hourly Wage Rate [ETB]	Total Wage Rate	Estimated Hourly Vehicle Rate [ETB]	Total Equipment Rate	Grand Total
1	Car	1	1	2	0.5	1.0	20.00	20.00	20.00	10.00	30.00
2	Station Wagon	1	2	3	0.5	1.5	10.00	15.00	30.00	15.00	30.00
3	Small Bus	2	10	12	0.5	6.0	5.00	30.00	40.00	20.00	50.00
4	Large Bus	3	47	50	0.75	37.5	2.00	75.00	150.00	150.00	225.00
5	Small Truck	2	-	2	0.75	1.5	3.00	4.50	80.00	60.00	64.50
6	Medium Truck	2	-	2	0.75	1.5	4.00	6.00	100.00	75.00	81.00
7	Heavy Truck	2	-	2	0.75	1.5	5.00	7.50	150.00	112.50	120.00
8	Truck Trailer	3	-	3	1	3.0	5.00	15.00	200.00	200.00	215.00

4.4.4. Saving in Vehicle Operating Costs

Vehicle operating costs (VOC) constitute the dominant share of the total costs of road transport. According to the World Bank (Harral & Faiz, 1988), VOC is about 75 – 95 percent of the total cost of road transport, except when the traffic volume is extremely low.

One of the reasons that road users prefer better road condition with extra out-of-pocket costs is by considering the savings from the vehicle operating costs. If maintenance is neglected, road users bear the major burden of the increase in total transport costs (the sum of infrastructure and vehicle operating costs), since the share of infrastructure costs in the total cost of transport is small.

The use of road system in poor condition gives rise to operating costs for the users. These include the costs of fuel, oil and tyres, and an element of vehicle maintenance. The vehicle operating costs (VOC) also include allowances for the purchase of new vehicles.

VOCs are calculated from the sum of the vehicle resource components, including:

- Fuel and lubricating oil consumption,
- Tyres and spare parts,
- Vehicle maintenance labor costs,
- Vehicle depreciation and Interest on capital

Extra VOCs have been calculated in the Highway Development and Management Model (HDM), which is based on numerous studies that have measured the impact of various factors, including road conditions, on vehicle operating costs. The HDM study found that road deterioration increases ownership costs, maintenance and repair costs, fuel and lubricant consumption costs, and tire costs. It is found that deteriorated roads accelerate the pace of depreciation of vehicles and the need for repairs because the stress on the vehicle increases in proportion to the level of roughness of the pavement surface. Similarly, tyre wear and fuel consumption increase as roads deteriorate since there is less efficient transfer of power to the drive train and additional friction between the road and the tyre.

The World Bank's Highway Design and Maintenance (HDM) Standards Study focused on the rigorous empirical quantification of tradeoffs between the costs of road construction, road maintenance and vehicle operation, and also on the development of planning models incorporating total life-cycle cost simulation as a basis for highway decision-making (Chesher & Harrison, 1987).

These procedures are combined in a computer model, HDM-VOC, for the calculation of user costs under a variety of road and traffic conditions, but not including congested traffic operation's. The relationships were developed from controlled experiments and extensive user surveys in Kenya, Brazil, India and the Caribbean, which together produced an enormous body of knowledge on road user costs in three continents with diverse road conditions and economic environments. They can be adapted to local conditions in other countries using estimates of local vehicle prices, labor and repair costs, vehicle utilization and other parameters. The HDM-VOC program predicts the various components of vehicle operating costs based on road and vehicle characteristics and unit costs in a free-flow traffic environment.

Estimating the savings in VOC due to using the new toll road facility is not a simple task. It requires knowing the level of deterioration of the existing toll-free road. If it will be kept in good condition, which is more unlikely, the saving is minimum. On the other if it will be deteriorated to a level of poor or bad condition, high saving will be gained by using the new facility.

A research made by the World Bank to develop fundamental relational links between the VOC and road condition shows that roughness' is a dominant effect of road condition on vehicle operation costs. Based on a case study made in Costa Rica, the research has developed an index by how much the road roughness affects VOC as indicated in Table 4.6 below (Harral & Faiz, 1988).

Table 4.6: The Effect of Road Roughness on Vehicle Operating Costs

No.	Vehicle Class	Road Condition		
		Good (2.3 IRI)	Fair (4.6 IRI)	Poor (6.9 – 9.2 IRI)
1	Car	100	106	114 – 126
2	Bus	100	104	109 – 116
3	Light Truck	100	111	124 – 138
4	Heavy Truck	100	114	129 – 146
5	Articulated Truck	100	112	127 – 144
	Average	100	109.4	120.6 – 134

For the purpose of this study the following assumptions are considered in estimating the saving on vehicle operating costs:

- The new toll road will be constructed to a better standard with design speed of 120 Km/hr and it will be kept in good condition with a proper maintenance at all times, rehabilitation and upgrading or expansion when it requires;
- The existing toll-free road will continue under the administration of ERA and its condition will continue with the current one – ‘FAIR Condition’. Expansion is not expected;

4.4.5. Reduction in Accident Costs

Road accidents are the major problems observed specially in developing countries. Though there are many factors contributing to accidents, the geometrical condition of the road, mainly the degree of curve, the width of driving lane, sight of distance are factors for rise of accidents in addition to road condition. The volume of traffic is also affecting the accident rate.

A number of studies of road crashes worldwide carried out by the Transport Research Laboratory (TRL) UK in recent years have shown that the road safety situation throughout the African continent is one of the worst in the world. With approximately only 4 per cent of the world’s motor vehicles, Africa’s road fatality share is about 10% of the world (2 ½ times greater). In several African countries, a motor vehicle is over a hundred times more likely to be involved in a fatal road crash than in the UK or USA (Transport Research Laboratory (TRL) UK, 2000).

This study identified that the number of people killed worldwide in road crashes in 1999 was between 750,000 and 880,000 and that, perhaps surprisingly about 85 percent of these deaths occurred in the developing and transitional countries of Africa, Asia, Latin America and the Middle East. The Fatality Rate in Ethiopia was also estimated 199 per 10,000 vehicles in the year 1998.

A report by the National Road Safety Council under the Ministry of Transport and Communications revealed that out of the accidents registered in 2006, 68% was occurred due to pedestrians strike and 3% due to animal strike. Table 4.7 below shows the accident of personnel by type (National Road Safety Council, 2006).

Table 4.7: Accident of Personnel by Category

No.	Accident of Personnel by Category	
1	Pedestrian Strike	68%
2	Overturn	13%
3	Fall from Vehicle	6%
4	Anima Strike	3%
5	Other	10%
	Total	100%

This report (National Road Safety Council, 2013) also disclosed the accident trend of Easten Shoa Zone which mainly includes the Addis Ababa – Adama road as indicated in the following Table 4.8.

Table 4.8: Accident Trend of East Shoa Zone

No.		2009/10	2010/11	2011/12	2012/13
1	Death	200	190	195	175
2	Serious Injury	100	110	165	95
3	Light Injury	50	80	45	30
4	Property Damage	250	340	335	285
	Total	600	720	740	585

A study for a review of road safety in Ethiopia by a joint TRL - Ross Silcock team estimated that the annual cost of road crashes was about Birr 400 million in the year 1999 (Transport Research Laboratory (TRL) UK, 2000). Out of this annual accident cost, the proportion of traffic flow for Addis Ababa – Adama Road would be about 9% (comparing 3,771,565 Vehicle-Km of 1996/97 national traffic flow with 322,830 vehicle-Km for this road). This makes the accident cost of Addis Ababa-Adama Road was about ETB 36 million. If we estimate the accident cost for the year 2008 with the ratio of accident cost to vehicle-Km of 1996/97 costs, it would be about ETB 122 million.

It is believed that the new toll road would significantly decrease this accident cost. The accident of personnel due to pedestrian strike and animal strike, which constitutes 70%, will not be expected as the new toll road will be protected from such interference.

4.5. Effectiveness of Toll Road in its Condition and Economic Domain

4.5.1. Stakeholders View

Assessment of stakeholders view is an integral part of the study. The involvement of various stakeholders and stakeholder groups are imperative for a successful project. The information gained from these groups provides with information that can be used to address important issues and concerns. The assessment also provides insight into the public acceptance of the concept.

A total of 2 stakeholders were approached, which are listed in Table 4.9 below.

Table 4.9: List of Stakeholders Interviewed

No.	Stake Holder	Role	Contacted Person
1	Ethiopian Roads Authority	Responsible for the administration and management of the road.	From Planning & Programming Division Manager; Planning Branch Head. From Team Leader From Civil Engineer (2)
2	Road Fund Administration	Funding for the maintenance of the road.	From Planning & Programming Division Head. From Team Leader (2) From Civil Engineer (2)

The assessment was made through interviews and by preparing questions related to specific stakeholder. The stakeholders were each asked a series of questions pertaining to the general road network in the country, their general view about tolling roads, their role in the road administration, and the general problems in the current road administration, management and financing.

More specifically, interviewees were asked for their opinions on traffic congestion in the road, where congestion was worse and how these problems might be addressed. The stakeholders were then asked their opinions on toll roads in general and their feelings of tolling Addis Ababa-Adama Trunk Road in particular. Complete list of the questions is attached in Appendix A.

General

The stakeholders have a similar view that the current condition of the Addis-Adama Road is highly congested and if some sort of solution would not be given sooner, the condition will worsen.

A. The Ethiopian Roads Authority

The result of interview conducted with employees of the Ethiopian Road Authority indicates that the toll road is highly congested and considers possible expansion or upgrading to alleviate the existing congestion problem. In doing so, the employees believe if potential investor who will construct and collect tolls would be found, the Authority can make a concession agreement with a private sector to construct a new road, upgrade or rehabilitate the existing road, operate for limited time and transfer to public at the end of concession period. But as it requires huge investment capital, ERA does not expect such potential private sector either from local or foreign investors. However, the current regulation concerning road administration does not allow a private sector or public enterprise to construct road for business purpose, and the law and regulation is required to be revised if tolling of road is going to be implemented, as per ERA's general view.

On the other hand, ERA is planning to construct a new toll road from Addis Ababa-Adama under its own administration. As per the current ERA's plan it is not yet specifically identified who is going to operate the toll road at the end of construction. In general terms, ERA has understood

the current traffic congestion problem of this road and funding for maintenance with the current practice will not be sustainable.

In addition it is stated that there is no study which estimates the time wasted due to delay by traffic congestion neither in the country nor specifically to this road. In addition there is no study which estimates the saving in VOC due to different road condition.

B. The Road Fund Administration Office

The interview with the Ethiopian Road Authority employees indicates that the Road Fund Administration Office has a general impression that the Addis Ababa-Adama road is currently handling traffic volume more than its expected capacity and damage on the pavement is usually observed more than expected. Though intensive and continuous maintenance has been carried out on this road, the condition of the road is getting worse from time to time due to heavy traffic.

The employees of the road fund stated that the office generally supports the implementation of toll road in general and the tolling of this road specifically as the traffic is highly increasing and will not be able to accommodate the traffic after a few years if another solution is not implemented.

4.5.2. Result of Customer' Interviews

Interview Procedures:

This interview includes driver and public interviews. Interviews were conducted with 15 car drivers (5 mini bus, 5 medium bus and 5 large bus drivers) who were using the existing road. The car owners/drivers were interviewed in Adama Town by using a chance where they stop for tea break, while the taxi drivers were interviewed in Akaki Town where they were queuing to accommodate passengers. The small bus and large bus drivers were interviewed in Adama Bus station. The location of interview for truck drivers was selected in Dukem city, because of the opportunity to interview truck drivers during a break the truck stop. The content of the whole questions of the interview is attached in Appendix A, and summary of the responses is presented below.

Findings:

There was a general consensus among most of the drivers that tolling the road is not recommended in any way. Car drivers, small (mini) bus drivers and small truck drivers were generally against the tolling of the road. They are mostly owners of the vehicle or employed by a close relative. The owner operators typically held the view that roads should be financed with fuel or other taxes, and that toll costs would be unfair, out-of pocket expenses for them. Several mentioned that they will use the existing toll-free road to avoid toll road. They stated that the current price escalation on fuel, parts and other expenses cannot be affordable and if toll costs would be added, it will worsen the situation and make things terrible. Only 30% of the drivers responded they may prefer the toll road with a minimum fee and provided that the condition of the existing road will not be improved.

The large bus drivers and truck drivers interviewed were almost employed drivers or were company drivers, and their opinions on tolling tended to be either in favor of a toll or were agreeable to tolling, particularly because their company would cover toll costs. 50%- 60% of these drivers are in favor of toll road, but still has a fear of high price which may discourage them from using it.

Several of the independent operators were also more similar to the company drivers in their viewpoints toward use of the toll road even though they might have expressed a negative view toward tolling in principle. We also have interviewed the public for their opinion and here is the analysis.

Table 4.10: Public Opinion Survey

No.	Question	Responses		
1	The current transport cost in comparison to their income.	Very high	Fair	Low
		80%	20%	0%
2	Knowledge about toll road	High Knowledge	Fair	Low knowledge
		0%	80%	20%
3	General attitude of the public towards to toll road implementation.	Do not accept	Accept but with minimum increment	Positive attitude
		85%	10%	5%

4.5.3 Review of the Cost Benefit Analysis Made on Addis-Adama Toll Road

The cost benefit analysis of toll road projects are very complex depending on many factors including the cost of road construction, maintenance, operation and related costs, and the revenue which is mainly depend on the traffic amount, the toll amount, which itself affect the traffic volume along with the ability to pay and willingness to pay.

The construction of road will depend on the physical characteristics of road way, the number of lanes and road width, land acquisition and RoW clearance costs. The number of lanes will depend on the traffic forecast so that it will accommodate the actual traffic without any congestion. As the traffic amount increases and reaches or nearing to reach its design capacity, it requires expansion during the course of operation.

1. Review of Traffic Volume

Before estimating the cost of construction, it is required to estimate the traffic volume to determine the geometric features of the road. The traffic volume is estimated based on the diverted traffic from the existing road as explained above. To estimate the diversion ratio, the road users' general opinion is taken into consideration. The toll amount and the condition of the existing toll-free road in the future will influence the amount of traffic. Based on the drivers' opinion and the public opinion survey, the possible savings in travel time, savings in VOC and the saving of accident costs, the following diversion factor is considered at the start of the toll road operation in this study.

- ✚ For car, station wagon and small bus: - 0.5
- ✚ For small truck and medium truck: - 0.6
- ✚ For large bus, heavy truck and articulated truck: - 0.75

The diversion ratio will obviously increase through time as the condition of the toll-free road will be getting worse.

2. Review of Impact Analysis of Toll Roads

The economic analysis made for Addis Ababa-Adama road shows that a toll road can be implemented. The sensitivity analysis for roads which provide better road condition and reducing transportation costs. However, it is observed that the new toll road must attract a reasonable volume of traffic to return its initial investment and operation costs. In line with this the impact analysis has been done to assure the required traffic volume will be maintained in the following three areas:

- Public Opinion–Willingness vs. ability to Pay;
- Current public transport system;

3. Public Opinion-Willingness to Pay

From the public interview results, it has been observed that the public is generally against tolling of the road. About 85% of the respondents are against the toll road and only 5% have positive attitude to toll. It can be concluded that the passengers are against toll road and may avoid using the toll road if implemented with this situation. The public may not easily understand the benefit of toll road especially by comparing with the value of travel time savings. Effective public relations works need to be done to aware the public the real benefit of the new system.

In the absence of such effort, the public may avoid using the toll road particularly at the initial stages and in the presence of other alternative toll-free road even if it costs them higher than the toll road. One of the problems in such public acceptance effort is the absence of research-based data that indicates the cost of delay in travel time either at national level or for any specific road network. If such facts were available, the costs and benefits of each alternative would be easily demonstrated to be perceived by the public.

It can also be observed from the driver's view survey that they have not fully accepted the tolling of the road. Only 30% of the car and station wagon drivers responded positively to the new system, and on average 42% of the drivers showed their acceptance to the toll road. This is mainly because of unawareness of the real benefits of using the toll road in respect with savings in Vehicle Operating Costs (VOC), savings in travel time and reducing the accident costs. This

benefit could not be also easily demonstrated as there is no research-based data showing the difference in VOC for different road conditions.

The willingness to pay is also largely a function of the potential user's wealth, ability to pay. Most of the public transport users (80%) expressed that the existing transport fee is unaffordable and any form of increment would worsen the situation.

In general, though the economic analysis shows the implementation of toll road for Addis Ababa-Adama road is viable, the interview from public opinion and the driver's interview indicated that the willingness to pay is very minimum. The ability to pay particularly in the case of public transport users is also low. The implementation of the system may face a problem of less than forecasted traffic especially at early stage.

Chapter Five

Summary, Conclusions and Recommendations

5.1. Summary

From the analysis it summarized that:

- ✚ Since the managements doesn't facilitate awareness program about the road to the public, the road didn't receive positive attitude from the users and public.
- ✚ The above perspective leads to low income of the road which must be solved immediately.
- ✚ Since there isn't good communication among the user and management the customers has fear of the managements increasing fee which might affect them.
- ✚ If the management doesn't change its approach to the customers and solve their complaints immediately, it might lose its customers.

5.2. Conclusions

The current management and financing system of roads in Ethiopia doesn't allow the private sector either to finance or administer the road infrastructure for commercial purpose. This is a bottleneck for the development of road network as the huge effort made in the past decade didn't alleviate the problem of road transport, which is a key for development of a country.

From the case study has been done for Addis Ababa-Adama road it is concluded that implementation of toll road in Ethiopia is feasible. The initial investment cost is too high and the return period is very long, which may not attract the private sector to participate in the business. For such reason the Government should take the initiative in financing the toll road and facilitate to participate the private sector.

5.3. Recommendation

In general, the following recommendations towards the effective implementation of toll road in Ethiopia are forwarded.

A. Institutional Reform and Legal Issues

Fundamental reforms are required to road agencies so that the administration and management of roads should be separated from operation. Appropriate laws and regulations should be drafted and issued which will bring the road operation to a pure business and facilitate the participation of the private sector in road financing, and administration.

The Government should concentrate in the expansion of roads to rural areas where it is not practical to implement the tolling option due to very low traffic, till it will develop and generate more traffic.

B. Government Support

The Government should support in providing bonds for loans from foreign Banks. In addition, as the toll road implementation involves huge loan in foreign currency, the Government should provide foreign exchange guarantee which protects the concessionaire from the risk of currency devaluation.

C. Public Private Participation

The toll road implementation requires big amount of fund raising, and the private sector may not involve in such new business. The Government needs to establish an independent public corporation which will involve the private sector for efficient implementation, whereby the public sector can raise more funds and the private sector contributes for efficient management.

D. Public Awareness

Both the Government and the Concessionaire will be expected to highly involve in public awareness to attract more traffic and increase the acceptance from the public. The Concessionaire is specifically required to show the advantages of using the toll road by demonstrating the benefits from the reduced travel time, savings in VOC and reduction of accident risks.

Hence, the researcher recommends further study to be carried out in detail covering the whole country to determine the level at which tolling can be implemented.

References

- African Development Fund. (2007). Appraisal Report for Nairobi - Thika Highway Improvement Project. Nairobi: Infrastructure Department, African Development Fund.
- Chakraborty, S. S. and Chaudhuri M. (1996). Traffic Demand Forecasting In Planning Methodologies & Case Studies. ' International Symposium on Infrastructure of the Future. Nov.1996, Bangalore, India.
- Chesher, A., & Harrison, R. (1987). Vehicle Operating Costs: Evidence from Developing Countries. Baltimore and London: The Johns Hopkins University Press.
- Department for Transport (DfT), UK. (2009). Values of Time and Operating Costs: Transport Analysis Guidance. London: Integrated Transport Economic Appraisal (ITEA) Division, DfT.
- Economic Evaluation Manual. (2007, November 7). Wellington, Newzeland. Retrieved July 12, 2009, from Land Transport NZ: <http://www.landtransport.govt.nz>
- Estache, A., Romero, M., & Strong, J. (2000). Private Financing and Regulation of Toll Roads. Bruxelles: The World Bank and University Libre de Bruxelles.
- Ethiopian Roads Authority. (2008). RSDP III - First Year Assessment. Addis Ababa.
- Ethiopian Roads Authority. (2003). Road Funding Report. Addis Ababa.
- Ethiopian Roads Authority. (2003). Road Sector Development Program Phase II (RSDP-II: 2002-2007). Addis Ababa.
- Ethiopian Roads Authority. (2007). Road Sector Development Program Phase III (RSDP-III). Addis Ababa.
- Evdorides, H., & Robinson, R. (Eds.). (2009). Restructuring Road Institutions, Finance and Management: Volume 2: Case Studies and Questions. Birmingham: The University of Birmingham.

- Farrell, S. (Ed.). (1994). *Financing Transport Infrastructure*. London: PTRC Education and Research Service.
- Fisher, G., & Babbar, S. (1998). *Private Financing of Toll Roads*. Washington DC: World Bank, Project Finance and Guarantees Group.
- Hamilton, M. J. (1996). *Privately Financed Road Infrastructure*. Washington DC: Sub-Saharan Africa Transport Policy Program, The World Bank.
- Schrank, D., B. Eisele, T. Lomax, and J. Bak. (2015). *Urban Mobility Scorecard*. The Texas A & M University, 2015.

APPENDICES

Appendix A: Questions to Stakeholders Interview

Perception about Addis Ababa-Adama Toll Road

I just selected the concerned department in the stakeholder organizations and made thorough discussion with each stakeholders. For more detailed data and information, I was referred to experts and got full cooperation.

The content of the general questions is the following:

1. How do you evaluate the current road administration and management system ?
2. What are the main problems for poor road network ?
3. What are the main problems for poor road condition ?
4. Does the existing law and regulation of the country have any clause which allows a private sector to participate in road administration ?
5. Is there any study concerning the time wasted by traffic congestion and the total economic loss of the country due to idle man power ?
6. Is there any study estimating the accident cost of roads in Ethiopia ?
7. Is the rate of expansion of road network and the rate of increase in vehicle fleet balance each other ?
8. Is there any study which estimates the increase in vehicle operating cost (VOC) based on different road condition for the case in Ethiopia ?

Appendix B: Questions to Drivers and Public Opinion Interview

1. Questions for Drivers

Interview to Drivers was to evaluate their perception about Addis Ababa-Adama Toll Road.

The method of recruitment was to approach the driver while they got out of the vehicle or they were in a stopping vehicle waiting for something so that they can have a time for interview. I first introduced myself showing the Support Letter written from the department, and then explained the purpose of the 5 to 10-minute interview.

2. Question for Public Opinion

The survey was conducted in Adama Bus Station by interviewing passengers who were waiting for transport bus to travel to Addis Ababa. The method of recruitment was to approach the person while they were waiting for the bus or they were in the bus waiting till it leaved the station. I first introduce myself showing the Support Letter written from the department, and then explained the purpose of the 5-minute interview.

After I got permission or willingness from the driver, I directly interviewed by writing the answers step by step. The questions are conducted in Amharic and the English version is the following:

1. How long have you been using the Addis Ababa -Adama road?
2. How often you use Addis Ababa-Adama road?
3. How long on average does it take you to drive between Addis Ababa and Adama?
4. How do you describe the traffic congestion of the road? Good, Fair or Worse?
5. How is the condition of the road? Good, Fair or Bad?
6. Do you think the existing number of lanes is sufficient to accommodate the existing traffic?
7. Do you think the existing number of lanes will be sufficient to accommodate the traffic after 5 or 10 years?
8. If the traffic is free, how long do you think it would take you to drive between Addis Ababa and Adama (in comparison with covering the same length of road between Adama and Methehara)?

9. Do you think the condition of the road and its geometrical features (curves and gradients) affect on the speed of your driving?
10. Do you think the condition of the road and its geometrical features (curves and gradients) increase your vehicle operating cost?
11. Do you know that you are paying for the maintenance of the road with some amount levied on fuel and oil prices?
12. Have you any awareness about toll roads?
13. If another road which has a very good condition, geometrical features, one way two or three lanes in both directions would be constructed for service with fee, do you think you prefer the new road and use it?
14. If the new toll road would shorten the current travel time by half and you want to use the road, how much do you think is the fair toll rate?
15. If another road which has a very good condition, geometrical features, one way two or three lanes in both directions would be constructed for service with fee and alternative transport system with higher rate would be provided on this road, do you think you prefer the new transport and use it?
16. If the new transport service on the toll road would shorten the current travel time by half and you want to use it, what percent increase on the current fee do you think is the fair price?