ADDIS ABABA UNIVERSITY COLLEGE OF BUSINESS AND ECONOMICS SCHOOL OF COMMERCE

FACTORS AFFECTING THE SUSTAINABILITY OF RAILWAY SERVICE IN ETHIOPIA:

THE CASE OF ETHIO-DJIBOUTI RAIL WAY SH. CO

BY

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A THESIS SUBMITTED TO THE SCHOOL OF COMMERCE OF ADDIS ABABA UNIVERSITY IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE DEGREE OF MASTERS OF ARTS IN LOGISTICS AND SUPPLY CHAIN

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Declaration

I, the under signed, declare that this thesis entitled as "*Factors Affecting the Sustainability of Railway Service in Ethiopia: The Case of Ethio-Djibouti Rail Way Sh. Co"* is my original work, prepared under the guidance of Dr. Berhanu Denu. All sources of material used while working on this thesis have been duly acknowledged. I further confirm that the thesis has not been submitted either in part or in full to any other higher learning institution for the purpose of earning any type of degree.

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STATEMENT OF CERTIFICATION

This is to certify that this thesis entitled as “Factors Affecting the Sustainability of Railway Service in Ethiopia: The Case of Ethio-Djibouti Rail Way Sh. Co”, submitted in partial fulfillment of the requirements for the degree of Master of Arts in Logistics and Supply Chain Management to the School of Commerce of Addis Ababa University, done by Tesfa Dagnachew is an authentic work carried by him under our guidance.

Berhanu Denu (Ph.D.) Addis Ababa, Ethiopia

Advisor *Signature* *Date* *Place*

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Acronyms and Abbreviations

EDR:	Ethiopia-Djibouti railway
SDCF:	Société Djiboutienne des Chemins de Fer
MPE:	The Ministry of Public Enterprise Ethiopia
MOT:	The Ministry of Transport of Ethiopia
MOFEC:	The Ministry of Finance and Economic Corporation Ethiopia
AALRT:	Addis Ababa Light Rail Transit Project
GDP:	Gross Domestic Production
IJEDR:	International journal of engineering development and research
ECMT:	European Council of Ministry of Transport
MOT:	Multi-Modal Transport operation.
SPSS:	Statistical Package for Social Sciences

ABSTRACT

The aim of this research was to assess factors that affect the sustainability of railway service in Ethiopia in case of Ethio-Djibouti Railway Sh. Co. The specific objectives of the study were to identify the successful indicators of sustainability benefit of Ethio-Djibouti rail way service, assess the major challenges for the sustainability of the railway service in Ethiopia and explore the methods of the corporation to ensure the sustainability of railway service in Ethiopia. To achieve the objectives of this research, descriptive research design and random sampling techniques were applied. When collecting the necessary data, structured questionnaire and interview were used in the study. The study found that economic, social, environmental, and technical, coordination and communication indicators of sustainability were not successfully analyzed in different stages of Ethio-Djibouti railway project. The finding also shown that lack of skilled man power, technology, low-quality of construction and shortage of power were the major challenges for the sustainability of railway service in Ethiopia. Moreover, to minimize the challenges and to insure the sustainability of railway service in Ethiopia the applicable approaches of ERC were enhancing the skills of man powers, enhancing the skills of managements and adopting public-privet ownership. Finally the study recommended that, better decision makers to be consider for development of training package in order to improve the quality of human resources and ERC should follow each and every asset to monitor and take relevant action for what is unfair of the project.

Key words: sustainability of the project, indicators of sustainability, Ethio-Djibouti rail way project

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Chapter One

1. Introduction

1.1 Background of the Study

Transportation system is very important for the growth of both the economy and the society. Advanced in technology have allowed people to travel farther, faster and explore more and more territory and expand their influence over large areas. Universally also both cargo volume and loads are growing in an increasing rate. Such growth demand seeks better transportation means for efficient and reliable transports of commercial and industrial products without delay and for better regional integrations. Therefore, Rail way infrastructure development is an essential component of regional integration through physical connectivity.

Nowadays rail way transportation is one of the most wildly used transport mechanism which are needed in the achievements of effective development and provide an efficient, cost effective, less land use, environmental friendly transport system and loading large volume of goods than motor vehicles. In addition these systems allow mass transport, very high speed, safety and durability. These conditions facilitate the demands of rail way transport in developed and developing countries including Ethiopia for transportation purposes.

Ethiopia is working tirelessly on building a far-reaching rail network. For instance Ethio-Djibouti railway is a new standard gauge international rail way that serves as the backbone of the new Ethiopian national railway network. It provides land locked Ethiopia with access to the sea, linking the Ethiopian capital of Addis Ababa with Djibouti and its port of Doraleh. More than 95% Ethiopian trade passes through Djibouti, accounting for 70% of the activity at the ports of Djibouti (Meseret, 2016). Ethiopia ranks 126 out of 160 countries in 2018 on the logistics performance index released annually by World Bank. The recently approved National Logistics Strategy aims to push Ethiopia's rank to as high as 40 by 2028. As such, to achieve this ambitious strategy Sustainable rail way service would play a big role.

The Government of Ethiopia established the Ethiopian Railways Corporation (ERC) under the Ministry of Transport with a mandate to create a modern nationwide railway network, replacing the Franco-Ethiopian railway that is no longer in service. ERC completed a 656 kilometers railway network construction project that links the capital city Addis Ababa to the port of

Djibouti. This railway expansion project was carried out by the China Railway group Limited (CREC) and the China Civil Engineering Construction Corporation. The new rail system started commercial operation in mid-2018. The two Chinese companies will operate and manage the $3.4 billion railway line for the next six years as local employees are trained to takeover in due course. This infrastructure project will significantly improve Ethiopia's international trade by reducing traders' logistical costs and time of delivery. The new electric railway cuts transport time from Djibouti to Modjo (a dry port city 70 kilometers away from Addis Ababa) from the current 84 hours to just 10 hours. Cargo capacity on the rail network is 3500 to 4000 tons of freight per train, with ERC anticipating 6 to 7 million tons of cargo per year in its first year of operation. Cargo volume will increase to 10 million tons in the mid-term.

According to Fente (2014), Railway transport system was very important for socio-economic development of Ethiopia. Because Railway transport means had advantage in efficiency, low transport cost, low carbon, caring bulk and heavy goods and free of climate and geographical conditions. Therefore, Sustainable railway transport planning though transport policy analysis and planning practices are mandatory to support sustainable development. Sustainable development constitutes environmental, social and economic objectives. Transport policy and planning decisions can have diverse, long-term impacts. A critical component of sustainable transport planning is the development of a comprehensive evaluation program that evaluates railway transport system performance based on an appropriate set of environmental, social and economic indicators (Litman, 2011).

It is believed that railway transportation system had large contribution for social and economic development of the country. However, the sustainability of the railway project is guaranteed when the project is implemented successfully through the contemporary project management issue like sustainability management. Literatures described that sustainability of any project can be measured through economic, social, environmental, technical, coordination and communication dimension. As such the project will continue the expected benefit for the country. Therefore this study wishes to examine factors affecting the sustainability of railway service in Ethiopia in case of Ethio-Djibouti railway project.

1.2 Overview of Ethio-Djibouti railway project

The Ethio-Djibouti Railway modernization project is the first cross-border electrified railway in Africa. The railway line is a 753 kilo-meter (km) electrified single-track standard gauge line between Ethiopia´s capital Addis Ababa and the Port of Djibouti, with 45 stations in total. The new standard gauge line runs parallel to and replaces the abandoned one-meter gauge railway, which was built more than 100 years ago. As a landlocked country, the line serves as the main transport corridor for Ethiopia to its gateway of the Port of Djibouti which handles over roughly 90% of the country's international trade. It runs from Addis Ababa/Sebeta through the two large Ethiopian cities of Adama and Dire Dawa and links industrial parks and dry ports.

The railway line is owned by Ethio-Djibouti Standard Gauge Railway Company (EDR), a joint venture company of the two state-owned companies Ethiopian Railway Corporation (ERC) and Société Djiboutienne de Chemin de Fer (SDCF). It was constructed by Chinese state-owned companies China Railway Group (CREC) and China Civil Engineering Construction Corporation (CCECC). CREC and CCECC are operating the railway for a period of six years following construction completion. The line was opened for freight in October 2015 and was formally inaugurated for passenger services in October 2016. It became officially commercially operational as of 1st January 2018.

The project is part of the **Belt and Road Initiative** and the first overseas railway constructed by Chinese enterprises with complete adoption of **international standards** (1,435 mm gauge line and electrification at 25 kV1), and Chinese equipment (CSR Zhuzhou for the rolling stock).

The new railway is expected to bring considerable advantages for long-haul transport of freight, with massively reduced travel times, from up to 50 hours down to ten hours. On the cost side, the temporary tariffs for passengers and freight adopted by the two governments are very competitive compared to road transport (USD 0.017 per passenger-km, an import rate of USD 0.046 per ton-km and an export rate of USD 0.023 per ton-km,) giving the railway a competitive cost advantage. The reduced transport costs and delivery times are forecast to increase trade volumes between the two countries. The estimated market share of rail transport is set at 75%, yet, to meet the traffic forecasts, the overall expansion of the Port of Djibouti should be taken into account. In terms of capacity, the new line can handle currently 11.2 million tons of freight, rising to 24.9 million tons by 2025 (Global construction review, 2015). The ERC anticipates the line to carry approximately four million tons of cargo by 2035, growing from 2.3 million tons

annually to be expected in 2025 and 3.1 million tons in 2030. To achieve these figures, the line requires, though, an expansion of the handling capacity at the Port of Doraleh (an extension of the Port of Djibouti for handling oil, bulk cargo, and containers with an annual turnover capacity of 8.2 million tons), with the aim of reaching 10 million tons by 2022 (The Guardian, 2018).

The new railway line boosts the performance of the international trade corridor and significantly contributes to the strengthened economic ties between the two countries. For Ethiopia, it helps accomplish its strategic goal of sustainable and stable economic development towards a middle-income country, with an annual GDP growth of 8.3% in 2019 and the target of an average GDP growth of 11% annually (The Economist, 2018). The line, designed as Ethiopia's main transport corridor, strengthens development opportunities for rural communities. New railway stations built on the outskirts of the urban settlements require, however, further investments to connect them to city centers and other interchange nodes by means of public transport. A strategic Transport Master Plan for Addis Ababa, currently under preparation, addresses the issues of integrated transport and urban development. The transfer of knowledge from the project development and first years of operation will benefit job creation in the local communities.

As part of the investment propositions, the two engaged Chinese enterprises committed themselves to training local personnel to operate maintain the railway. More than 300 employees of the Ethiopian Railway Company were sent to technical universities and schools in Beijing, Tianjin, and Chengdu to further their professional knowledge of railway engineering, train driving, and track maintenance (The World bank group, 2019). In addition, they provided regular training to promote compatibility of the working culture between both parties. Upon completion of the project, approximately 2,000 local workers were hired for infrastructure and rolling stock maintenance.

The total cost of the project was USD 5.09 billion (2011 value). The Governments of Ethiopia and Djibouti altogether financed 30% of the project and currently own the railway assets. The other 70% of the project cost was financed through concessional loans from China Exim-Bank (EXIM), the China Development Bank, and the Industrial and Commercial Bank of China. These loans were supported by market capitalization of nearly USD 3.3 billion (The World Bank group, 2020). The Governments of Ethiopia and Djibouti have both purchased credit guarantee insurance for their loans.

The project has faced some financial risks, associated with lower traffic volumes than predicted in the transport forecast and currency exchange rate fluctuations – as the project's debt was structured in US Dollar, while construction and operation cost as well as revenues were granted in Ethiopian Birr. In effect of some repayment risks, the Chinese banks have restructured the Ethiopian debt, extended the repayment period from 15 to 30 years.

1.3. Statement of the Problem

Sustainability of any project is a contemporary issue which justifies as the continual flow of benefit of a project before and after completion of the project. It is also shows as one of the factor to measure the success of projects. However, in developing countries the issue of sustainability of a project is not the integral parts of decision makers and business practices. The condition also existed in Ethiopian projects. This implies that there are prevalence's of sustainability and sustainable project problems. Recently Ethiopia builds different projects in order to aggravate the socio- economic developments of the country. From those projects Ethio-Djibouti railway project is one of them. This project was built by investing a billion of budgets from the scarce resource of the country. As such it should be delivered continues flows from the development perspective. However, the benefit which delivers to the future generation will be compromised. Because at the first investigation on Ethio- Djibouti railways project the researcher observed problems of integration of sustainability issue of the project. These include: the railway is not performing to its potential mainly due to theft and vandalism. The speed limit of the trains has been reduced from 80 km per hour to 50 km per hour due to damages to the railway infrastructure. The trip from Addis Ababa to Djibouti now takes 18 hours, lagging by 6 hours from its previous arrival time and this resulted in huge loss. The areas where incidents of theft are high, fences have been put up covering up to 60 kms. However, putting up a fence covering the entire railroad distance was practically impossible due to financial limitations. As a result these problems drive the researcher to examine the factors that affect the sustainability of railway project in Ethiopia in case of Ethio-Djibouti Railway Sh. Co. The other issue was herding of livestock along the railway and breaking and entering the fence was the other major obstacles facing the railway. Accidents have caused the death of several people and hundreds of domestic animals. Such accidents cost the Railway corporations millions in compensation. Authorities initially planned to reduce traveling time between Addis Ababa and Djibouti from 3

days to 12 hours. Power cuts resulting from power interruption and theft of its equipment is slowing down Ethio-Djibouti train performance. Theft of railway nails and transmission lines is costing the railway corporations thousands of dollars. Financial constraints were holdback the cooperation to implant surveillance cameras.

Globally different studies have been done on factor affecting the implementation of railway project. However, the sustainability analysis is a contemporary project management issue which did not include in their study variables. In case of Ethiopia different studies were performed on sustainability of the project. For instant Abdulmalik (2017) has been done a research on performance assessment of Addis Ababa Light Rain Transit based on sustainability variables (indicators) like economic, social and environmental. He used quantitative approaches and found that timesaving, affordability, accessibility, employment, safety, urban regeneration were the major sustainable benefits of the project. He also found shortcomings on low average speed due to close gap between the stations, short radius curves and low operating speed of the trams. Similarly, Getaw (2017) has been done a research on post completion sustainability of Ethiopian railway project in case of Addis Ababa Light Rail Transit Project. He used six dimensions: economic, environmental, social, technical, coordination, and communication dimensions to measure sustainability. To achieve the objectives of this study, qualitative research design and purposive sampling techniques were applied. In collecting the necessary data, observation, document analysis and interview were used in the study. At the same time the study found that the major factors of sustainability were not applied in the project. However, the study used qualitative approach through interview methods and the study did not show empirically the relationship between variables. As such it affects the generalization of the study.

In general the earlier studies performed on the sustainability of projects had gaps on variable selection, research approach, sampling techniques and methods of data analysis. Therefore this study fill the gap by adding more variables, mixed approach, and used more detailed descriptive analysis to examine the factors that affect the sustainability of railway project in Ethiopia in case of Ethio-Djibouti Railway Sh. Co.

1.3 Research Objective

1.3.1 General Objectives

To identify the factors that affecting the sustainability of railway service in Ethiopian.

1.3.2 Specific Objectives

- To identify the successful indicators of sustainability benefit of AA-Djibouti rail way service.
- To assess the major challenges for the sustainability of the railway service in Ethiopia.
- To explore the implication of the corporation to ensure the sustainability of railway service in Ethiopia.

1.4 Research Questions

1. What are the successful indicators of sustainability on Railway Service of Ethiopia?

2. What are the major challenges which deteriorate the sustainability of the railway Service in Ethiopia?

3. What are the procedural approaches of ERC to ensure the sustainability of AA-Djibouti railway service?

1.5 Significance of the Study

This study would contribute to identify the factors that affect the sustainability of Ethio-Djibouti railway service to the stack holders. The findings of financial performance of margin par firms in this study would expand the literature of sustainability of the project in general and on Ethio-Djibouti Railway Sh. Co in particular. The study would offer valuable contributions from both a theoretical and practical standpoint where it contributes to the general understanding of the role of sustainability on the project. This research study would be of great importance to Government of Ethiopia as it would provide information on the role of sustainable project on the socio-economic developments of the country. The study provided information that can be used as empirical evidence by researchers.

1.6 Scope of the Study

First this research did not cover all projects in Ethiopia in their varied nature. Its geographical location focused only Ethio-Djibouti railway project. The rationale behind for the selection of this project is its great contribution for GDP of Ethiopia by exporting and importing goods and services. So that it has been helpful to earn foreign exchange and play a significant role for increasing exports of Ethiopia. Conceptually, the study limited itself to finding out the factor affecting the sustainability of railway service in Ethiopia. Being a survey, the findings would be as true as the time when the data was collected. Therefore, findings may not be applicable to later times. Secondly, the data required for the research were quantitative and qualitative in nature. But the qualitative data will be indicating the possible influence of opinions and attitudes of the respondents.

1.7 Limitation of the Study

This research was expected to have several limitations. Being a survey, the findings would be as true as the time when the data was collected. Therefore, findings may not be applicable to later times. Secondly, the data required for the research will be quantitative and qualitative in nature. But the qualitative data will be indicating the possible influence of opinions and attitudes of the respondents. Focusing on railway projects, the findings may not be applicable to the whole country.

1.8 Organization of the Study

The study had five chapters. The first chapter contains background of the study, statement of the problem, objectives of the study, research questions, significance, scope and limitation of the study. Chapter two focuses on relevant literature review. In this chapter a review the relevant literatures in relation to the topic under discussion will be made. Chapter three discussed about the methodology and procedures used for data collection and analysis. Chapter four contains an analysis of the data and presentation of the results. Finally chapter five offers conclusion and recommendations

Chapter Two

2. Related Review Literatures

2.1 Introduction

This section will review the available literature which is either directly or indirectly related to sustainability of rail way project. Specially, the chapter reviews the definition and concepts, the theoretical framework that lead to the study, determinants of sustainability and the studies done relate to the problems. The chapter finalized with conceptual framework. The sources included in this review are collected from books, websites, article journals, past literature reviews and researches which are related to the topics.

2.2 Definition of Railway Transportation

Rail transport (also known as train transport) is a means of transferring passengers and goods on wheel vehicles running on rails, which are located on tracks. In contrast to road transport, where the vehicles run on the prepared flat surface, rail vehicle (rolling stock) are directionally guided by the tracks on which they run. Tracks usually consist of steel rails, installed on sleepers set in ballast, on which the rolling stock usually fitted with metal wheels moves. Other variations are also possible, such as slab track in which the rails are fastened to concrete foundation resting on prepared subsurface. Rolling stock in rail transport system generally encounters low frictional resistance than road vehicles. The operation is carried out by a railway company, providing transport between train station or freight customer facilities. Power is provided by locomotives which either draw electric power from a railway electrification system or produce their own power usually by diesel engines or historically steam engine. The International Journal of Engineering Development and Research (IJEDR) defined railway transportation as railway transports are safe land transport system when compared to other forms of transport. Rail way transport is able to transfer large number of passengers and cargo and energy efficiency, less flexible and more capital intensive than road transport. According to IJEDR (2018), the successful railways is important for improving operational efficiency and delivering and taking logistics from and to passengers, freight forwarders, and third-party logistics providers.

The most common types of goods transported by rail are the usual goods and sea containers, railway transport can also carry: bulk (brick, ore, coal, wood, etc.); dangerous (gasoline, liquefied gas, oil, acids, etc.); bulk (sunflower oil, alcohol, molasses, etc.); quarantine (raw sugar, coffee beans, vegetables, etc.); heavy (construction and agricultural machinery, petrochemical equipment, boilers, etc.); controlled by the state veterinary Supervision (canned fish, meat and dairy products, animal feed, etc.).

2.3 The role of Railways Service

The railway helps to connect people to places and enables them to go about their daily lives. Railway is one of the safest forms of transport than other mode of transports. As a result demands of the world people increase time to time. Train as one of modes of transport, has various advantages compared to other modes. In addition to the large carrying capacity, train is also more energy efficient and environmentally friendly as well as safer than other land vehicles. Railway particularly suited to serving certain transport markets. It is especially efficient when moving a large number of people in to and around dense urban areas and over medium to long distance at speed. Given its high fixed cost in the form of the track, signaling and station infrastructure, which do not vary significantly with passengers numbers, it is less cost-efficient at serving other types of market. According to OECD (2013), the main reason applying rail transportation reforms has to ensure end-user prices at an efficient level, productive efficiency and investment and innovation guarantee a satisfactory level of service quality, safety and variety.

Therefore business and customers across the country are the ultimate end users of rail freight service. They all rely on goods being moved efficiently and cost effective around the country. The rail freight industry plays an important role in supporting productivity and increasing the sustainability of the country's economy. Business making products that need to be transport to their customer make commercial decision about which transport mode to use. Three broad types of benefit can prompt these businesses to opt for rail freight. These are financial, operational and environmental benefits. Furthermore, the railway in countries creates a range of economic benefits that extend far beyond the direct benefits to its passengers and freight users. As such it is capable at delivering economic benefits in a number of further respects like, labor market mobility, facilitating housing development, social mobility, easing road congestion.

The railway transport has wider environmental benefits. So that for freight and passengers, rail performs better than most fossil fuel based transport modes: it provides lower carbon alternatives to car and lorry transport. Rail reduces total greenhouse emission from transport. Train travel gives rise to fewer pollutants than road transport means less noise pollution than road and air travel. As well as enabling businesses in other sector to travel and access clients and markets, the rail sector also directly generate significant economic activities and employment in the country economy.

2.4 Concepts of Sustainability

The concept sustainability can be traced back to 1970 and later popularized by world commission on environment development (WCED) a branch of United Nations. The concept is founded on economic theory known as theory of environmental limit whose brain child was Thomas Malthus (1766-1834) & David Recardo (1772-1823). The argument in their theory is that resource in the environment that we live is finite (WCED, 1997). In the WCED report namely our common future, the concept sustainable development and sustainability began to take shape and later became popular with environmental conservation. According to WCED (1987), sustainable development is a development that meets the needs of current generation without compromising the ability of future generation to meet their own needs. In the context of this study therefore, the concept sustainability is about people being able to maintain and sustain the project or programme outcome by their own assets or resources while not compromising the needs of future generation.

The basic idea of project sustainability is that any project should be designed to produce a continuous flow of outputs, services, and outcomes for a long time over its useful or economic life. Some definitions refer to the continuation of benefits after a project has been completed. Because sustainability includes project effects after implementation, some definitions refer to the likelihood that project results will be maintained over time. Project results should be sustainable even where there are several risks to outputs and outcomes; the notion of building resilience to risk is part of the reason for focusing on capacity development activities in a project scope, and for identifying mitigating measures (Asian development bank, 2010). Based on this, it is possible to say that Project sustainability refers to the sustainability of project effects rather than any particular project organization, which can be dissolved at the end of project implementation. Sustainability has been defined in many ways by many groups. Of the many definitions

available, perhaps the most applicable to infrastructure is that of the World Commission on Environment and Development (1987) as the continuation of benefits from a development intervention after major development assistance has been completed and the probability of continued long-term benefits. The resilience to risk of the net benefit flows over time. However, sustainable development is still seen as a complex issue that defies definition for practical purposes.

2.5 Approaches of Sustainability in all Project Phases

The need of sustainability has been emerged, as a result of economic, social, environmental and technical challenges. Therefore, to effectively integrating sustainability action in to project implementation close coordination and uses of appropriate resource are mandatory. Regarding to this, (FHWA, 2013) has been developed six approaches for implementation of sustainability on every project. These are: Develop a Sustainability Vision, Identify Project Context, Define Sustainability Goals, Identify Sustainable Solutions, Assess and Select Sustainable Solutions, and Incorporate Solutions.

2.6 Sustainability Evaluation Framework and Indicators

Sustainability is an integrated process involving social, economic, cultural, legal, political, health, environmental, financial and a host of other factors which can facilities continuity and sustainability of an organization system, structure, or institution in market place. Sustainability in project measured by: financial capital, manufacturing capital, natural capital, human capital, social desirability, cultural acceptance, economic sustainability, technical feasibility, political expediency, operational viability and environmentally conditions.

The demand for project sustainability have risen to a new concept called project sustainability management (PSM). This refers to a complex mix of system, structure, plan, resource, law, regulation, technologies and other mechanism put in place for an efficient and effective management of the sustainability process of any project. The project sustainability management process is designed to custmerize sustainable development project goals and indicators to suit local conditions and priorities and to ensure the project sustainability goal are allied and traceable to social goals and objectives. The project sustainability management system identifies the relevant issue, objectives and performance level to be met. It also establish an ethical framework as the basis for establishing policies, codes of conduct, consult with and maintained

dialogue with stakeholders and accounts for result achieved. The global principles of sustainability are concern for the future, participation of stakeholders in decision making of the project, equity in resource conception and quality and integrity of environment. Therefore factors that affect sustainability of any project or evaluation framework and indicators of sustainability were economic, social, environmental, technical, communicative, coordination dimension which international aspects.

2.7 Transport Sustainability Benefits

It has been proposed many definitions for sustainable transportation. Of them, the common definition selected by the European Council of Ministers of Transport (ECMT, 2004) because it has a broad scope and recognizes specific transportation issues. According to this definition, a sustainable transport system: Allows the basic access and development needs of individuals, companies and society to be met safely and in a manner consistent with human and ecosystem health, and promotes equity within and between successive generations. It is affordable, operates fairly and efficiently, offers a choice of transport mode and supports a competitive economy, as well as balanced regional development. Moreover limits emissions and waste within the planet's ability to absorb them, uses renewable resources at or below their rates of generation, and uses non-renewable resources at or below the rates of development of renewable substitutes, while minimizing the impact on the use of land and the generation of noise.

In achieving a reasonable level of sustainability, it depends on the integrated pattern of human actions, which therefore necessitates the coordination of deliberations between different actors and sectors. This consequently tries to achieve consistency between the local short-term and global long-term targets (Litman, 2007). Therefore, achieving benefits in a sustainability manner in the transport sector requires a very critical dimension of integrating the necessary elements capable of consistent management of the developed process.

2.8 Challenges related to the Sustainability of Railways Service

Because of the continually concepts of sustainability, appropriate solution of it is changing constantly. As such, sustainability in railway transportation systems affected by different challenges like, the significant requirements for land and natural resource to build roadways and to power the train used. These conditions led a negative impact on human and natural environment from the emission, congestion and accident created by the vehicles operating system (FHWA, 2013). Transportation Research Board of the National Academies (2005) describes the challenges of transport project sustainability as sustainability sometimes has a low

priority. Governments, private and international development agencies commonly hold that development planning processes and those associated with lending focus more on approval and implementation of projects, and less on the processes and conditions required to maintain project outputs and outcomes during the rest of the project life. Giving a low priority to the sustainability of projects can result in several substantial consequences: more rapid deterioration of infrastructure and increased maintenance costs, reduction in the level and duration of project benefits, reduced quality of services, reduced access of particular groups to project benefits, and reduced focus on institutional development. Influence on project sustainability has been attributed to different factors. The main factors influencing sustainability at the project level were grouped into four categories (Asian development bank, 2010): Continued delivery of services and production of benefits, Maintenance of physical infrastructure, Long-term institutional capacity, and Political support.

2.9 Review of Empirical Literatures

Sustainability concept brings the issues of three pillars of sustainable development namely economic, social and ecological development. In any community development programme the three pillars are considered systematically and not to be handling in isolation as the proponents of system theories suggests. In their argument, world commission on environment development indicates that community economic development is a function of local self-reliance, basic human needs affordability, and equity in resource distribution, community participation, social accountability, appropriate technology and sound development structures (WCED, 1997). The influence of the concept sustainability has increased significantly in local, national and international development programmes.

Fente (2014) examined the important quality indicator of rail freight transportation and found that Safety of cargoes during transportation, Regularity of cargo arrival, Just-in-time delivery, Security of carriages, Proper maintenance of the cargos and Availability of cargo handling equipment at loading points. Based on his descriptive statistical analysis most important quality indicators are Safety of cargoes during transportation found that the respondents overall expectation on a scale of 1 to 5 is 4.6069. The study realize that respondents expect a lot from the delivery of goods without losing, delivery of goods without contaminating and delivery of goods without damaging dimensions.

Furthermore, in Europe as European Commission (2013) described, the rail sector plays a significant role in the economy of the European Union which made an economic benefit of the annual turnover of EUR 73 billion and employing 800,000 people. To be a sustainable system, Skilled and well-qualified train drivers are significant factor in the safety, interoperability and competitiveness of railways. There are over 133,000 train drivers in the European Union at the human interface with technical developments and cross-border operations. United States of America has invested $148 billion in 2007 to keep the national network up to acceptable service standards. Capacity improvements including railway construction are planned at several levels of analysis because the demand of rail transport has been increasing from time (Cambridge Systematic Inc, 2007).

Bourgault, *et.al,* (2008) stated that, transportation infrastructures such as highways and railways can reduce distribution margins of the transportation cost in narrowing the gap between prices faced by producers and consumers, thereby facilitating better improvements for both; in general, efficient transportation infrastructures lower transaction costs, raise value added, and increase potential profitability.

2.10 Conceptual Framework of the Study

The conceptual framework indicates the crucial process, which used to show the direction of the study. The study shows the relationship between six dimensions of sustainability and project implementation of sustainability. Therefore, these dimensions are described as: Environmental dimension consists of the irreversible impacts were avoided, as much as possible, on the surroundings from implementing a project, examined potential noise pollution effectively and the measures taken to avoid land pollution, Environmental protection law and regulations on construction activities were considered in the project, The project has included all environmental considerations into project design and Consideration being given to the reduction of earthwork and excavation, formwork, reinforcement, concreting and waste treatment during structural operation of the project

Social dimension include: avoid negative impacts on cultural heritage, project future safety risks to the public and project user, increased local infrastructure capacity, the project installed security alarm and security screen, the project improved living standard to local community,

promotion for public awareness of the project, safety measures, facilities and insurance for working staffs has considered in the project.

Economic dimension: economic sustainability concerns mainly reduction of travel time, additional employment, and effects on local economy, affordability, the cost for consuming various types of energy such as electricity, training cost, labor cost and material choice.

Coordination dimension: Coordination can be seen as a process of managing resources in an organized manner so that it includes factors like: horizontal and/or vertical integration between our projects and other service rendering organizations, challenges faced due to lack of coordination between infrastructure projects, institutional collaboration /coordination /dialogue/ experience sharing between agencies in sustaining infrastructure projects, services rendering agencies/organizations should coordinate to sustain infrastructure projects, legal entity that is responsible to coordinate infrastructure projects and the body that is responsible to coordinate infrastructure projects contributed a lot in sustaining infrastructure projects

Communication dimension: Without effective communication mechanism among the project team members and stakeholders, aspiring of achieving sustainability in any project is unthinkable. Therefore, the dimension includes: The project defined the communication requirements for the project and how information will be distributed, Communications management constraints has been identified clearly in the project, Based on the defined stakeholders communication requirements, the methods and technologies were properly set in the project, Workable Communication matrix was designed for the project and The communication flowchart was developed for the project

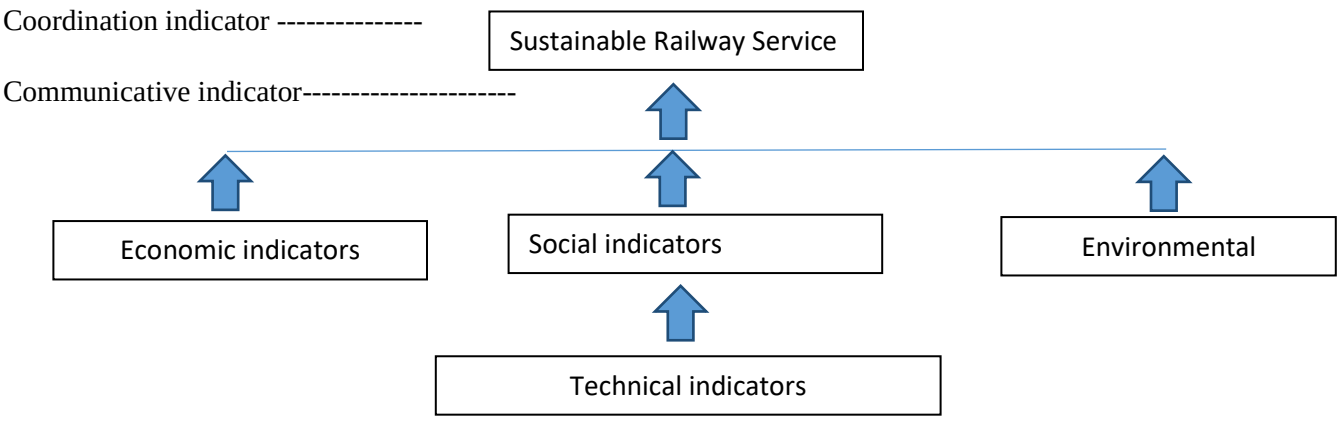

Figure 2.1 owners summary of literature

Chapter Three

3. Methodology of the study

3.1 Introduction

This chapter describes the methodology that used for the study and it includes the research design, the research approach, target population, sample and sampling techniques, data source and type and tools/instruments of data collection, procedure of data collection and methods of data analysis.

3.2 Research Design and Methodology

This research was formalized as a descriptive research design type. A descriptive research design describes or defines a subject, through creating a profile of a group of problems, people, or events, through the collection of data, the tabulation of the frequencies on research variables and the analysis of their interaction (Cooper and Schindler, 2006). This research approach was appropriate for this study based on the fact that the researcher intended to collect detailed and current information that would enable identifying and describing the current situation concerning the study. Creswell (1994) stated that the descriptive method of research is a technique of gathering information about the present existing condition. This research design is a fact finding study with adequate and accurate interpretation of findings.

3.3 Research Approach

The thesis was made with mixed approach (qualitative and quantitative approach) which conducted interviews and open end and close end questionnaire to collect the data. The study believed that both qualitative and quantitative approaches can contribute greater to the completeness of the investigation at hand. Mixed research is useful to capture the best of both qualitative and quantitative approaches and the researchers also intended to assess detail the major indicators and challenges in the sustainability of railway service in case of AA-Djibouti railway project.

3.4 Target Population and Sample Procures

Target Population

The target population is defined as the entire group a researcher is interested in. The populations of this study were employees of ERC in Addis Ababa. Therefore the target population for the study is those who are employees of ERC. Thus, employees of AA- Djibouti railway project were selected purposively for this research because they have sufficient information about the sustainability of this rail way services. For this reason the employees can be qualified as a good representative of the various categories of employees of ERC. Therefore the population that were used for this thesis were employees of Ethio-Djibouti Standard Gauge Addis Ababa and Ethiopia Rail Way Corporation Addis Ababa office staffs.

Sample Design

According to Cooper and Schindler (2001) the sampling method selected for the research depends on the requirements of the project, its objectives, the funds available and time constraints. There are two types of sampling method: namely probability (or random) sampling methods and non-probability sampling methods. Probability sampling occurs when the probability of including each element of the population can be estimated. In other words, a researcher can estimate the accuracy of the generalization from a sample to population. Moreover they refer to non-probability sampling method as the case where the probability of including each element of the population in a sample is unknown. Here, it is not possible to determine the likelihood of the inclusion of all representative elements of the population into the sample.

Thus, the researcher is selecting AA-Djibouti railway project by using purposive sampling method. From the variety of probabilistic sampling techniques, the researcher used random sampling methods for small target population of the study. Based on random sampling technique, experts were selected for the participatory indicator scoring because of their relationship with this AA-Djibouti rail infrastructural development as one of the major working group. Their knowledge and experience during the planning and implementation is useful in administering the questionnaire, scoring the indicators, thereby giving them score. The total population of this railway project was 1480 project team member. From this 215 workers were involved on the

construction of Ethio-Djibouti railway project and they have at least first degree and have been working in the construction of the railway projects.

Therefore, in order to determine sample size; the researcher used formula for calculating the required sample size from the target populations. The formula was developed by Taro Yamane (1967).). It is calculated as follows

It is calculated as:

$$n= N/1+N (e2)$$

$$n= 215/1+215(0.05) ^2=140$$

Where,

n is the sample size

N is the population size (215)

e is sampling error (0.05)

Therefore, the sample size of the study is 140. Then to estimate the number of sample from each department respondents have selected by random sampling methods.

3.5 Data Sources and Types

Both primary and secondary data were used to conduct this study. Primary Source is the data consists of materials that gathered by the researcher through systematic observation, the results of questioners and interviews. Primary data entails first hand data that has not been published documented in a book. Questionnaire will prefer due to its being first-hand information that is no altered, at the short time possible. It is structured and semi-structured having both close ended and open ended question designed to elicit specific response for quantitative and qualitative analysis respectively. The major data collection instruments are questioner and semi-structured interview were used by the researcher in order to collect information. The secondary data were collected from different literatures, books, journals, manuals, magazines, newspapers and other documents available.

3.6 Data Collection Procedures

Data were collected using questionnaires, interviews and document analysis using reports, manuals and different research papers using primary and secondary data collection method from

Ethio-Djibouti Standard Gauge Addis Ababa and Ethiopia Rail Way Corporation Addis Ababa office.

3.7 Data Analysis

This data's was collect through well-structured Likertscale questionnaire and semi structure interview. For the purpose of achieving the objectives of the study, the collected data was first code, sorted and organized for analysis. Summary statistics like the frequencies, percentages and means were used to analyze the data by using Statistical Package for Social Scientists (SPSS). The descriptive statistical results were present by tables, frequency distributions and Percentages to give a condensed picture of the data. This was achieved through summary of statistics, which includes the means and standard deviations values which are computed for each variable in this study.

3.8 Ethical Consideration

In this thesis the researcher adheres to all ethical and legal issues and handles it professionally. A formal letter from Addis Ababa University, School of commerce sent to Ethio-Djibouti Standard Gauge Addis Ababa and Ethiopia Rail Way Corporation Addis Ababa office. The names of employees selected in the sample were not mentioned in the questionnaire for confidentiality purpose. Also the researcher respect the respondents right to participate or not at any time.

Chapter Four

4. Data presentation, Analysis and Interpretation

This chapter provides a data analysis, discussion and interpretation of gathered row data of the study on factor affecting the sustainability of Railway service in Ethiopia in case of Ethio-Djibouti Railway Sh. Co. The data is summarized and presented in the form of frequencies, mean, standard deviation, charts, graphs and tables. Data collected through different techniques were analyzed in this chapter. The target population of the study was employees of Ethio-Djibouti railway project Standard Gauge in Addis Ababa and Ethiopia Rail Way Corporation office staffs in Addis Ababa. As such a total of 140 questionnaires were issued, out of the one hundred forty questionnaires distributed; 130 of them were successfully completed, returned and used for the study. The response rate was approximately 92.8 % of the total questionnaires distributed. Therefore the value of the response rate is very good and adequate to accomplish the study.

4.1. Demographic characteristics of respondents

As described under the topic of sampling techniques the researcher was purposively selected Ethio-Djibouti railway project for the selection of respondents. Therefore, the researcher selected randomly 140 sampled employees of the project which have connection to work in the construction of the railway projects to gather data's for analysis. As such these sections describe the background information relating to the study.

4.1.1. Gender of respondents

To determine the gender balance among the respondents the analysis of gender is mandatory.

Table 4.1 Gender of Respondents

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	**Male**	**94**	**72.3**	**72.3**	**72.3**
	Female	**36**	**27.7**	**27.7**	**100.0**
	Total	**130**	**100.0**	**100.0**	

Source survey 2021

As shown table 4.1 the finding obtained 72.3% of respondents were male while the remaining 27.7% were female. This shows that male respondents were larger than females.

4.1.2 Education

This part is also important to determine the academic status of respondents based on level of education. Then the results of the findings are tabulated in table 4.2.

Table 4.2 Educational Status of Respondents

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	**Degree**	**41**	**31.9**	**31.9**	**31.9**
	Masters	**89**	**68.1**	**68.1**	**100.0**
	Total	**130**	**100.0**	**100.0**	

Source survey 2021

With regard to educational level; the entire respondents were master's holder (68.1%) and degree holders comprises 31.9%of the respondents. This implies that most of the respondents were master's degree holder and the researcher used highly educated respondents to gather available information for the study.

4.1.3 Profession of respondents

Table 4.3 Educational Profession of Respondents

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	**Engineering**	**80**	**61.7**	**61.7**	**61.7**
	Project Management	**22**	**17.0**	**17.0**	**78.7**
	Economics	**12**	**8.5**	**8.5**	**87.2**
	Sociology	**16**	**12.8**	**100.00**	
	Total	**130**	**100.0**	**100.0**	

Source survey 2021

As seen in table 4.3, from the total respondents completed the questionnaire, 61.7 % were Engineer as they involve on planning, design and construction stage of the project. And 17 % were project managers as they involve both on the managing, planning and design stage of the project, and the rest 12.8% and 8.5% were Sociologists and Economists were Railway Administrator.

4.1.4 Experience of respondents

As shown in table 4.4 the majority (53.2%) of respondents currently have 6-10 years of experience. As the same time 34% of respondents have work experience from 1-5 years. The remaining 8.3% and 4.3% of respondent have an experience 16-20 and 11-15 years respectively. This means that the respondents who participate in this study are well experienced and created opportunity for the researcher to gather data from experienced and well informed respondents.

Table 4.4 Respondents Experience

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	**1-5 Years**	**44**	**34.0**	**34.0**	**34.0**
	6-10 Years	**69**	**53.2**	**53.2**	**87.2**
	11-15 Years	**5**	**4.3**	**4.3**	**91.5**
	16-20 Years	**12**	**8.5**	**8.5**	**100.0**
	Total	**130**	**100.0**	**100.0**	

Source: survey 2021

4.2. Score result for sustainability indicators

4.2.1. Economic Dimension

In the economic dimension, eight indicators (sub factors) are extracted from review literature and on this premise, the researcher tried to see the economic sustainability of Ethio-Djibouti Railway service. This analysis is prioritizing Ethio-Djibouti railway project in terms of financial and economic viability. The evaluation is presented in table 4.5.

In table 4.5, the researcher asked respondents opinion about indicators of economic dimensions of sustainability of Ethio-Djibouti railway project. As a result, the majority (57.4%) of respondents agree on reduction of travel time as compared to the use of vehicle on the road. As the same time, 29.8% of the participants strongly agree on the reduction of travel time of Ethio-Djibouti railway than other transport means. The remaining 2.1%, 4.3% and 6.4% of respondents were strongly disagree, disagree and neutral on the statement respectively. The result also took the highest mean (4.26) as the indicator with the most frequented figures of the maximum weight. On generation of additional employment, 44.7% and 38.3% of participants were strongly agreed and agree on the statement respectively. The rest 14.6% and 2.1% of them were neutral and disagree on additional employment generation of Ethio-Djibouti railway project respectively. As a result, it recorded the mean value of 4.19. Concerning to serve the strength of

local economy, 53.3% of respondents disagree on greater effects of local economy. As the same time, 36.2% of participants were strongly disagreed on advantage of infrastructure to generate economic benefit as the project implementation. The remaining 8.4% and 4.3% of the respondents were strongly agree and neutral on the statement respectively. Relating to transport affordability by the people as compared to road transport, 42.6% and 17% of respondents were agree and strongly agree on affordability of the people on transport fee than other road transportations respectively. On the contrary, 25.5% and 14.5% of the participants were neutral and disagree about affordability of the railway transportation respectively. On consideration of the cost for consuming energy such as electricity during construction, 36.2% respondents were agree on consideration of energy costs during construction. Similarly, 27.7% of respondents strongly agree that during construction stage of the project energy cost consideration was applied. However, 21.3% and 14.4% of respondents were neutral and disagree that there were no cost estimation of power sources of the project. Regarding to service- training for quality of human resources of the project, 31.9% of participants disagree on the statement about employees braining. Similarly, 31.9% of the respondents were no idea about the training of employees. On the contrary, 25.5% and 4.3% of respondents were agree and strongly agree on the development of training cost for improving the human resource of the project respectively. Relating to human resource provision for planning, managing and operating the project, 48% and 12.8% of respondents were agree and strongly agree about human resource planning and managing of labor cost of the project respectively. On the contrary, 25.5%, 8.5% and 4.3% of respondents were disagreeing, neutral and strongly disagree on the statement respectively. On the project consideration of the material choice, 57.4% of respondents agreed on consideration of the economy, durability and material selection of the project. The remaining, 25.5%, 12.8% and 4.3% of respondents were neutral, disagree and strongly disagree about material selection of the project.

Table 4.5 Respondents Response for Economic Dimension

ECONOMIC DIMENSIONS	1=SDA	2=DA	3=NEU	4=AG	5=SAG	Mean	SD
Reduction of travel time as compared to the use of vehicle on the road.	3(2.1)	5(4.3)	8(6.4)	74(57.4)	38(29.8)	4.26	.793
Additional employment to be generated by the project		2(2.1)	19(14.6)	49(38.3)	58(44.7)	4.19	.798
The project serves the local economy and take advantage of the infrastructure to generate economic benefit(effects on	47(36.2)	69(53.2)	6(4.3)	8(6.4)		2.62	.945

local economy)							
Transport affordability by the people as compared to road transport		19(14.9)	33(25.5)	55(42.6)	22(17)	3.62	.945
The cost for consuming various types of energy such as electricity, gas and coal was considered during construction(energy cost)		19(14.4)	27(21.3)	47(36.2)	39(27.7)	3.77	1.02
Training package was developed for improving the quality of human resources of the project(training cost)	8(6.4)	41(31.9)	41(31.9)	33(25.5)	5(4.3)	2.89	1.00
Human resource were provided for planning, managing and operating the project(labor cost)	5(4.3)	33(25.5)	11(8.5)	63(48)	16(12.8)	3.40	1.13
The project has considered the economy, durability and availability for material selection(material choice)	5(4.5)	16(12.8)	33(25.5)	74(57.4)		3.36	.870
TOTAL	2	18	22	58	30	3.6	

Source survey, 2021

Therefore, most of the respondents give higher weight for reduction of travel time (time saving) as their first choice by scoring it as highest value in the questionnaires. Additional employment is the second ranked choice from economic benefit of Ethio-Djibouti railway service. The third highest mean of response was consideration of the cost of consuming various types of energy such as electricity, gas and coal during construction (energy cost). The fourth highest mean value of the respondent was the transport affordability by the people than road transport. However the respondents disagree about the strengthening of local economy and it's advantageous on local infrastructure to generate economic benefit and training packages for improving the quality of human resources. This shows that training package was not developed by human resources for improving the ability of employees and the integration of the rail way line with the existing freight and ports network appears to be low and likely influencing the low usage of the project local economy and infrastructure.

4.2.2 Social dimension

The social indicators of sustainability of Ethio-Djibouti railway service are presenting in table 4.6 as follows.

Table 4.6 Descriptive Analysis of Social Dimension

SOCIAL DIMENSIONS	1=SDA	2=DA	3=NEU	4=AG	5=SAG	Mean	SD
Avoid negative impacts from project development on any cultural heritage		21.3	14.9	48.9	14.9	3.57	.994
Assessment was conducted to identify any project future safety risks to the public and project user	4 6 . 8	4 6 . 8	2 7 . 7	2 5 . 2		2 . 2 1	. 8 3 2

The project has increased local infrastructure capacity such as drainage, sewage, power, road and communication, shopping, education, financing and medical	6 . 4	4 2 . 6	3 1 . 9	1 4 . 9	4 . 3	2.23	.983
The project installed security alarm and security screen	1 4 . 9	5 5 . 3	1 7	8 . 5	4 . 3	2.26	1.17
The project improved living standard to local community	4 . 3	4 0 . 6	4 0 . 4	1 0 . 4	4 . 3	2.30	.883
Promotion public awareness of the project and possible impacts to the public were implemented	6 . 4	1 0 . 6	1 7 . 0	6 6 . 0		3.43	.927
The project considered the cost for employing workers, managers and professionals	1 0 . 6	1 0 . 6	2 3 . 4	4 4 . 4	1 0 . 6	3.34	1.147
Safety measures, facilities and insurance for working staffs has considered in the project	1 0 . 6	5 7 . 4	1 7 . 0	1 0 . 4	4 . 3	2.34	1.08
TOTAL	6 . 6	1 4 . 0	2 3 . 6	5 0 . 2	5 . 3	3.33	

Source, survey 2021

As shown in table 4.6 among the social sustainability indicators of the Ethio-Djibouti railway project, majority (48.9%) of respondent agree on avoid negative impacts from project development on any cultural heritage. Similarly, 14.9% of respondents were strongly agreed on the statement. The rest 21.3% and 14.3% of the participants were disagreeing and neutral on the negative impacts of the project on cultural heritage respectively. In case of future risk assessment of the project to public and project users, 48.6% of respondents were disagree on the conduct of assessment to identify the project future safety risk to the public and project user. Likewise, 27.3% of participants were neutral or they have no idea about the statements. On the contrary, 25.5% of respondents were agreeing on the conduct of assessments to identify the project future risk. Regarding to increase local infrastructure capacity, 42.6% of respondents were disagreeing on the statement. Similarly 31.9% of respondents were neutral about the statements. However, 14.9% and 4.3% of respondents were agreed and strongly agree on the benefits the project for increasing local infrastructure capacity respectively. Relating to security alarm and screen, 55.3% of participants were disagreeing about the project installation of security alarm and screen. Similarly 17% and 14.9% of respondents were neutral and strongly on the statement respectively. On the contrary, 8.5% and 4.3% of respondents were agree and strongly agree on the installation of security alarm and screen on Ethio-Djibouti railway project. Concerning to improve the living standards of the local community, 40.6% of respondents were disagreeing on the project improvements of living standards of the local community. On the other hand 40.4% of participants were neutral or they have no idea about the project improvements of living standards of the people. However, 10.4% of respondents were agreeing on the local community living standard improved by Ethio-Djibouti railway project. On

promotion of public awareness, 66% of respondents were agreed about the statement. On the other hand 17% and 10.6% respondents were neutral and disagree on the statement respectively. Regarding to the project consideration about cost for employing workers, managers and professionals, 44.4% and 10.6% of respondents were agree and strongly agree respectively. On the contrary, 23.4% and 10.6% of them were neutral and disagree on the statement respectively. Concerning to safety measures for working staffs of the project, 57.4% of respondents were disagree. Similarly 17% of them have no idea about the statement. However, 10.4% and 4.3% of respondents were agree and strongly agree on consideration of safety measures , facilities and insurance for working staffs.

Therefore, the negative impacts of the project consists of absence of safety measures, facilities and insurance for working staffs, low improvement of living standards of the local community, absence of security alarm and screen, absence of increasing local infrastructure like: road, shopping and drainage and absence of the assessment about the project future risk to the public. Moreover, thousands of farmers and ethnic tribes had complained that they had not been treated fairly by ERC due to unfair compensation by land acquisition. These condition led lack of public participation of local community and nomadic tribes on the project implementation.

4.2.3. Environmental dimension

Information on the existing state of the Ethio-Djibouti railway project impact on environmental condition is important to declare it's sustainably. Therefore a description of possible influences on the environment condition presented in table 4.7 and explained in the following paragraphs. Table 4.7 below, depicts descriptive analysis of environmental dimension. As such, on the avoidance of serious risks on the surroundings from implementing a project, 46.2% of respondents disagree about the statement. Similarly, 25.5% of respondents have no idea about the statement. On the other hand, 26.6% of participants were agreeing on the avoidance of serious impacts from implementing the project. On consideration of noise pollution during construction and operation stages, 40% of participants were agreeing. On the contrary, 27.7% of respondents were disagreeing about consideration of the project impact on noise prolusion during construction stage. The remaining 23.4% of respondents were neutral or have no idea about the statement. Regarding to effective use of the land, 57.4% respondents were agree on the statement and for 6.4% were strongly agree about the effective utilization of the land for the

project. The rest 14.9% and 10.6% of participants were neutral and disagree on effective usage of the land and measurements to avoid land pollution. Concerning to rule and regulation on Environmental protection, 48.9% of respondents were agree about consideration of law and regulation construction activity of the project. However 23.4% and 17% of respondents were disagreeing and neutral about the statement respectively.

Table 4.7 Descriptive Analysis of Environmental Dimension

ENVIRONMENTAL DIMENSIONS	1	2	3	4	5	Mean	SD
The irreversible impacts were avoided, as much as possible, on the surroundings from implementing a project	2.1	46.2	25.5	26.6		2.96	.908
Examined potential noise pollution during both project construction and operation stages	4.3	27.7	23.4	40.4	4.3	3.13	1.013
The project has utilized the land effectively and the measures taken to avoid land pollution	10.6	10.6	14.9	57.4	6.4	3.38	1.114
Environmental protection law and regulations on construction activities were considered in the project		23.4	17	48.9	10.6	3.47	.975
The project has included all environmental considerations into project design for construction, operation, closure/demolition, recycling, and disposal phases	8.5	12.8	23.4	51.1	4.3	3.30	1.041
Consideration being given to the reduction of earthwork and excavation, formwork, reinforcement, concreting and waste treatment during structural operation of the project	12.8	8.5	19.1	59.6		3.26	1.073
TOTAL	5.8	19.9	21.7	48.7	3.7	3.24	

Source survey, 2021

On the hand the majority (51.1%) of respondents were agreed that the project has included all environmental considerations into project all project lifecycle. Regarding to Consideration to the reduction of earthwork and excavation, formwork, reinforcement, concreting and waste treatment during structural operation of the project, the majority (59.6%) of the respondents were agreed.

This implies that, by considering rules and regulation of environmental protection, Ethio-Djibouti railway project used land effectively, minimize noise and land pollution during construction and operational stage. However, avoidance of serious risks on surrounding from implementing the project was not given that much consideration.

4.2.4. TECHNICAL DIMENSION

Technical performance measured the success of any projects. This means that technically effective project connected with the socio- economic development and environmental conditions

of the project. As a result the technical faller of the project would negatively influence the economic, social and environmental benefits of the project. The researcher tried to summarize the points regarding to technical performance dimension which was collected from literatures review and listed in the following table 4.8.

Concerning, the technical performance of Ethio-Djibouti railway project, 46.6% of the respondents disagreed that the project was designed by skilled personal and their performance perfect. Similarly, 34% of respondents have no idea about the skill and the performance level of the project designer. On the other hand 12.8% and 3.5% of respondents were agreed and strongly agree about the statement respectively. On the project durability analysis, 50.9% of respondents were disagreeing about the analysis of durability of the project during implementation stage. At the same time, 19.4% of them have no idea about the statement. However, 30.6% of participants were agreeing about the durability analysis of the project. Regarding to the standardize raw materials and equipment use, 58% of respondents were disagree and 8.3% neutral. The rest 28.9% were agree about the project usage of standardized raw materials and equipment. The majority (42.2%) of respondents replied neutral and have no information about Flexibility and adoptability of the project. As the same time 36.2% of respondents were disagree on the statement. As a result the majority (48.6%) of the respondents agreed that the project has situational for vulnerability of failure.

Table 4.8 Descriptive Analysis of Technical Dimension

TECHNICAL DIMENSIONS	1=SDA	2=DA	3=NEU	4=AGR	5=SAG	Mean	SD
The project was designed by skilled personal and their performance perfect		6.4	46.8	34.0	12.8	3.53	.804
The contractors, consultants were performed in reliability manner		44.7	31.9	19.7	4.3	2.34	.841
The project durability analysis was performed during implementation	1.6	50.9	19.4	30.4		2.17	.842
The standardize raw materials and equipment were used		58	8.3	28.9	4.3	2.49	.718
Flexibility and adoptability of the project were held in detailed manner	4.3	36.2.	42.6	8.2	4.3	2.23	.890
The project has situational for vulnerability of failure	4.3	12.8	46.8	34	2.1	3.17	.842
TOTAL MEAN	2.1	12.4	41.0	39.7	4.6	2.65	

Source survey, 2021

4.2.5. COORDINATION DIMENSION

Coordination of federal and regional utility service provider organization was mandatory for effective and efficient use of resources. As such the following table 4.9 describes the indicators of coordination sustainability of Ethio-Djibouti railway service.

As it can be observed in table 4.9, below, the majority (53.1%) of the respondents disagreed about the horizontal and/or vertical integration between the projects and other service rendering organizations' projects in sustaining infrastructure projects. While 27.2% and 19.2% of respondents were neutral and agree on the statement. Regarding to challenges that the organization faced due to lack of coordination between infrastructures projects, large numbers (48.9%) of respondents were agree. Similarly, 21.3% of respondents were strongly agreed on the statement. Concerning to institutional collaboration and experience sharing between organizations in sustaining infrastructure projects, more than half (57.3%) of respondents disagree. However 23.4% of participants were agree about the statement.

Table 4.9 Descriptive Analysis of Coordination Dimension

COORDINATION DIMENSIONS	1=SDA	2=DA	3=NEU	4=AGR	5=SAG	Mean	SD
There is horizontal and/or vertical integration between our projects and other service rendering organizations' projects in sustaining infrastructure projects.		53.1	27.7	19.2		2.34	.788
There are challenges our organization faced due to lack of coordination between infrastructure projects.		14.9	14.9	48.9	21.3	3.77	.960
There is institutional collaboration /coordination /dialogue/ experience sharing between agencies in sustaining infrastructure projects	4.3	57.3	12.8	23.4	4.3	2.33	1.006
There are a number of issues services rendering agencies/organizations should coordinate to sustain infrastructure projects constructed in Addis Ababa and other regional town.		46.8	23.4	17	12.8	2.22	.928
The challenges we faced can be minimized or eliminated if certain follow up is made available from project owners or agencies of different projects?		10.6	17	57.4	14.9	3.77	.840
TOTAL MEAN	3.6	16.4	19.8	51.9	8.2	3.44	

Source survey, 2021

On the other hand the researcher asked the respondents about services rendering agencies/organizations should coordinate to sustain infrastructure projects constructed in Addis Ababa and other regional town. As a result, 46% of respondents were disagreed on the presence

of legal entity to coordinate service rendering organizations. However, the majority (57.4%) agreed on the challenges that faced can be minimized through follow up from project owners of different projects.

This implies that there was no legal authority which responsible for the coordination of service providers in the country. As a result, the low vertical and horizontal integration between projects brought challenges on collaboration and experience sharing between organizations in sustaining infrastructure projects.

4.2.6. COMMUNICATION DIMENSION

Other factor that affects the sustainability of the project is communication about the project and the way of information distribution. As such to make effective communication the manager of the project plays a significant role. The ability of the project manager on the way of information communication also led the project success. This was discovered using the following table 4.10 indicators.

The table, 4.10 presented the communication sustainability of the project. As such 63.8% of respondents agree about the project defined communication requirements for the project and how information will be distributed. The rest 14.9% and 10.6% of respondents were neutral and disagree about the statement. Concerning to identify communications barriers in the project, 55.3% of participants disagree on the statement. Similarly 19.1% of respondents have no idea about the statement. However 10.6% of respondents were agree on the statement.

Table 4.10 Descriptive Analysis of Communication Dimension

COMMUNICATION DIMENSIONS	1=SDA	2=DA	3=NEU	4=AGR	5=SAG	Mean	SD
The project defined the communication requirements for the project and how information will be distributed		10.6	14.9	63.8	10.6	3.74	.793
Communications management constraints has been identified clearly in the project	10.6	55.3	19.1	4.3	10.6	2.51	1.101
Based on the defined stakeholders communication requirements, the methods and technologies were properly set in the project	6.4	57.4	8.5	23.4	4.3	2.30	1.082
Workable Communication matrix was designed for the project	10.6	12.8	38.3	34	4.3	3.09	1.039
The communication flowchart was developed for the project	10.6	12.8	34	38.3	4.3	3.13	1.055
TOTAL MEAN	7.64	12.7	22.9	49.7	6.8	3.35	

Source survey, 2021

As the same time, 57.4 of respondents were disagree on the responsibility of defined stakeholders communication requirements, the methods and technologies were properly set in the project. However 23.4% of participants were agree on the statement. Moreover, on design of workable Communication matrix of the project, 38.3% of respondent have no idea about the statement. But 34% of respondents agree about the project communication matrix of the project. Regarding to communication flowchart of the project, 38.3% respondent were agree. However 34% of them have no information about the statement.

4.3. Sustainability of the project

Sustainability in the project is an approach to balance the environmental, social, economic aspects of projects to meet the current needs of stakeholders without compromising future generation. As such to see the sustainability of Ethio-Djibouti railway project the following indicators are presented in table 4.11.

Table 4.11 Descriptive Analysis of Sustainability of the Project

Sustainability of the Project	1=SDA	2=DA	3=NEU	4=AGR	5=SAG	Mean	SD
1. Creating Sustainable economic growth and prosperity	2.1	4.3	6.4	53.2	34	4.13	.875
2. Protecting and enhancing the environment		10.6	25.5	40.4	23.4	3.77	.937
3. Ensuring social equity (fairness) or well being		14.9	31.9	36.2	14.9	3.94	1.988
4. quality of customer service	4.3	6.4	23.4	57.4	8.5	3.60	.901
5.healthy and safety	4.3	6.4	25.5	44.7	19.1	3.68	1.002
6. sustained and dynamic engagement	10.6	2.1	27.7	48.9	10.6	3.47	1.080
7. supply chain sustainability		12.8	34	31.9	21.3	3.62	.968
TOTAL MEAN	3.0	8.2	24.9	44.6	18.8	3.74	

Source survey, 2021

Table 4.11 shows the respondents agreement level on the existing sustainable benefits of Ethio-Djibouti railway services. Therefore on creating sustainable economic growth and prosperity, more than half (53.2%) of respondents were agreed on the statement. Regarding to protect and enhancing the environment, 40.4% of respondents were agreed with the mean value of 3.77. On ensuring social equity, most of respondents was neutral, i.e., they were not sure on the statements. Concerning to quality of customer service, health and safety, and supply chain sustainability, most of the respondents were agree with the mean value of 3.60, 3.68 and 3.62 respectively.

4.4. Analysis of Interview

In order to assess factors affecting the sustainability of rail way service, interview was conducted to high and middle level managers of Ethio- Djibouti railway project and the response is analyzed and presented under the following paragraphs:

For the question "What are the challenge that affect the sustainable flow of benefits of Ethio-Djibouti railway project? Concerning to this question, the interviewees stressed that factors that affect the continuation of the benefits of Ethio-Djibouti railway service are: absence of skilled man power, low technological capacity, low economic growth, low quality of infrastructure, low construction quality and low managerial conditions. Moreover interviewees explained that the shortage of power was other challenges of Ethio-Djibouti railway when it started operation. Furthermore, respondents described that Ethio- Djibouti railway Service Office doesn't has any sustainability document, design document, construction document, operation document and etc.

For the question, what are the approaches of ERC to ensuring the sustainability of Ethio-Djibouti railway service? The response of the interviewees implies that ERC did differently to enhance sustainability of the project and summarized as follows: Opening project office, avail the necessary manpower for the project office, ERC is developing a proposal which enable the office to generate money from advertising using the trains screen board. This will help Ethio-Djibouti railway Service Office to generate money and have the economic power to lead the system. Moreover the respondents said that integration of the rail line with the existing freight and port networks appears to influencing the usage of the line. This could have been improved through better planning at the inception of the project to address inter-country coordination.

Chapter Five

5. Summary, Conclusion and Recommendation

5.1 Summary

This study is used to identify factors affecting the sustainability of railway service in Ethiopia: The case of Ethio-Djibouti Sh. Co. Therefore, based on the research questions the findings of the study are summarized as follows:

Concerning to economic dimension, the study found out that Ethio-Djibouti railway project was time saving transport means, generated additional employment, consuming sufficient cost of energy like electricity and gas, and affordable by the people. However, in terms of training packages for the project employees and strengthening local economy and infrastructure were given low attention. Therefore, the ERC does not explore exhaustively the economic dimension of Ethio-Djibouti railway project. Even if the training cost of employees of the project is the backbone for sustainability of the project, the study investigate that the training package of economic dimension was not treated well. Furthermore the railway was built without access roads, trucks line; branches line storage facilities and dry ports. It was official policy to build cheap railway line first as the economic integrated work was considered to be easy.

Regarding to social dimension, the finding indicated that the negative impacts of the project on the society consists of absence of safety measures, facilities and insurance for working staffs, low improvement of living standards of the local community, absence of security alarm and screen, absence of increasing local infrastructure like: road, shopping and drainage and absence of the assessment about the project future risk to the public. Moreover, thousands of farmers and ethnic tribes had complained that they had not been treated fairly by ERC due to unfair compensation by land acquisition. These condition led lack of public participation of local community and nomadic tribes on the project implementation.

On the Environmental Dimension, the researcher finding that by considering rules and regulation of environmental protection, Ethio-Djibouti railway project used land effectively, minimize noise and land pollution during construction and operational stage. However, avoidance of serious risks on surrounding from implementing the project was not given that much consideration.

The findings revealed that the technical performance dimension of the project is low. If the project is failed technically, the impact also reflected on the other dimensions. It is the pillar of

all the rest dimensions for any project. The research output proved that some of the technical performance didn't meet the designed performance like reliable performance of contractors and consultants were very difficult to control the contractor to perform based on the standards. The durability of the project is also absence due to the contract type. Low standardizes raw materials and equipment was used. Flexibility and adoptability of the project were held in small manner. As a result the project has situational for vulnerability of failure. Therefore, the researcher had got very difficult to know the technical performance of the project since the design, construction and operation documents are not at the hand of ERC. According to the interviewees' response, the technical performance will be seen after some time while the project is at operation due to many reasons.

On the bases coordination dimension, due to the absence of authorized organization to coordinate these service providers, the country is losing huge money that can get from a process of managing resources in an organized manner through coordination and simultaneously that help the project to achieve high degree of operational efficiency. This implies that there was no legal authority which responsible for the coordination of service providers in the country. As a result, the low vertical and horizontal integration between projects brought challenges on collaboration and experience sharing between organizations in sustaining infrastructure projects.

Regarding to communication the study found that, the project was defined communication requirements and how information will be distributed. These were letter and telephone to communicate with their stakeholders. However, the project was not set mechanism to identify communication barriers and no responsible stakeholders for communication requirements, methods and technologies. This condition resulted in the absence of communication matrix and flow charts. Generally, the study showed that there is no communication management plan that can serve as a guideline for communications throughout the life of the project and will be updated as communication needs change. Like coordination dimension, the role of communication is not recognized in the project. However, literature depict that most of the time of a Project Manager's is spent communicating and thinking about it.

The study also found that the major factors that challenge the sustainable of Ethio-Djibouti railway project were: low skills of manpower, low technological capacity, low growth of economy, low infrastructure quality, low construction quality and weakness of managerial conditions. Moreover the shortage of power was other challenges when Ethio-Djibouti railway

was started operation. The trains were stranded when they faced power shortage and a corrective action was not made soon.

Concerning to approach to ensuring the sustainability of Ethio-Djibouti Sh. Co. railway service; the study found that expanding project office, hiring skilled manpower for the project office. Moreover, ERC is developing a proposal which enable the office to generate income from advertising using the trains screen board and Pedestrians Oriented Plan (POP) which focused on constructing buildings around the stations and using the stations for advertisements. This will help Ethio-Djibouti railway Service Office to generate money and have the economic power to lead the system. Integration of the rail line with the existing freight and port networks appears to influencing the usage of the line. This could have been improved through better planning at the inception of the project to address inter-country coordination.

5.2 Conclusion

The purpose of the study was to examine the factors affecting the sustainability of railway service in Ethiopia in case of Ethio-Djibouti Railway Sh. Co. The study had three research questions. Such aswhat are the successful indicators of sustainability in Railway Service in Ethiopia? What are the major challenges which deteriorate the sustainability of the railway Service in Ethiopia? And what are the procedural approaches of ERC to ensure the sustainability of AA-Djibouti railway service?

The study was descriptive in nature. The scope of the study was limited to Ethio-Djibouti railway project. The target population of this study comprised of 140 employees of the project. The unit of analysis for this study was individual organizations. The study used random sampling method to sample 140 project employees and managers from the selected departments. A structured questionnaire and semi-structured interview was used to collect data from the sampled employees or managers of the identified project. Data analysis involved trough descriptive statistics (frequencies, percentages and means). The findings were presented in tables and figures.

The Case of Ethio-Djibouti railway project is also one of the major projects that is used for the Socio- and macroeconomic benefits to the country. Export and import in Ethiopia and Djibouti were clearly improved, as well as increasing an economic performance in both countries. The transformative role of railways in Ethiopia and Djibouti played an important role in land

development. The project has fostered trade among the two countries by boosting the performance of the international trade corridor, although there are still improvements to the Ports of Djibouti and Doraleh that need to be completed to fully realize the project's benefits. For Ethiopia, it helps accomplish its strategic goal of sustainable and stable economic development towards a middle-income country. For Djibouti, the better and more competitive railway service supports port and transit cargo operations, which are essential sources of income and employment for the country. Therefore, this study has discussed the major successful indicators and sub indicators which should influence sustainability of Ethio-Djibouti railway project.

The study found that the economic factor/dimension assessed by the project was

- Time saving transport means,
- Generated additional employment,
- Consuming sufficient cost of energy like electricity and gas
- Strengthening local economy and infrastructure
- Affordable by the people.

However, in terms of training packages for the project employees were given low attention.

The social dimension the project only focused on

- Cost of employing workers managers and professionals,
- Low impact on culture and
- Promotion on public awareness.

However, the project had negative impacts on the society which consists of low future risk assessment to the public, problems of drainage, road and shopping, low safety measures, facilities and insurance to working staffs and less contribution to the living standards of the local community were some negative impacts of the project.

Environmental factors/dimensions the study stated that project had negative effect during construction period due to the construction equipment in operation and heavier traffic caused by the materials transportation and reduced road traffic capacity and a positive effect due to the significant replacement of motor traffic by the Ethio-Djibouti railway project system during the operation period.

As a result of contract type, the respondents stated nothing regarding to the technical performance dimension. Moreover the study found that coordination and communication factors were not implemented by the ERC from the very beginning to the end of the project life cycle.

The major challenge which affect the sustainable of Ethio-Djibouti railway project were:

- low skills of manpower
- low technological capacity
- low growth of economy
- low infrastructure quality
- low construction quality
- weakness of managerial conditions
- shortage of power

5.3. Recommendation

Based on the findings, the researcher forwarded recommendation as follows:

1. As shown on the result, Ethio-Djibouti railway project human resources were given less attention. This is due to low human capital, finance and raw materials. And it is clear that Ethio-Djibouti railway project stockholders don't show much improvement in creating efficient human capital operating the project. Hence it is better decision makers to consider development of effective training for improving the skill of employees of the project.
2. To make successful social indicators, the governments and the project stakeholders should developed safety, facilities and insurances to the public and promotion should be made for the public awareness in order to improve the living standards of the local community.
3. Technical performance of human resource group should be developed in designed and efficient manner.
4. ERC should develop corrective coordination and communication style on the project in order to encourage collaboration and strengthens of the project.

Reference

1. Asian Development Bank: Independent Evaluation Department. (2010). Post-Completion Sustainability of Asian Development Bank-Assisted Projects.
2. Federal Highway Administration (FHWA). (2013). An Integrated Approach for Building Sustainable Roads.
3. Transportation Research Board of the National Academy. (2005). Integrating Sustainability into the Transportation Planning Process.
4. Mass Transit Railway (MTR) Corporation Limited. (2013). Supplementary update to the sustainability Report 2013. MTR Corporation.
5. Litman, T., 2007. Developing indicators for comprehensive and Sustainability transport planning. Transportation Research Record: Journal of the Transportation Research
6. Ethiopian Railways Corporation, 2009. Feasibility study of Addis Ababa Light Rail Transit.
7. Brundtland World Commission on Environment and Development. (1987). Report of the World Commission on Environment and Development.
8. UNEP-IETC. Agenda 21 for Sustainable Construction in Developing Countries. A Discussion Document. Pretoria, South Africa.
9. The International Council for Research and Innovation in Building and Construction (CIB) and United Nations Environment Programme International Environmental Technology Centre (UNEP-IETC), 2002.
10. Creswell, J.w., 1994.Research Design: Qualitative and Quantitative Approaches, London.
11. Cooper, D. R. and Schindler, P. S. 2001. *Business research methods.*7th Edition.
12. Bless, and Higson-Smith, C. 2000. Fundamentals of Social Research Methods: An African Perspective.3rd Edition.
13. Yamane, Taro. (1967). Statistics, An Introductory Analysis, 2nd edition, New York.
14. Creswell, J. W. (2013). Research Design: Qualitative, Quantitative, and Mixed Methods Approaches. United States of America: SAGE Publications.
15. Jeon, C. M., Amekudzi, A. and Guensler, L. 2010. Evaluating Plan Alternatives for Transportation System Sustainability: Atlanta Metropolitan Region. International Journal of Sustainability Transportation.

16. ERC, (2012) Final Evaluation Report on Feasibility Study of Addis Ababa/Sebeta – Djibouti Railway Project, NRN.

17. Shenhar, A. J., &Dvir, D. (2001).Reinventing project management: The diamond approach to successful growth and innovation. Boston, unpublished MA thesis: Harvard Business

18. Litman, T., 2007. Developing indicators for comprehensive and Sustainability transport planning. Transportation Research Record: Journal of the Transportation Research.

19. European Commission. (2013): The Fourth Railway Package – Completing the single European railway area to foster competitiveness, and growth.

20. Cambridge Systematic, Inc. (2007).National Rail Freight Infrastructure Capacity and Investment Study. Washington DC: Association of American Railroads.

21. Bourgault, M., Drouin, N., & Hamel, E. (2008). Decision making within distributed project teams: An exploration of formalization and autonomy as determinants of success. PMI Project Management Journal.

22. Berman, G. and Bianchi, M. (2005). Evaluation of European Investment Bank (EIB) Financing of Railway Projects in the European Union. Evaluation Report. EIB.

23. Williams, K. and Dair, C. 2007. What is stopping sustainable building in England? Barriers experienced by stakeholders in delivering sustainable developments. "Sustainable Development"

24. Hossain, L. (2009). Communications and coordination in construction projects. Construction Management and Economics.

25. Haavaldsen, T., Laedre, O., Volden, G. H. and Lohne, J. (2014). On the concept of sustainability – assessing the sustainability of large public infrastructure investment projects. International Journal of Sustainable Engineering.

26. Fenta.T, 2014. Demands for Urban Public Transportation in Addis Ababa. Journal of Intelligent Transportation and Urban Planning

27. Eshete, M. 2015. Public Transportation System: The Case Of Addis Ababa. Addis Ababa University College of Social Science.

28. Ibrahim Worku, (2011) Road Sector Development and Economic Growth in Ethiopia; Ethiopia Support Strategy Program II; International Food Policy Research Institute, Addis Ababa, Ethiopia.

29. Global Construction Review (2015): Ethiopia steams ahead with vision for a modern national rail network.

30. The Guardian (2018): In Ethiopia's bush lands, promised riches of a railway boom turn to dust.

31. The Economist (2018): Camel trains are holding up Ethiopia's new railway line.

32. World Bank Group (2019): Djibouti Country Overview, World Bank Group (2020): Economic data for Ethiopia.

33. World Bank Group (2020): Economic data for Djibouti.

Appendix

Addis Ababa University

Faculty of Business and Economics

School of Commerce

Department of Logistic and Supply Chain Management

APPENDIX: 1

Questionnaire to be filled by employees

Dear respondents

The purpose of this questionnaire is to collect relevant data for the study entitled the "Factor affecting the sustainability of railway service in Ethiopia: the case of Ethio-Djibouti railway project. Hence, your response has vital contribution for the study and success of the study as well. So you are kindly request to read all question and fill the questionnaire with genuine responses. Be sure that your responses will not be used for other purposes other than academic purpose. Your specific answers will be completely anonymous, but your views, in combination with those of others, are extremely important. I would like to thank you for allowing me to take a few minutes of your valuable time.

Please note the following points before you start filling the questionnaire:

i. You do not need to write your name on questionnaire paper
ii. Read all instruction before attempting to answer the questions
iii. There is no need to consult other to fill the questionnaire

Thank you in advance

Part I: respondent's characteristics

Please provide appropriate response by encircling on your choice from one of the suggested alternatives.

1. Gender

   1. Male 2. Female

2. Age

   1. 18-30 2.31-40

   3. 41-50 4. Above 50

3. Education

1. First degree 2. Master's degree

3. PHD

4. Educational profession

1. Engineering 2. Project management

3. Architecture 4. Construction management

5. Economics 6. Management

7. Sociology

5. Experience

1. 1-5 years 2. 6-10 years

3. 11-15 years 4. 16-20 years

5. Above 20

Part II: success factors for sustainable benefit

Instructions: Please tick the number that you feel most appropriate, using the scale from 1 to 5 (Where 1 = strongly disagree, 2 = disagree, 3 = neutral, 4 = agree and 5 = strongly agree).

ITEMS	1	2	3	4	5
1. ECONOMIC DIMENSION					
1.1. Reduction of travel time as compared to the use of vehicle on the road.					
1.2Additional employment to be generated by the project.					
1.3 The project serves the local economy and take advantage of the infrastructure to generate economic benefit					
1.4 transport affordability by the people as compared to road transport					
1.5 the cost for consuming various types of energy such as electricity, gas and coal was considered during construction					
1.6 training package was developed for improving the quality of human resources of the project					
1.7 human resource were provided for planning, managing and operating the project					
1.8 the project has considered the economy, durability and availability for material selection					
2. SOCIAL DIMENSION					
2.1 avoid negative impacts from project development on any cultural heritage					
2.2 assessment was conducted to identify any project future safety risks to the public and project user					
2.3 the project has increased local infrastructure capacity such as drainage, sewage, power, road and communication, shopping, education, financing and medical					
2.4 the project installed security alarm and security screen					
2.5 the project improved living standard to local community					
2.6 promotion public awareness of the project and possible impacts to the public were implemented					

2.7 the project considered the cost for employing workers, managers and professionals					
2.8 safety measures, facilities and insurance for working staffs has considered in the project					
3. ENVIROMENTAL DIMENSION					
3.1The irreversible impacts were avoided, as much as possible, on the surroundings from implementing a project					
3.2 Examined potential noise pollution during both project construction and operation stages					
3.3 Examined potential noise pollution during both project construction and operation stages					
3.4 The project has utilized the land effectively and the measures taken to avoid land pollution					
3.5 Environmental protection law and regulations on construction activities were considered in the project					
3.6The project has included all environmental considerations into project design for construction, operation, closure/demolition, recycling, and disposal phases					
3.7 The project has utilized the land effectively and the measures taken to avoid land pollution					
3.8 Consideration being given to the reduction of earthwork and excavation, formwork, reinforcement, concreting and waste treatment during structural operation of the project					
4 TECHNICAL DIMENSION					
4.1 the project was designed by skilled personal and their performance perfect					
4.2 the contractors, consultants were performed in reliability manner					
4.3 the project durability analysis was performed during implementation					
4.4. The standardize raw materials and equipment's were used					

4.5. Flexibility and adoptability of the project were held in detailed manner					
4.6. The project has situational for vulnerability of failure					
5. COORDINATION DIMENSION					
5.1. There is horizontal and/or vertical integration between our projects and other service rendering organizations' projects in sustaining infrastructure projects.					
5.2. There are challenges our organization faced due to lack of coordination between infrastructure projects.					
5.3. There is institutional collaboration /coordination /dialogue/ experience sharing between agencies in sustaining infrastructure projects					
5.4. There are a number of issues services rendering agencies/organizations should coordinate to sustain infrastructure projects constructed in Addis Ababa and other regional town.					
5.5. There is a legal entity that is responsible to coordinate infrastructure projects in A.A. and regional City administration					
5.6. The challenges we faced can be minimized or eliminated if certain follow up is made available from project owners or agencies of different projects?					
5.7. The body that is responsible to coordinate infrastructure projects contributed a lot in sustaining infrastructure projects of Addis Ababa and regional cities.					
6. COMMUNICATION DIMENSION					
6.1 The project defined the communication requirements for the project and how information will be distributed					
6.2 Communications management constraints has been identified clearly in the project					
6.3 Based on the defined stakeholders communication requirements, the methods and technologies were properly set in the project					

6.4 Workable Communication matrix was designed for the project					
6.5 The communication flowchart was developed for the project					

Part Iп. Sustainability of the project

I would be grateful if you could spare a few minutes to complete this sustainability Questionnaire. Please tick the appropriate box to indicate your degree of agreements. Where: 5 = Strongly agree, 4 = Agree, 3 = Neutral, 2 = Disagree, 1 = strongly disagree

Sustainability of the Project	1	2	3	4	5
1. Creating Sustainable economic growth and prosperity					
2. Protecting and enhancing the environment					
3. Ensuring social equity (fairness) or well being					
4. quality of customer service					
5.healthy and safety					
6. sustained and dynamic engagement					
7. supply chain sustainability					

Interview questions

1. What are the major factors that challenge the sustainable flow of benefits in the case of Ethio-Djibouti railway project?

2. What are the implications of ERC's approach to ensuring the sustainability of Ethio-Djibouti railway transit? What and how should ERC do things differently to enhance the sustainability of this project?