



ST. MARY'S UNIVERSITY  
SCHOOL OF GRADUATE STUDIES

**ASSESSING CRITICAL FACTORS OF PROJECT MANAGEMENT  
AFFECTING THE PERFORMANCE OF ETHIOPIAN RAILWAY  
PROJECTS, THE CASE OF ADDIS ABABA LIGHT RAIL TRANSIT**

BY  
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JUNE 2019  
ADDIS ABABA, ETHIOPIA

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**ST. MARY'S UNIVERSITY**  
**SCHOOL OF GRADUATE STUDIES**  
**DEPARTMENT OF PROJECT MANAGEMENT**

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## DECLARATION

I hereby declare that I am the sole author of this dissertation entitled “**Assessing Critical Factors of Project Management Affecting the Performance of Ethiopian Railway Projects, The Case of Addis Ababa Light Rail Transit**” and has not been presented to any other University or College for the completion of any degree.

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## ENDORSEMENT

This MA thesis entitled: **“Assessing Critical Factors of Project Management Affecting the Performance of Ethiopian Railway Projects, The Case of Addis Ababa Light Rail Transit”** conducted by **Abebe Million** has been submitted to St. Mary’s University, School of Graduate Studies for examination with my approval as a university advisor.

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## ACRONYMS AND ABBREVIATIONS

AALRT.....Addis Ababa Light Rail Transit

ANOVA.....Analysis of Variances

ERC .....Ethiopian Railway Corporation

FDRE.....Federal Democratic Republic of Ethiopia

HRM .....Human Resource Management

IMS .....Information Management System

LCC .....Life Cycle Cost

LRT.....Light Rail Transit

PM .....Project Management

PMBOK.....Project Management Body of Knowledge

PMI.....Project Management Institute

QM.....Quality Management

RII.....Relative Importance Index

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## ABSTRACT

*Infrastructure development is a significant driver for advancement across the African continent and a critical enabler of economic growth. To track sustainable development one of the facilitator is transportation infrastructures. Mega transportation infrastructure projects need plenty of resources, human capital and knowledge to accomplish their projects successfully. Mostly, projects success is largely being measured by their completion on time, with allocated resources and expected quality. Moreover, managers' efficiencies to handle each and every knowledge area management make the project performance more effective.*

*The purpose of this study is to assess critical project management factors affecting the performance of railway projects in Ethiopia by taking Addis Ababa Light Rail Transit as a case study. The major objective is to analyze the managers' efficiencies to handle the knowledge area management and to examine the critical factors that ensure railway project success based on the empirical evidence of project practitioners in the case study.*

*This dissertation is organized with five chapters. The impact of transportation infrastructure development projects to Ethiopian economy is the researcher main reason to study in this topic and poor project management practices in projects. The research is both descriptive and explanatory type. Data collected by using self-administered questionnaires for 50 respondents. The percentage frequency distribution, relative importance index and regressions were used to analyze data. Among numerous factors, this study found out: Well-defined stakeholder management plan, Estimation of project cost, Determine the required budget, Control cost, Quality checklists, Confirming HR availability and Well-defined cost plan are the most critical factors for effective performance of AALRT project by using both methods. Also, the study revealed that the AALRT success perceived by completing the project on time and cost as planned, the project meet its product technical and operational performance, the customers' needs and expectation by the project are the core success criteria for the project to said effective.*

*Therefore, this paper provides insight into the project management knowledge areas critical factors influencing the performance of railway construction project for different objectives, focusing on the operation and implementation phases in the context of project management.*

**Keywords:** *Infrastructure, Project Management Success Factors, Success Criteria, Addis Ababa Light Transit, Ethiopia*

# CHAPTER ONE

## INTRODUCTION

### 1.1. Background of the Study

Infrastructure refers to the fundamental facilities and systems serving a country, city, or other area as well as the services and facilities necessary for its economy to function, Steven (2003). For example, transportation infrastructures are critical to economic growth and an important tool for a country's overall progress. The growth of global railway infrastructure development has encouraged many countries including Ethiopia to develop railway as a key strategy to enhance the national transportation infrastructure and strengthen economic competitiveness. In addition, investment in large railway projects have to contribute like, increasing the attractiveness of public transport, improvement of its position in the market, increase of its turnover, increase of its profitability, reduction of travel time and majorly reduction of maintenance cost, Nevertheless, the development of railway infrastructure projects demands massive land use, high cost, huge resources and time. These demands have great impact on the economy, environment and social wellbeing. Spang (2003).

A lack of railways, ports and quality roads has hindered Africa's development in recent years. But nowadays, economic heavyweights such as China and India pumping billions of dollars into Africa to transform the continent's fortunes and stake a claim in the world's next high-growth territory, Economic Times (2016). As a result, of the major constraints in the transport infrastructure service like limited connectivity, outdated railway network, high transport cost, poor quality of transport services and growing mobility needs of people, the Ministry of Transport of FDRE was found to be careful to develop railway system in the country, Yehualaeshet (2012). As a very cost-effective means of transport over long distances, the Ethiopian railway infrastructure development projects are expected to significantly stimulate the national economy and accelerate regional integration, The Ethiopian Messenger, (2016).

The construction of the Light Rail Transit (LRT) system in Addis Ababa and a modal shift of freight transport from road to an electric rail. Hernan & Robert (2016) cited as for businesses dependent

on highway traffic, projects like LRT can potentially disrupt the flow of customers that provide essential business revenue. As a result, the first phase of the project of Addis Ababa Light Rail Transit (AALRT) is opened and began to work on September, 2015. Ethiopian Railway Corporation (ERC) is the institution given the mandate by the Government of Ethiopia of renewing, rehabilitating, managing and redeveloping the railway network system within the Ethiopian Metropolitan. Then, the project owner implement Light Rail Transit for the capital city of Addis Ababa with almost 475 million dollar to cover 34.25 km in two rail lines (east-west) with 41 stations in two lines, will able to carry 60,000 passengers an hour in full operations. It was 85 percent financed by the Export-Import Bank of China through a loan agreement signed with the Chinese government in June 2011, CPI (2016). AALRT is the first light rail and rapid transit in eastern and sub-Saharan Africa, RGI (2015). The two lines use common track of about 2.7 km. It is fit for elevated, at grade and below grade with high capacity of 70 km/hr. According to ERC the system carried on average 113,500 daily passengers. Even there are future plans for extensions in all four directions of the city.

Transportation project performances or success is largely being measured by transportation system effectiveness and efficiency as well as the plummeting environmental and climate impacts of the system, Newman & Kenworthy (1999). To achieve effective outcome from our project works, project management is one of the way of discipline nowadays. Project management is a specialized management technique necessary for the planning, organization and control of projects under one strong point of responsibility, G. Wanyona (2014). Various organizations have used project management techniques as a means of bridging the gap between failure and success in the implementation of projects. Despite this increasing awareness of project management by organizations, projects still fail.

On the contrary, lack of sound project management by owners or contractors on projects on the other hand leads to construction delays and extra costs for both parties. Similarly, professional project management practices as the skills and science of planning, designing, and managing activities throughout the project lifecycle. In agreement with the above stated points project management is clearly designed to achieve a successful outcome of the projects. The infrastructure for transport operations, such as roads and railways, use non-renewable resources, so effective use of resources also the other component for project success. So, the effective implementation or



project performance of public infrastructure projects can be measured in the context of effective practices of project management process, tools and techniques within the project life cycle.

Thus, the study aims to build up the concept of project management for projects to investigate the critical factors that ensure success of Ethiopian railway projects through AALRT project and analyze the managers' efficiencies to handle knowledge area management like project scope management, project time management, project cost management, project integration management, project quality management, project risk management, project human resource management, project communication management, project procurement management and project stakeholder management and propose a recommendation for succeeding phases of the project.

## **1.2. Statement of the Problem**

The Ethiopian AALRT project faced many challenges especially, for time management, cost management, quality management etc. from designing, construction, and operation to quality product and services delivery. Generally, the project were not prepared properly according to the project phases and the project managers and stakeholders of those projects have no enough knowledge for the management of knowledge areas. These new transit lines also bring challenges to local businesses, long-term changes to the corridor because of inappropriate designing and causing extensive disruptions during construction. Ultimately, the success of a new transit line is dependent on the success of these businesses to serve as destinations for riders, provide employment opportunities, and maintain the cultural fabric of the different neighborhoods and communities. Yigzaw (2017) found in his study that most of the firms are not so optimistic to assume that business will be better and better once they faced acute fall of their business in the LRT implementation period. Also the project is failed to meet the needs of customers, because regarding the mobility issue. After the construction of the LRT the firms feel more inconvenience of the parking space, crossing points and pedestrian facility. The present focus of ERC is on construction of railway lines and finishing several current railway projects in recent years. The above problems plus in some extent, it is required to evaluate the performance and expected outcomes of completed railway projects to understand the level of their success through different measures to make the railway development more effective for future, this inspired the researcher to carry out preliminary research

on identifying the most critical success factors that need to be managed carefully on all the knowledge areas of project management during the railway construction project in AALRT.

Besides, recent literature suggests that there are plenty factors influence the project success or performance, Tamek (2017). Considering the knowledge gap, there is a possibility of conducting a scientific research in our country context, Also, a few literatures exist on the critical success factors of a project management on a particular part of the project life cycle, like risk management, procurement and planning, etc., but rarely on the all knowledge areas of the project management. Therefore, this paper is focused on assessing the critical factors which influence the railway construction project performance with respect to all project management knowledge areas and help the organization to improve the chances of project success of their railway projects in the future.

### **1.3. Research Objectives**

The target of this thesis is to carry out assessment on the causes of project success and to realize how the managers are undertaking the project management functions in each knowledge area according to PMBOK. This aim is intended to be achieved with the following objectives.

#### **1.3.1. General Objective**

The general objective of this study is to determine the critical factors of project management for railway project performance in Ethiopia through Addis Ababa Light Rail Transit project.

#### **1.3.2. Specific Objectives**

Particularly, the study will attempt to:

- ➔ To identify critical project management success factors that influence the performance of Addis Ababa Light Rail Transit railway project.
- ➔ To determine the relationships between critical project management success factors and the performance criteria in Addis Ababa Light Rail Transit railway project.
- ➔ To assess the effects of critical project management success factors on the performance measures of Addis Ababa Light Rail Transit railway project.

## **1.4. Research Questions**

The following questions will guide the study:-

1. Which factors are critical according to the knowledge area management to ensure the success of Addis Ababa Light Rail Transit railway project?
2. Is there a significant relationship between critical project management success factors and performance criteria in Addis Ababa Light Rail Transit railway project?
3. How does critical project management success factors have effect on project performance measures in Addis Ababa Light Rail Transit railway project?

## **1.5. Research Hypothesis**

For this study, the following hypotheses were formulated:

*Hypothesis 1:* Project Management Knowledge area factors has effect on project time and cost performance.

*Hypothesis 2:* Project Management Knowledge area factors has effect on project technical and operational performance.

*Hypothesis 3:* Project Management Knowledge area factors has effect on project customer need expectation performance.

## **1.6. Significance of the Study**

As they require plenty of resource and budget, many mega infrastructure projects many not meet stakeholders needs and not effective as they planned after the completion. This study will be helpful for policy makers who are the government through the relevant ministries and regulators by detecting significant factors associated with project management practices which determine the success or continuity of railway infrastructure projects. Also the study will benefit stakeholders in Ethiopia who play a vital role in transportation sectors by identifying challenges that will be affecting the performance of service in their operations at the railway project.

In addition, project management field is a new knowledge area for a country like Ethiopia, there is a gap on implementing project management practices, principles, tools and techniques in our projects. Moreover, even many studies conducted on success factors of projects, but the studies focused only on the common success factors like cost, time and quality. So, this paper try to view all vital knowledge areas which impact the effectiveness of a project. For instance, the introduction of LRT system for Addis Ababa has the advantage of providing an alternative means of public transport to the city's road-based system. As such mega projects uses huge resources and money, also they are enabler for our economic growth. Using proper project management principles and knowledge through during every project activities for such kinds of projects is a needed. Because of those reasons, the researcher hope this study will contribute its part in this matter.

### **1.7. Scope and Limitations of the Study**

Currently, Ethiopian Railway Corporation has two under construction and two completed railway projects. Of the 1364 km of railways, in January 2018, ~800km were fully operational (the AALRT and The Addis Ababa - Djibouti Railway. The study focused on only at AALRT project. The study focuses on project management success factors that contribute to effective performance of railway infrastructure in Addis Ababa Metropolitan. How project management knowledge areas properly implemented and which knowledge area factor can improved railway infrastructure and enhance exploiting the potential of urban centers with proper use of PM. How railway projects can sustain for future and what critical factors affect transport infrastructure service implementation by assigning a list of variables which are extracted from extensive review of literature by outlining a conceptual framework.

There are some limitations in this study also, as the population of the respondents are only 39. In order to get a more accurate result, the questionnaires should be distributed to a more population of respondents who are experienced project managers. Also, all the questionnaires were distributed to ERC office, respondents who have experience on the project are not willing or left the company. Also, in numerous literatures there is no approaches for benchmarking to measure the performance measure of railway companies. There is no proposal with the objective to measure a railway project performance and lack of methods and frameworks to measure rail companies' performance measurement.

## **1.8. Organization of the Study**

The thesis was organized in to five chapters. The first chapter is an introduction part and present the background issue, statement of the problem, objectives, significance and limitation of the study. The second chapter was presented the literature review, related reviews with both empirical and conceptual documents. The third chapter was discussed about the research methodologies that was employed in the study. It was comprised with research design, sampling procedure and techniques, data collection instruments and method, data analysis method. Data presentation, analysis and interpretation was presented in the fourth chapter. Finally, in chapter five summary, conclusion and recommendation of the study occurred.

## **1.9. Purpose of the study**

The purpose of the study is to assess the quality of project management practices or best practices by determining the critical factors regarding with project knowledge areas management that facilitate project success in the railway construction project in Ethiopia, specifically the Addis Ababa light rail transit railway project.

## **CHAPTER TWO**

### **LITERATURE REVIEW**

#### **Introduction**

This chapter offers an insight into the literature by other scholars and researchers to provide the understanding and explanation of critical success factors in project management which affect the performance of railway infrastructure projects. It reviews literature that is related to the specific and general objectives of the research. It specifically covers the past studies where it discussed literature related to the specific objective of the study. It also presents literature on the critical review of major issues, summary and gaps to be filled and the conceptual framework.

#### **2.1 Theoretical Background**

A number of researchers have formulated theories and models that explain how best to effectively implement megaprojects in a method that should ensure that all the project goals are met within the constraints of time, cost, quality and scope through their studies on the theories and models.

##### **2.1.1 Project and Success**

According to PMI (2004), the definition of a project is: A temporary endeavor undertaken to create a unique product, service or result. Though there are process based activities in the infrastructure construction industry, for instance regarding manufacturing of building materials, from a contractor or a property developer perspective most of the activities in the construction industry are project based. Also when considering different initiatives to industrialize the infrastructure construction process the recent years it is fair to say that a major part of the money spent in the construction sector is invested in project activities. Considering this, it is crucial for the players in the infrastructure construction industry to be experts in management, monitoring and control of projects, thus find the recipe for successful projects. Major parts of a recipe for successful projects ought to be generic for all kind of projects, but it is reasonable to believe that some other features are more specific to the construction industry, to certain types of projects, to the project size and to other characteristics of a project.

The concept, or criteria of, project success has been a variable in numerous studies. Few people would disagree with the statement that project success is interpretable in many ways. Project success in simpler terms is the success of a project. The follow up questions that could arise are, Can you measure success? What makes a project successful or effective? How to improve the chances of project success etc.

Theoretically, it is important to draw a distinction between successes on projects management and success in projects. According to Wit (1988), success in project management is mainly attached to the success of the direct conduct of project manager, to applying specific tools of the discipline as well as to cost, scope and time of any project. However, success in projects refers to goals and benefits foreseen by the project for the organization as a whole. In other words, it refers to the effectiveness of a determined initiative linked to the achievement of the initial goal, enabling the company to enjoy the benefits planned by projects. Many more lay out a bolder proposal: quality is an ambiguous, multidimensional, and subjective concept that lends itself to different interpretations by various project stakeholders, Wateridge, (1998). Baker et al. (1974) added the issue of client satisfaction. Project success therefore becomes a “virtuous square of criteria”: time, cost, quality, and client satisfaction. For Munns & Bjeirmi (1996), the project management objectives differ from the project objectives, and we can no longer afford to confuse strict adherence to the “time/cost /quality triangle”—the most common objective of project management—with project success.

On the other hand, Cleland (1986) suggested that "project success is significant only if measured from two vantage points: the extent to which the project's technical performance objective was accomplished on time and within budget; the contribution that the project made to the strategic mission of the organization". According to Turner (1996) successful projects are on time and within budget, it provides a satisfactory benefit to the owner or government, achieves its objectives and targets. Wateridge (1998) also concluded that the project meets its defined objectives, quality thresholds and profitable for the owner.

According to Pinto & Slevin (1988), Project success is something more difficult than just meeting cost, time, and performance specifications. As a matter of fact, client's contentment with the final result has a great deal to do with the perceived success or collapse of projects". Baccarini (1999) discovered two different components of project success: these are given below:

► **Project Management Success** - This concentrates upon the project process and especially the successful achievement of cost, time, and quality. Also the way in which the project management process was performed will be considered.

► **Product Success** - This deals with the effects of the project's final product. A clear difference should be made between product success and project management success, in order to properly identify and evaluate project management success and product success, as they are differ from each other. According to Baccarini (1999), Project success or effectiveness can be summarized as:



From the review project success mainly depends on the successful project management practices. The successful project management will include two components. The first component is the project management process such as a project initiating process, project planning process, project executing process, project monitoring process and project closing process. The second component is project body of knowledge areas management, likely project time management, project scope management, project cost management, project quality management, project integration management, project communication management, project risk management, project procurement management and project stakeholder management. Therefore, the successful project management will support to ensure the project product success and then it definitely ensure the project success.

### **2.1.2 Project Management and Success in Projects**

Project Management (PM) is the application of knowledge, skills, tools, and techniques to project activities to meet the project requirements, PMBOK, (2008). Today, PM has developed to be an independent discipline, however, its concepts and techniques are continuously evolving. Project management began to take shape as a body of knowledge in the mid-twentieth century, many processes, techniques and tools have been developed. They cover various aspects of the entire lifecycle of projects and have made possible for project management to increase its efficiency and effectiveness, thus contributing to an increased project success rate.

Project management success may ultimately lead to project success, but the opposite is not true: it is reasonable to assume that failure in project management may lead to project failure, except under



fortuitous circumstances, but that the project can also fail despite successful project management (Ika, 2009). Effective project management is a critical success factor in many organizations, and nowhere is it more crucial than in the development of organizational information systems. Delays, cost overruns, and failures in information system development projects are notorious (Cerpa & Verner, 2009; Goldfinch 2007; and Keil, Cule, Lyytinen, & Schmidt, 1998) and can frequently be traced to poor project management practices (Cerpa & Verner, 2009; Goldfinch, 2007; and Keil et al., 1998).

Although much knowledge has been collected about PM, the research results lack generality and tend to be idiosyncratic to particular situations. Research in PM is often “practically focused and rich in descriptive detail but may be specific to a given context, and not broadly applicable” (2013, p. 938). Hence, knowledge in project management may be perishable and sensitive to changes in environmental factors and contexts. The impact of such factors and contexts must be appropriately represented if a broad theoretical base is to be developed. It is of relevancy that many scholars have been highlighting the benefits of the utilization of project management such as Kerzner (2001). The success for a project oriented company is directly tied to results gained in each of its projects, since these projects constitute the crucial business and the essential skills of the organization (Kerzner 2001). The PM literature traditionally refers to two streams of studies of project success. One stream is the project success factors; these are the independent variables that make success more likely. Other one is the project success criteria; these are the dependent variables that measure success (Morris and Hough, 1987; Wateridge, 1998; Turner, 1996 as cited in Muller and Jugdev, 2012).

### **2.1.3 Project Management Success Factors**

Han et al. (2012) define success factors as those factors that influence, constitute as well as determine the success of a project. According to Wit (1988) and Cooke-Davies (2002), success factors are those inputs to the management system that lead directly or indirectly to the success of the project.

Success factors are further classified under two main categories, one being hard, and objectives, tangible and measurable while the other soft, subjective, intangible and less measurable, Chan et al., (2004). Many studies have been focused on project success factors (e.g. Chan et al., 2004; Hatush and Skitmore, 1997; Nguyen et al., 2004; Parfitt and Sanvido, 1993; Salminen, 2005; Sanvido et al., 1992; Tabish and Jha, 2011; Terry, 2002 as cited in Chovichien and Nguyen (2013).

Silva et al. (2015) extract critical success factors affecting construction project success from literature and grouped as internal and external factors.

Therefore, extending the traditional triangle to include the quality of the management process, the integration, the scope, the communication, the procurement, the human resource, the risk and stakeholder management process will be able to provide a more complete view of project management success.

### **2.1.3.1 Effect of Quality Management on Project Success**

Quality is an important attribute when it comes to a product or service. Simply putting it, if the quality of the product/service is not good, then the customer will not be interested in it. Accomplishment of acceptable levels of quality in the construction industry has long been a problem. Great expenditures of time, money and resources, both human and material, are wasted each year because of inefficient or non-existent quality management procedures. Quality management in construction projects should mean maintaining the quality of construction works at the required standard so as to obtain customers' satisfaction that would bring long term competitiveness and business survival for the companies, Tan and Abdul-Rahman (2005). The quality control procedure in construction projects is based on tender documents, specifications, working drawings etc., therefore, the pre tender stage quality and standards of the work should be properly maintained. Therefore it is important to maintain quality control of the construction projects from the inception of its design stage up to the completion of construction including the maintenance period Chandrasena (2001). Quality performance of operations can be evaluated based on the availability and implementation of certain quality improvement techniques that will support the achievement of the operations goals. Quality performance should be assessed for two categories of processes carried out by project organizations, ISO (2003):

- ▶ The project management process includes all activities that are needed to manage the project and achieve the project objectives on a continual basis (e.g. planning, controlling, and improving).
- ▶ The process related to the project's product activities for realizing the project's product (e.g. design/engineering, procurement, construction).

Also, Project quality management includes: identifying the quality requirement for the project, auditing the quality requirement, quality control measurement, monitoring and recording the result of executing the quality activities to access performance and quality checklists.

### **2.1.3.2 Effect of Scope Management on Project Success**

Project scope management is the process of defining what work is required and then making sure that all of that work and only that work is done. Project scope management involves planning, creation of work breakdown structure and verification and control of project scope, PMBOK (2013). It is very essential that the project team and the stakeholders have the same understanding that what will be the product that will be produced and also what are the processes that the project team will be using to produce them. According to, Schwalbe (2009) states that the first step in project scope management is scope planning. The project's size, complexity, importance, and other factors will affect how much effort is spent on scope planning and the main output is a project scope management plan and the tools and techniques are template forms, standards as well as expert judgment. The next step in project scope management is to define the work required for the project further. Good scope definition is very important to project success because it helps to improve the accuracy of time, cost and resource estimates, it defines a baseline for performance measurement and project control and it aides in communicating clear work responsibilities. Creating work breakdown structure, validating and controlling scope are the final procedures of project scope activities.

### **2.1.3.3 Effect of Time Management on Project Success**

Time management is important in any construction project. Without proper time management, many problems will occur such as extension of time or time overrun. Some of the researchers describe time overrun as delay and some of them describe that the time overrun is an effect from the construction delay, no matter what it was described, time overrun become the most general problem in construction industry worldwide, Olawale & Sun (2010). Time overrun occur when the actual progress of a construction project is slower than the planned schedule, Ibrahim (2011). Delay or time overrun will affect all parties involved in the project. It will affect the profits which would be obtained if the project can be completed on the schedule. But due to the time overrun, contractors had to spend more money on labor, plant and may lose the opportunity to get the next project.

Hence, effective time management is very important and crucial to achieve successful completion of construction projects.

For project managers, it is particularly important to possess time management skills to be successful. Effect of the efficient time management using project holds, planning schedule management, defining and sequencing activities, estimating activity resources and duration and control schedule.

#### **2.1.3.4 Effect of Cost Management on Project Success**

For any project to be successful, money is required either for buying raw materials, or using a particular machine or even just outsourcing certain sub tasks. It is important to have a good estimate of how much is really required to make a good product/service. Project managers must make sure their projects are well defined, have accurate time and cost estimates and have a realistic budget that they were involved in approving.

As the definition above indicates project cost knowledge area includes processes involved in estimating, budgeting, and controlling costs. It is primarily concerned with resource costs of schedule activities. A broader view of project cost management is often referred to as life-cycle costing. Life cycle costing (LCC) is the process of attaching costs to individual lifecycle stages of the project. Life cycle costing involves acquisition, operating, and disposal costs when evaluating various project alternatives. LCC is therefore concerned with the overall life cycle of the project.

Project Cost Management have four components:

- ▶ Resource Planning: determining what resources (people, equipment, materials) and what quantities of each should be used to perform project activities.
- ▶ Cost Estimating: developing an approximation (estimate) of the costs of the resources needed to complete project activities.
- ▶ Cost Budgeting: allocating the overall cost estimate to individual work items.
- ▶ Cost Control: controlling changes to the project budget.

These processes interact with each other and with the processes in the other knowledge areas as well. Each process may involve effort from one or more individuals or groups of individuals based on the needs of the project. Each process generally occurs at least once in every project phase.

### **2.1.3.5 Effect of Integration Management on Project Success**

Integration refers to coordination among processes. Integration management is one of the most important elements of project management, which encompasses all aspects of a project. Project integration management ensures the successful coordination among project activities. Asif et al. (2010) mention integration as a deliberate process of developing a governance structure, which makes the management of key stakeholder requirements more systematic. Moreover, integration management encompasses the main elements as scheduling, budgeting and costing, configuration management, and documentation.

Project integration ensures the proper coordination among project activities. Therefore, the impact of integration management on project success should be well understood so that project managers might benefit from the positive aspects of properly coordinated project activities. A major portion of existing research studies (Tatum, 1990; Halfawy and Froese, 2007; Ozorhon et al., 2014; Berteaux and Javernick-Will, 2015; Ospina- Alvarado et al., 2016) has previously demonstrated the critical role of effective integration in project management research. The PMBoK lists the ten main knowledge areas essential to project management and four additional areas in its Construction Extension. Among those, project integration management is listed as the first knowledge area, which involves combination, unification, and coordination processes of project management, PMI (2013).

Because of the essential function of integration in project management, this study develops a comprehensive framework with other knowledge areas which claims at illustrating the strong link between integration and project management effectiveness. Within this perspective, the study proposes construction specific components for integration management and measures project management performance by means of different project success measures. Project integration management consists of develop project charter, develop project management plan, direct and manage project work, monitor and control project work, perform integrated change control and close project or phase. A questionnaire was designed based on those activities and administered to railway construction professionals in AALRT project to get which an important activity/factor is.

### **2.1.3.6 Effect of Communication Management on Project Success**

Communication is an essential process in the world of project management. Around 80% -90% of a project manager time is spent on communicating. It is difficult to master, but essential to make a good effort in achieving. Many times on troubled projects, project team members feel that if the communication had been better, the project would have run smoother. Therefore, communication is often listed as one of the most needed areas for improvement.

To ensure the success of a project much information, including expectations, goals, needs, resources, status reports, budgets and purchase requests, needs to be communicated on a regular basis to all major stakeholders. Skilled communication involves actively listening, cultural/personal aspects, understanding stakeholder expectations and people handling skills.

It is truly critical for project managers to get the message across right the first time to avoid failures in the communication process. Project managers communicate by using different mediums to convey a message. The important factors involve communicating how the project will be managed, including how information will flow into and out of the project. There should be also a clear and concise communication plan to address project responsibilities and the types of communication that will take place. It includes the processes required to ensure timely and appropriate generation, collection, distribution, storage, retrieval, and ultimate disposition of project information, PMI (2008). The project communication management process includes, communication requirement analysis, application of communication technology and model, application of information management system and control communication.

### **2.1.3.7 Effect of Risk Management on Project Success**

The concept of risk management emerged as a continuous process followed by any project to address the risks associated with its activities and implementations. It is concerned with the investigation of the risks involved in the project in order to enable project management to deal with future risks and difficulties that could hamper its track. In addition, it contributes to the efficient use of resources that affect the success of the project. The (PMI) considered the project management is one of the ten parts of knowledge building in the most important and difficult in the project management areas. Risk management consists of: planning risk management, identify risks, project

risk register, performing qualitative and quantitative risk analysis, plan risk response, project risk categorization, review and assessment.

Risks can be classified into two types and may have potential negative effects as follows: First, the traditional risks are based on physical or legal causes such as natural disasters, fires, accidents, etc. Second, the intangible risks such as those dealing with knowledge, efficiency, communication and relations between contracting parties; adhering to the timetable for completion and achieving performance, operational efficiency and quality standards, and risks related to the inability to provide the necessary human resources and labor, And the failure of contractors and suppliers to meet their contractual obligations as a result of inappropriate risk management or non-compliance with their proper applications.

Previous studies in the project management in information technology and construction have shown that the application of risk management has affected project performance in terms of efficiency, performance improvement and productivity enhancement. Moreover, the lack of project risk management is one of the reasons for failure of projects such as failure to comply with the deadlines of the project, increasing cost and poor quality performance. Till now the using of risk management in environmental projects and their impact on their success is undiscovered, Lam et. al. (2007). Therefore, the current study aimed to identify the impact of risk management on the success of projects with other knowledge areas similar time, scope, cost, quality, integration, communication, procurement, HRM and satisfaction of stakeholders.

### **2.1.3.8 Effect of HRM on Project Success**

Projects usually involve attention to a variety of human, budgetary and technical variables. Although many definitions exist, most researchers agree that projects generally possess the following characteristics: limited budget; date for completion; quality standards, and a series of complex and interrelated activities (generally project structure or matrix structure). From a review of the literature on project management, many researchers and practitioners consider performance, effectiveness and success as synonyms, Gobeli & Larson (1987).

Project human resource management processes includes: identifying project roles, responsibilities and required skills, clear organizational chart and position descriptions, confirming human resource

availability, develop project team, managing of that project team are the activities to be effective in today's highly competitive environment, project management activities needs to devote a significant amount of skill, knowledge and attention to human resources. Managing people effectively influences many results of a project. For instance, the importance of training in project management context is widely reported in the literature, Baker, Osvaldo & Andrews (1988), Cameron, & Whetten (1983).

As Guest (1997) argues: 'The distinctive feature of HRM is its assumption that improved performance is achieved through the people in the organization.' If, therefore, appropriate HR policies and processes are introduced, it can also be assumed that HRM will make a substantial impact on firm performance. To back up these assumptions three questions need to be answered: What is performance? What impact does HRM make on performance? How does HRM make that impact? The concept of performance covers both what has been achieved and how it has been achieved. The impact made by HRM as Arthur (1990, 1992, and 1994) put firms with a high commitment strategy had significantly higher levels of both productivity and quality than those with a control strategy. Also, Guest et al (2000b) reveals that a greater use of HR practices is associated with higher levels of employee commitment and contribution and is in turn linked to higher levels of productivity and quality of services. In addition, Guest et al (2000a) comment, much of the research has demonstrated an association between HRM and performance but leaves uncertainties about cause and effect. However, they do state that 'HRM is essentially concerned with achieving results through full and effective utilization of human resources.' They go on to suggest that: 'This is only likely to be achieved through a set of appropriate practices resulting in high quality, flexible and committed employees.'

Any theory about the impact of HRM on organizational performance must be based on three propositions. The first one is HR practices can make a direct impact on employee characteristics such as engagement, commitment, motivation and skill. Next, if employees have these characteristics it is probable that organizational performance in terms of productivity, quality and the delivery of high levels of customer service will improve. Finally, if such aspects of organizational performance improve, the financial results achieved by the organization will improve. Some of HR practices that impact on performance are: attract, develop and retain high quality people, talent management, provides individuals with stimulating and interesting work and



gives them the autonomy and flexibility to perform these jobs well, develop a climate of learning – a growth medium in which self-managed learning as well as coaching, mentoring and training flourish, develop a performance culture which encourages high performance in such areas as productivity, quality, levels of customer service, growth, profits, and, ultimately, the delivery of increased shareholder value and reward management.

### **2.1.3.9 Effect of Procurement Management on Project Success**

Procurement management is a formal process to obtain goods and services. Procurement practices refer to the strategies of procuring or acquiring goods and services, McFalls (2016). The managerial actions taken to enhance the performance of the unified supply chain is as a result of procurement practices. Supplier relationship management entails the selection of vendors and the integration of businesses to obtain proper complementary skills in order to solve important concerns. According to Petcavage & Pinkerton (2010) supplier and client relationships have unfolded from transactional nature to an alliance based collaborative in nature. Conforming to Fawcett et al. (2007) and Melnyk et al. (2011) strategic sourcing principles act as the indicator to an appropriate relationship. Strategic sourcing consist of strategic outsourcing and supplier capability analysis.

Executives and many business entrepreneurs are beginning to realize that successful strategic supplier partnerships result in benefits such higher returns on investment, as access to new technology and knowledge, and better market penetration than those of competitors who do not have such alliances. According to Bailey et al. (2005) mutual buyer and supplier relationships provide gains with the aim of acquiring beneficial outcomes in various aspects. Applying Just in Time is one of the methods which ensures reduced inventory levels by ensuing the supplies are delivered when needed. So, a good procurement system is vital to an effective company's supply chain system. Best procurement practices improve efficiency and effectiveness of an organization which translates to an improvement of its overall performance. Overall procurement practices such as supplier relationship management, ethical procurement, information sharing, adoption of technology and adopting green supply chain management ensure that organizational performance enhanced by supporting procurement functions in construction projects. Carr & Smeltzer (1999) lists the procurement activities as follows: procurement evaluation techniques, negotiations, performance review, inspection on the procurement, procurement audit and payment system.

### **2.1.3.10 Effect of Stakeholder Management on Project Success**

The first definition of the word “stakeholder” expressed at the Stanford Research Institute in 1963 which is “those groups without whose support the organization would cease to exist”, Freeman & Reed (1983). However, stakeholders could be obstructive, rather than a supportive, and this existence required a new definition. Freeman and Reed have developed a new approach that is the definition used today. The researchers handled the stakeholders in two different perspectives: wide and narrow (Freeman & Reed, 1983). From a wide perspective, stakeholders are called individuals or groups that are influenced or influenced by their organization. For example; other stakeholders, society and so on. On the other hand, in the narrow definition, stakeholders are called actors to maintain the existence of the organization. Examples are employees, customers and suppliers (Freeman & Reed, 1983).

Every project consists of different interests, and those who own these interests are called project stakeholders (Olander & Landin, 2005). Stakeholder management might be a challenge to project success in terms of creating disagreements and uncertainties, Johansen, (2014). The great number of researchers demonstrates that especially for complex engineering and global projects which have a large number of interested groups or organizations, have been significantly affected by both internal and external stakeholders in different ways such as arising uncertainty or conflicts, Olander & Landin (2005).

Project stakeholder management involves identification of stakeholders, analysis of their interest and influences, management of stakeholder engagement, control stakeholder engagement, conduct stakeholder analysis, well-defined stakeholder management plan, effective communication between project stakeholder and evaluate the attributes of the stakeholders in the construction project. The project manager is expected to possess the ability to identify the needs and influences of the stakeholders to manage them effectively, PMP (2011). From all perspectives, to achieve success, each stakeholder's requirements of the project need to be properly analyzed. Hence, stakeholders' expectations and requirements will also clarify how they perceive the project. As a result of the failing in the management of these perceptual differences, the project may be perceived as successful by one of the stakeholders while at the same time unsuccessful by the other.

Stakeholders are the originator of the project management organization that is responsible for the delivery of stakeholders' expectation and satisfaction. The successful delivery of any project deliverables highly depend on stakeholder engagement and management (Chang et al., 2013), and the effective engagement and management of stakeholder relies on project manager's ability to identify stakeholders 'expectations from the beginning to close-up (Cleland, 1999). Researchers described project stakeholder management as a process in which project team facilitates the needs of stakeholders to identify, discuss, agree, and contribute to achieve their objectives.

## **2.2 Empirical Reviews**

### **2.2.1 Transportation Infrastructure Projects**

The term "infrastructure" is used on various scientific and non-scientific fields. It originates from Latin, and namely the word "infra" is understood as grounds or fundamentals while "structure" means distribution of elements of certain undefined setup. By the definition that is given in the Cambridge Dictionary (2016) "infrastructure" is the basic systems and services, such as transport and power supplies, that a country or organization uses in order to work effectively. Infrastructure is a component of the territorial structure of national economy, which is formed by the transport, communications, trade, energy and water management system, as well as dwellings, schools, objects of health protection, culture, sports and other objects for care of inhabitants and their arrangement in any territory, Saeima (2010). Russian researches Rudneva and Kudryavtsev believe that transport infrastructure is a regional transport infrastructure capital, i.e. "a certain type of capital demonstrating the specific social character, manifested in transport infrastructure ability to bring to the region the benefits with not only economic, but also with socio-cultural characteristics, and conditioning the synergistic effect of its implementation", Rudneva and Kudryavtsev (2013).

Infrastructure is a complex field with so many different components under it; but all of them can be categorized into two main types of infrastructures. They are the hard and the soft infrastructure. Hard Infrastructure refers to the physical network that keeps an industrialized nation smoothly functional. Among the components that are classified under the hard infrastructure are the capital assets like the utilities, transport vehicles, telecommunication systems, roads, highways, railways, subways, traffic lights and street lights, dams, walls and culverts, drainage systems, the airports and bus terminals, and bridges, among others.

To evaluate the results of the transport infrastructure development, first of all it is necessary to determine the role of transport infrastructure in the overall system of transport and logistics. This approach allows identifying the factors and conditions that affect the transport infrastructure development; in the future, it can assist in determination of the range of measurement indicators and characterization of the transport infrastructure development. It is generally assumed that the logistics infrastructure which conditions the effective performance of the logistics processes comprises “technical means, manners to handle them and systems of how to use them”, Grzelakowski (2014).

Transport infrastructure includes transit-oriented structures and facilities for signage and markings, safety, lighting, communication, landscaping, navigation and maintenance. Infrastructure in Africa is generally in a poor state due to major problems taking the form of under-maintenance, budget execution failures, and substantial hidden costs. Transport infrastructure in the East African Community (EAC) is no exception to this ominous experience. The recently launched EAC common market faces a major obstacle in the huge infrastructure deficit, which has seen the 2010 – 2011 Global Competitiveness Report rank the EAC member states at position 101 and below out of 139 countries in terms of infrastructure competitiveness. The poor transport infrastructure performance makes the cost of doing business in the EAC high, by far exceeding the Asian scenario.

### **2.2.2 Addis Ababa Light Rail Transit Development Objectives**

One of the main objective of the project is to provide an alternative means of public transport to the city’s road-based system, case study (2016). This electric rail network powered through renewable energy (electricity in Ethiopia is almost entirely renewable, generated by hydropower, geothermal and wind power) are listed as the most beneficial interventions. A modal shift from road to rail will be a key pillar to transform Ethiopia’s economy to a middle income country, as affordable integration to its neighboring countries will be achieved, NAMA (2016). LRT are mode of electrified rail based transit, usually urban in nature, which is distinguished by operation in routes of generally exclusive, though not necessarily grade-separated, rights-of-way. This is distinguished from heavy rail systems, also known as rapid transit or ‘metro’ (e.g. subway or elevated), which are full grade-separated from other traffic, and which are characterized by higher passenger capacities than light rail.

However, during and after the implementation of this project almost all the existing transport infrastructures would be re-constructed. This the whole transportation change, caused major traffic congestion and disruption in some areas, resulting in considerable losses to businesses profit; in addition after implementation it has affected the mobility of the people and access to business firms along the LRT lines. Whole of the railway tracks enclosed by fences. The installation of the fences covers all the 31km rail way by having a space at 39 points that are reserved for rail station. Among the 39 stations, 3 of them are found in caves, 9 of them on bridges and 27 on the ground that can also be used as zebra crossing for the pedestrians, Fasika (2015).

A case study conducted by Elizabeth (2015), investigated that since the AALRT system is safe guarded with fences so, pedestrians are limited and walk a long way to cross over the rails to get their destination. This increase the walking distance, inadequate parking area and cars have to drive even longer as the former turning points to have been blocked by the fence. According to ERC the intention of those restrictive fences are to avoid accidents which came from pedestrians suddenly cross the lines. Due to this inconvenience most shops and businesses owners located along the two roads were loses their customers and the fences block their customers coming from the opposite side of the road, Fasika (2015). After the completion of AALRT project the effective implementation of the project is dependent on the achievement of the project deliverables by transforming inputs to output through topnotch project management as illustrated by the project management theory, Koskela & Howell (2002). Therefore, this study try to assess what factors associated with project management perspective that affect the effective implementation of the services offered by this first phase of urban railway project.

The first phase of the project of AALRT is opened and began to work on September 20, 2015. The total length of the first phase of the project in two sides around 31.6 km with 39 station, the project starts its trial operation by Shenzhen Metro Group operators on February 1, 2015 with a low-floor trams manufactured by CNR Changchun (Railway Gazette, 2015). Of the two rail lines, the east-west line will extend 17.4 kilometers, stretching from Ayat Village to Torhailoch, and passing through Megenagna, Leghar and Mexico Square and other lines in that direction. The north-south line, which is 16.9 kilo meters in length, passes through Menelik II Square, Merkato, Lideta, Legehar, Meskel Square, Gotera and Kality. Trains are expected to be able to reach maximum speeds of 70km/h. The services cost from 2-6 Ethiopian birr which is the cheapest of all means of

transportation at hand at the moment. According to ERC the system carried on average 113,500 daily passengers and service frequency was 10 minutes during peak hours on both lines and 20 minutes during off-peak hours. The maximum and minimum intervals between stations are 1.972 km and 0.435 km respectively. The average station interval is 0.773km. The total length of Phase 1 will be 31.6 km. The two lines share common tracks between Meskel Square and Lideta along Ras Mekonen Street and Chad Street, on a distance of approximately 2.662 km, which has the currently highest passenger number (ERC, 2012).

### **2.2.3 Project Success Criteria & Project Success Factors for the study**

Muller and Turner (2007) defined the two components of project success in relation to the use of project management as follows:

- ▶ Project success criteria are the measures by which judge the successful outcome of a project. i.e. for the purpose of this study project effectiveness or performance measures by meeting project cost and time goals, meeting project technical and operational goals and meeting customer needs and expectations.
- ▶ Project success factors are the elements of a project that can be influenced to increase the like hood of success. For the purpose of this study the ten PM knowledge area elements are the project effectiveness factor for the railway project.

#### **2.2.3.1 Project Performance Measures**

Many lists of success criteria have been introduced in the previous decades by various researchers. Primal success criteria have been an integrated part of project management theory given that early definitions of project management included the so called 'Iron Triangle' success criteria - cost, time and quality. Atkinson (1999). Atkinson continues that "as a discipline, project management has not really changed or developed the success measurement criteria in almost 50 years".

A chronological summary of major studies in project success in the 21st century appears in Table 1. The studies are marked by type as conceptual (C), empirical (E), summary (S), or mixed-method (M). Where a specific number of individual items were tested or postulated, that number is shown and the specific outcomes factors are reported.

*Table 2.1. Major 21st Century Project Success Measure Studies, PMI (2011)*

<b>Name</b>	<b>Year</b>	<b>Type</b>	<b>Factors</b>
Shenhar et al.	2001	E	Project Efficiency, Customer, Business Success, Future
Pinto	2004	C	Project Efficiency, Customer, Business Success, Future
Jugdev & Müller	2005	S	Efficiency, Effectiveness
Dilts & Pence	2006	M	Recurring Business, Customer, End-user, Team, Stakeholder, Supplier
Zwikael & Globerson	2006	C	Customer Satisfaction, Technical Performance, Schedule, Cost
Shenhar & Dvir	2007	E	Project Efficiency, Customer, Business Success, Future, Team
Müller, Turner	2007	M	Complexity, Strategic Importance, Contract Type, Life-cycle Stage, Culture
Bani Ali	2008	E	Perceived Performance Impact, Functionality
Geoghegan & Dulewicz	2008	E	Usability, Value of Project Outcome to Users, Project Delivery
Khang & Moe	2008	E	Beneficiaries, Capacity, Reputation, Work extension, Sustainability
Malach-Pines et al.	2009	E	Agreements, Customer, Future
Ika	2009	E	Iron Triangle, Client/End-user, Stakeholders, Team
Korrapati & Eadara	2010	C	Project Success, Job Satisfaction
Papke-Shields et al.	2010	E	Cost, Time, Specifications, Quality, Client, Business Objectives
Ika	2010	S	Project Management Success, Deliverable Success, Duration, Budget
Shao et al.	2010	S	Business Success, Stakeholder, Future, Efficiency, Social Effects, Team
Devine et al.	2010	E	Growth/Innovation, Internal Processes, Customer, Financial perspectives
Al-Tmeemy et al.	2011	E	Efficiency, Customer, Business success, future

### **2.2.3.2 Project Success Factors**

Murphy, Baker and Fisher (1988) used a sample of 650 completed aerospace, construction, and other projects with data provided primarily by project managers on the factors contributing to project success. Theirs has been the most cited, used, extensive and authoritative research in the area of project success factors. They found ten factors that were found to be strongly linearly related to both perceived success and perceived failure of projects, while twenty-three project management characteristics were identified as being necessary but not sufficient conditions for perceived success. Pinto and Slevin (1987, 1988) and Morris and Hough (1986, 1987) also did an important work on project success factors in the 1980s. While Morris and Hough (1986, 1987) drew primarily on literature and case study analysis of major projects, Pinto and Slevin (1987, 1988) based their findings on the opinions of a usable sample of 418 PMI members responding to questions asking

them to rate the relevance to project implementation success of ten critical success factors and four additional external factors, Pinto & Slevin (1986).

Consequently, one can conclude that there are countless number of factors that may have a bearing on project success. They may differ from one project to another. As a roadmap for the project goes through in the chronological phases (initiation, planning, execution and closing) with the processes of project management best practices and to reach an effective end, project effectiveness factors considered by this study are: Cost Management, Time Management, Scope Management, Quality Management, Integration Management, Risk Management, Communication Management, Human Resource Management, Procurement Management and Stakeholder Management factors.

In order to determine how PMBOK address the success factors for construction projects, the set of success factors must first be determined. Therefore, in this study it was decided to use the rank order of project management practices from literatures to get critical factors.

Table 2.2 Project Management Body of Knowledge Areas factor in literature

Project Management Practices from the literature	Georgiva and Allen	Loo (2002)	PMBOK (2013)	Pinto & Dominguez	White & Fortune	Cooke (2002)	APM-BOK (2006)	Angla Clark (1999)	Yang (2013)
Integration Management			✓						
Scope Management		✓	✓			✓	✓	✓	
Time Managmentne			✓						
Cost Management			✓				✓		
Quality Management			✓				✓		✓
HR Management		✓	✓	✓	✓		✓		✓
Communication Management	✓	✓	✓	✓	✓		✓	✓	
Risk Management			✓		✓	✓	✓		
Procurement Management			✓				✓		
Stakeholder Management	✓	✓	✓	✓			✓		



## 2.3 CONCEPTUAL FRAMEWORK

Upon literature analysis, it has been possible to indicate several frameworks of project effectiveness factors and project effectiveness in project management in different industry, even being quite scattered in different areas. Likewise, frameworks of success in projects have been organized. Thus, it has been possible to structure a conceptual framework for managing projects and effective in managing it.

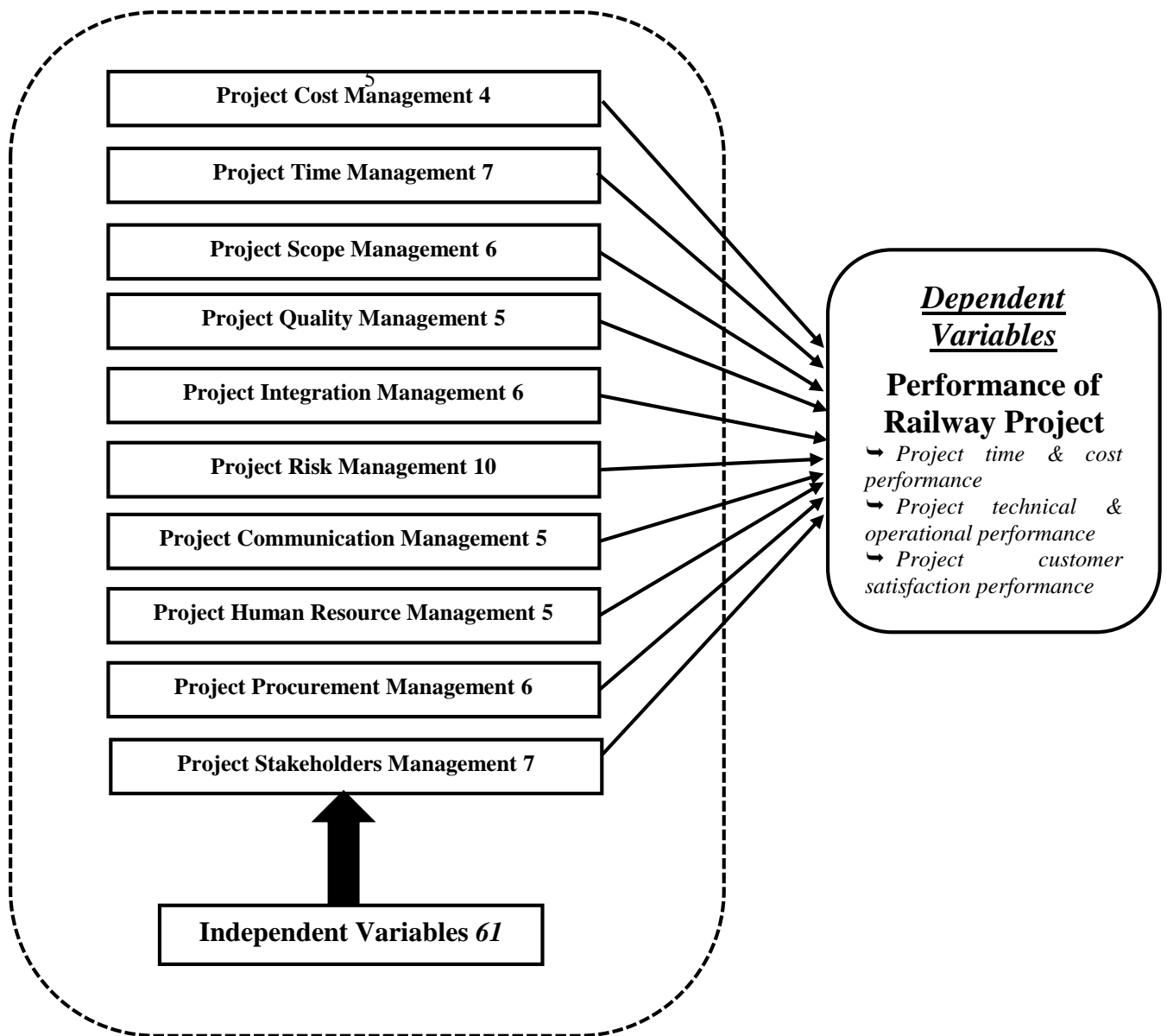


Figure 2.1 Conceptual framework for the study. Source: adapted from Ahmed & Asim (2016)

## **CHAPTER THREE**

### **METHODOLOGY**

#### **INTRODUCTION**

This chapter represents the research methodology of the study. It describes and justifies the methods and processes that were used to collect data that were used in answering the research questions.

#### **3.1 Research Design and Approach**

The study follows both descriptive and explanatory procedures. Descriptive design was used to describe the characteristics of the respondents and to assess the critical PM factors in percentage distribution and RII methods while explanatory design was concerned to test both objectives and the research hypothesis, since one of the goals of this research is finding relationships between critical factors and in their influence on project performance. According to Creswell (2002), explanatory research is usually used to increase understanding, expand knowledge and explain a phenomenon that has little research done on it.

There are two types of research strategies such as quantitative and qualitative research (Naoum, 2007). Quantitative approaches seek to gather factual data and to study relationships between facts and how such facts and relationships accord with theories and the findings of any research executed previously, where qualitative approaches seek to gain insights and to understand people's perception of "the world" whether as individuals or groups, Fellows & Liu (2008). In this research, a quantitative approach is selected to understand the factors that can ensure the success of project management in railway construction projects and to investigate how the knowledge areas of project management were adopted properly by project managers to come up successful projects in AALRT project. The required quantitative data will be obtained from questionnaires.

#### **3.2 Target Population and Sampling**

##### **3.2.1 Target Population**

The target population of the study are 170 experts consisted from ERC organization who worked on the light rail development are the target group for the questionnaire administration. The sampling frame of the paper are the experts involved in the project and consultants employed for project who

supervise the activities of the rail construction, other experts, employees, project managers. Their knowledge and experience during the planning and implementation is useful in administering the questionnaire.

### 3.2.2 Sampling Technique

Sampling is a method that allows researchers to infer information about a population based on results from a subset of the population. Selective or purposive sampling relies on the judgment of the researcher need to be time-and cost-effective. Also, most of the employees who participate in the project are leaving the organization. So, this paper follow a purposive sampling technique, Saunders & Thornhill (2007).

### 3.2.3 Sample Size

The sampling size was determined by using the following sample determination table developed by Carvalho (1984), a sample of 50 staffs are selected from the target population of 170 which is between 151-280 intervals. The following table shows the breakdown of population range the small, medium, and large sample that can be drawn for the study. The researcher believe that obtaining a representative sample by using a sound judgment, also it provide a diverse range of cases relevant and get deep insight for the study under examination. Mugenda and Mugenda (2008) describe a sampling design as the process of selecting a number of individuals for a study in a way that the objects represent the characteristics of the population. According to Mugenda and Mugenda (2008) the sample size for any meaningful study must be a sample of 10% to 30% of the target population for adequacy.

Table 3.1. Sample Size Determination

Population Size	Sample Size		
	Small	Medium	Large
<b>51-90</b>	5	13	20
<b>91-150</b>	8	20	32
<b>151-280</b>	13	32	50
<b>281-500</b>	20	50	80
<b>501-1200</b>	32	80	125
<b>1201-3200</b>	50	125	200
<b>3201-10000</b>	80	200	315
<b>10001-35000</b>	125	315	500
<b>35001-15000</b>	200	500	800

Source: Carvalho (1984)

### **3.3 Data Sources and Data Collection Method**

To reach on a better finding the researcher gathered data only by primary data collection method from those target population using questionnaires. Self-administered questionnaire with both close-ended and open-ended questions are employed to get experts perceptions and opinions in the topic. The questionnaires were dropped and picked later from respondents.

### **3.4 Procedure for Data Collection**

Questionnaires have been widely used for descriptive and analytical surveys in order to find out the facts, opinions and views. It enhances confidentiality, supports internal and external validity, facilitates analysis, and saves resources. Data are collected in a standardized form from samples of the population. The standardized form allows the researcher to carry out statistical inferences on the data, often with the help of computers. The used questionnaire has some limitations such as: it must contain simple questions, no control over respondents and respondents may answer generally, Naoum (2007). Therefore, this paper procedures Likert rating scale was adapted to support producing the appropriate ratings. Except for demography questions, all variables identified were incorporated in the questionnaire properly for measurement purpose with a 5-point Likert scale rating of 1-5 points. The questionnaire were distributed to employees who have been directly working in the project activities to fill it independently and returned for analysis.

### **3.5 Validity of the Instruments**

Research instruments are the data gathering tools employed by the researcher in the field. According to Gall, Borg & Gall (1996) validating of an instrument is improved through expert judgments. Saunders (2000) insist on that research is only valid if it actually studies what it sets out to study and only if the findings are verifiable. Validity is the accuracy and meaningfulness of inferences, which are based on the research results (Mugenda and Mugenda, 1999). It is the degree to which the results obtained from an analysis of data actually represents the phenomenon under study. The construct validity of a measure is directly concerned with the theoretical relationship of a variable to other variables and it is the extent to which a measure behaves the way that the construct it purports to measure should behave with regard to established measures of other constructs, DeVellis (1991).

In this study the process of survey, the questionnaires were sent to the respondents is understandable and acceptable and it is prepared clearly by the researcher respondents to respond correctly and relied on Likert-type scale format of expressing respondent’s opinions about different project management knowledge areas practices as project effectiveness factors that influence the effective implementation of AALRT railway projects. Finally, the empirical data analyzed with SPSS 20 software.

### 3.6 Reliability of the Instrument

Reliability indicates the stability and consistency with which the data collection instruments measure the concept, Zikmund (2000). Mugenda and Mugenda, (1999) stipulate that reliability of an instrument is the degree of consistency with which it measures a variable. For this study the research method carefully explained throughout this research. The sample selection based upon non-probability. The people are selected because of their positions of responsibility in the area. There is no control over respondents, which would have negative effects upon the reliability of this study. This study is possible to reproduce with consistent results. Furthermore, when conclusions are to be drawn about a population on the basis of regression analysis carried out on a sample of that population, there are several assumptions that must be taking into consideration and satisfied to allow for the statistical validity of the findings.

*Table 3.2 Cronbach Alpha reliability test result*

Reliability Statistics	
Cronbach's Alpha	N of Items
.867	68

**Source: Own survey, 2019**

### 3.7 Data Analysis Method

Data processing is the collection of and manipulation of items of data to produce meaningful information. The data analysis help the researcher for transformation of processed data to look significant factors that influencing an effective implementation of the railway project. Therefore the study will be properly process the data by checking its validation, then sorting, summarize, analysis, aggregating, reporting and presentation by using statistical figures and presentations.

The descriptive is about background information on the respondents and presented in frequency distribution tables and percentages. The data collected by this design was used to suggest reasons for particular relationships between independent and dependent variables, Saunders (2007). The data collected was edited, collated to eliminate errors and coded for analysis using the Statistical Package for Social Sciences version 20 tool. The data was analyzed both quantitatively and qualitatively.

The main objective of this dissertation is to rank the critical success factor of AALRT project. Therefore, it requires adequate method to rank those success factors. The Relative Importance Index (RII) is used to rank in this study because this method is possible to cross-compare the relative importance of the factors that the project practitioners have faced in their field work.

Also, a regression analysis was used to determine the relationship of predictor on outcome variables. Regression had been calculated using the proposing formula:

$$Y_i = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \dots + \beta_p X_p + \varepsilon_i$$

Where:  $Y_i$  is the value of the dependent variables for case  $i$ ,

*(Project time & cost performance, Project technical & operational performance and Project customer satisfaction performance)*

$X_p$  is the value of the  $p$  independent variables, (elements of ten knowledge areas)

$\beta_0$  &  $\beta_1$  is the coefficients and  $\varepsilon_i$  is the error term in prediction for case  $i$ .

### **3.8 Ethical Considerations**

The researcher take utmost caution while administering the questionnaires. Authorization was obtained from the concerned office as well supporting letter from the Department of Project Management, at St. Mary University Student Support Office. Respondents were give assurance regarding confidentiality of the information obtained.

## **CHAPTER FOUR**

### **DATA ANALYSIS, PRESENTATION AND INTERPRETATION**

#### **INTRODUCTION**

This chapter presented the major findings and results of the study. Also, an interpretation of analyzed data displayed. The chapter presents discussion about the critical project management factors that influence the performance of AALRT project in Ethiopia presented from relative importance of those factors from the viewpoint of project practitioners and identified and ranked the most critical success factors affected on project management process in AALRT construction project with the percentage frequency distribution method and the relative importance index (RII) method.

The present condition of a project management level in Ethiopia is quite low and inadequate. More than half of the mega projects are not able to finish within the time and cost schedule. This study investigates the light rail transit which is built and operated in the capital city of Ethiopia, Addis Ababa in two lines. Assessing the success factors and understand the reason for these success factors helps to make recommendation that help achieve the further rail transit construction projects in the country. From the collected data in this chapter the researcher, present the analysis result in form of tables and figures and qualitative analysis in text.

The questionnaires are developed based on the components in the ten knowledge areas of Project Management Body of Knowledge (fifth edition). The respondents were asked to fill up the questionnaires in accordance with the level of agreement based on their experiences. The survey was conducted in a number of departments in Ethiopian Railways Corporation employees for 50 respondents. The total respondent of this survey is 39 out of 50 respondents. Therefore, the respondent ratio of this survey was 78%. According to Mugenda & Mugenda (2003) the statistically significant response rate for analysis should be at least 50%.

#### **4.1 Characteristics of Respondents**

According to the sampling procedure described in chapter three, respondents from different department participated to fill the questionnaires and returned. All of them are project practitioners

and participants of the Ethiopian Railway Corporation railway construction projects. The demographic characteristics of the respondents are presented below in the table 4-1.

*Table 4.1 Characteristics of the respondents*

<b>Characterstics</b>	<b>Frequency</b>	<b>Percentage</b>
<b><i>Sex</i></b>		
Male	29	74
Female	10	26
<b><i>Age</i></b>		
21-30	10	25
31-40	24	62
41-50	5	13
50+	0	0
<b><i>Higher Education</i></b>		
High School or Equvalent	3	8
Bachelor Degree	21	54
Masters Degree	15	38
Doctrate	0	0
<b><i>Working years</i></b>		
1-2 years	4	10
2-4 years	12	31
4+ years	23	59

## **4.2 Results of Descriptive Statistics for PM Factors affecting performance**

To include all the data values, the most frequently used measure of central tendency is the mean or average, which includes all data values in its calculation. Because the mean is the building block for many of the statistical tests used to explore relationships.

In this section, project management factors affecting the performance of AALRT was assessed by using percentage distribution and the Relative Importance Index (RII) methods to identify the success factors. Moreover, this research is aimed to identify the critical elements in the ten knowledge areas of project management areas in the project.

### **4.2.1 Project Scope Management Factors**

This question is intended to get the views of project practitioner regarding with the project scope management. The respondents answer and evaluate the important level of the factors based on their empirical experiences and the results are as in the following table 4.2.



*Table 4.2 Frequency distribution of Project Scope Management Factors on project performance*

<b>Factors</b>	<b>Highly Important</b>	<b>Important</b>	<b>Moderately Important</b>	<b>Less Important</b>	<b>Least Important</b>
Planning Scope Management	46%	21%	33%	0%	0%
Collecting Requirements	74%	23%	3%	0%	0%
Define Scope	64%	31%	5%	0%	0%
Creating WBS	64%	36%	0%	0%	0%
Validating Scope	56%	23%	21%	0%	0%
Controlling Scope	56%	21%	23%	0%	0%

**Source: Own Survey, (2019)**

Collecting requirements, defining scope and creating a work break down structure are consecutive project scope management factors on the respondent mentioned as highly important factors to success or performance of the project.

#### **4.2.2 Project Time Management Factors**

The respondents answer and evaluate the important level of the project time management factors based on their own experiences. All the respondents give feedbacks as “highly important” and the results are as shown in table 4.3.

*Table 4.3 Frequency distribution of Project Time Management Factors on project performance*

<b>Factors</b>	<b>Highly Important</b>	<b>Important</b>	<b>Moderately Important</b>	<b>Less Important</b>	<b>Least Important</b>
Plan schedule management	46%	21%	25%	8%	0%
Define activities	64%	26%	10%	0%	0%
Sequence activities	62%	31%	7%	0%	0%
Estimate activity resources	74%	23%	3%	0%	0%
Estimate activity duration	56%	44%	0%	0%	0%
Develop schedule	69%	31%	0%	0%	0%
Control schedule	62%	28%	10%	0%	0%

**Source: Own Survey, (2019)**

From the above table critical project time management factors are: estimating activity resources, developing schedule and defining activities are the three highly important project time management success factors mentioned by the respondents.

### 4.2.3 Project Cost Management Factors

For this part, the project partakers are asked the importance level on the factors of project cost management and the data will be identified by using the frequency distribution method to rank the importance level and the results presented below in table 4.4.

*Table 4.4 Frequency distribution of Project Cost Management Factors on project performance*

<b>Factors</b>	<b>Highly Important</b>	<b>Important</b>	<b>Moderately Important</b>	<b>Less Important</b>	<b>Least Important</b>
Well-defined cost plan	74%	13%	5%	5%	3%
Estimation of project cost	90%	5%	5%	0%	0%
Determine the required budget	80%	15%	5%	0%	0%
Control cost	80%	13%	7%	0%	0%

**Source: Own Survey, (2019)**

From the above table the most important factor which contribute to project performance revealed by the respondents is estimation of project cost for the project. Determining the required budget and controlling the project cost is the second leading factors of project cost management.

### 4.2.4 Project Quality Management Factors

Project quality management is another aspects of project management success factor which influence the performance of the project. There are five factors of project quality management and the respondent level the importance of those factors and presented as follows by table 4.5.

*Table 4.5 Frequency distribution of Project Quality Management Factors on project performance*

<b>Factors</b>	<b>Highly Important</b>	<b>Important</b>	<b>Moderately Important</b>	<b>Less Important</b>	<b>Least Important</b>
Identifying the quality requirement for the project	44%	26%	18%	12%	0%
Auditing the quality requirement	36%	31%	31%	2%	0%
Quality control measurement	19%	39%	21%	21%	0%
Monitoring & recoding the result of executing the quality activities	77%	20%	3%	0%	0%
Quality checklists	89%	8%	3%	0%	0%

**Source: Own Survey, (2019)**

From the above table quality checklists are highly important factor for the performance of project quality management and identifying the quality requirement for the project less important factor as the respondent identified.

#### 4.2.5 Project Integration Management Factors

Factors regarding to project integration management listed in the table 4.6 and asked for project participants and practitioners using survey questions and the respondent ranked the importance of those factors as follows.

Table 4.6 Frequency distribution of Project Integration Management Factors on project

Factors	Highly Important	Important	Moderately Important	Less Important	Least Important
Develop project charter	21%	48%	26%	5%	0%
Develop project management plan	67%	66%	0%	0%	0%
Direct & manage project work	59%	41%	0%	0%	0%
Monitor and control project work	59%	41%	0%	0%	0%
Perform integrated change control	31%	46%	18%	5%	0%
Close project and phase	26%	56%	18%	0%	0%

Source: Own Survey, (2019)

As the above table indicated both “Direct, manage, monitor and control project work” highly important factors for the project success or performance as the respondent revealed. Developing project charter and closing project and phase are the least important factors as the table indicated.

#### 4.2.6 Project Communication Management Factors

In this question, the factors are organized based on the factors of project communication management. These factors will be perceived by frequency distribution method to identify the rank and the results are as in the table 4.7.

Table 4.7 Frequency distribution of Project Communication Management Factors on project

Factors	Highly Important	Important	Moderately Important	Less Important	Least Important
Communication requirement analysis	31%	46%	13%	10%	0%
Application of communication tech	28%	46%	26%	0%	0%
Application of communication model	41%	28%	31%	0%	0%
Application of IMS	59%	23%	18%	0%	0%
Control communication	66%	18%	8%	8%	0%

Source: Own Survey, (2019)

As table 4.7 shows Application of information management system and control communication highly important factors and application of communication model is moderately important factor for project performance stated by the respondent.

#### 4.2.7 Project Risk Management Factors

The survey questionnaire focused on project risk management is aimed to get the overviews of project practitioner regarding with the project risk management. The respondents answer and evaluate the importance level of these factors based on their empirical experiences and the results are as in the below table 4.8.

*Table 4.8 Frequency distribution of Project Risk Management Factors on project performance*

<b>Factors</b>	<b>Highly Important</b>	<b>Important</b>	<b>Moderately Important</b>	<b>Less Important</b>	<b>Least Important</b>
Plan risk management	54%	15%	26%	5%	0%
Identify risks	74%	15%	11%	0%	0%
Project risk register	31%	38%	31%	0%	0%
Perform qualitative risk analysis	49%	31%	10%	10%	0%
Perform quantitative risk analysis	51%	46%	3%	0%	0%
Plan risk responses	67%	15%	18%	0%	0%
Risk probability & impact assessment	49%	23%	23%	5%	0%
Project risk categorization	67%	10%	8%	10%	5%
Strategies for +ve risk / opportunities	54%	10%	36%	0%	0%
Strategies for negative risks or threats	35%	26%	26%	13%	0%

**Source: Own Survey, (2019)**

As the above table shows, planning risk management, identifying risks and planning risk responses are the three highly important factors of project risk management for project performance. Perform qualitative risk analysis and strategies for negative risks or threats are less important factor declared by the respondents.

#### 4.2.8 Project Human Resource Management Factors

The purpose of this question is to get the opinions of project practitioner at ERC regarding with the project human resource management. The respondent answer and evaluate the importance level of those factors based on their empirical experiences and the outcomes are presented below.

*Table 4.9 Frequency distribution of Project Human Resource Management Factors on project*

<b>Factors</b>	<b>Highly Important</b>	<b>Important</b>	<b>Moderately Important</b>	<b>Less Important</b>	<b>Least Important</b>
Identifying project roles, responsibilities and required skill	61%	26%	10%	3%	0%
Clear organizational chart and position descriptions	44%	38%	13%	5%	0%
Confirming human resource availability	67%	31%	2%	0%	0%
Develop project team	69%	26%	5%	0%	0%
Management project team	62%	23%	10%	5%	0%

**Source: Own Survey, (2019)**

From the results in table 4.9 confirming human resource availability, developing and managing project team are the highly important project human resource management factors for the performance of the project bring up by the respondents from other factors.

#### **4.2.9 Project Procurement Management Factors**

In table 4.10 the results from the project practitioners are asked to evaluate the important level on the factors of project procurement management and the data are identified by using the frequency distribution method to rank the importance level. The respondents answer the question based on their owned evidences in the field work of the project.

*Table 4.10 Frequency distribution of Project Procurement Management Factors on project*

<b>Factors</b>	<b>Highly Important</b>	<b>Important</b>	<b>Moderately Important</b>	<b>Less Important</b>	<b>Least Important</b>
Procurement evaluation techniques	39%	28%	23%	10%	0%
Procurement negotiations	41%	28%	21%	10%	0%
Procurement performance review	25%	31%	26%	18%	0%
Inspection on the procurement	49%	26%	15%	10%	0%
Procurement audit	46%	31%	23%	0%	0%
Payment system	64%	21%	15%	0%	0%

**Source: Own Survey, (2019)**

#### 4.2.10 Project Stakeholder Management Factors

The question is based on the factor of project stakeholder management. The respondents evaluated the level of importance with their own experiences and the data will be ranked with the frequency distribution method and the results are as in the table 4.11.

Table 4.11 Frequency distribution of Project Stakeholder Management Factors on project performance

<b>Factors</b>	<b>Highly Important</b>	<b>Important</b>	<b>Moderately Important</b>	<b>Less Important</b>	<b>Least Important</b>
Identify stakeholders & interest	48%	26%	26%	0%	0%
Manage stakeholder engagement	36%	36%	28%	0%	0%
Control stakeholder engagement	44%	33%	23%	0%	0%
Conduct stakeholder analysis	66%	21%	13%	0%	0%
Well-defined stakeholder management plan	77%	15%	8%	0%	0%
Effective communication between project stakeholders	67%	10%	23%	0%	0%
Evaluate the attributes of the stakeholders in the construction project	64%	15%	21%	0%	0%

**Source: Own Survey, (2019)**

Well-defined stakeholder management plan and effective communication between project stakeholders are the highest important project stakeholder management factors ranked by the respondents. In contrast management of stakeholder engagement has the least important factor also mentioned.

#### 4.3 Responses on performance measures of AALRT Project

The performance of AALRT can be measured in different dimensions as discussed in chapter two. The five dimension of the performance measure for this study are: meet time, cost, and quality; impact customer, impact team, business success and prepare for future. The questionnaire distribute to assess the performance of the project and the extent to how much the project is effective. The following table presented the respondents response for those performance measures.

Table 4.12 Responses on statement of effectiveness of AALRT project.

Project Effectiveness Variables	Likert Scale				
	Strongly Disagree	Disagree	Moderately Agree	Agree	Strongly Agree
The project meets its time & cost goals.	0%	0%	15%	70%	15%
The project meet technical & operational goals.	0%	6%	15%	64%	15%
The project meets customer need & expectations.	5%	46%	10%	10%	28%

Source: Own Survey, (2019)

#### 4.4 Assessment of Factors Affecting Project Performance With Relative Importance Index Method

On each of the variables, respondents were asked to indicate the extent to which that variable influences the performance of the project at ERC, based on a five-point scale where:

1-Least important, 2-Less Important, 3-Moderately important, 4-Important and 5-Highly Important. In order to empirically as-certain the factors and to the extent to which each factor contribute to project management practices on their project , both by itself and in combination of the other factors, the Relative Importance Index (RII) was employed. According to Johnson and LeBreton (2004), RII aids in finding the contribution a particular variable makes to the prediction of a criterion variable both by itself and in combination with other predictor variables. The relative importance index (RII) method is a statistical method to determine the ranking of different causes and factors. As this dissertation is designed to determine the important factors to make sure the successful projects, the relative important index (RII) method is used to identify the critical success factors. The RII five point scale, ranging from 1 (least important) to 5 (highly important) is transformed the importance indices (RII) for each factor as follows:

$$RII = \frac{\sum W}{A * N}$$

$$RII = \text{Sum of weights } (W1 + W2 + W3 + \dots + Wn) / A \times N$$

Where: W = weights given to each factor by the respondents and will ranges from 1 to 5 ‘1’ is least important and ‘5’ is highly important.

A = highest weight (i.e. 5 in this case), and N = total number of respondents.

#### 4.4.1 Project Scope Management Factors (RII)

Here, the project practitioners are asked to evaluate the important level on the factors of project integration management and the data are identified by using RII to rank the important level. The 39 respondents answer the question based on the empirical evidences that they faced in the field work.

Table 4.13 Statement of project scope management factors in RII method

Items of Scope Managment	Importance of success factors					RII
	1	2	3	4	5	
Collecting Requirements	0	0	1	9	29	0.9436
Creating WBS	0	0	0	14	25	0.9282
Define Scope	0	0	2	12	25	0.9179
Validating Scope	0	0	8	9	22	0.8718
Controlling Scope	0	0	8	9	22	0.8718
Planning Scope Management	0	0	13	8	18	0.8256
<b>Weighted overall mean</b>						<b>0.8931</b>

Source: Own Survey, (2019)

From the results in the table 4.13; collecting requirement is a critical element of project scope management identified by the respondents.

#### 4.4.2 Project Time Management Factors (RII)

The question is based on the factor of project time management. The respondents evaluate the level of importance with their own experiences and the data are ranked with RII and the results are as in the table 4.14.

Table 4.14 Statement of project time management factors in RII method

Items of Time Managment	Importance of success factors					RII
	1	2	3	4	5	
Estimate activity resources	0	0	1	9	29	0.9436
Develop schedule	0	0	0	12	27	0.9385
Estimate activity duration	0	0	0	17	22	0.9128
Define activities	0	0	4	10	25	0.9077
Sequence activities	0	0	3	12	24	0.9077
Control schedule	0	0	4	11	24	0.9026
Plan schedule management	0	3	10	8	18	0.8103
<b>Weighted overall mean</b>						<b>0.9033</b>

Source: Own Survey, (2019)



#### 4.4.3 Project Cost Management Factors (RII)

For this question, the project practitioners are asked for the important level on the factors of project cost management and the data are identified by using RII to rank the important level of each factor.

The results are as in the table 4.15.

Table 4.15 Statement of project cost management factors in RII method

Items of Cost Management	Importance of success factors					RII
	1	2	3	4	5	
Estimation of project cost	0	2	0	2	35	0.9897
Determine the required budget	0	0	2	6	31	0.9487
Control cost	0	0	3	5	31	0.9436
Well-defined cost plan	1	2	2	5	29	0.9026
<b>Weighted overall mean</b>						<b>0.9461</b>

Source: Own Survey, (2019)

#### 4.4.4 Project Quality Management Factors (RII)

For this part, the project practitioners are asked for the important level on the factors of project quality management and the data are identified by using RII to rank the important level of each factor.

The results are as in the table 4.16.

Table 4.16 Statement of project quality management factors in RII method

Items of Quality Management	Importance of success factors					RII
	1	2	3	4	5	
Quality checklists	0	0	1	3	35	0.9743
Monitoring and recording the result of qty activity	0	0	1	8	30	0.9487
Identifying the quality requirement for the project	0	5	7	10	17	0.8000
Auditing the quality requirement	0	1	12	12	14	0.8000
Quality control measurement	0	8	8	15	8	0.7794
<b>Weighted overall mean</b>						<b>0.8604</b>

Source: Own Survey, (2019)

#### 4.4.5 Project Integration Management Factors (RII)

Factors regarding to project integration management in RII method listed in the table 4.17 and asked for project participants and practitioners using survey questions and the respondent ranked the importance of those factors as follows.

Table 4.17 Statement of project integration management factors in RII method

Items of Integration Management	Importance of success factors					RII
	1	2	3	4	5	
Develop project management plan	0	0	0	13	26	0.9333
Direct and manage project work	0	0	0	16	23	0.9179
Monitor and control project work	0	0	0	16	23	0.9179
Perform integrated change control	0	2	7	18	12	0.8051
Close project or phase	0	7	0	22	10	0.7795
Develop project charter	0	2	10	19	8	0.7692
<b>Weighted overall mean</b>						<b>0.8538</b>

Source: Own Survey, (2019)

#### 4.4.6 Project Communication Management Factors (RII)

The question is based on the factors of project communication management. The respondents evaluated the level of importance with their own experiences and the data are ranked with RII and the results are described in the table 4-18.

Table 4.18 Statement of project communication management factors in RII method

Items of Communication Management	Importance of success factors					RII
	1	2	3	4	5	
Control communication	0	3	3	7	26	0.8872
Application of information management system	0	0	7	9	23	0.8821
Application of communication model	0	0	12	11	16	0.8205
Application of communication technology	0	0	10	18	11	0.8051
Communication requirement analysis	0	4	5	18	12	0.7945
<b>Weighted overall mean</b>						<b>0.8378</b>

Source: Own Survey, (2019)

#### 4.4.7 Project Risk Management Factors (RII)

The survey questionnaire focused on project risk management is aimed to get the overviews of project practitioner regarding with the project risk management. The respondents answer and evaluate the importance level of these factors based on their empirical experiences and the results of RII in descending order presented below in table 4.19.

Table 4.19 Statement of project risk management factors in RII method

Items of Risk Managment	Importance of success factors					RII
	1	2	3	4	5	
Identify risks	0	0	4	6	29	0.9282
Plan risk responses	0	0	7	6	26	0.8974
Perform quantitative risk analysis	0	0	1	18	20	0.8974
Project risk categorization	2	4	3	4	26	0.8462
Strategies for positive risks or opportunities	0	0	14	4	21	0.8359
Plan risk management	0	2	10	6	21	0.8359
Perfrom qualitative risk analysis	0	4	4	12	19	0.8359
Risk probability and impact assessment	0	2	9	9	19	0.8307
Project risk register	0	0	12	15	12	0.8000
Strategies for negative risks or threats	0	5	10	10	14	0.7692
<b>Weighted overall mean</b>						<b>0.8477</b>

Source: Own Survey, (2019)

#### 4.4.8 Project Human Resource Management Factors (RII)

The following table shows human resource management factors by showing the important level of each factor. And then those data are ranked by using the RII method.

Table 4.20 Statement of project human resource management factors in RII method

Items of HR Managment	Importance of success factors					RII
	1	2	3	4	5	
Confirming human resource availability	0	0	1	12	26	0.9436
Develop project team	0	0	2	10	27	0.9282
Identifying project roles, responsibilities and required skill	0	1	4	10	24	0.8923
Management of project team	0	2	4	9	24	0.8821
Clear organizational chart and position descriptions	0	2	5	15	17	0.8410
<b>Weighted overall mean</b>						<b>0.8974</b>

Source: Own Survey, (2019)

#### 4.4.9 Project Procurement Management Factors (RII)

The procurement management issue is more or less ignored in some project. However, the inefficient management of procurement management may effect on the achievement of project goals. According to the PMBOK, the following factors are designed to know the importance level of procurement management. The outcomes are as shown in the table 4.21.

Table 4.21 Statement of project procurement management factors in RII method

Items of Procurement Managment	Importance of success factors					RII
	1	2	3	4	5	
Payment system	0	0	6	8	25	0.8974
Procurement audit	0	0	9	12	18	0.8462
Inspection on the procurement	0	4	6	10	19	0.8256
Procurement negotiations	0	4	8	11	16	0.8000
Procurement evaluation techniques	0	4	9	11	15	0.7897
Procurement performance review	0	7	10	12	10	0.7282
<b>Weighted overall mean</b>						<b>0.8145</b>

Source: Own Survey, (2019)

#### 4.4.10 Project Stakeholder Management Factors (RII)

The ten knowledge area of project management is stakeholder management, in this question the respondents are asked for the importance level on the factors of project stakeholder management and the data are identified to rank the important level of those factors by using RII. The results are presented below in table 4.22.

Table 4.22 Statement of project stakeholder management factors in RII method

Items of Stakeholder Managment	Importance of success factors					RII
	1	2	3	4	5	
Well-defined stakeholder management plan	0	0	3	6	30	0.9385
Effective communication between project stakeholder	0	0	9	4	26	0.8872
Evaluate the attributes of the stakeholders in the project	0	0	8	6	25	0.8872
Identify stakeholders and interest levels	0	0	10	10	19	0.8462
Control stakeholder engagement	0	0	9	13	17	0.8410
Manage stakeholder engagement	0	0	11	14	14	0.8154
<b>Weighted overall mean</b>						<b>0.8693</b>

Source: Own Survey, (2019)

#### 4.5 Summary of factors in relative importance index (RII) method

Among the ten project management knowledge areas some have critical factors. The following table shows ranking each knowledge area by the average mean of their RII in their level of the importance which have influence the performance of the project.

Table 4.23 Summary of factors in RII method

Knowledge Areas Factors	Weighted Overall Mean	Rank
Project Cost Management	0.9461	1
Project Time Management	0.9033	2
Project Human Resource Management	0.8974	3
Project Scope Management	0.8931	4
Project Stakeholder Management	0.8693	5
Project Quality Management	0.8604	6
Project Integration Management	0.8538	7
Project Risk Management	0.8477	8
Project Communication Management	0.8378	9
Project Procurement Management	0.8145	10

Source: Own Survey, (2019)

As the table shown above when investigating the perception of survey participants on the most critical factors, project cost management has more critical factors from other project management knowledge areas. Around 40% of factors are extracted from *Project Cost Management* and around 20% of the most critical factors are extracted from *Project Quality Management* and *Project Scope Management*, *Project Time Management*, *Project Risk Management* and *Project Stakeholder Management* gotten 10% of their factors.

#### 4.6 Critical Factors from Both Methods

The top twelve most important level of success factors are selected as the critical success factors of project management in Addis Ababa light railway construction project by using the percentage distribution method and relative important index method. Here, the ten most common critical success factors are able to be identified from those each 12 success factors. The ten common success factors are very crucial to the successful project management in AALRT construction project. The ten common success factors of project success, which can be considered as critical for the project.

The two uncommon factors of each method are shown in bold and italic and highlighted with gray color. The common critical success factors can be seen in the below table 4.24.

Table 4.24 Common Critical factors from both methods.

No	Percentage frequency distribution method	Relative Importance Index (RII) method
1	Well-defined stakeholder management plan	Estimation of project cost
2	Collecting Requirements	Quality checklists
3	Estimation of project cost	Determine the required budget
4	Quality checklists	Control cost
5	Determine the required budget	Monitoring and recoding the result of executing the quality activities to access performance
6	Monitoring and recoding the result of executing the quality activities to access performance	Effective resource management
7	Control cost	Well-defined stakeholder management plan
8	Estimate activity resources	Collecting Requirements
9	Confirming human resource availability	Estimate activity resources
10	Well-defined cost plan	Identify risks
11	Identify risks	Well-defined cost plan
12	Develop project management plan	Customer management practices

Source: Own Survey, (2019)

From the study objective of factors which are critical according to the knowledge area management to ensure the effective project implementation in Addis Ababa Light Rail Transit railway project, the most common twelve critical factors by the respondent identified in the above table.

Moreover, the current study revealed that from project cost management: *estimation of project cost* and *determine the required budget* have been identified as the two top most important factors of project success/performance among project cost management each factors respond by 37 respondents each for the successful realization of the project and the relative important index (RII) of this factor is 0.9897 and 0.9487 respectively.

These two factors are closely related to the success of the project, which are crucial for the successful completion of any project. This provides an additional empirical evidence in support of previous research indicating that the effective estimation of the required budget and the certain amount of budget will be able to ensure the successful completion of projects and it will become the most critical component for the railway construction projects.

The other factors are from project quality management is, quality checklist and it denoted as “important” critical factor among project quality management factors and around 38 respondents (97%) and the relative importance index (RII) of this factor is 0.9743. The project practitioners’ experience showed that many other projects – although generally achieving their goals – have been considered as unsuccessful due to poor quality raw materials, machines and equipment. Therefore the respondents evaluate this factor as the important ones in the project management.

Monitoring and recording the result of executing the quality activities to the access performance is the fourth major critical success factor from project quality management. About 97% of the respondent with 0.9487 RII it is identified this factor is an important for project success or perform well. It is because, the poor management practices directly and indirectly lead to decline of construction productivity and ultimately effect on project quality. In construction terms, cost, schedule, and possibly quality goals are established for each project.

Another critical factor is the *control cost* and it is indicated fifth position according to the RII method and the percentage frequency distribution method. The 36 respondents (92%) among 39 show the important level of this factor as “important”. Evidently, the budget issues are very influential on the success of project management in every project of ERC. It is very observable in this study.

Both *collecting requirements* from project scope management and *estimating activity resources* from project time management about 38 of respondents (97%) responded as an important factor of the current project success.

Confirming human resource availability, well-defined stakeholder management plan, identifying risks, developing project management plan and well-defined cost plan with 0.9436, 0.9385, 0.9385, 0.9333, 9026 RII respectively are the important factor for the project to perform appropriately.

#### **4.7 Regression Analysis**

Regression analysis was conducted between project effectiveness variables considered in this study; project cost and time performance, project technical and operational performance and project customer need and expectation performance. The regression analysis model for the three dependent variable and twelve independent variables.

Before conducting the regression the key regression analysis assumptions are performed.

- ↳ **Linearity:** There must be a linear relationship between the outcome variable and the independent variables. Scatterplots can show whether there is a linear or curvilinear relationship. The plots are presented in this survey at annex.
- ↳ **Normality** – Multiple regression assumes that the residuals are normally distributed.
- ↳ **Multicollinearity** - Multiple regression assumes that the independent variables are not highly correlated with each other. This assumption is tested using Variance Inflation Factor (VIF) values must less than 2.5.
- ↳ **Homoscedasticity** –This assumption states that the variance of error terms are similar across the values of the independent variables. A plot of standardized residuals versus predicted values can show whether points are equally distributed across all values of the independent variables.

#### 4.7.1 Analysis of dependent variables

Table 4.25 Model summary of Dependent Variables Regression

Model Summary <sup>a</sup>					
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.407 <sup>b</sup>	.166	-.219	.621	2.354
2	.639 <sup>c</sup>	.409	.136	.668	1.774
3	.459 <sup>d</sup>	.211	-.154	1.495	1.791

a. Predictors: (Constant), Develop PM Plan, Confirming HR availability, Quality Checklist, Determine the required budget, Well-defined Stakeholder Management Plan, Identify Risk, Cost Control, Well-Defined Cost Plan, Estimate Activity Resources, Monitoring & Recording quality activity, Collecting Requirements, Estimation of Project Cost

b. Dependent Variable 1: Project Time & Cost Performance

c. Dependent Variable 2: Project Technical & Operational Performance

d. Dependent Variable 3: Project Customer need & expectation Performance

The regression of project time and cost performance in model 1 on the explanatory variables gives  $R^2$  value of 0.407, as shown in the table above, where  $0 < R^2 < 1$ . Here, about 40.7% of the variation in the dv (Project time & cost performance) of a railway project has been explained by the critical explanatory variables extracted from the above two methods. And the rest 49.3% variability is explained by the other variables.

Also from the above regression of project technical and operational performance in model 2 on the explanatory variables gives  $R^2$  value of 0.639, as shown in the table above, where  $0 < R^2 < 1$ . Here, about 64% of the variation in the dv (Project technical & operational performance) of a railway



project has been explained by the critical explanatory variables extracted from the above two methods. And the rest 36% variability is explained by the other variables.

Finally in model 3 in project customer needs and expectation performances on the explanatory variables gives  $R^2$  value of 0.459, as shown in the table above, where  $0 < R^2 < 1$ . Here, about 46% of the variation in the dv (Project customer expectation & need performance) of a railway project has been explained by the critical explanatory variables extracted from the above two methods. And the rest 54% variability is explained by the other variables.

The ANOVA generated from dependent variables demonstrated that, there is significant relationship between dependent and independent variables in table 4.28 below.

In the following table at model 1, the F-test ( $F=14.4$ ) examines the significance of  $R^2$ . The twelve project management factors has a combined significant effect on project time and cost performance of the railway project.

Table 4.26 ANOVA of dependent variables regression

		<b>ANOVA</b>				
Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	1.989	12	.166	14.430	.001 <sup>a</sup>
	Residual	10.011	26	.385		
	Total	12.000	38			
	Regression	8.003	12	.667	14.197	.000 <sup>b</sup>
	Residual	11.587	26	.446		
	Total	19.590	38			
3	Regression	15.500	12	1.292	15.578	.040 <sup>c</sup>
	Residual	58.089	26	2.234		
	Total	73.590	38			

a. Dependent Variable (Model 1): Time and Cost Performance

b. Dependent Variable (Model 2): Technical and Operational Performance

c. Dependent Variable (Model 3): Customer need and expectation Performance

Predictors: (Constant), Develop PM Plan, Confirming HR availability, Quality Checklist, Determine the required budget, Well-defined Stakeholder Management Plan, Identify Risk, Cost Control, Well-Defined Cost Plan, Estimate Activity Resources, Monitoring & Recording quality activity, Collecting Requirements, Estimation of Project Cost

## 4.7.2 Analysis of independent variables

Table 4.27 Variable Coefficients <sup>a</sup>

Model		B	Std. Error	t	Sig	VIF
1	(Constant)	4.767	2.187	2.187	.038	
	Well-defined Stakeholder Management Plan	.033	.160	.160	.018*	1.305
	Collecting Requirements	.302	1.311	-1.311	.020*	1.054
	Estimation of Project Cost	.004	.014	.014	.013*	1.372
	Quality Checklist	-.190	-.952	-.952	.350	1.245
	Determine the required budget	.173	1.728	.728	.031*	1.156
	Monitoring & Recording Quality activity	.113	.438	.438	.665	2.081
	Cost Control	.001	.005	.005	.163	1.412
	Estimate Activity Resources	-.051	-.230	-.230	.820	1.552
	Confirming HR availability	.012	.061	2.061	.042*	1.286
	Well-Defined Cost Plan	-.083	-.367	-.364	.217	1.580
	Identify Risk	-.070	-.347	-.347	.312	1.677
	Develop PM Plan	.211	1.028	1.028	.313	1.316
	2	(Constant)		2.345	2.864	.008
Well-defined Stakeholder Management Plan		-.232	.102	-1.344	.069	1.805
Collecting Requirements		-.078	.273	-.402	.691	1.654
Estimation of Project Cost		.027	.240	.115	.909	2.372
Quality Checklist		.045	.295	1.269	.002*	1.245
Determine the required budget		.298	.262	1.489	.015*	1.156
Monitoring & Recording Quality activity		-.149	.313	-.686	.499	2.081
Cost Control		.080	.213	2.445	.016*	1.412
Estimate Activity Resources		.122	.264	.652	.050	1.552
Confirming HR availability		.129	.229	2.756	.046*	1.286
Well-Defined Cost Plan		.165	.137	1.868	.039*	1.058
Identify Risk		.015	.183	1.089	.030*	1.277
Develop PM Plan		.315	.260	1.823	.008	1.316
3		(Constant)		5.250	.416	.681
	Well-defined Stakeholder Management Plan	.031	.451	1.156	.017*	1.305
	Collecting Requirements	.100	.611	.445	.056	1.154
	Estimation of Project Cost	.147	.537	1.549	.049*	1.317
	Quality Checklist	.207	.661	1.066	.030*	1.245
	Determine the required budget	-.307	.586	-1.328	.196	1.756
	Monitoring & Recording Quality activity	-.059	.702	-.234	.800	2.081
	Cost Control	.194	.476	1.937	.000*	1.412

Estimate Activity Resources	-.335	.592	-1.543	.093	1.164
Confirming HR availability	.042	.512	1.211	.035*	1.286
Well-Defined Cost Plan	.104	.306	1.474	.039*	1.480
Identify Risk	-.018	.410	-.094	.062	1.277
Develop PM Plan	.107	.582	.536	.596	1.316

Model 1 = Dependent Variable 1: Time & Cost Performance

Model 2 =Dependent Variable 2: Technical & Operational Performance

Model 3 =Dependent Variable 3 : Customer Need & Expectation Performance

\* Significant at  $p < 0.05$

**Source: Own Survey, (2019)**

## 4.8 Hypothesis Testing

A linear regression test was conducted to verify the association between those twelve critical project management factors and the railway construction project performance. As it is discussed in chapter two of this thesis, the railway project performance at operational perspective is the aggregate outcome of the performance of the three effectiveness criteria such as: meeting project time and cost goals (time and cost performance), meeting technical and operational goals (tech & operational performance) and meeting customer needs and expectation (customer satisfaction performance).

### 4.8.1 The effect common factors on project time and cost performances

The result from the above regression test presented in Table 4.28 model 1 suggested that, there was a significant relationship ( $F=14.430$ ,  $p < 0.05$ ) between the railway project effectiveness measures such as meeting cost and time goals and the twelve critical factors in combined. In addition to this, the combined association was relatively strong ( $R^2=.407$ ), which is 40.7% of the total variation in time and cost performance was affected by the twelve project management factors.

From the regression result in the above table 4.29, it can be concluded that project managers effective implementation of project Well-defined stakeholder management plan ( $\beta=0.033$ ,  $t=.160$ ,  $p < 0.05$ ), project scope collecting requirement ( $\beta=0.302$ ,  $t=1.311$ ,  $p < 0.05$ ), estimation of project cost ( $\beta=0.004$ ,  $t=0.014$ ,  $p < 0.05$ ), determine the required budget ( $\beta=0.173$ ,  $t=1.728$ ,  $p < 0.05$ ) and confirming HR availability ( $\beta=0.012$ ,  $t=2.061$ ,  $p < 0.05$ ) each have significant positive effect on project time and cost performance. However, the rest has not significant positive effect.

### **4.8.2 The effect of common factors on project technical and operational performances**

Referring the above regression test presented in Table 4.28 model 2 suggested that, there was a significant relationship ( $F=14.197$ ,  $p<0.05$ ) between the railway project effectiveness measures such as meeting project technical and operational goals and the twelve critical factors in combined. In addition to this, the combined association was relatively strong ( $R^2=.639$ ), which is 64% of the total variation in time and cost performance was affected by the twelve project management factors.

Also, from the regression result in the above table 4.29, it can be concluded that project managers effective implementation of project quality checklist ( $\beta=0.045$ ,  $t=1.269$ ,  $p<0.05$ ), determine the required budget ( $\beta=0.298$ ,  $t=1.489$ ,  $p<0.05$ ), confirming HR availability ( $\beta=0.129$ ,  $t=2.759$ ,  $p<0.05$ ), well-defined cost plan ( $\beta=0.165$ ,  $t=1.868$ ,  $p<0.05$ ), cost control ( $\beta=0.080$ ,  $t=2.445$ ,  $p<0.05$ ) and identify risks ( $\beta=0.015$ ,  $t=1.823$ ,  $p<0.05$ ) each have significant positive effect on project time and cost performance. However, the rest has not significant positive effect.

### **4.8.3 The effect of common factors on project customer need and expectation performances**

Table 4.28 presents model 3 and, there was a significant relationship ( $F=15.578$ ,  $p<0.05$ ) between the railway project effectiveness measures such as meeting customers need and expectation performance and the twelve critical factors in combined. In addition to this, the combined association was relatively strong ( $R^2=.459$ ), which is 46% of the total variation in customer need and expectation performance was affected by the twelve project management factors.

From the regression result in the above table 4.29, it can be concluded that project managers effective implementation of project Well-defined stakeholder management plan ( $\beta=0.031$ ,  $t=1.156$ ,  $p<0.05$ ), estimation of project cost ( $\beta=0.147$ ,  $t=1.549$ ,  $p<0.05$ ), quality checklist ( $\beta=0.207$ ,  $t=1.066$ ,  $p<0.05$ ), cost control ( $\beta=0.194$ ,  $t=1.937$ ,  $p<0.05$ ), confirming HR availability ( $\beta=0.042$ ,  $t=1.211$ ,  $p<0.05$ ) and well-defined cost plan ( $\beta=0.104$ ,  $t=1.474$ ,  $p<0.05$ ) each have significant positive effect on project time and cost performance. However, the rest has not significant positive effect.

#### **4.8.4 Summary of PM factors affecting railway project performance**

The railway project effectiveness is the collective output of the three effectiveness measuring criteria which are discussed in the above deliberations. That stands for, we can say, success factors of any of the above criteria is a sub set of the success factors of the railway project success. The grand mean of the three success criteria scores are: Well-defined stakeholder management plan, estimation of project cost, determine the required budget, implementing quality checklists, cost control, confirming HR availability and well defined cost plan.

## **CHAPTER-FIVE**

### **CONCLUSION AND RECOMMENDATIONS**

#### **5.1 SUMMARY OF FINDINGS**

Respondents of this study comprised from all project practitioners who are available and responded on the studied project. The outcome shows that with response rate of 78% was considered very adequate for the study. The study investigated that project management factors especially, project cost management, project quality and project time management has a significant influence for the successful railway construction project. Specifically, project quality checklist, well-defined stakeholder management plan, project scope collecting requirements, estimating and controlling project cost, determine the required budget, identifying risks and confirming HR availability are the critical elements of project knowledge management identified by the respondents and has significant effect on the project performance measures on the study.

#### **5.2 CONCLUSION**

In the past it was believed that if a project's completion time exceeds its due date, or expenses overrun the budget, or its results did not satisfy a company's preset performance criteria, the project was considered to be a failure. At present it is understood that determining whether a project is a success or failure is far more complex.

Project management is a valid and legitimate approach to management and has increasingly become an important tool of choice for the realization of objectives across industries, developments and economic sectors. It involves managing resources in order to successfully achieve specific project goals and objectives through the completion of specific tasks. The main challenge of project management lies in achieving all of the project goals and objectives while utilizing the allocated resources, manage and handle to the project knowledge areas to successfully overcome the project constraints.

The purpose of the study was to identify critical project management success factors that influence the performance of Addis Ababa Light Rail Transit railway project. Accordingly, the study indicates that attention must be paid to the ten critical success factors of the projects to obtain the

project success for further city's railway expansion projects. These critical project management success factors are:-

- ↳ Well-defined cost plan
- ↳ Estimation of project cost
- ↳ Determine the required budget
- ↳ Control cost
- ↳ Monitoring and recoding the result of executing the quality activities to access performance
- ↳ Quality checklists
- ↳ Collecting Requirements
- ↳ Estimate activity resources
- ↳ Identify risks and
- ↳ Well-defined stakeholder management plan are the most critical ones.

Success in project management of a completed facility depends on many issues with a variety of factors. Identification of critical success factors, particularly in terms of the operation phase at of the project, can help interested parties to determine significant factors that should be given special attention to ensure the success of the project. Furthermore, those critical success factors of PM can be considered to be a means to improve the effectiveness of the project through the entire phase of the project life cycle. Therefore, this paper provides insight into the project management critical factors influencing railway construction project performance for different objectives, focusing on the operation and implementation phases in the context of project management.

Finally, the study revealed that the AALRT success perceived by completing the project on time as planned, the project meet its technical and operational performance, the customers use the service provided by the project and if the project create a new market, that are the core success criteria for the project to said effective.

So, the study revealed that if proper strategies are in place from the beginning the projects through implementation & construction will benefit community, business owners and government itself.

### **5.3 Recommendation for further study**

Indeed the complexities of project management present some challenges for the success of projects in the railway construction project in Ethiopia.

- ↳ This study, therefore, recommends that at every phase of the project life cycle, the critical success factors based on the effective knowledge areas management should be addressed and it will be a better project management experience.
- ↳ A number of possible future studies using the proposed approach can be conducted with large number of samples and the researcher strongly recommended.
- ↳ Future projects should have sound plans to cover the project cost during the implementation projects. This will help avoid unrealistic project time planning.
- ↳ Also, future phases of projects should take into account on the quality of project by way of monitoring and recording results of executing the quality activities to assess performance and recommend necessary changes.
- ↳ Proper scheduling should be made in collecting the requirements and estimating activity resources of future projects. This will also help in determining the critical activities in the project which will need much attention if the project is to be finished within time and cost schedule.
- ↳ Lastly, there should be proper risk planning in future project such as identification and assessment of all risk elements for proper analysis to determine their influence on the project is important for the success of the project. This could help to think through how these risk elements can be managed for a successful result.



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# APPENDICES - A

## Research Questionnaire

**Dear Participant,**

My name is Abebe Million. I am a MA student currently pursuing my masters at St. Mary's University. I am doing a research as part of my dissertation which aims to assess critical factors of project management affecting the performance of railway projects in Ethiopia, the case of Addis Ababa light rail transit project. Your voluntary contribution by providing correct information is vital for the success of this study. The information will be kept confidential and you may decide to stop being a part of the research study and have the right to omit or refuse to answer or respond to any question that is asked of you. I am so thankful and appreciative to you for taking the time to answer this survey questionnaire.

Yours faithfully,

Abebe Million

Tel: +251911-80-57-38

### **Part I: Demographic Information**

Please mark your appropriate opinion among the alternatives provided below.

1. Sex

Male  Female

2. What is your age?

21-30 years  31-40 years  41-50 years  50 and above

3. What is your highest education?

High School or Equivalent  Bachelor Degree  Master's Degree  Doctorate Degree

Other (Specify) \_\_\_\_\_

4. How long have you been with the company?

Less than 1 year  Between 1 & 2 years  Between 2 & 4 years  > 4 years

### **Part II: Project Management factors in Ten Knowledge Areas Questionnaire**

Please respond to each of the following statements about your project. Indicate the degree of importance each items.

**1. Rate the following factors of Project Scope Management in terms of their effect on the success of Addis Ababa Light Railway Transit Project.**

(5=Highly Important, 4=Important, 3=Moderately Important, 2=Less Imp. 1=Least Imp.)

No	Project Scope Management Factors	5	4	3	2	1
1	Planning scope management					
2	Collecting requirements					
3	Define scope					
4	Creating Work Breakdown Structure					

5	Validating Scope					
6	Controlling Scope					
7	Other (Specify)					

**2. Rate the following factors of Project Time Management in terms of their effect on the success of Addis Ababa Light Railway Transit Project.**

(5=Highly Important, 4=Important, 3=Moderately Important, 2=Less Imp. 1=Least Imp.)

No	Project Time Management Factors	5	4	3	2	1
1.	Plan schedule management					
2.	Define activities					
3.	Sequence activities					
4.	Estimate activity resources					
5.	Estimate activity duration					
6.	Develop schedule					
7.	Control schedule					
8.	Other (Specify)					

**3. Rate the following factors of Project Cost Management in terms of their effect on the success of Addis Ababa Light Railway Transit Project.**

(5=Highly Important, 4=Important, 3=Moderately Important, 2=Less Imp. 1=Least Imp.)

No	Project Cost Management Factors	5	4	3	2	1
1.	Well-defined cost plan					
2.	Estimation of project cost					
3.	Determine the required budget					
4.	Control cost					
5.	Other (Specify)					

**4. Rate the following factors of Project Quality Management in terms of their effect on the success of Addis Ababa Light Railway Transit Project.**

(5=Highly Important, 4=Important, 3=Moderately Important, 2=Less Imp. 1=Least Imp.)

No.	Project Quality Management Factors	5	4	3	2	1
1.	Identifying the quality requirement for the project					
2.	Auditing the quality requirement					
3.	Quality control measurement					
4.	Monitoring and recording the result of executing the quality activities to access performance					
5.	Quality checklists					
6.	Other (Specify)					

**5. Rate the following factors of Project Integration Management in terms of their effect on the success of Addis Ababa Light Railway Transit Project.**

(5=Highly Important, 4=Important, 3=Moderately Important, 2=Less Imp. 1=Least Imp.)

No	Project Integration Management Factors	5	4	3	2	1
1.	Develop project charter					
2.	Develop project management plan					
3.	Direct and manage project work					
4.	Monitor and control project work					
5.	Perform integrated change control					
6.	Close project or phase					
7.	Other (Specify)					

6. *Rate the following factors of Project Communications Management in terms of their effect on the success of Addis Ababa Light Railway Transit Project.*

(5=Highly Important, 4=Important, 3=Moderately Important, 2=Less Imp. 1=Least Imp.)

No.	Project Communication Management Factors	5	4	3	2	1
1.	Communication requirement analysis					
2.	Application of communication technology					
3.	Application of communication model					
4.	Application of information management system					
5.	Control communication					
6.	Other (Specify)					

7. *Rate the following factors of Project Risk Management in terms of their effect on the success of Addis Ababa Light Railway Transit Project.*

(5=Highly Important, 4=Important, 3=Moderately Important, 2=Less Imp. 1=Least Imp.)

No	Project Risk Management Factors	5	4	3	2	1
1.	Plan risk management					
2.	Identify risks					
3.	Project risks register					
4.	Perform qualitative risk analysis					
5.	Perform quantitative risk analysis					
6.	Plan risk responses					
7.	Risk probability and impact assessment					
8.	Project risks categorization					
9.	Strategies for positive risks or opportunities					
10.	Strategies for negative risks or threats					
11.	Other (Specify)					

8. *Rate the following factors of Project HR Management in terms of their effect on the success of Addis Ababa Light Railway Transit Project.*

(5=Highly Important, 4=Important, 3=Moderately Important, 2=Less Imp. 1=Least Imp.)

No.	Project Human Resource Management Factors	5	4	3	2	1
1.	Identifying project roles, responsibilities and required skill					
2.	Clear organizational chart and position descriptions					
3.	Confirming human resource availability					

4.	Develop project team					
5.	Management project team					
6.	Other (Specify)					

**9. Rate the following factors of Project Procurement Management in terms of their effect on the success of Addis Ababa Light Railway Transit Project.**

(5=Highly Important, 4=Important, 3=Moderately Important, 2=Less Imp. 1=Least Imp.)

No.	Project Procurement Management Factors	5	4	3	2	1
1.	Procurement evaluation techniques					
2.	Procurement negotiations					
3.	Procurement performance review					
4.	Inspection on the procurement					
5.	Procurement audit					
6.	Payment system					
7.	Other (Specify)					

**10. Rate the following factors of Project Stakeholder Management in terms of their effect on the success of Addis Ababa Light Railway Transit Project.**

(5=Highly Important, 4=Important, 3=Moderately Important, 2=Less Imp. 1=Least Imp.)

No.	Project stakeholder Management Factors	5	4	3	2	1
1.	Identify stakeholders and interest Levels					
2.	Management stakeholders engagement					
3.	Control stakeholders engagement					
4.	Conduct stakeholder analysis					
5.	Well-defined stakeholder management plan					
6.	Effective communication between project stakeholders					
7.	Evaluate the attributes of the stakeholders in the construction project					
8.	Other (Specify)					

### **Part III: Regarding Project Performance Criteria Questionnaire**

Please respond to each of the following statements about your project. Indicate the degree to which you agree or disagree with the statements by marking one response for each item. Different Dimensions of project success.

**Ans. (5=Strongly Agree, 4 = Agree, 3 = Moderately Agree 2= Disagree 1=Strongly Disagree)**

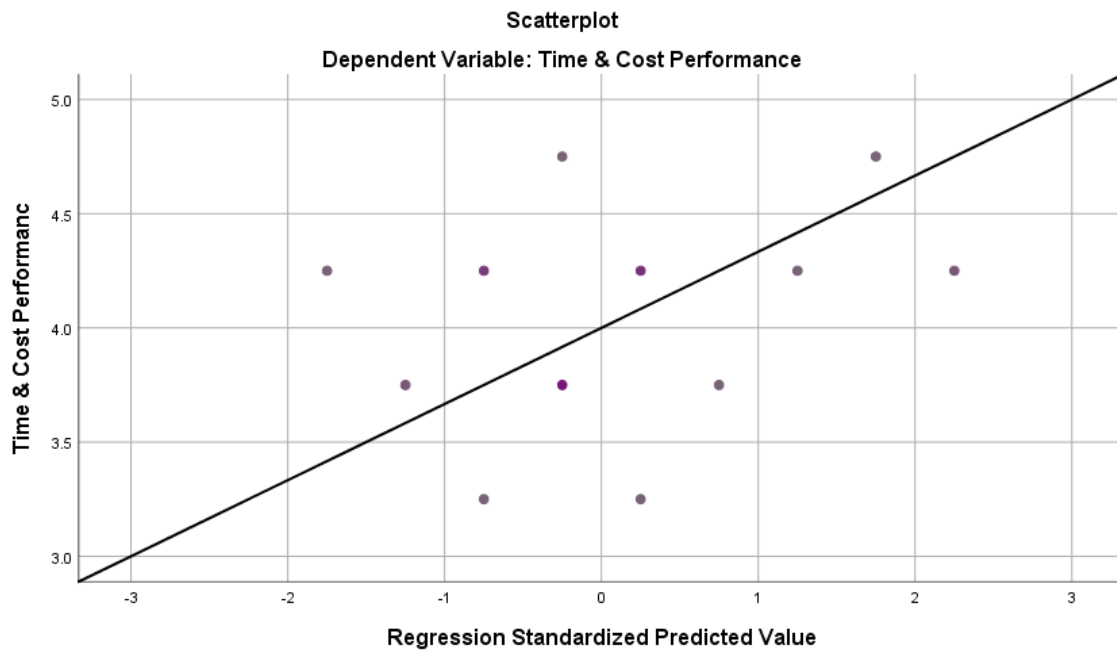
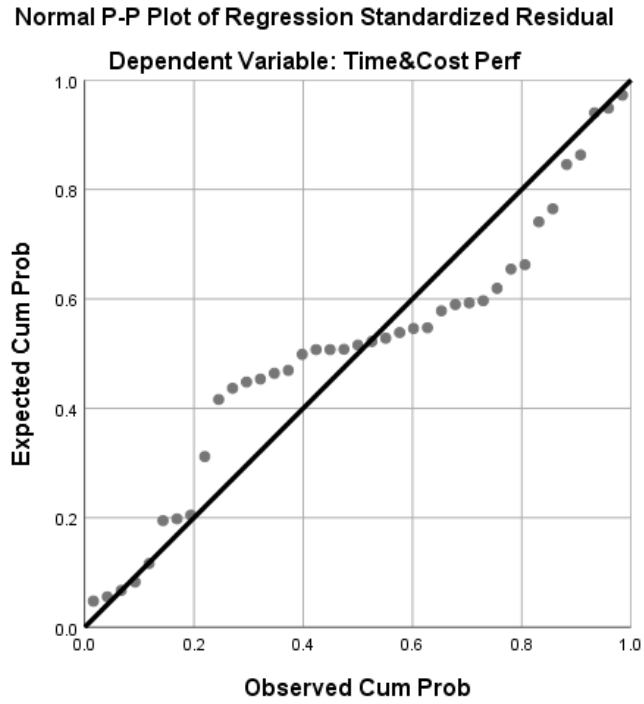
No	Statment of Project Effectiveness	5	4	3	2	1
1	The project meets its time and cost goals.					
2	The project meet its technical & operational goals.					
3	The project meets customer needs and expectation.					

+THANK YOU FOR YOUR TIME & CO-OPERATION!!

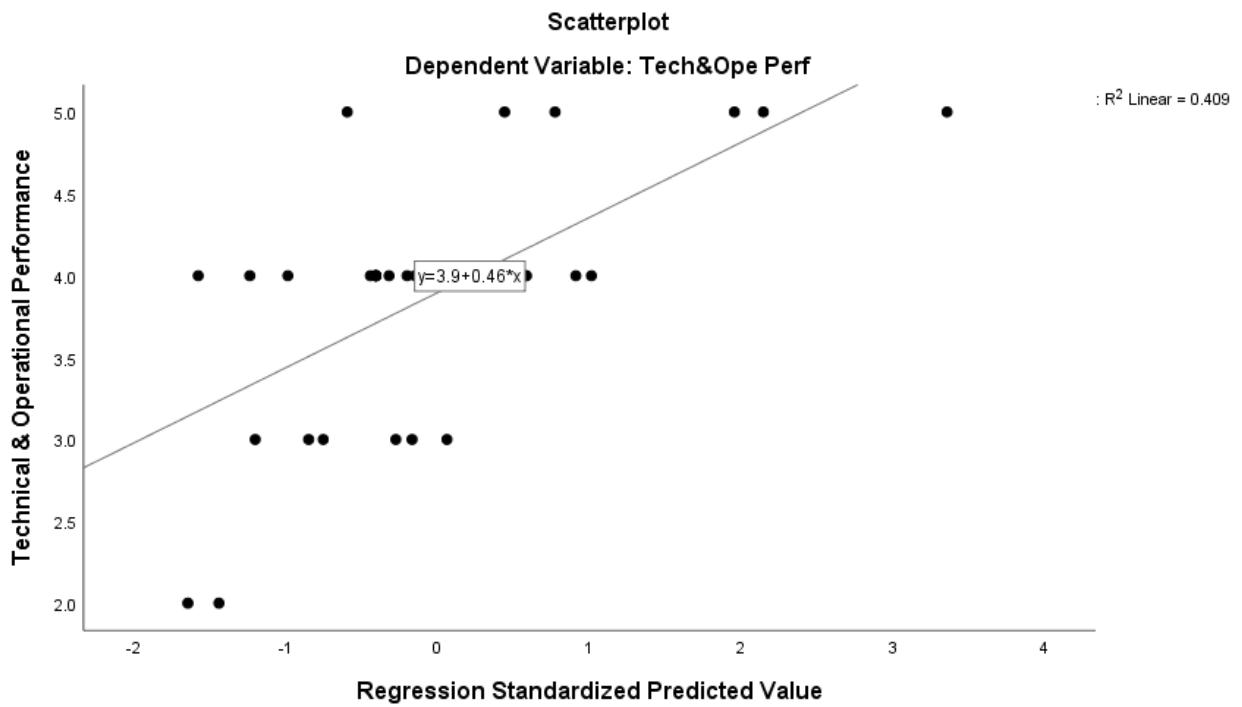
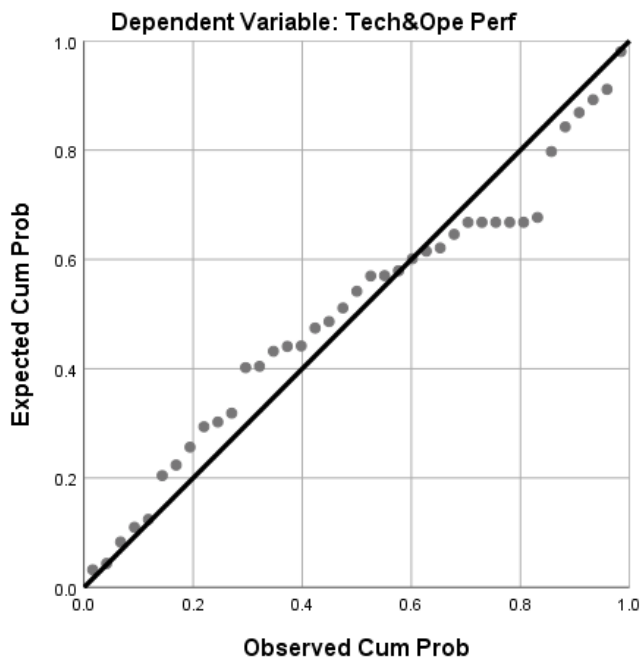


## APPENDICES – B: Some Analysis Results

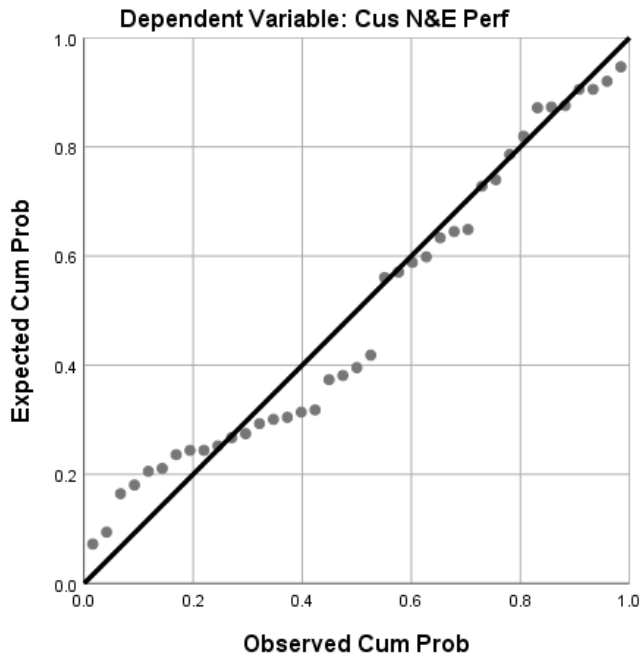
Results of linearity test



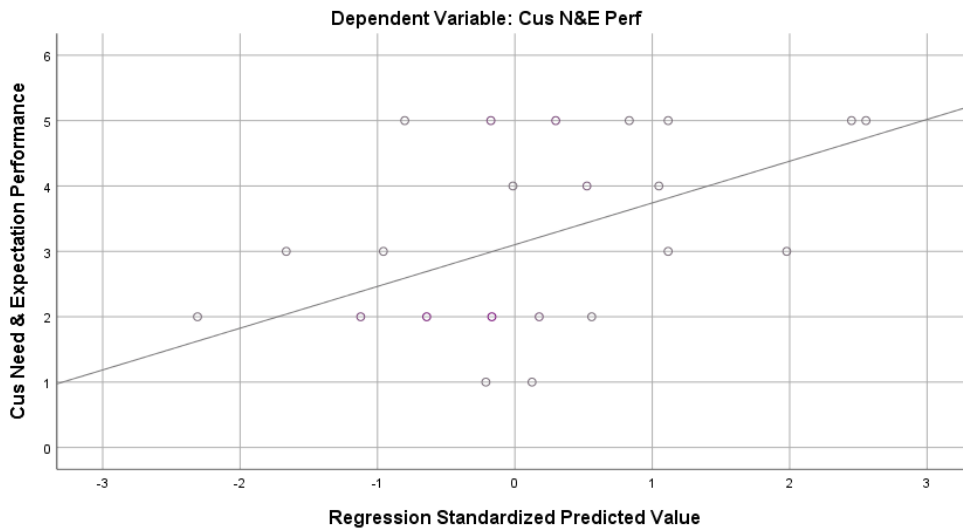
Normal P-P Plot of Regression Standardized Residual



Normal P-P Plot of Regression Standardized Residual



Scatterplot



**Correlation Analysis**

		1	2	3	4	5	6	7	8	9	10	11	12
Well-Defined Cost Plan(1)	Pearson Correlation	1	.007	.292	.536**	.166	.391*	.431**	.072	.085	.107	.047	.203
	Sig. (2-tailed)		.968	.071	.000	.314	.014	.006	.665	.607	.516	.778	.216
Well-defined Stakeholder Management Plan(2)	Pearson Correlation	.007	1	.304	.033	.048	-.006	-.007	-.098	.388*	.215	.109	.090
	Sig. (2-tailed)	.968		.060	.841	.770	.971	.968	.552	.015	.189	.511	.587
Collecting Requirements(3)	Pearson Correlation	.292	.304	1	.204	.074	.393*	.226	.162	.293	.197	.158	.360*
	Sig. (2-tailed)	.071	.060		.214	.653	.013	.167	.325	.071	.230	.336	.024
Estimation of Project Cost(4)	Pearson Correlation	.536**	.033	.204	1	.275	.342*	.604**	-.079	.129	.150	.121	.185
	Sig. (2-tailed)	.000	.841	.214		.090	.033	.000	.634	.433	.362	.465	.260
Quality Checklist(5)	Pearson Correlation	.166	.048	.074	.275	1	-.033	.093	.169	.200	-.095	.116	.045
	Sig. (2-tailed)	.314	.770	.653	.090		.842	.575	.303	.221	.564	.482	.786
Determine the required budget(6)	Pearson Correlation	.391*	-.006	.393*	.342*	-.033	1	.427**	.252	-.077	.126	.173	.067
	Sig. (2-tailed)	.014	.971	.013	.033	.842		.007	.121	.641	.445	.292	.685
Monitoring & Recording Quality activity(7)	Pearson Correlation	.431**	-.007	.226	.604**	.093	.427**	1	.103	-.085	.237	-.047	.074
	Sig. (2-tailed)	.006	.968	.167	.000	.575	.007		.533	.607	.147	.778	.656
Cost Control(8)	Pearson Correlation	.072	-.098	.162	-.079	.169	.252	.103	1	.077	-.158	.068	.213
	Sig. (2-tailed)	.665	.552	.325	.634	.303	.121	.533		.643	.337	.679	.194
Estimate Activity Resources(9)	Pearson Correlation	.085	.388*	.293	.129	.200	-.077	-.085	.077	1	.197	.313	.144
	Sig. (2-tailed)	.607	.015	.071	.433	.221	.641	.607	.643		.230	.053	.382
Confirming HR availability(10)	Pearson Correlation	.107	.215	.197	.150	-.095	.126	.237	-.158	.197	1	.218	.034
	Sig. (2-tailed)	.516	.189	.230	.362	.564	.445	.147	.337	.230		.183	.836
Identify Risk(11)	Pearson Correlation	.047	.109	.158	.121	.116	.173	-.047	.068	.313	.218	1	-.055
	Sig. (2-tailed)	.778	.511	.336	.465	.482	.292	.778	.679	.053	.183		.740
Develop PM Plan(12)	Pearson Correlation	.203	.090	.360*	.185	.045	.067	.074	.213	.144	.034	-.055	1
	Sig. (2-tailed)	.216	.587	.024	.260	.786	.685	.656	.194	.382	.836	.740	

\*\* . Correlation is significant at the 0.01 level (2-tailed).

\* . Correlation is significant at the 0.05 level (2-tailed).