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SCHOOL OF CIVIL AND ENVIRONMENTAL ENGINEERING

AN ASSESSMENT OF THE ROLE OF PROJECT MANAGEMENT TECHNICAL AND BEHAVIORAL COMPETENCY IN THE SUCCESS OF CONSTRUCTION PROJECTS IN ETHIOPIA

By

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A thesis submitted to School of Civil and Environmental Engineering in partial fulfillment of requirements of the Degree of Master of Science in Civil Engineering in Construction Technology and Management

Advisor

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The undersigned have examined the thesis entitled '***An Assessment of the Role of Project Management Technical and Behavioral Competency in the Success of Construction Projects in Ethiopia***' presented by **Kifleyohannes Daniel Abebe**, a candidate for the degree of **Master of Science** and hereby certify that it is worthy of acceptance.

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DECLARATION

I certify that research work titled ***'An Assessment of the Role of Project Management Technical and Behavioral Competency in the Success of Construction Projects in Ethiopia'*** is my own work. The work has not been presented elsewhere for assessment. Where material has been used from other sources it has been properly acknowledged and referred.

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ABSTRACT

The objective of this research is to study the role of project management technical and behavioral competencies on project performance in the Ethiopian construction industry. The unique nature of the construction industry, coupled with challenges of global competitiveness, and changing regulatory requirements have created excessive demand for highly knowledgeable and competent project management. Project management is a philosophy and technique that allows users the maximum utilization of their potential with limited sources, together with the increase of profitability. Competency is capacities and attributes that project manager should possess to realize project aims and objectives. Effective project performance can be achieved with relating competency of an individual, requirement of the job and project environment. This study used a quantitative survey and it was design to examine the role of project management technical and behavioral competencies in project performance. This study employed stratified random sampling technique to distribute survey questionnaire to the contractors. The data and information collected through questionnaire survey was interpreted quantitatively. Findings indicate the role of project management technical and behavioral competencies is undeniable in the success of a project. Besides, technical competencies have a substantial effect on project performance. Projects meet their technical performance goals, efficiency of the project management effort, and projects meet their operational performance goals are perceived as successful projects. There is a moderate correlation between project management technical competencies and project success and strong relationship between project management behavioral competencies and project success. Though, lack of particular PM competencies has a significant impact on the projects performance. Since, both technological factor and ethical factors are the biggest challenge in Ethiopian construction industry, therefore it was recommended that the sector must have ways to overcome these challenges and all concerned stakeholders work intensively on remedial measures. Moreover, focus is needed to be given to professionals in the industry and different methods to develop competencies in addition to experience on site.

Keywords: *Construction; Competency; Project Management Competencies; Project performance*

ACKNOWLEDGMENTS

First of all I would like to owe my special thanks to the Almighty **GOD**, for empowering and giving me internal courage to accomplish this research and allow me to push one step further my educational career.

My deepest gratitude goes to my advisor, Abraham Assefa Tsehayae (PhD), for all the time and effort he have put into this research, for every advice and time he gave me, encouragement and guidance during this research work.

I would also like to thank all individuals and companies those who responded to the survey. I am very grateful to each of these people for taking time out of their busy schedules.

Finally, I would like to thank, all members of my family and friends for their inspiration and endless encouragement during this research work.

Kifleyohannes Daniel Abebe

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ACRONYMS

AIPM	Australian Institute of Project Management
APM	Association for Project Management
CMAA	Construction Management Association of America
CSF	Critical Success Factor
ECPMI	Ethiopian Construction Project Management Institute
GDP	Gross Domestic Product
HR	Human Resource
ICB	International Competence Baseline
IPMA	International Project Management Association
KRAs	Key Results Areas
KSAs	Knowledge, Skill and Abilities
KPI	Key Performance Indicator
MoUDC	Ministry of Urban Development and Construction
OGC	Office of Government Commerce
PMBOK	Guide to the Project Management Body of Knowledge
PM	Project Management
PMI	Project Management Institute
PMO	Project Management Office
PRINCE2	Projects IN Controlled Environments

CHAPTER ONE

1. INTRODUCTION

1.1. Background of the Study

Project management is a relatively young discipline and had begun to develop in the middle of the 20th century as a new managerial discipline primarily in the engineering and construction industries (Verzuh, 2005). The difficult and complex environment of the construction industry brought about the identification of certain competencies that Project Management must possess to deal with it successfully. In the early days of project management, the emphasis was placed on technical skills in traditional project management. Through time project teams are concerned on engagement of more and more non-engineering personnel, and behavior skills became equally important as technical skills (Liu *et al.*, 2010).

In the delivery of successful projects, certain knowledge, skills, and personal attributes are required for a project manager to be effective. This refers to the project manager's competency (Tony *et al.*, 2014). A project may be well-conceived and adequately financed, the resources may be specialists, and consultants may be highly experienced, but if the efforts of all the participants are not skillfully coordinated and managed, the project may overrun the budget, fail to meet the schedule, or fall short in functional and technical quality. The larger and more complex the project, the more critical the overall management function becomes. Project management may well be the career were technical, business and people skills routinely intersect. To become a good project manager; knowledge of the application area, soft skills, and coping with the project environment are must-haves and needs full proficiency in tools such as project management software. A team consists of multiple members each having a different personality, managing and catering to their needs can be a difficult task at times. With so many people working on a project together, there can be disagreements and differences in a team that can have a negative impact on the project and work environment.

Project management success is measured using tangible technical criteria such as measured variables. In general, technical aspects include the four dimensions in the classical version of the iron triangle: time, cost, scope, and quality (PMI, 2012).Although some authors argue that behavioral aspects associated with the PM, such as attitudes and interpersonal knowledge skills are related to project performance (Kerzner, 2010).

1.2. Statement of the Problem

The project management team should have to demonstrate knowledge, skills, and experience suitable with the size, complexity, and risk of the project. Competent project managers consistently apply their project management knowledge and personal behaviors to increase the likelihood of delivering projects that meet stakeholders' requirements. According to the Project Management Institute (PMI, 2012), a project's success rate improves by approximately 40% when project managers possess and nurture the ideal skillset (i.e. a powerful mix of technical, leadership, and business management expertise). On the other hand, the business world needs more highly skilled project managers, otherwise, it will continue to bleed around a hundred of millions for every billion of budget invested on projects without the right talent and strategy, project schedules and costs will remain difficult to detect.

Many projects fail to meet expectations and therefore management competency (knowledge, skills, and attitudes) is influential in order to initiate, plan, execute, monitor and control the construction project effectively and efficiently (Williams, 2005). Project success was recognized to be a complex and multidimensional concept considering not only 'the iron triangles' (i.e. time, cost, and quality) but encompassing many attributes (Pinnington, 2014). The critical factors for the success of construction projects in Ethiopia are top-ranked as; lack of competent personnel and construction project management and capable construction-related research and development institution (Hailemeskel, 2013).According to a study Capacity Gap of Construction Contractors conducted by ECPMI (2018),in the field of project management knowledge; lack of awareness of project management knowledge areas, lack of interest in developing the budget and quality of the human resources at the time of

the project and this is because of the implementation problem of the project mostly related to the competent staff, and the working condition of all three stakeholders; contractor, consultant, and employer is unintegrated are found as gaps. In Ethiopia the highest grade contractors are incapable in construction project management in which the practice leads to wasteful project delivery and the optimized and continuous improvement level of construction management processes maturity is nominal (Desta, 2017). Thereof, implementation of successful projects needs competent PM and generates positive effects on the project or organization and also ensures long term development. Furthermore, the

The construction industry is also naturally fragmented and has a long supply chain. Within one project, numerous stakeholders, such as the client, consultants, contractors, government officials, community, workers, and project team members may influence the project and its outcome. Project management has to get things done through a large and diverse set of people involved in the projects and responsible for managing the interaction between all stakeholder groups and each of them has their own expectations and project success criteria. According to PMI (2013), success approached in relationship with projects is even more important since the number of failing projects is extremely high, more than one third of projects failing to reach their objectives. Construction projects offer recurring challenges and uncertainty that test the competency of a project management. Among this complex and unpredictable environment project management have an important role to be the hub that integrates all project components and propels them towards successful delivery of the project. PM competencies are one of the key factors associated with project success (Marion, *et al.*, 2014). As stated earlier, international practice shows competency is associated with project success or has an effect on project success but Ethiopian experience doesn't show that or competency based research haven't been studied in particular with the construction industry. Therefore, the gap has to be studied and an improvement in project performance may have relationships with the competencies of Construction Project Management and needs an assessment.

1.3. Objective of the Study

1.3.1. General Objective

The main objective of this research is to assess the role of project management technical and behavioral competencies on construction projects success in the Ethiopian construction industry.

1.3.2. Specific Objectives

The specific objectives of this research paper are:

- To investigate the relationship between the competencies and construction projects success in Ethiopia.
- To assess the competency dimensions that affect project success the most.
- To understand aspects of competencies that project managers think are more important.

1.4. Research Questions

i. Do project management competencies affect the project's success?

ii. Which competency affects project performance more?

1.5. Limitation and Scope of the Study

The research was focused on achieving the aims and objectives that were set out in section 1.3.1, 1.3.2 and answering questions listed in section 1.4. The study uses a questionnaire survey for the data collection purpose with different stakeholders in the field to assess the role of project management competencies in construction projects success.

The study addresses only the technical and behavioral aspects of competency. Difficulties have been encountered in the collection of data because there is no organized information related to the performance of different projects. Therefore, the limited availability of data resulted in a lack of further in-depth studying on the topic of the researcher. The other limitation of this study is that it considered only the first class of contracting companies in the Ethiopian construction industry which may restricts the generalizability of the results of the study.

1.6. Significance of the Study

This research focuses on assessing the role of the project management competencies in the construction industry and project success, in an attempt to develop and use the competencies that are seen to be related and most efficient in project management practices.

The study's significance is that the research conducted will enhance the trend of the Ethiopian construction industry and the project management competencies of the projects and programs by providing insight into whether relationships exist between the project management competencies and the success or failure of projects.

1.7. Outline of the Research

The research constitutes mainly five chapters. A brief introduction into these five chapters is presented below:

- **Chapter One: Introduction**

It is a general introduction about Project Management Competency and project performance-related issues. A list of the key objectives of the research have been presented, scope and limitations, and the significance of this research have been emphasized in this chapter.

- **Chapter Two: Literature Review**

This is a detailed literature review on Technical and Behavioral Competency of Construction Project Management. The chapter discusses various ways in which the management competency plays a role in the performance or success of a project. Many publications that have presented research on the existing Project Management Competency were critically discussed. The chapter also discussed literature on research that has been carried out about different categories that are used to measure project managers' capability in the industry.

- **Chapter Three: The research design and methodology**

This chapter demonstrates the process by which the researcher collects the information needed to answer the research question. The purpose of the research design and lit review is

to collect, verify, and synthesize evidence from the past to establish facts that support the research objectives. For this study, the Questionnaire is research instruments. It also uses secondary sources and a variety of primary documentary evidence, such as diaries, official records, reports, archives, and non-textual information (i.e. maps, pictures, audio, and visual recordings).

- **Chapter Four: The research analysis and discussions**

This chapter presents results from questionnaire prepared with the literature which develops an understanding of the role of Competencies of a Project Management that are assessed. The results have been discussed in detail to arrive at a better understanding of the roles to solve the problems related to the performance of projects.

- **Chapter Five: The research conclusions and recommendations**

It explains the conclusions from the research findings and includes recommendations on how Project Management Competencies role will help in improving performance. A suggestion for future research needs has also presented in this chapter.

This study focused on Technical and Behavioral competencies and their relationship with the performance of project management which is considered critical to the project success. Besides, the purpose of this study is to contribute to the discussion by assessing the results of the study about the role of project management Technical and Behavioral competencies on construction projects performance in the Ethiopian construction industry.

Main players of the construction industry including owners, contractors and consultants have become interested in identifying the essential skills to be provided in the project manager to be characterized as a competent manager.

CHAPTER TWO

2. LITERATURE REVIEW

2.1. Introduction

The Literature review introduces some important aspects of construction project management. This chapter also defines the competency concept and takes a look at the background of several competencies that are central in the construction management system. The most relevant literature is reviewed concerning the research aims starting with construction project management roles and responsibilities and the relationships between their competencies and the employee performance in construction projects. Besides, this section investigates different techniques of project management competency development.

The unique nature of the construction industry, coupled with challenges of global competitiveness, and changing regulatory requirements have created excessive demand for highly knowledgeable and competent project management. Competition is eager and only the flexible will survive. These business conditions translate directly to greater demand for efficient and effective management of an entire range of projects. Within such a changing construction project's characteristics, project managers and the teams increasingly find themselves confronting the new issues and undertaking additional roles that haven't traditionally been part of their responsibilities.

A project management competency refers to the capability to manage projects professionally by working hard at best practices, management process, and the application of project management methods. Project management competencies require knowledge and experience in the area of construction which enables the projects to meet their deadlines and objectives (Garish and Huemann, 1999).

2.2. Historical Evolution

Near the turn of the 20th century, social efficiency became a dominant social idea in the United States of America. Frederick Taylor, who was called the father of scientific management, became a significant figure with the development of management thinking and practice. He proposed a greater division of labor, with jobs being simplified, an extension of

managerial control over all elements of the workplace and cost accounting based on systematic time and motion study (Taylor, 1911). All of these elements were associated with the rise of the concept of competency. In the 1930s in the United States, the Roosevelt administration promoted functional analysis of jobs, which resulted in the publication of a dictionary of occupational titles recognizing knowledge and skills connected to different occupations (Horton, 2000). In the 1940s and 1950s, researchers started systematically identifying and analyzing broad performance factors (Flanagan, 1953 and 1954). A Competency-based methodology was founded in the late 1960s and early 1970s by a psychologist from Harvard University called David McClelland. Fact, competency methodology can be gathered with the help of 'use a criterion sample' to specify the most effective characteristics, operative thoughts and behavior that are linked to successful results and the best predictor to what individuals have done in similar post situations and what they can and will do in present and future situation (McClelland, 1973). Miller *et al.,* (2001) described the following two essential reasons that caused organizations to use competencies:

1. An individual's performance in the organization can be increased according to the appropriate of the competencies in many personnel processes such as appraisal, training, etc.
2. Organizational values and objectives can be manifested by their competency methodology. HR practices in the organization will include drafting the competency requirements and facilitating individuals and teams can easily understand it.

Numerous people with very different interests, characteristics, priorities, and goals are the main result of the project-based nature of the construction industry. Hence, to successfully manage and coordinate these competing individual interests and goals with those of central to the project construction project management must possess required technical and behavioral skills.

A project success is attached on the PM competencies of the project manager and the project team. PMI (2002; 2008; 2013; 2018) identifies and categorizes the competencies needed by the managers and staff of PM, into three broad competent areas such as project management knowledge competency which comprises what the project management team knows about

PM: project management performance competency which entails what the project team can accomplish while applying project management knowledge; and project management personnel competency which implies how the project management team behave while performing the activities in a project.

PMI (2008) discovered that successful project management necessitate the project manager and team to understand and use knowledge and skills from at least the following (Figure 1) four areas of expertise. The Project Management Body of Knowledge (PMBOK) entails the application area knowledge, standards and regulations; understanding the project environment; general management knowledge and skills; and interpersonal skills (PMI, 2008; 2013).

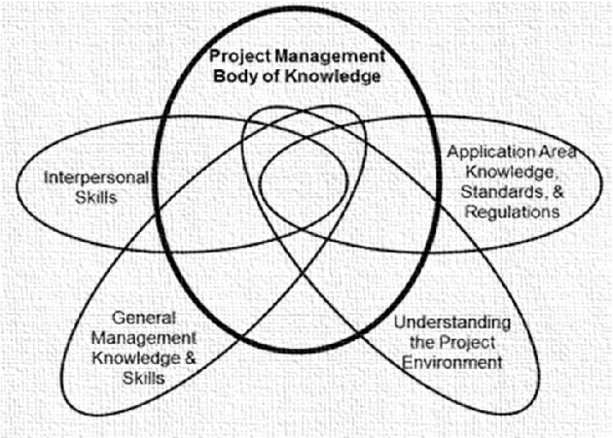


Figure 1. Overlapping Competencies for Successful Project Management (Adopted from PMI).

2.3. Project Management Standards

There are many PM management standards or methodologies that are used in the global context for managing projects, while some are applicable only within the countries in which they have developed. This study tries to discuss some of the project management standards used in an international context.

2.3.1. Project Management Body of Knowledge (PMBOK)

The PMBOK is a trademark of the Project Management Institute (PMI) and this institute is an inclusive body that manipulates the sum of knowledge within the profession of the project management (PMI, 2002). Like other professions such as law, medicine, and

business project management body of knowledge rests with its practitioners and academics who apply and advance it. The standard is unique to the project management field (PMI, 2002; 2008). The PMBOK guide is the standard for managing projects, most of the time along with many types of industries. This standard describes project management processes, tools and techniques for managing scope, schedule, quality, cost and any project environment aspects that influence project success. Therefore it is called 'project tailoring' that allows working for most projects in different sectors. According to PMI (2002; 2008; 2013) there is ten project management body of knowledge areas as described below. These ten bodies of knowledge areas are though interrelated to accomplish project requirements but with different skills, tools and techniques to the project activities.

Project management knowledge draws on ten areas:

1. Project Integration Management: Its objective is to coordinate the diverse components of the project by quality project planning, execution, and change control to achieve the required balance of time, cost and quality.
2. Project Scope Management: To create a quality product by including only the required work and to control scope changes.
3. Project Time Management: To ensure that the completion project on time.
4. Project Cost Management: To ensure that the project is completed within allotted budgets.
5. Project Quality Management: To ensure that the product will satisfy the requirements.
6. Project Procurement Management: To ensure quality service or product acquisition.
7. Project Human Resource Management: To employ quality leadership to achieve quality teamwork.
8. Project Communication Management: To distribute quality project information.
9. Project Risk Management: To identify and control risk in a project.
10. Project Stakeholder Management: To continuously communicating with stakeholders to understand their needs and expectations, addressing issues according to their occurrence, managing diversified interests and encouraging appropriate stakeholder involvement in project decisions and works.

There is also an extension guide as a supplement to the PMBOK guide. The extension guide describes the generally accepted principles for construction projects that are not common to all project types. The extension aims to improve the efficiency and effectiveness of the management of construction projects and to include material specifically applicable to construction that is not covered in the PMBOK Guide (PMBOK, 2000). The extension guide falls into four knowledge areas particularly applicable to construction projects as listed below:

1. Safety Management:- It describes the processes required to assure that the construction project is executed with appropriate care to prevent accidents that cause or have the potential to cause personal injury or property damage.
2. Environmental Management:- It describes the processes required to ensure that the impact of the project execution to the surrounding environment will remain within the limits stated in legal permits.
3. Financial Management:- It describes the processes to acquire and manage the financial resources for the project and is more concerned with revenue source and analyzing/updating net cash flows for the construction project than is cost management.
4. Claim Management:- It describes the processes required to eliminate or prevent construction claims from arising and for the expeditious handling of claims if they do occur.

2.3.2. Projects IN Controlled Environments (PRINCE2)

PRINCE2 (Projects IN Controlled Environments) defines itself as a project management methodology. Also it has all the components to be standard by definition, purpose, and application. It is a “structured method based on experience drawn from thousands of projects, and for contributions of countless project sponsors, project managers, project teams, academics, trainers and consultants” (OGC, 2009). Its structure is based on the integration of four elements; principles, themes, processes and the project environment. The seven principles PRINCE2 comprises are continuous business justification, learn from experience, define roles and responsibilities, manage by stages, manage by exception, focus

on products and tailor to suit the project environment. The seven PRINCE2 themes are the business case, organization, case, organization, quality, plans, risk, change, and progress.

This standard is also process-based approach and includes the following process: starting up, directing, initiating, controlling, managing the product delivery process, managing a stage boundary and closing project. PRINCE2 prioritizes the necessity of the profitability of the project from inception through completion, as it is well stated in the principles and themes in the business case.

Similar to the PMBOK standard, PRINCE2 can be applied to any project independent of the project size, type, organization, geography or culture. According to this standard, if organizations implement PRINCE2 they can improve their maturity level and organizational capability (OGC, 2009). PRINCE2 focuses on six aspects of project performance; to complete a project on budget, on time, with expected quality, within the specified scope, within an adequate and evaluated risk and the required benefits.

2.4. Competency Definition

Interpretations and uses of the word competency are varied and numerous as the contexts in which the word is employed. Regulators, industry authorities, and companies in every sector have their definitions, according to their reference frames and purposes. Each sector's approach to competency is formed by the nature of its working activities but all are concerned with ensuring a safe, efficient, and skilled workforce. Most of the approaches agree broadly that competency designates the ability to independently execute a role or task to the required standards. Hence, there is no unified definition for competency yet; it always depends on the context or situation what we want to describe. Therefore, before discussing the use of the competency concept it may be useful to attempt to define the competency term with recognized definitions in the field.

Industry sectors abroad including construction tend to break down competency into individual competency and organizational capability. Individual competency is required to ensure efficiency, effectiveness, and safety to increase business profitability and drive growth but must be enabled and supported by effective organizational capability. According to a research by Pye Tait (2014), competency at all levels in construction must be

understood in the broadest sense, as being more than simply job competency or health and safety, but rather constituting the whole toolbox; job and task based skills and knowledge, functional skills, health and safety knowledge, competency, and human factors.

Competency or competence came from Latin word "Competentia", meaning meeting together, agreement and symmetry. Both terms meaning sufficiency to deal with what is at hand. The term 'competency' is one of those words who have become popular in recent decades. Second, the term competence is focusing on the job and can be used to describe the areas in which the project manager should be competent which mainly including functional tasks, whereas the term competency is focusing on the person that is needed in large extent to help project managers to implement successful and effective functional tasks (Sewchurran *et al.*, 2010).

The application of these two terms in the organization can be affected by the main theoretical and practical differences between these two terms. The first difference between these two terms related to the use of each one in the main aspects of the organization. Recently, the term 'Competence' is widely used in management literature and many researchers favored its usage than using the previous term 'skill'. However, 'Competency' has some difference from the knowledge, skills, and abilities (KSAs). The differences are represented mainly in the higher level of competency than KSAs as if also involves the traits, motives, and self-concept of an individual (Spencer, 1993).

According to Spencer the five competency characteristics were described as motives, traits, self-concept, knowledge, and skills.

- Motives: The encouraging factors that leading people to attain their objectives. In general motives lead, guide, and choose behavior away from others toward specific actions or objectives.
- Traits: Is referring to the physical characteristics and compatible responses to several subjects.
- Self-concept: It is an individual's attitudes, values or self-image.
- Knowledge: It refers the individual's understanding and information about specific content areas.

➥ Skill: It refers the individual's ability to carry out particular physical or mental tasks.

The skill is judging itself in an action. Concerning some definitions of skill, it can be regarded as a combination of knowledge, awareness, methods, and techniques that leads to a better, faster, more useful and constructive task and role performance. So, skill is a set of features and capabilities that leads to high quality fulfillment of jobs (Amini, 2016). Figure 2 shows that the structure in which core competencies, middle personalities, and surface competencies be developed in different layers.

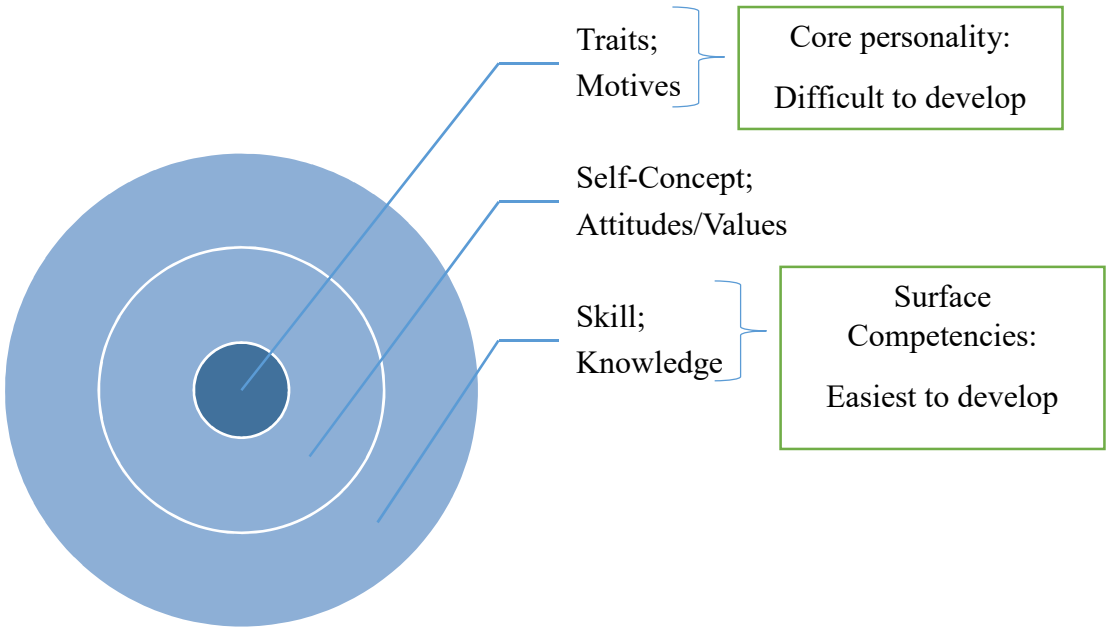


Figure 2. Competency Structure

Skills and knowledge competencies are visible and related to the outer characteristics of people, which can be developed easily. Trait, motive, self-concept competencies are more hidden, deeper, and central to personality. These three competencies can't be assessed and developed easily. According to the Cambridge Advanced Learner's Dictionary "competency is the ability to do something well." Among the many definitions provided by the oxford English Dictionary, one with a similar meaning would be competency is "sufficiency of qualification; capacity to deal adequately with a subject."

A good definition of competency is presented by Berglund (1999), in Glader (2001); "Competency is used to accomplish something. It includes knowledge in all their shapes, but

it also includes personality traits and abilities, such as social competency, but it is however not impossible to also talk about organizational competency" one can then refer back to the complete competency at the individual level in the organization or the stored knowledge concerning systems, techniques or the culture. Competency is a supporting characteristic of a team member that is causally connected to criterion referenced effective and superior performance in a job or situation (Bauer, 2005).

International Project Management Association (IPMA) defined competency as knowledge + experience + personal attitude. Knowledge and experience are related to technique and attitude is related to behavior (IPMA, 2006). Competency can be linked with individual behavior and job performance. It can be demonstrated as the ability to perform activities within a project environment that leads to expected outcomes based on defined and accepted standards (PMI, 2012). Competencies are defined as the "ability to mobilize, integrate, and transfer knowledge, skills, and resources to reach or surpass the configured performance in work assignments, adding economic and social value to the organization and the individual" (Takey *et al.*, 2015).

PMBOK defined competency as capacities and attributes that project management should possess to realize project aims and objectives. The project management competencies are the core of the business and are often used as a tool to the strategic advantage of project success. Developing competencies help project management as a team to keep pace and help to adapt the current market and industry demands for success. Competency is a combination of skills, knowledge, and individual characteristics (Crawford, 2005). The definitions give an idea that a competent project manager is a person who has the expertise in the field of project management, has personal characteristics that will make the person capable of actually performing the project management and can accomplish the given tasks at a certain level of performance.

According to Harvard University Competency dictionary Competencies, in most general terms, are "things" that and individual must demonstrate to be effective in a job, role, function, task, or duty. These "things" include job-relevant behavior (what a person says or does that results in good or poor performance), motivation (how a person feels about a job,

organization, or geographic location), and technical knowledge/skills (what a person knows/demonstrates regarding facts, technologies, a profession, procedures, a job, an organization, etc.). Competencies are identified through the study of jobs and roles.

As mentioned in the earlier discussion, competencies can be defined in several ways. Most authors mentioned in the discussion above considered competency as a mix of knowledge, behavior, skills, and traits that gives people the potential for effectiveness in performing tasks. On the base of the related literature and pervious discussions, the "competency" definition can be summarized as a set of behavior patterns that a professional is required to come up with to perform desired functions and jobs with competency.

Major components of competencies include:

- Abilities
- Attitudes
- Behavior
- Knowledge
- Personality
- Skills

When applied to project management, competency is the ability to execute activities within a project environment to expected and accepted standards. Competency can be described as consisting of three separate dimensions (Cartwright and Yinger, 2007):

- Project Management Knowledge Competency: What is known about project management by the project manager.
- Project Management Performance Competency: What is accomplished by the project manager while applying their project management knowledge.
- Personal Competency: How the project manager behaves when performing the project or activity, their attitudes and core personality characteristics.

The three dimensions of competency; Knowledge, Performance and Personal competency are demonstrated in different ways:

- Knowledge competency can be demonstrated by passing an appropriately credentialed examination.
- Performance competency can be demonstrated by the successful delivery of projects.
- Personal competency can be demonstrated by the project manager's behavior when delivering successful projects.

2.5. Competency Classifications

The difference in competencies requirements between various levels or industries can describe the unavailability of one opinion about the classification of the competencies needed for each person in the organization.

The most common approaches for competencies classification discussed in a wide range in previous literature are the functional, analytical and personal characteristics (Boyatzis *et al*., 2007).While Crawford (2005) suggested the following three classifications approaches of competencies:

1. **Input competencies:** which involve the knowledge and skills provided by each person into his job.

2. **Personal competencies:** these are the key attributes describing any personable to complete his job.

3. **Output competencies**: which are regarded as the verifiable performance that any person displays in the job.

Figure 3 illustrates the concepts of competency as Technical and Behavioral according to Hassan *et al*., 2010. Technical competency comprises hard skills and knowledge, and Behavioral competency comprises soft skills and abilities.

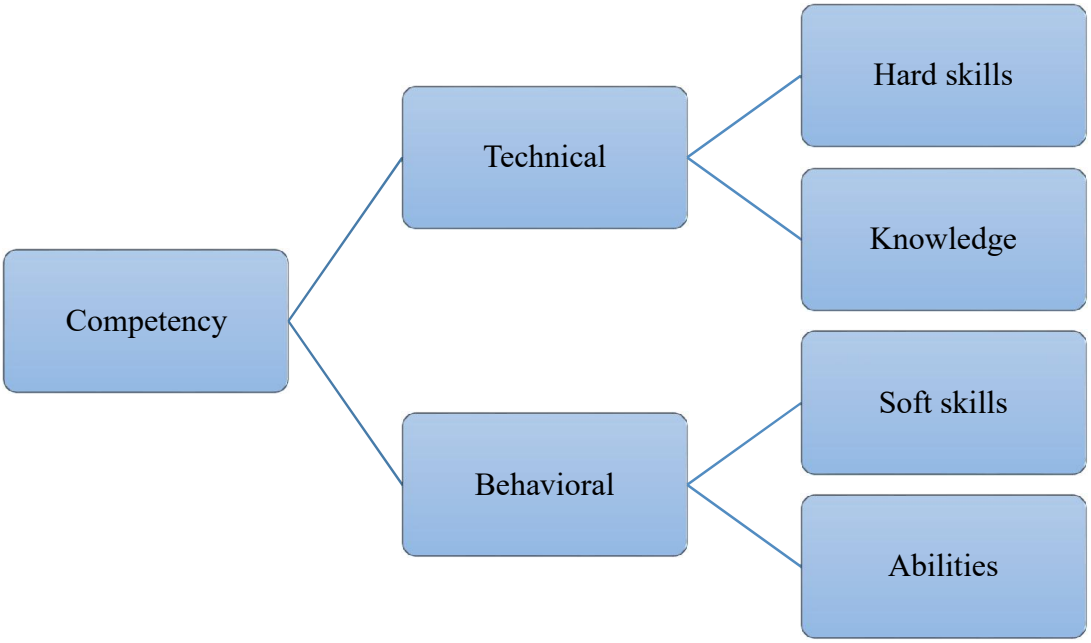


Figure 3. Concepts of Competency (Adopted from Hassan et al., 2010)

2.5.1. Technical Competency

Technical competencies are professional knowledge, skills, and abilities (KSA) and refer to the attributes required to perform a job properly. KSAs may include capabilities gained through education, service, experience or on-the-job training. There are three broad levels consistent across Project Management roles:

- Foundation: a baseline level of the knowledge or skill area.
- Proficient: a developed knowledge or skill area and the ability to apply in a practical context.
- Expert: mastery of the knowledge or skill area.

i. Hard Skills

Hard skills refer to knowledge areas of a particular field of study in an industry where a firm's activities can be situated skills (Andrews and Higson, 2008).In general, hard skills in the project management context generally refer to processes, procedures, tools, and techniques.

Hard skills are part of the skill set that is required for a job. They include the expertise necessary for an individual to successfully do the job. They are job-specific and are typically listed in job postings and job descriptions. Hard skills are acquired through formal education and training programs, including college, apprenticeships, short-term training classes, online courses, certification programs, as well as by on-the-job training.

ii. Knowledge

Is facts, information, and skills acquired through experience or association; the theoretical or practical understanding of a subject. It is awareness or familiarity gained by experience of a fact or situation and acquaintance with understanding of science, art or technique.

Knowledge is a familiarity, awareness, or understanding of something, such as facts, information, descriptions, or skills, which is acquired through experience or education by perceiving, discovering, or learning. Knowledge can refer to a theoretical or practical understanding of a subject. Knowledge is factual. It is awareness, information, or understanding about facts, rules, principles, concepts, or processes necessary to perform the tasks of a job (Hoge, *et al.*, 2005).

2.5.2. Behavioral Competency

Behavioral competencies are immeasurable characteristics of a person that are related to their success at work. They are generally considered to be adequately or well-qualified. There are three broad levels of competency:

- ✓ Development: a must-have competency for any role across the university
- ✓ Proficient: a level of ownership for one's responsibilities
- ✓ Expert: at a senior level in the organization and has accountability for leading in complex situations and relationships

iii. Soft Skills

Soft skills emphasize personal behavior and are seen as intrapersonal and interpersonal skills. Soft skills specifically consider issues related to deal with humans as a project

management practice is seen as social conduct and interaction occurring between people working together to accomplish an objective (Cicmil and Marshall, 2005). Soft skills are the essential factors to attain a successful project by providing effective performance to achieve the objectives and goals.

These are the interpersonal skills that enable you to succeed in the workplace. You'll often hear these referred to as "people" skills, and while they're necessary for success on the job.

iv. Abilities

Ability is a considerable proficiency, competency-based on the natural skill, training, or other qualification. It is the quality of being able to perform a quality that permits or facilitates achievement or accomplishment.

Figure 4 shows that; Behavioral competencies are 'below the waterline', in that they are harder to see and measure but make the most difference. They are additional to the 'above waterline' Technical Competencies knowledge, skills and abilities (such as business knowledge, technical knowledge on how to do a job, knowledge about methodologies) that are easy to see and measure and important to perform the job effectively, but which are rarely the factors that make a person a superior performer.

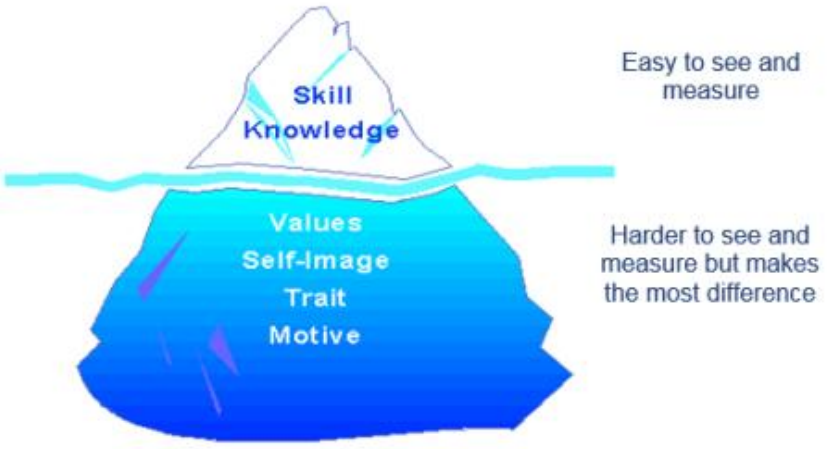


Figure 4. Waterline of competencies (Adopted from PMO, 2016)

It is accepted that skills and knowledge are noticeable and also teachable, where skills and knowledge are categorized as hard competency and can be developed through training and education. Similarly to knowledge, a mixture of skills may need to accomplish a given task. Here, it is clear that knowledge and skills complement each other. Knowledge on most occasions became a primary element and as a basis for the establishment of skills. In a serious note, between both types of competency (i.e. technical and non-technical), technical competency is a vital consideration to match an individual to their job scopes, but regrettably, it was often being ignored by the common competency approaches. To a certain extent, the superfluous focus made towards non-technical competency (i.e. behaviors and attitudes) by early developers of competency models were gradually diminished the important fixtures of technical competency. Therefore, concerning the technical competency of construction management, both contexts (i.e. knowledge and skills) were of utmost importance. Thus, drawing from the works of several researchers, technical competency attributes related to construction management were identified. Generally, construction management functions such as planning, organizing, staffing, coordinating, and controlling were considered technical attributes. It was able to be derived from analysis of the key tasks or work outputs, where a pure construction activity that involves process, methods, materials, systems, and equipment comes into perspective is under mentioned in Figure 5.

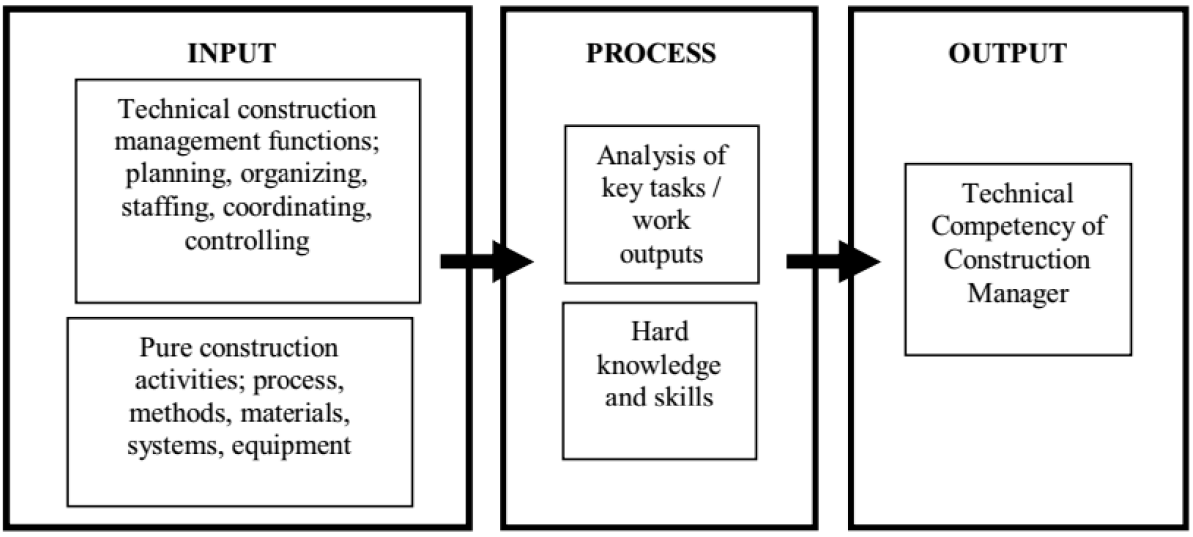


Figure 5. Processes of technical competency for construction management

A competency is an observable and/or measurable knowledge, skills, ability, attitude or behavior or another personal characteristic that:

- Is essential to perform the job, or
- Contributes to successful performance on the job and differentiates standard from superior performance

According to IPMA (2006), the project manager's competencies are described in the following three different categories:

1. **Contextual Competencies:** reflecting the interaction of programs and projects with their organizations' processes; these draw from other disciplines, and while essential to project success, they are often ignored.
   - Projects and project management
   - Programs and program management
   - Portfolio management
   - Project, program and portfolio orientation
   - Permanent organization
   - Business processes
   - Systems approach and integration
   - Human resource development
   - Safety, Security, Health, and Environment
   - Legal aspects
   - Finance and accounting
   - Management of change
2. **Technical Competencies:** including the traditional disciplines of project management and a few that are not normally considered except by the most effective.
   - Project success criteria
   - Stakeholders and interested parties
   - Objectives and strategies
   - Risk: threats and opportunity

- Project quality
- Project organization
- Teamwork
- Problem-solving
- Project scope
- Product scope
- Project lifecycle and phases
- Schedules
- Resources
- Cost
- Procurement and contracts
- Configuration management
- Project control
- Documentation, information, and reporting
- Communication
- Performance measurement
- Project startup
- Project closeout

3. **Behavioral Competencies:** deal with the personal relationships and the conduct of the candidate with the individuals and groups managed in the projects. These are sometimes called soft skills. However, there is nothing soft about them. They have a hard impact on service quality and customer and employee satisfaction.
   - Leadership
   - Engagement and motivation
   - Self-control
   - Assertiveness
   - Relaxation
   - Openness
   - Creativity
   - Results orientation

- Efficiency
- Consultation
- Negotiation
- Conflict and crisis
- Reliability
- Values appreciation
- Ethics

In the same line with the aforementioned classifications, Washington State Human Resources (2012) proposed three groups for competency as follows;

1. **Knowledge competencies:** this group involves the competencies related mainly to practical or theoretical knowledge.
2. **Skill and ability competencies:** this group of competencies related to the provided competencies naturally or that acquired or learned competencies to accomplish tasks.
3. **Behavioral competencies:** this group related to the needed behavior type from an employee as his organization except during performing a task. Behavioral competencies concerns recognizing the action or conduct patterns of an individual.

Competent management can be defined as the ability to meet organizational objectives, use available resources efficiently, maintain high levels of employee performance and professionalism and provide excellent service to customers. Poor managerial communication, inappropriate equipment and facilities, badly designed workflows, inadequate policies and systems, poor communications, work stress, and insufficient understanding and control of the environment in which the work is taking place can all lead to the appearance of individual incompetence. It is for these reasons that managerial and organizational capability is as vital as individual competency.

2.6. Project Management Competency Development

Given that most engineering project managers receive mostly technical, mathematical and science education in their undergraduate years, they are well equipped to address the technical aspects of project management but are not prepared to undertake the general

management of projects (Edum-Fotwe and McCaffer, 2000).Many of the skills and the combination of the technical and the general management skills required are specific to the construction industry.

Most development activities are very informal and reactive. The advancement of learning and development of project management competencies is necessary. Because the process of learning is by trial and error method is that it takes time, and the more competitive time that the industry currently finds itself in doesn't allow much room for error.

Project manager's competencies must be developed so that they can think and work on their own and fulfill their responsibilities innovatively while understanding and foreseeing the market and business situations. According to Julius (2011), that the development of the competitive success of an organization could only be met with the development of the skills of the managers.

The most popular methods of ways of addressing development needs are (PMI, 2007):

- **Mentoring:** a mentor is assigned to provide support, assistance, and advice, and is considered as a "go-to" person to discuss issues and concerns. This improves knowledge sharing and cross functional cooperation, and it is usually a relationship-oriented long-term activity with a focus on development.
- **Coaching:** a coach is appointed to help the person learn about specific tasks; the focus is on concrete issues to improve the performance on the job. This means that this is usually a task-oriented short-term activity.
- **Peer-to-peer:** this is a situation where project managers have similar capabilities and can provide support to each other, creating a positive and collaborative environment.
- **Role-playing:** this is a technique used to explore human dynamics to address specific behaviors in project situations.
- **On-the-job training:** performing the actual tasks to gain experience, confidence, and be able to execute more complex tasks gradually.
- **Group training:** consists of providing educational training to individuals with similar development needs.

- **In-house training:** consists of delivering a training course by an experienced person within the organization to tackle general improvement areas.
- **Computer-based training:** the training is provided through computer software, usually for individuals to use it at their own pace and convenience. This tool can also be used as a 'refresher' material.
- **Individual training:** obtain the training in a specific knowledge area from an external provider, given that the resources are not readily available internally in the organization.
- **Conferences:** formal gatherings to discuss relevant and current topics that provide information that can help improve the job performance of an individual.

One of the most important sources of competency development is having a mentor. Enables co-workers to grow and succeed through feedback, instruction, and encouragement.

- Coaches others regardless of performance level. Shares specialized approaches and skills that will increase capabilities.
- It helps others identify key goals and use their talents to achieve those goals. Sees others' potential and strengths, and works to build on them.
- It takes time to observe behaviors that contribute to or detract from others' success. Highlights performance strengths and weaknesses by giving factual, specific, non-judgmental feedback.
- Builds relationships with teammates so that coaching efforts are received in a positive, developmental manner. Takes steps to learn the work interests and career goals of teammates.
- Actively supports others stretching beyond their comfort levels and trying new techniques that may enhance success. Coaches for incremental, one-step-at-a-time improvements, offering praise and recognition as each step forward is made.
- Encourages repeating and building upon areas of strength, and dissects areas that may be improved. Suggests methods and gives examples that provide a roadmap to improved performance.

- Models success behaviors, a high-performance work ethic, and constant self-improvement.

Turk (2007) identified several areas that require different management competencies to be managed by project managers, including:

1. **People:** including managing the project team and that associated personnel who sometimes work in the project; upper management; the end-users; the vendors; and everyone else who is a stakeholder. The key role of the project manager is to motivate, manage, co-ordinate and maintain the morale of the whole project team (The Chartered Institute of Building, 2002).

2. **Financial intricacies:** including both what is planned to be spent and what is spent on the project.

3. **Schedule:** the project schedule and all the individual tasks that are part of it.

Figure 6 proves that the way project management develops competency in the hierarchy of ascending order listed below.

i. Knowledge

ii. Skill

iii. Attitudes

iv. Competency

v. Performance

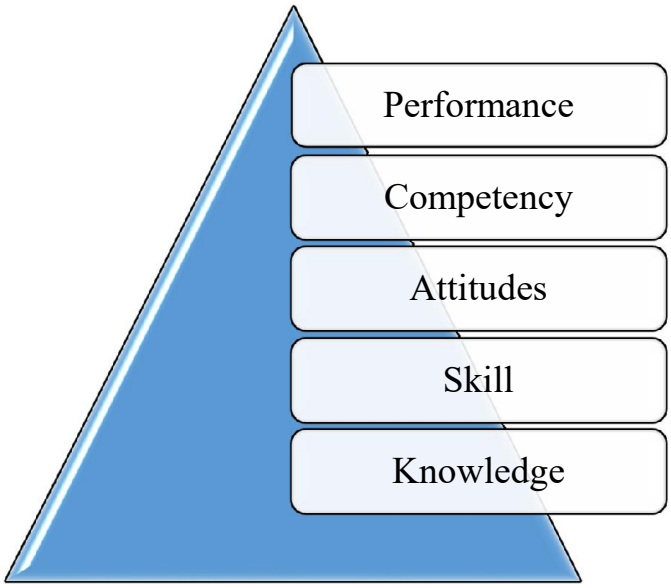


Figure 6. Hierarchy of developing competency

2.7. Competency Development Process

Professional competency in project management is attained by holding together knowledge acquired during training, and skills developed through experience and the application of the knowledge. Much of the knowledge needed to manage construction projects is unique to project management (such as critical path analysis and project cash flow forecast) (Edum-Fotwe and McCaffer, 2000). Modern project management practice, therefore, demands other general and management knowledge, coupled with skills that extend beyond the technical aspects of traditional engineering areas.

The construction industry presents a suitable environment for reviewing the development of professional competency in project management. This is because nearly all its business activities are based on the project management approach and so it a bound sin cases of successful project management that can provide useful lessons.

Project managers acquire various knowledge and skills through the experiences they go through in their working life. The relevance of such experience derives from the changing conditions of their business environment. Thus, what academic knowledge and training they previously acquired will need to be tuned to match the changing conditions of practices within the construction industry.

Competency Development Roadmap:

1. Define roles and competencies
2. Assess competencies
3. Establish a professional development program with career paths
4. Execute training program
5. Measure competency and project delivery outcomes before and after training

The ultimate goal in competency development is a sustainable performance in managing projects. This can be accomplished by creating a well-trained work force capable of maximizing their potential in the various roles required in project management.

As the sustainable performance of projects is dependent on the competencies of the management, Figure7 describes the development process of competencies needed for project management (PMI, 2007).

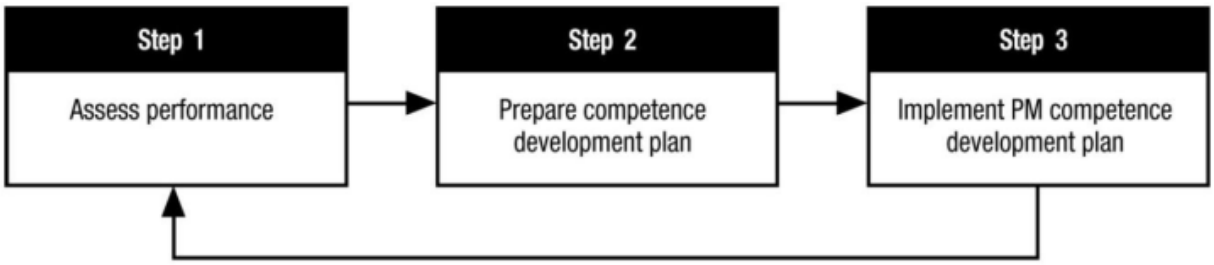


Figure 7. Competence Development Process (Adopted from PMI (2007))

2.8. Projects' and Project Management

2.8.1. Project

The Cambridge dictionary explains projects as: "a piece of planned work or an activity which is finished over sometime and intended to achieve a particular aim".

A project is temporary in that it has a defined beginning and end in time, and therefore defined scope and resources. And a project is unique in that it is not a routine operation, but a specific set of operations designed to accomplish a singular goal. This means that the specific team and resources working on a project only work together for the duration of the project, and after completion of the project, the team will disband and move on to new

projects (if they are permanently working on projects) or go back to their normal jobs (if they were only involved in project-work part-time). So a project team often includes people who don't usually work together sometimes from different organizations and across multiple geographies. And all must be expertly managed to deliver the on-time, on-budget results, learning, and integration that organizations need (PMI, 2007).

According to Kerzner (2010), a project can be thought to be any arrangement of exercises and performances that:

- Have a particular goal to be finished inside of specific determinations
- Have a period
- Have limited capitals (if applicable)
- Use up human and non-human resources (i.e. money, people, and equipment)
- Capable of particular function (i.e. cut across several functional lines)

Any good project has a clear and well-defined objective, a defined budget with a specific set of resources and time constraints that have to be met for the project to be labeled successful upon completion (Jones, 2007).

2.8.2. Project Management

Project management and project managers are an essential part of every industry. Construction projects require skilled management, as they are complicated and face many challenges and constraints, such as cost, time regulations, materials, and environmental rules. In construction projects, several activities happen and take place at the same time but still are connected and integrated. Therefore, we need careful and effective communications and cooperation to manage and control these activities.

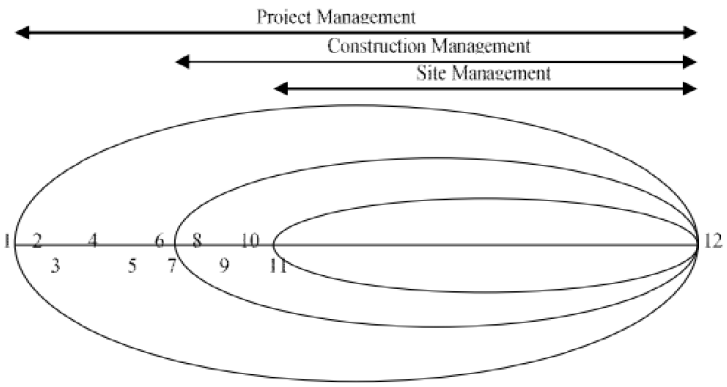
Project management is so diverse and cannot fairly be explained in only one sense. The project manager's ability to complete successfully all functions identified in his role description refers to his competency. Among the project team members, the PM is considered one of the key people who have greater input in driving a project to successful completion, and maybe the most important piece in the puzzle of successful project management (Cleland, *et al*., 2006).

Project management is a philosophy and technique that allows users the maximum utilization of their potential with limited sources, together with the increase of profitability; with a look at the future (Pinto, 2001). Project management involves the discipline of planning, organizing and managing resources to achieve specific goals. PMBOK defines Project Management as "the application of knowledge, skills, tools, and techniques to project activities to satisfy or exceed stakeholder's needs and anticipation from a project."

Walker defined Construction project management as "The planning, co-ordination and control of a project from inception to completion on behalf of a client requiring the identification of the client's objectives in terms of utility, function, quality, time, and cost and the establishment of relationships between resources, integrating, monitoring, and controlling the contributors to the project and their output and evaluating and selecting alternatives in pursuit of the client's satisfaction with the project result" (Walker, 2007).

Because of the rising complexities of the construction business, management principles began to evolve more effectively. Big projects involved thousands of workers, huge quantities of materials, machinery, and equipment. The construction management process is where the detail design is transformed into a construction/fabrication plan and day-to-day coordination and control of processes on-site or in a factory. It was agreed that all construction managers should comprehensively have adequate competencies; a determinant to the success of a construction project. In general, construction managers should have hard (technical) and soft (behavioral) competency to ensure that they are professionally fit for the construction world (Stoof, *et al*., 2002).

Figure 8 retrieves the way of achieving organizational goals, the use of effective project management, construction management, and site management which increasingly growing in the modern world.



Legends: Process	
1. Idea	7. Advertise notice to bidders
2. Conceptual design	8. Bid period & receipt of proposals
3. Approval of conceptual design	9. Select contractor
4. Preliminary & final design	10. Notice to proceed
5. Bid package complete	11. On-site construction period
6. Decision to release for bid	12. Inspection & acceptance of project

Figure 8. Overall phases of a general construction project life cycle (Adapted from Hairuddin M., Determining the Technical Competencies of Construction Managers, 2016).

2.9. Components of Project Success

By the 1990s, the focus on the project manager had shifted to include the whole of the project team and the organizational context for the management of projects. Project Managers measure the success by project/product quality, budget and timelines, and degree of customer satisfaction. The project involves risk, which means that there are elements of uncertainties that need to be managed by the project manager and his team to accomplish a project. The project also faces resource constraints. That means that there is always a limited resource that requires maximum management effort to achieve efficiency in results (Maylor, 2010).

The construction industry is one of the largest job creators in developing countries and is highly competitive. Project success was referred to as reaching the objectives and the planned results in compliance with predetermined conditions of time, cost and performance. According to Park, with the following items accomplished, a project has a high chance of success. The criteria are Time, Cost, Quality, Safety, Client satisfaction, Employees

satisfaction, Cash-flow management, Profitability, Environment performance and Learning and development (Park, 2009).

The environment within which the project manager works is impacted by the type of project being managed, or the characteristics of the project as well as the business environment, team characteristics, and other factors. However, effective project management has also become more effort demanding as the environment within which projects are delivered has become increasingly vary and complex. Making it more difficult are changes to the characteristics of the project team, such as changing business relationships, new technologies, heterogeneous teams, and more diverse stakeholders.

"The critical success factors are those components that are needed to build an environment where projects are managed consistently with excellence" (Kerzner, 2010). Typically, the satisfaction of clients is identified as the main factor of project success. Stakeholders' satisfaction became increasingly important due to the competitive character of the marketplace and the uncertainty of the environment.

The effectiveness of the project manager is critical to the project success. Project manager performance and project success are strongly connected. The main cause of project failure is leadership lack of a project manager (Yasin and Zimmerer, 1998). Therefore, project management ability is among the most essential elements in leading to strong project performance.

In every project, there is a defined Project Manager, but there are also many people with different backgrounds, skills, and knowledge available for the Project Manager to use for the project to go forward. These people form a team which is organized by the Project Manager and used to achieve the expected project goal and reach project success. The team is one of the respective project management tools.

Every Project Manager would like to run a project that finishes with success but only the minority does in reality. Critical success factors (CSFs), also known as Key Results Areas (KRAs), refer to the activities that must be completed to a high standard of quality to achieve the goals of the project. CSFs are a way to prioritize certain tasks as the project plan

is being executed. Having clear CSFs helps the project team clarify what needs to be worked on first or needs special attention, allowing people to work together to achieve the project's main objectives.

Project management success factors:

- **Organizational Systems**

A project operates in with people, process and technology of an organization. Projects have an impact on the culture, policies, procedures and other aspects of an organization. The organizational structure has a major influence on the execution of the project.

- **Sectoral Program Quality**

It is broken down into three main processes: Quality Planning, Quality Assurance, and Quality Control. At first glance, each process group has an imposing list of inputs, tools and techniques, and outputs.

- **Individual Competency of Project Team**

Each role will have its own set of competencies needed to perform the job effectively. Individual competencies need to be seen in the context of what a team requires to perform well.

Hyvari (2006) considered the factors such as political, economic, social, and technical as well as factors related to nature affect the project performance in Table 1 below, either positively or negatively.

Table 1. Success factors in project management (Adapted from Hyvari, 2006, pp. 36).

The project	The project team members	The Project Manager
1) Clear goals/objectives	1) Commitment	1) Commitment
2) End-user commitment	2) Communication	2) Ability to coordinate
3) Adequate funds/resources	3) Technical background	3) Effective leadership
4) Realistic schedule	4) Effective monitoring	4) Competency

5) Having a clear boundary 6) Dependencies between activities of the project network 7) Project life cycle 8) Urgency	and giving feedback 5) Troubleshooting 6) Others scope known by members	5) Situational management 6) Ability to delegate authority 7) Management of changes 8) Having relevant past experience 9) Effective conflict resolution

Different authors identify two groups of factors: strategic and tactical which influence project performance at various stages of the project life cycle. For example, the 'strategic' group consists of factors as project mission, top management support, and project scheduling. The 'tactical' group includes factors as client consulting, human resource selection and personnel training.

Researches have shown that success factors impact can vary at different phases of the project lifecycle and with the measures of success chosen by experts. In the past, project success was connected to the completion of project activities as planned, on budget, and expected quality. Later the understanding of project success has been changed including the limitation of minimum changes in the scope of activities without interruption in the work flow and with complete acceptance of results by the project client.

There is no preference to distinguish between project success and the success of project management in general. The project success concept has been expanded to a six dimension construct where, additionally to the original dimensions (Time, Cost, and Quality), other important issues have been incorporated (Shenhar, *et al.*, 1997). These factors are:

(i) Meeting the strategic goals of the client organization,
(ii) Achieving satisfaction of the end-users, and
(iii) Attaining satisfaction of all other stakeholders.

2.10. Relationship between Project Management Competencies and Project Success/Performance

Different researches on project success show that it is difficult to create a universal checklist of project success criteria which are suitable for all type of projects. Project performance is defined as the extent to which the project is carried out as planned in terms of objectives, time and financial constraints, and organizational policy and procedures. This definition emphasizes the process of how the project was carried out. It is the project management's role to lead the project through these processes. Project success can be measured by comparing the project's stated objectives to what the project achieved. Furthermore, project success can be perceived in some ways depending upon the perspective of the various stakeholders, including clients or customers, the project manager, the project team, the project sponsor, or the performing organization. Achieving project success is becoming more important in the highly competitive construction industry. It is the collective agreement of these stakeholders, regarding the degree to which the project met its objectives, that truly defines whether the project is viewed as a success (Cartwright and Yinger, 2007).

According to Crawford (2003), project managers require the correct combination of skills and competencies to be successful. The strong relationship among project success and project management effectiveness is valuable to understand which skills and competencies are important to project management success. However, the available literature examining the skills and competencies of project managers is still largely contained in lists that appear to assume that there is a static set for all projects.

It could be concluded that project management is considered to be the main body which is responsible for delivering the project successfully and achieving the project's goals. Construction project management leads and drives the projects in the right direction and concludes construction projects successfully.

According to Pinto and Covin, (1989), Project Critical Success Factors are:

1) **The mission of the projects:** Initial clarity of goals and general direction.

2) **Support from top management:** Willingness of top management to provide the necessary resources and authority for project success.
3) **Project schedule/plan:** A detailed specification of the individual action process for project implementation.
4) **Client consultation:** Communication, consultation and active listening to all parties of concern.
5) **Personnel/team members:** Selection, recruitment and training of the necessary personnel for the project team.
6) **Technical tasks:** Availability of the required technology, tools and expertise to accomplish the specific technical action steps.
7) **Client acceptance:** The act of selling the final project to its ultimate intended users.
8) **Monitoring and feedback:** Timely provision of comprehensive control information at each stage in the implementation process.
9) **Communication:** The provision of an appropriate network and necessary data to all key actors in the project implementation.
10) **Troubleshooting:** The capability to handle unexpected crises and deviations from the plan.
11) **Characteristics of the project leader:** Competency of the project leader such as administratively, interpersonally and technical knowledge, as well as the scale of authority available to perform his/her duties.
12) **Power and policies:** The degree of political activity within the organization and the perception of the project as furthering an organizational member's self-interests.
13) **Environmental effects:** The likelihood of external organizational or environmental factors impacting on the operation of the project team either positively or negatively.
14) **Urgency:** The perception of the project or the need to implement the project as soon as possible.

Competencies are often studied by individual attributes, and individual attributes can broadly be classified as cognitive and behavioral attributes. The cognitive attributes include technical skills that usually include technical knowledge and expertise. Behavioral attributes include not only personal characteristics that describe how one handles a situation, but also

interpersonal skills that describe how relationships are handled, and organizational skills that describe how to secure organizational outcomes through organizational structures (Rainsbury *et al.*, 2002).

Technical skills are cognitive attributes of competencies, as these skills involve knowing technical aspects to perform a job. On the other hand behavioral attributes of competency includes personal behavior and managing relationships with people. Therefore, the two skills or competency attributes have a link to project success.

Competencies often help in project performance, but competencies are seldom used as leading indicators to track project performance (Fayek and Omar, 2016).While selection of project managers based on technical competency may lead to brilliant solutions to the customer's stated or written technical needs, a lack of management ability can lead to failed projects that over-run on cost, are late to critical path schedules, fail to fully utilize the diversity of talent available within the project team, neglect to address a customer's unspoken needs, or otherwise do not meet the expectations of key stakeholders.

Effective project performance as shown in Figure 9 can be achieved with relating competency of an individual, requirement of the job and environment (Gale, 2007).

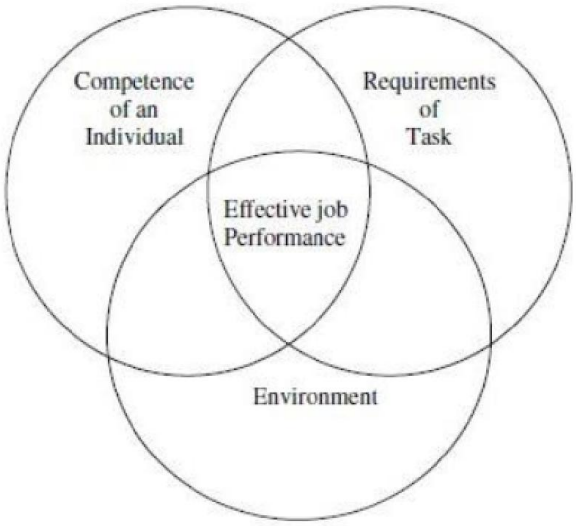


Figure 9. Relationship between competence and job performance (Adopted from Gale (2007))

Figure 10 shows that furthermore, project management competency is considered fundamental since it will have an impact on project performance and consequently in the organizational performance.

Figure 10. Relationship between project management competence and organizational performance (Adopted from Crawford (2005))

"A competent project manager alone does not guarantee project success, and that focusing solely on project manager competency, regardless of the organization's performance, is too simplistic" (PMI, 2002).A project manager may successfully balance the competing needs of scope, time, cost, quality, resources, and risk but the project success may be influenced by the organizations project management maturity and capability. It is just as possible to have a competent project manager working within an organization in the early stages of maturing its practices resulting in an unsuccessful project, as it is to have an unsuccessful project resulting from a project manager who is incompetent working within a mature organization.

Table 2below details that a considerable appreciation for the broader concepts of project success (i.e. evaluates some criteria in four subcategories; characteristics of the final product, goal attainment, stakeholder satisfaction and success of the project management).

Table 2. Construction project success criteria (Adapted from Williams, 2016).

Was the final product good?	Did the project meet its delivery objectives?
1. Zero defects on building handover	1. On-time
2. Low defects in the use	2. On budget
3. Better service and resultant increased life cycle performance of the facility	3. Production of a legacy, not just a building

Were the stakeholders satisfied with the project?	Was project management successful?
1. Happy customers	1. Good health and safety record
2. Happy users	2. Projects set up better and better contract
3. Happy subcontractors	3. Fewer changes
4. Happy Sewell team (which would, of course, lead to better project performance)	4. Smooth/clean/tidy site
	5. Predictability and control of cost, time, quality, and risk

2.11. Project Management Competency Practice of Different Countries

2.11.1. Australia

In the Australian construction industry success of major infrastructure projects and/or project management is not very common. Technological and design changes are the main cause of project management failure, but particularly when project managers lack the necessary competencies and skills to effectively influence such changes. Project management success is typically measured at the end of the project against success criteria, such as internal efficiency accordingly, (i.e. typically cost, time, and quality) (Joslin and Muller, 2015). Therefore, Joslin and Muller (2015) argued that the competencies of a project manager are integral to project success.

Schedule delays, cost overruns, poor coordination, contractual problems, inadequate assessment and project management of project risks, poor stakeholder project management, tackling unethical behavior in the industry are the key challenges that affect project managers in large construction and new infrastructural projects (Ahmad *et al.*, 2019). The challenges facing project managers in the construction industry has far-reaching consequences requiring the development of new and enhanced competencies and skills to support the successful delivery of projects (Sue *et al.*, 2019). “When mega construction

projects are open to the public eye, success criteria become misrepresented, power and politics affect project management, and external agencies distort priorities" (Patanakul *et al.*, 2016).

It is therefore not surprising that project management requires a new level of competencies and skill sets to remain competent for successful project delivery because the increasing complexity of managing large construction and infrastructure development projects in Australia presents a variety of emerging challenges for project management."Project managers are challenged by schedule delays, scope changes, cost concerns, managing stakeholders' expectations, coordination problems, procurement issues, and technology and it is argued that these challenges and competencies have a role in determining project success" (Sue *et al.*, 2019).

2.11.2. North America

According to CMAA construction project management is a professional service that uses specialized project management techniques to the planning, design, and construction of a project. American construction management and leadership thinking historically come from the United Kingdom (UK), which is also the home of the European construction management certification system widely validated in the construction industry globally (Kalnina, 2018). According to Walker *et al.*, (2006) problem solving expertise and leadership expertise are the highest category competencies and this is the mostly agrees with other practical studies on project management competencies conducted in the United States.

As project management continues to grow, it is becoming more evident that success in the role of project management can't be attained with a technical competency set only. Leadership style of the project management directly impacts the outcome of the project. Therefore, excellent interpersonal or soft skills are necessary requisites for project performance (Gillard, 2009). A versatile PM with competencies to successfully deal with a diverse and changing set of challenges will be a valuable asset to the construction industry. They will add a value that exceeds what other competitors would offer and will be one of the ways to stay ahead of the competition and become the project management team of choice.

The competencies of these PMs falls into four competency areas: (1) Technical/Virtual, (2) Management, (3) Cognitive, and (4) Leadership (Wiezel, and William, 2015).

2.11.3. South Africa

A project manager must be competent in structuring the project task and clarifying scope, communicating effectively, developing the project objectives, showing reliability and planning the economy of projects. Professional project management competencies are thus attained by relating education and knowledge acquired during training, and skills developed through experience and application of such knowledge and experience through effective behaviors (Alam *et al.*, 2008).

According to Arendse (2013), project management's leadership competency influences project success. For individual competencies, the capacity to interact effectively was a significant in that project managers result with specific behavioral competencies are likely to generate better job performance from subordinates and stakeholders.

2.11.4. Malaysia

It is a common belief that project management, construction management, and site management are the tools for improving the performance of the construction project as a whole. As a result, a competent construction manager is required throughout the particular phase to shape the construction stability and geared up to complete the proposed development as according to several common objectives (Yaman, 2016).

The construction industry in Malaysia plays a critical role in economic development. Despite this, this sector suffers frequent problems, including time and cost overrun, low quality, and poor performance and productivity, for the reason those incompetent project managers who lead and execute projects (Hashim, 2016). According to Mahmood *et al.*, (2006), competencies ranked in order of importance as Knowledge/Cognitive Competency, Values/Ethical Competency, Personal or Behavioral Competency, and Functional Competency.

2.12. Project Management Practice in Ethiopia

Project Management is designed to achieve a successful outcome of the projects and argues that if not properly practiced it may convey a differing result. According to Tadesse *et al.*, (2016), the research demonstrated that the level of Ethiopian construction project management practice in terms of improving the general project management procedures, project management functions, tools and techniques to be unsatisfactory. Particularly the level of practice in terms of safety, risk and time management was found to be very low.

The construction industry of Ethiopia, in general, suffers from poor project management and control with performance constraints including inadequate capacity of local contractors and consultants, inadequate public sector delivery capacity, corruption, erratic work opportunities, use of outdated technologies and practices, lack of effective supporting policies and poor state of the economy (Hailemeskel, 2013). Many factors attribute to failure of any construction project which is mainly related to the problems and failure in performance. Hence, the construction industry performance problems in developing economies can be classified into three categories: problems of shortages or inadequacies in industry infrastructure (mainly supply of resources), problems caused by clients and consultants and problems caused by contractor incompetency/inadequacies (Shaban, 2008).

2.13. Summary of the Literature Review

In this chapter, the researcher examine thoroughly literature relevant to this study, which intended to examine the perceptions of different project managers of the Ethiopian construction industry participant of the role of project management technical and behavioral competencies on project success. The construction industry and its project management demands major improvement in its extent in competency development. The main certain way for stimulating the development of competency in project management is moving forward project management institutions and concepts.

As a conclusion, the skill competencies are important for effective communication with team members and conflict resolution. Secondly, the knowledge competencies identified professional practice gap of the learner can be based on a range of needs. Third, Experience

competency; this means that the project manager uses information from a variety of sources including personal experience and his observations to identify options and solve problems.

2.14. Gap Analysis

The literature review covers different topics in a manner, starting from introduction, following project management standards, defining competency, classifying competency, discussing project management competency development, components of project success and relationship between project management competencies and project success.

Most current project control systems measure quantitatively cost and schedule status and forget other major aspects of project performance like cash flow, profitability, quality, safety, project team satisfaction, as client satisfaction which is in some cases as important as cost and schedule. Traditionally, cost, schedule, and quality are the objectives considered as the most critical to the success of construction projects and often called the iron triangle. The concept of project success is defined with respect to clear set of goals and objectives. Despite the complexities of measuring project performance, the concept was quantified into a meaningful index that is based on measured and objective data. The complexity of measurement of performance is due to the following facts: project objectives are dynamic in nature and change over time, many project participants representing various interests are involved in defining and prioritizing the project objectives, and some of the desirable objectives are subjective in nature (Fayek *et al.*, 2003).

The difference in judgment of project success is mainly due to the lack of clear and consistent evaluation procedures and methodology in the project's life cycle. There are many occasions where the project is under budget and progressing as scheduled. Yet it is considered a failure because of the low quality and safety performance records. Conversely, a project can be behind schedule and over budget and still be considered a successful one because it was completed with high quality, excellent safety record, and to the satisfaction of the client (Nassar, 2009).Therefore, underperformance of a project can be related to competency. Which implies incompetent projects often lacks to meet project objectives in terms of Time, Cost, and Quality parameters.

Project management Technical and Behavioral competencies for the success of a project as a factor haven't studied in-depth in the Ethiopian construction project management aspect. As it is aforementioned project management requires the precise combination of skills and competencies to be successful and efficient in achieving performance. Project performance is described as an outcome in which the project is carried out as planned in terms of objectives, time and financial constraints, and organizational policy and procedures and this is the main problem of the projects in the construction industry of the country. Therefore, this research will try to assess the role of project management technical and behavioral competencies in accomplishing projects in the Ethiopian construction industry.

Among the gaps that were found in the existing literature lack of attention given to the competencies of project management for better success of projects. A critical consideration should be given to the construction project management technical and behavioral competency in Ethiopia to improve the performance of construction projects. To provide proper solutions for the problems it is necessary to investigate the relationship between competencies of project management and project success.

CHAPTER THREE

3. RESEARCH METHODOLOGY

3.1. Introduction

This chapter introduces the research design used to answer the research questions denoted in chapter one. In addition, this it delivers the suitability of the research design and approach, and provides justification for the research design. The sampling techniques are also described. The aim of this research was to explore the role of project management Technical and Behavioral competencies in successful project completion of the Ethiopian construction industry.

As other factors of contributing for the success of the project, competencies of the project management is also the crucial one. To further define successful project means, in the context of the research question, it is intended to mean; projects which meeting or exceeding expected project outcomes.

3.2. Study Approach and Design

The aim of this research was to gather data on the role of project management technical and behavioral competency on project success. A quantitative survey was designed to examine the role of project management technical and behavioral competencies in project success. A quantitative approach is statistical by nature and often uses a questionnaire. In a quantitative due to its numerical descriptions of new understanding can be valued because of its usefulness in making comparisons across variables and events. Besides, distributions, aggregate patterns, probabilities, and correlations are best researched with quantitative analysis (Stefan, 2012). A numerical data created by a likert Scale can be clearly presented in graphs and charts. It is for these reasons, and also it's appropriate and clear approach to data analysis that this methodology was chosen to collect the data for this study.

To achieve the objective of the study, IPMA ICB (2006) technical and behavioral competency elements were adopted and designed to fit construction project perspectives. The IPMA ICB (2006) lists contextual, technical, and behavioral competencies. For the purpose of this study only technical and behavioral competencies were used and this enabled

a basis for designing a questionnaire to collect appropriate data. Then a questionnaire was distributed to project management experts and senior managers in different construction companies to get sufficient responses for statistical analysis. Consistent standardized measurement across all respondents ensures that comparable information will be obtained about everyone who participated in the study. The printed-out questionnaire as research tools for the data collection is employed for this study.

Descriptive research can be either quantitative or qualitative. The difference between quantitative and qualitative methods is a subject which is come across repeatedly in deliberations about the research method and design. In this study, quantitative approach has been adopted as a result of the specified objectives of the study and the accuracy of the approach results. "Quantitative research is objective in nature and it represents an investigation in a human or social problem, by testing a hypothesis or theory consists of many variables can be determined by using numbers that need to be analyzed by adopting several statistical techniques, so that, it can be easy to decide if the hypothesis or theory is true or not" (Naoum, 2007).

3.3. Study Population, Sample and Unit of Analysis

Construction industry was targeted in this study. Therefore, population of this research is grade one contractors who are working in the construction industry of Ethiopia. Ministry of Urban Development and Construction (MoUDC) classifies construction works into four major specialization areas (General, Buildings, Roads, and Special). The contracting companies who have a valid registration in MoUDC until the end of June 2019 are included in the study.

The rationale for captivating this sample frame is that, the first class of contractors manifests the idea of competency in an enhanced manner because of their exposure in different types of projects are expected have better project management competency concept and practice. To achieve the intended objective Project managers, office engineers, and foremen's are preferred as the sample elements of this study because they can provide reliable information and clearer understanding about the purpose of the study and as these people are in a position to be more expert within their field and therefore represent the sample population

more effectively. The selection of the sample group is important to the reliability of the project, as the opinions of those in the sample group will be taken as representing the entire sample population for the purpose of this research. Questionnaire tool should be filled by a specific group of peoples (called sample) who are a part of a wider group (called population). Constructing representative sample is very important to obtain a reliable and valid study.

3.3.1. Sample Size

The sample size required for this research of contractors participating in the survey will be determined statistically using the following equation (Cochran, 1975).

$$n_o = \left(z^2 * \frac{(p*q)}{d^2}\right)$$ ..... [Equation 3.1]

Where:

- **n_o;** First estimate sample size
- **z;** Linked to 95% confidence interval (use 1.96)
- **p;** Expected prevalence (as fraction of 1)
- **q;** 1 – p (expected non prevalence)
- **d;** Relative desired precision

Cochran pointed out that if the population is finite, then the sample size can be reduced slightly. Therefore, the first estimate sample size **(n_o)** can be adjusted as:

$$n = \left(\frac{n_o}{1+\frac{(n_o-1)}{N}}\right)$$ ..... [Equation 3.2]

Where:

- **n_o;** First estimate sample size
- **n;** Sample size
- **N;** Population size

The sample will be determined by using single population proportion formula at 95% CI with 5% margin of error. The expected prevalence, ***p*** was set to be 0.5. Hence, the expected

non prevalence, ***q*** was equal to be 0.5. The relative desired precision was set at 0.1 (10%) for the possible error in the questionnaire. The study population is 133 contractors and the sample size will be as follows when equated in the above Equation 3.1 and Equation 3.2.

$$n_o = \left(z^2 * \frac{(p * q)}{d^2}\right)$$

$$n_o = \left(1.96^2 * \frac{(0.5 * 0.5)}{0.1^2}\right)$$

$$n_o = 3.84 * 25$$

$$\underline{n_o = 96}$$

The adjusted sample size **(n)** is calculated as follows:

$$n = \left(\frac{n_o}{1 + \frac{(n_o - 1)}{N}}\right)$$

$$n = \left(\frac{96}{1 + \frac{(96 - 1)}{133}}\right)$$

$$n = \frac{96}{1.72}$$

$$\underline{n = 55.8 \approx 56}$$

3.3.2. Sampling Technique

In this research stratified random sampling using Microsoft Excel were carried out so that each member of the population has an equal chance of being selected. Random sampling procedure can be conducted by numbering each basic sampling unit and then choosing the desired number of units randomly from the random list by inserting random function '=RANDBETWEEN()' and '=VLOOKUP()' function. Thereof, Random sample provides a

good approximation of the population and offer better assurance against sampling bias as its more representative than non-probability samples.

3.4. Study Tool

There are two types of sources for data collection to answer any research questions which are known by primary and secondary data sources (Cooper and Schindler, 2006). Both sources of data will be used to answer this research's questions.

Primary data refers to the data collected for a particular research as a response of the identified problem, such as observations and questionnaires. On the other line, secondary data refer to the data that can be collected from different types of publications and documents, such as books, articles, magazines and reports. It is required to conduct critical analysis of the advantages and disadvantages of several data collection methods to select the most appropriate method. The study data will be collected by a structured questionnaire as main tool and discussed later in this chapter.

3.4.1. The Questionnaire

‘‘The questionnaire was based on category questions, which are commonly used when a researcher wants to collect data of certain characteristics and questions were developed such that only one answer applied” (Saunders, *et al.*, 2015).

Questionnaires were distributed and filled by selected parties and without any influence from the researcher, in order to obtain in depth knowledge about the research subject related issues and provide suggestions and recommendations to increase the quality and efficiency of the research.

The questionnaire is composed of five parts as follows (See Appendix I):

First, respondent background, which includes gender, age, position, education, year of experience and company classification are included. Second, competency of a project management is included. Third, relationship between project management competencies and project success is included. Fourth, measure of project management's efficiency is included. Finally, project success criteria/Measures the efficiency aspects of the project success is included.

3.4.2. Reliability and Validity

Validity is the amount of systemic or built-in error in questionnaire. Validity of a questionnaire can be established using a panel of experts which explore theoretical construct (Wong, *et al.*, 2012). It was a review of all the questionnaire items for readability, clarity, and comprehensiveness and come up to some level of agreement as to which items should be included in the final questionnaire.

The literature review was used to ensure content validity. The study has addressed the content validity of the questionnaire instrument by using project management competencies identified in the literature, by defining each competency in specific terms to increase understanding of terminology used in the survey and by review of the survey content. The questionnaire was sent to the mentor of the study for further comments on the questions and layout to ensure that the optimal responses were collected, based on the experience in past research works. Also the questionnaires are checked for the reliability and valid responses were analyzed before analyzing it.

3.5. Data Collection and Statistical Analysis

3.5.1. Data Collection

For the study purpose both primary and secondary data are used. Descriptive statistics is a summary statistic that quantitatively describes or summarizes features of a collection of information used to analyze the data collected through questionnaire survey. The collected and analyzed data and the results generated was organized and summarized in order to reach at meaningful conclusions and forwarding useful recommendations. The response question was compiled and was presented in both visual and descriptive form in chapter four. Questions were grouped in their appropriate coding areas as entered by the questionnaire designer.

3.5.2. Correlation Analysis

To examine the relationship between the competencies and performance in terms of time, cost, and quality Pearson's correlation analysis was used. The Pearson's correlation coefficient (r) is the strength measure of the linear association between variables (Kossowski, 2011). The values of r can vary from -1 to 1 and $r > 0$ indicates positive

relationship, r < 0 indicates negative relationship, and r = 0 indicates the variables are independent and not related.

There are no hard and fast rules for describing correlation strength and generally Pearson offered the following guidelines:

1. $0 < |r| < 0.3$; indicates weak correlation.
2. $0.3 < |r| < 0.7$; indicates moderate correlation.
3. $|r| > 0.7$; indicates strong correlation.
4. r = +1; indicates perfect positive linear relationship and r = -1; indicates perfect negative linear relationship.

3.6. Research Plan

The methodology set out to carry out the research is presented in the following flow chart:

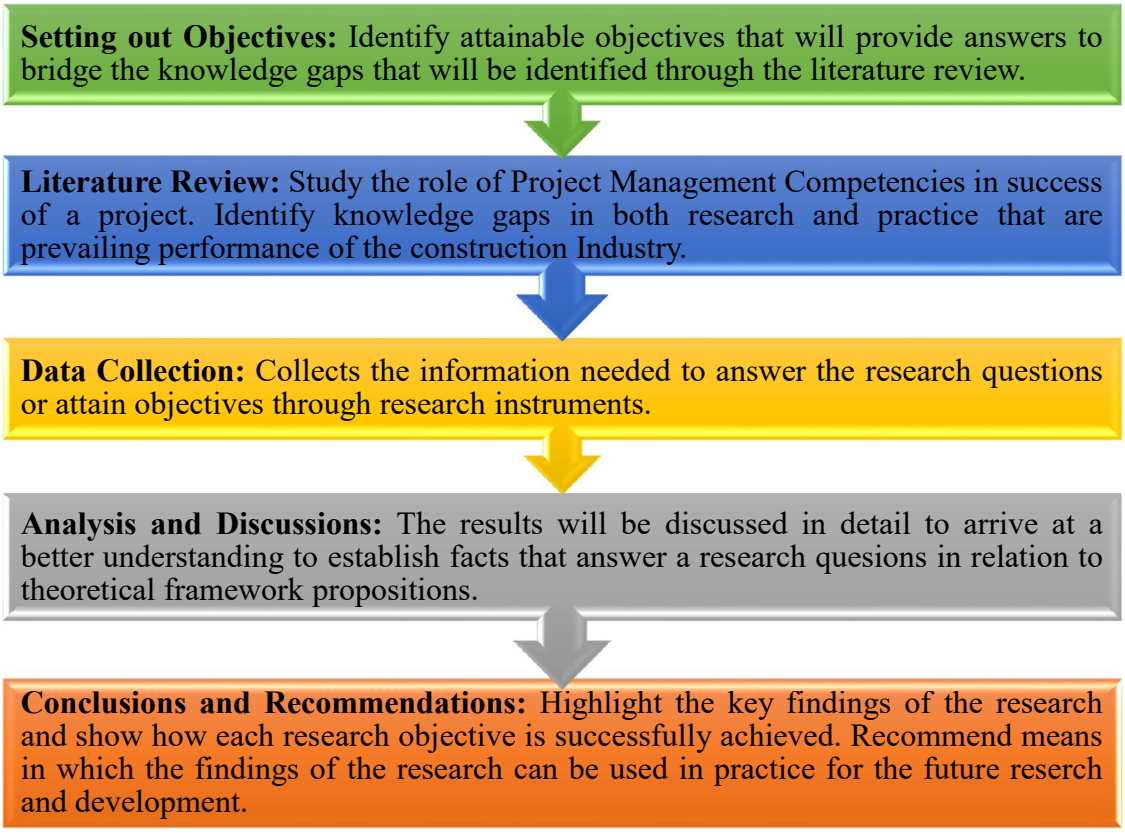


Figure 11. Research plan flowchart

CHAPTER FOUR

4. RESULTS AND DISCUSSION

This chapter presents the data collected through questionnaires. The result of the survey was analyzed by descriptive statistics. The data that were collected from the questionnaire are discussed in five sections hereafter. The first section discusses the status of respondents namely project managers, office engineers, and general foreman's. The next section describes the general trend of competencies of project management of construction companies. The third section discusses the relationship between project management competencies and project success. The fourth part of the data describes measures of project management's efficiency. The last section discusses measures of the efficiency aspects of the project's success.

From the questionnaire survey, 47 valid responses and 1 incomplete were obtained out of 56 distributed questionnaires to contractors selected through simple random sampling, giving a response rate of 86%. Thus, out of all only the valid responses (47) were used for the analysis purpose which accounts for 84%. This level of response rate meets the expected value for this research for a designed analysis purpose. The mean for Technical and Behavioral competency elements and project performance standards are calculated and ranked as collected from survey respondents. Besides, percentages are used for other parts of the analysis.

4.1. Respondent Background

The first part of the questionnaire survey demonstrates the background of the respondents' Gender, Age, Educational qualification, Field of specialization, Official title, Years of experience in construction project and Company classification according to Ethiopian contractor's specialization.

4.1.1. Gender

As can be observed from Figure 12 below, the distribution of the response is 72% male and 28% female. Which shows male is the most frequent gender category.

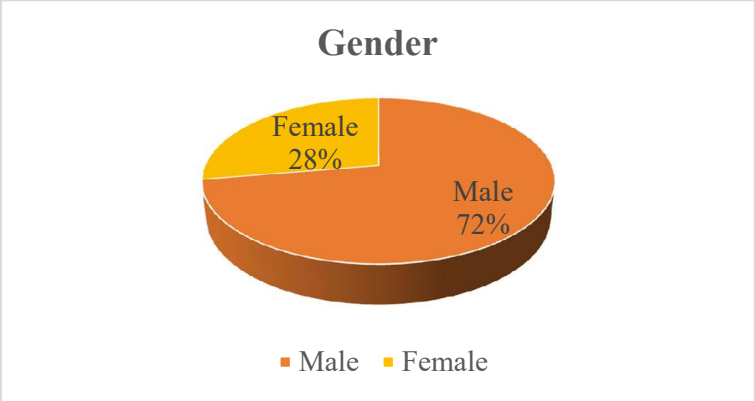


Figure 12. Gender category of respondents

4.1.2. Age

Figure 13 below, presents the age distribution of respondents which 53.19% in a range from 30-39, 21.28% in a range from 40-49, 19.15% in a range from 25-29 and 6.38% in a range of 50 and older. It shows that, since the majority of the respondents are project managers, the managers in the industry are young.

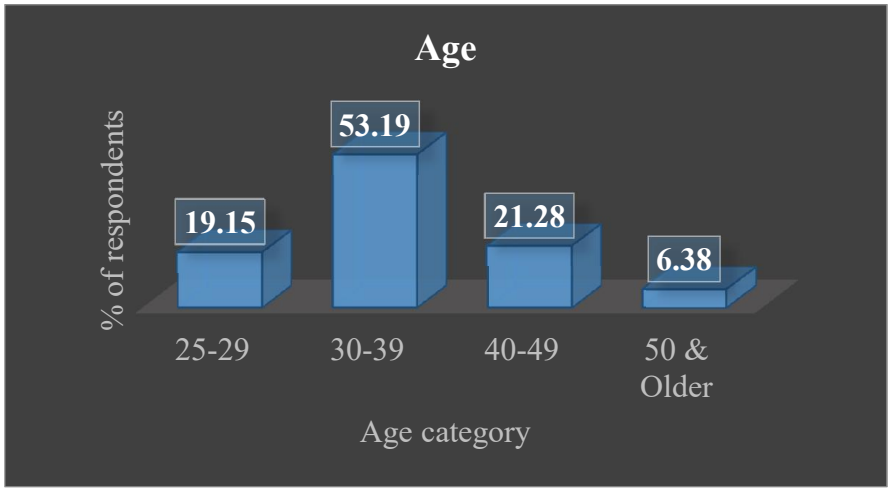


Figure 13. Age category of respondents

4.1.3. Educational Qualification

As it can be observed from Figure 14 below, most of the respondents' qualification is bachelor's which is about 59.57% and the second rank is master's which is about 38.30%.

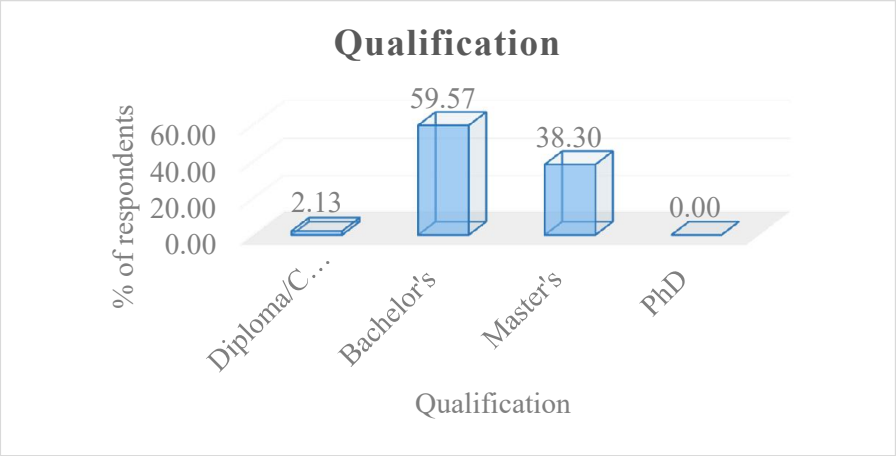


Figure 14. Qualification of respondents

4.1.4. Specialization

According to Figure 15 below, the responses from civil engineers are 89.36% with a qualification of bachelor's and master's and 10.64% of the responses were other. This implies that civil engineers are influential in management of construction projects.

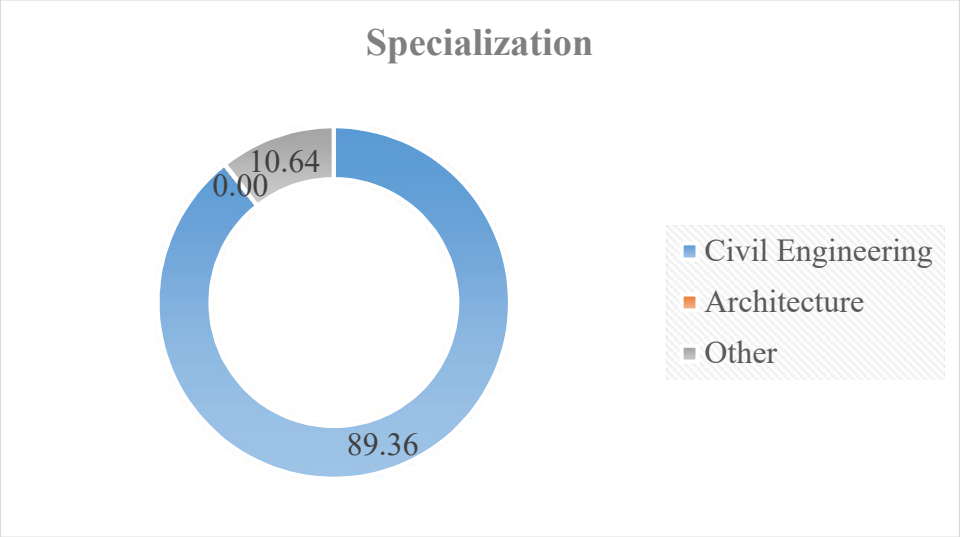


Figure 15. Academic background of respondents

4.1.5. Official Title

From Figure 16 below, it can be seen that the majority of the responses were collected from project managers which are 43%, secondly from office engineer's which constitutes 40%, thirdly stated as other positions which are 15% and lastly general foreman which is 2%. The

stated as other titles that were obtained by some respondents might be some persons with a different official title in the construction industry. From the analysis project managers are the one who bears more responsibility and they are reliable with the subject matter.

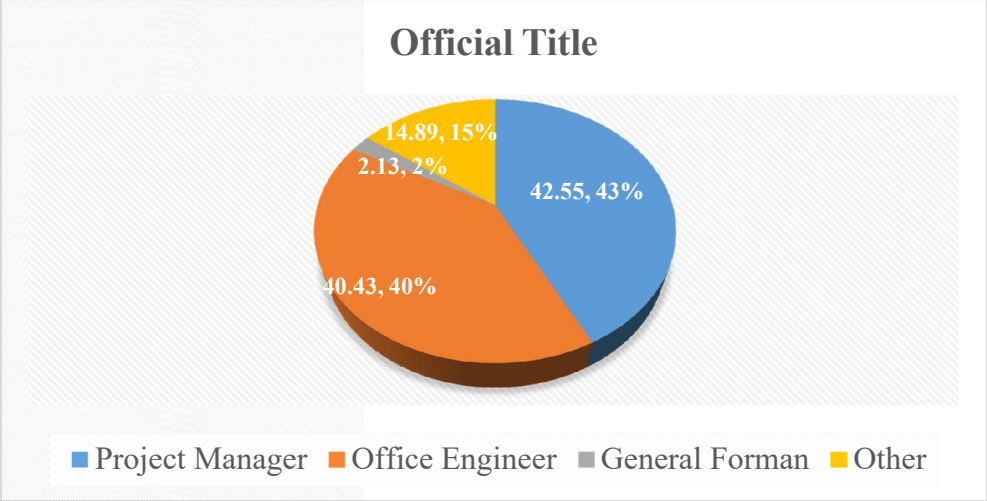


Figure 16. Official title of respondents

4.1.6. Years of experience in construction projects

As it can be illustrated in Figure 17 below, the year of experience gained over time by the respondents is 42.55% between 5 and 10 years, 25.53% between 10 and 15 years, 19.15% above 15 years and 12.77% under 5 years.

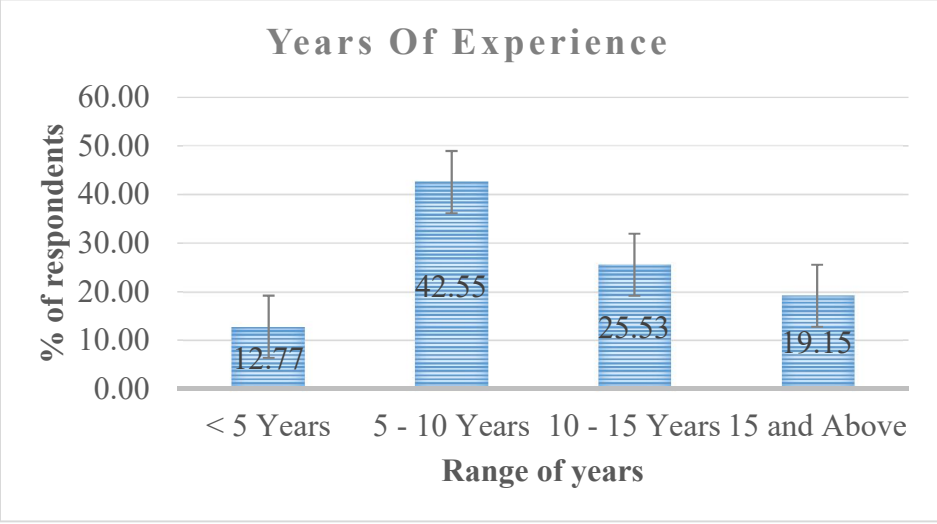


Figure 17. Years of experience in the construction industry

4.1.7. Company Classification

Figure 18 below, shows that the majority of the respondent's company classification was General Contractor (GC) grade one which constitutes about 53.19%, the next category is Building Contractor (BC) grade one which is 42.55% and lastly Specialized Contractor (SC) which is 4.26%. This means that a larger portion of the companies are general contractors.

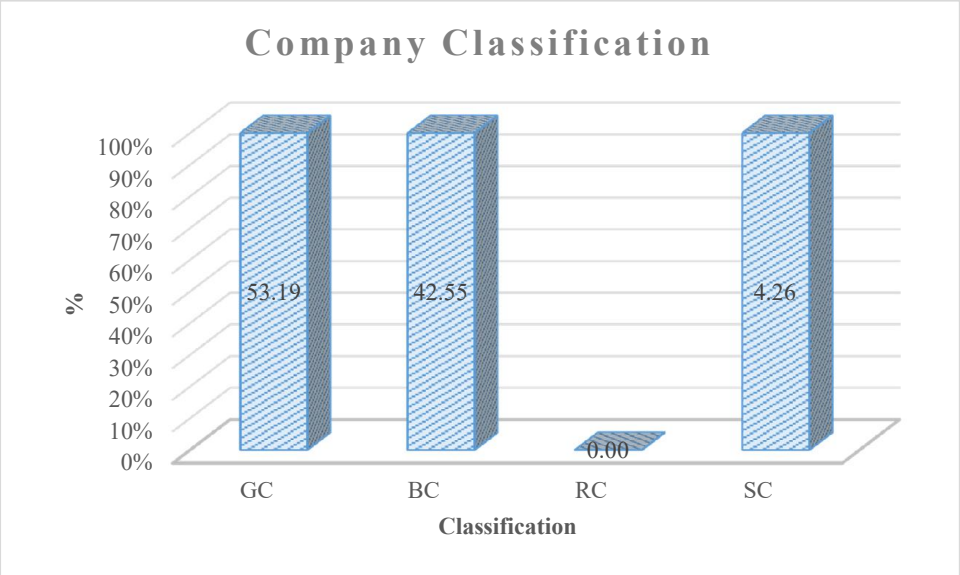


Figure 18. Company classification in the construction industry

4.2. Competencies of a project management

This section presents the general trend of project management in different aspects. Participants in the survey were asked to respond whether their PM competency is competent or not, defining sets different competencies, characteristics of an employee which are most important and how does incompetent project management has an effect on project performance.

4.2.1. Defining sets of project management competencies

As can be shown in Figure 20 below, 97.87% of the respondents confirm that they define sets of project management competencies required when hiring a project manager or project team member and only 2.13% of the respondents wouldn't define. It means that there is an agreement on the necessity of acquiring competent professional in a recruitment process.

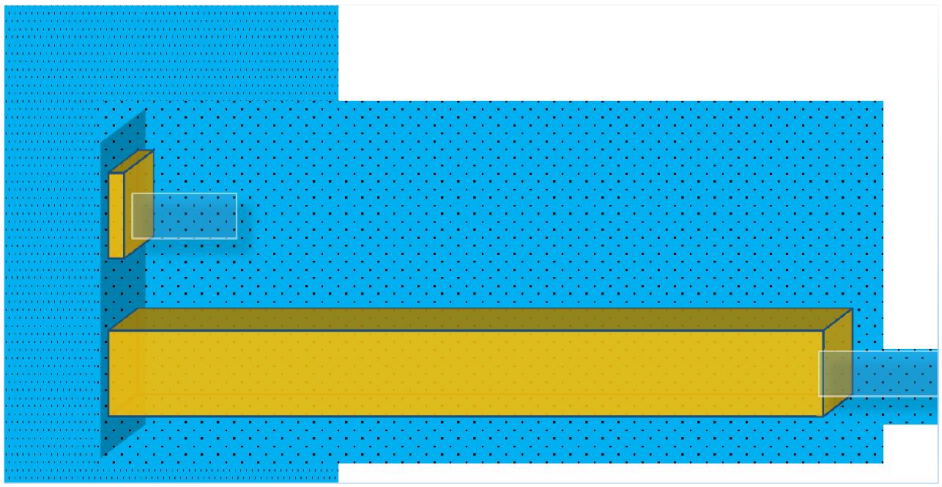


Figure 19. Defining sets of PM competencies

4.2.2. Characteristics of an employee which are most important

Figure 21 below, describes that the majority of the respondents which is 55% agreed combination of all the factors is important, next to this 41% of the respondents said that project management competencies (knowledge, skills, and attitude) is important and 4% of the respondents said formal education and qualification is important. In addition to these, some of the respondents picked that project management competencies (knowledge, skills, and attitude) and formal education and qualification (certificates and license) is important.

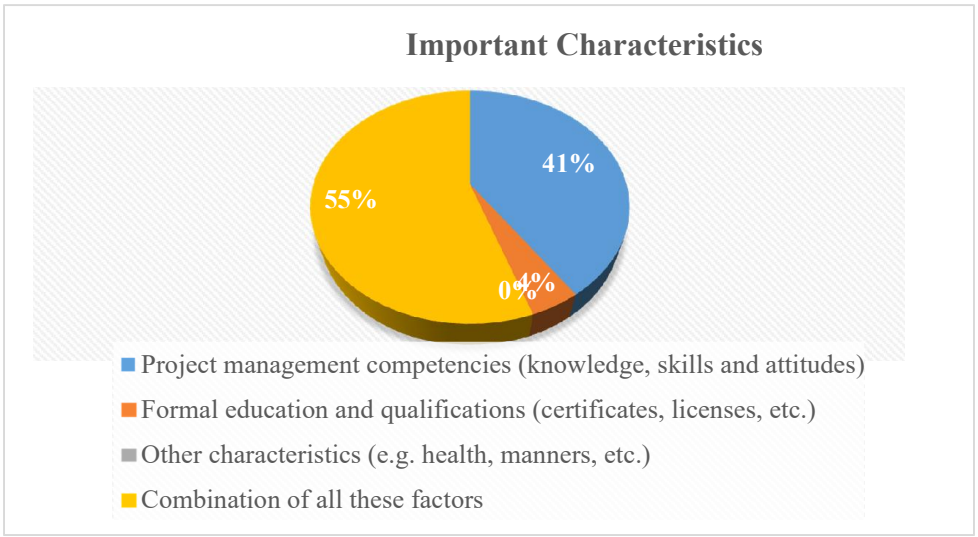


Figure 20. Important characteristics of an employee

4.2.3. Effects of the lack of a particular project management competencies on projects performance

As it can be shown in Figure 22 below, lack of particular PM competencies has been rated as 85.11% has a significant impact and 14.89% has a moderate impact. Which indicates if the management is incapable of developing competency in some aspects it harms the overall success of a project or a desired need.

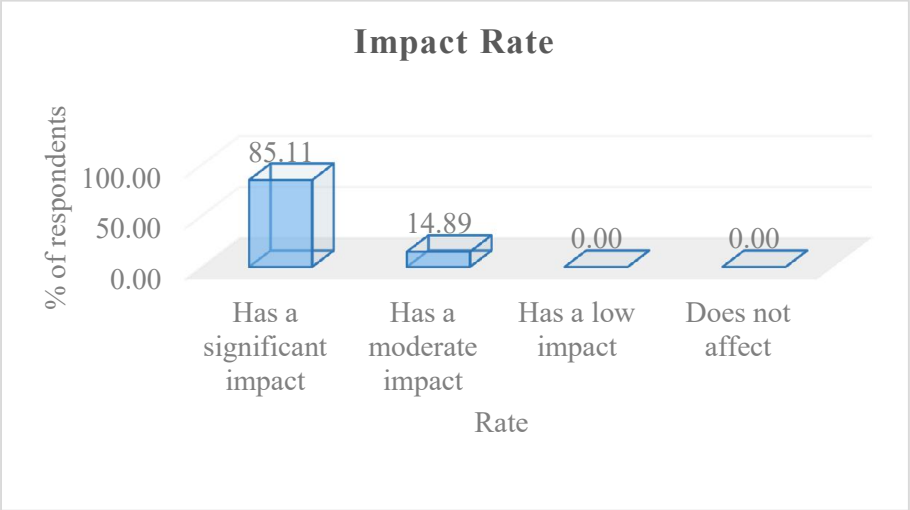


Figure 21. Impact of lack of particular PM competencies on project performance

4.2.4. Rank of project management competencies according to the importance and effect having on the projects performance

According to Figure 23 below, 72.34% of the respondents agreed that PM technical competencies ranked first and have greater effect on project performance and 27.66% of the participants responded that behavioral competencies have an effect. In parallel to this, some of the respondents revealed that both technical and behavioral competencies affect construction project performance.

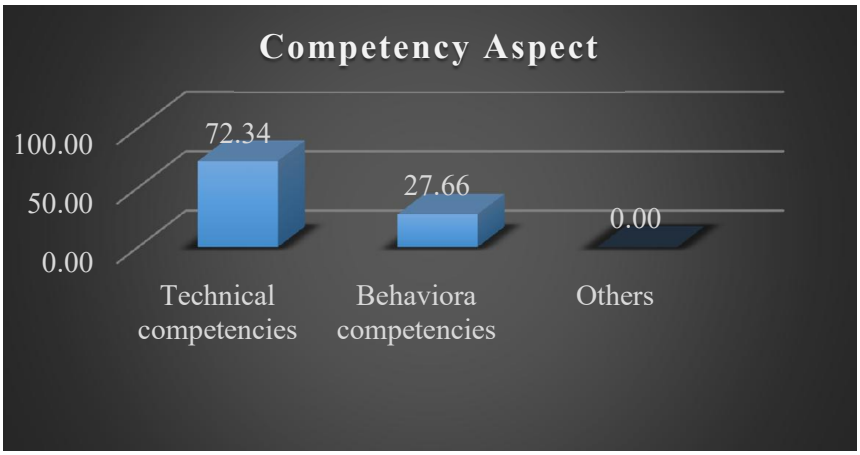


Figure 22. Competency aspects having a substantial effect on project performance

4.3. Relationship between project management competencies and project success

The relationship of project management competencies and project success were sufficiently discussed and lack management ability can lead to failed projects. According to different researchers, there is a strong connection between project success and project management's effectiveness.

4.3.1. Ways of an employee/professional are exposed/learn competencies

Figure 24 below, shows that 93.62% of the respondents agreed that professionals develop competencies by experiencing on site, 4.26% of the participant responded that it can be learned externally and 2.13% responded that it can be learned internally. In addition to this, some respondents dictate that all options can be the way to develop competencies except trial and error. It shows that most competencies associated with construction are learned or developed in the working site.

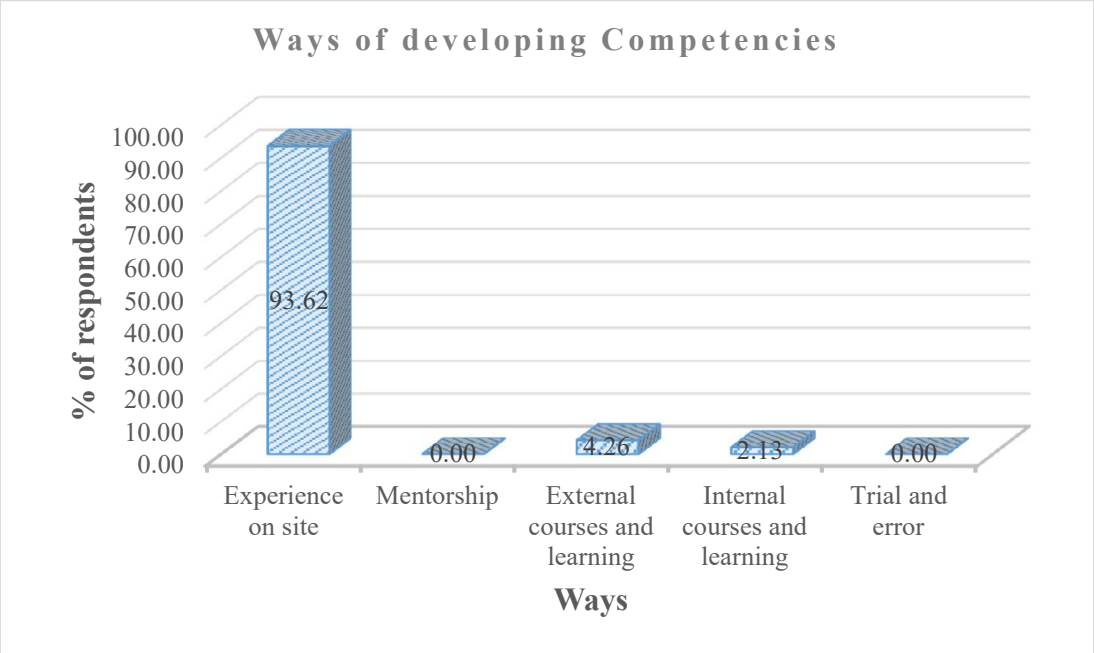


Figure 23. Ways of a professional develop competencies

4.3.2. Technical Competency elements that are associated with project management

Table 3 below, indicates that the technical competency elements exist and ranked in the first place is schedules (the structuring, sequencing, duration estimating and scheduling of activities) with a mean score of 4.45, in the second place is objectives and strategies (identification, definition and agreement of the project to conform the demand and expectations) with a mean score of 4.43, and in the third place is teamwork (directing and leadership of team making, performing in teams and group heterogeneity) with a mean score of 4.34. It means that in the Ethiopian construction industry schedule related issues, objectives and strategies of a project, and teamwork in projects are given emphasis as a practice under technical competencies.

Table 3. Mean and Ranking of Technical Competency elements existence

	Competencies	Mean	Rank
12	**Schedules**		
12.1	The structuring, sequencing, duration estimating and scheduling of activities	4.45	1
3	**Objectives and Strategies**		

3.1	Identification, definition and agreement of the project to conform the demand and expectations	4.43	2
7	**Teamwork**		
7.1	Directing and leadership of team making, performing in teams and group heterogeneity	4.34	3
19	**Communication**		
19.1	Effective exchange and understanding of information between different parties	4.26	4
10	**Product scope**		
10.1	Defining the deliverable and should deliver all that is described within the scope	4.23	5
5	**Project quality**		
5.1	Ensuring set of inherent characteristics fulfils the project requirements	4.21	6
6	**Project organization**		
6.1	Design of appropriate roles, organizational structures and capabilities for the project	4.21	6
13	**Resources**		
13.1	Planning, with the designation and assigning of resources with the appropriate acceptable standard	4.19	8
17	**Project control**		
17.1	The integrated control of the project	4.17	9
20	**Performance measurement**		
20.1	Summary of the project/system	4.15	10

Table 4 below, indicates that the technical competency elements which have influence on time performance output and ranked in the first place is problem solving (identifying the problem and its root cause; developing ideas and options for solving the problem) with a mean score of 10.19, in the second place is schedules (the structuring, sequencing, duration estimating and scheduling of activities) with a mean score of 4.53, and in the third place is teamwork (directing and leadership of team making, performing in teams and group heterogeneity) with a mean score of 4.47. It means that incapacities in problem solving, schedule related issues, and teamwork inefficiencies are factors which influence time performance.

Table 4. Mean and Ranking of Technical Competency elements which have influence on the time

Competencies		Mean	Rank
8	**Problem solving**		
8.1	Identifying the problem and its root cause; developing ideas and options for solving the problem	10.19	1
12	**Schedules**		
12.1	The structuring, sequencing, duration estimating and scheduling of activities	4.53	2
7	**Teamwork**		
7.1	Directing and leadership of team making, performing in teams and group heterogeneity	4.47	3
13	**Resources**		
13.1	Planning, with the designation and assigning of resources with the appropriate acceptable standard	4.21	4
17	**Project control**		
17.1	The integrated control of the project	4.21	4
3	**Objectives and Strategies**		
3.1	Identification, definition and agreement of the project to conform the demand and expectations	4.15	6
6	**Project organization**		
6.1	Design of appropriate roles, organizational structures and capabilities for the project	4.15	6
1	**Project success criteria**		
1.1	Understanding objectives within the agreed constraints for overall project success	4.06	8
15	**Procurement and contracts**		
15.1	Incurring improved value from suppliers of goods or services to the project	4.02	9
21	**Project startup**		
21.1	Providing the basis for a successful project	4.02	9

Table 5 below, indicates that the technical competency elements influence on cost performance output and ranked in the first place is teamwork (directing and leadership of team making, performing in teams and group heterogeneity) with a mean score of 4.40, in the second place is cost (the process which is mandatory for planning, monitoring, and controlling costs on project life-cycle) with a mean score of 4.38, and in the third place is problem solving (identifying the problem and its root cause; developing ideas and options

for solving the problem) with a mean score of 4.28. It means that schedule related issues, and teamwork inefficiencies, improper cost monitoring, and incapacities in problem solving are factors which influence cost performance.

Table 5. Mean and Ranking of Technical Competency elements which have influence on the cost

	Competencies	Mean	Rank
7	**Teamwork**		
7.1	Directing and leadership of team making, performing in teams and group heterogeneity	4.40	1
14	**Cost**		
14.1	The process which is mandatory for planning, monitoring, and controlling costs on project life-cycle	4.38	2
8	**Problem solving**		
8.1	Identifying the problem and its root cause; developing ideas and options for solving the problem	4.28	3
15	**Procurement and contracts**		
15.1	Incurring improved value from suppliers of goods or services to the project	4.17	4
6	**Project organization**		
6.1	Design of appropriate roles, organizational structures and capabilities for the project	4.11	5
13	**Resources**		
13.1	Planning, with the designation and assigning of resources with the appropriate acceptable standard	4.11	5
17	**Project control**		
17.1	The integrated control of the project	4.09	7
1	**Project success criteria**		
1.1	Understanding objectives within the agreed constraints for overall project success	4.06	8
10	**Product scope**		
10.1	Defining the deliverable and should deliver all that is described within the scope	4.06	8
12	**Schedules**		
12.1	The structuring, sequencing, duration estimating and scheduling of activities	4.00	10

Table 6 below, indicates that the technical competency elements influence on quality performance output and ranked in the first place is project quality (ensuring set of inherent characteristics fulfils the project requirements) with a mean score of 4.26, in the second place is project organization (design of appropriate roles, organizational structures and capabilities for the project) with a mean score of 4.17, and in the third place is teamwork (directing and leadership of team making, performing in teams and group heterogeneity) with a mean score of 4.11. It means that non-insurance of project requirements, inappropriate project organization, and teamwork inefficiencies are factors which influence quality performance.

Table 6. Mean and Ranking of Technical Competency elements which have influence on the quality

	Competencies	Mean	Rank
5	**Project quality**		
5.1	Ensuring set of inherent characteristics fulfils the project requirements	4.26	1
6	**Project organization**		
6.1	Design of appropriate roles, organizational structures and capabilities for the project	4.17	2
7	**Teamwork**		
7.1	Directing and leadership of team making, performing in teams and group heterogeneity	4.11	3
19	**Communication**		
19.1	Effective exchange and understanding of information between different parties	4.06	4
8	**Problem solving**		
8.1	Identifying the problem and its root cause; developing ideas and options for solving the problem	4.02	5
1	**Project success criteria**		
1.1	Understanding objectives within the agreed constraints for overall project success	3.98	6
4	**Risk: threats and opportunity**		
4.1	Work on lessons learnt in past project has an important contribution to the success of future projects	3.98	6
17	**Project control**		
17.1	The integrated control of the project	3.98	6

10	**Product scope**		
10.1	Defining the deliverable and should deliver all that is described within the scope	3.94	9
3	**Objectives and Strategies**		
3.1	Identification, definition and agreement of the project to conform the demand and expectations	3.91	10

4.3.3. Behavioral Competency elements that are associated with project management

Table 7 below, shows that the behavioral competency elements exist and ranked in the first place is efficiency (the ability to use time and resources effectively to bring out the agreed-up outcome) with a mean score of 4.38, in the second place is negotiation (stakeholders means of resolving disagreements concerned with the project) with a mean score of 4.26, and in the third place is results orientation (to concentrate the team's attention on key objectives to obtain the optimum outcome for the parties) with a mean score of 4.21. It means that in the Ethiopian construction industry efficiency in resource utilization, negotiation in conflicts, and results orientation in projects are given emphasis as a practice under behavioral competencies.

Table 7. Mean and Ranking of Behavioral Competency elements existence

	Competencies	Mean	Rank
9	**Efficiency**		
9.1	The ability to use time and resources effectively to bring out the agreed-up outcome	4.38	1
11	**Negotiation**		
11.1	Stakeholders means of resolving disagreements concerned with the project	4.26	2
8	**Results orientation**		
8.1	To concentrate the team's attention on key objectives to obtain the optimum outcome for the parties	4.21	3
1	**Leadership**		
1.1	Providing direction/motivating others in their role to fulfil the project's objectives	4.19	4
12	**Conflict and crisis**		
12.1	Ways of handling conflicts and crisis	4.13	5
7	**Creativity**		
7.1	The ability to think and behave in an inventive and original manner	4.09	6
15	**Ethics**		

15.1	Morally recognized conduct or behavior of an individual	4.04	7
13	**Reliability**		
13.1	Delivering what you have said with the time and quality agreed	3.89	8
4	**Assertiveness**		
4.1	The ability to state your views persuasively and authoritatively	3.85	9
2	**Engagement and motivation**		
2.1	Making peoples believe in the project and want to be part of it	3.81	10

Table 8 below, shows that the behavioral competency elements influence on-time performance output and ranked in the first place is results orientation (to concentrate the team's attention on key objectives to obtain the optimum outcome for the parties) with a mean score of 9.68, in the second place is efficiency (the ability to use time and resources effectively to bring out the agreed-up outcome) with a mean score of 4.49, and in the third place is leadership (providing direction/motivating others in their role to fulfill the project's objectives), negotiation (stakeholders means of resolving disagreements concerned with the project), and conflict and crisis (ways of handling conflicts and crisis) with a mean score of 4.19. Such result indicates that poor attention on key objectives, inefficiency, and improper leadership are factors which influence time performance.

Table 8. Mean and Ranking of Behavioral Competency elements which have influence on the time

Competencies		Mean	Rank
8	**Results orientation**		
8.1	To concentrate the team's attention on key objectives to obtain the optimum outcome for the parties	9.68	1
9	**Efficiency**		
9.1	The ability to use time and resources effectively to bring out the agreed-up outcome	4.49	2
1	**Leadership**		
1.1	Providing direction/motivating others in their role to fulfil the project's objectives	4.19	3
11	**Negotiation**		
11.1	Stakeholders means of resolving disagreements concerned with the project	4.19	3

12	**Conflict and crisis**		
12.1	Ways of handling conflicts and crisis	4.19	3
2	**Engagement and motivation**		
2.1	Making peoples believe in the project and want to be part of it	4.13	6
7	**Creativity**		
7.1	The ability to think and behave in an inventive and original manner	4.06	7
13	**Reliability**		
13.1	Delivering what you have said with the time and quality agreed	4.00	8
3	**Self-control**		
3.1	Systematic and disciplined approach to cope with daily work, changing requirements and to deal with stressful situations	3.98	9
15	**Ethics**		
15.1	Morally recognized conduct or behavior of an individual	3.96	10

Table 9 below, shows that the behavioral competency elements influence on cost performance output and ranked in the first place is efficiency (the ability to use time and resources effectively to bring out the agreed-up outcome)with a mean score of 4.49, in the second place is results orientation (to concentrate the team's attention on key objectives to obtain the optimum outcome for the parties) with a mean score of 4.32, and in the third place is leadership (to concentrate the team's attention on key objectives to obtain the optimum outcome for the parties) conflict and crisis (ways of handling conflicts and crisis) with a mean score of 4.17. Such result indicates that inefficiency, poor attention on key objectives, and improper leadership are also factors which influence cost performance.

Table 9. Mean and Ranking of Behavioral Competency elements which have influence on the cost

Competencies		Mean	Rank
9	**Efficiency**		
9.1	The ability to use time and resources effectively to bring out the agreed-up outcome	4.49	1
8	**Results orientation**		

8.1	To concentrate the team's attention on key objectives to obtain the optimum outcome for the parties	4.32	2
1	**Leadership**		
1.1	Providing direction/motivating others in their role to fulfil the project's objectives	4.17	3
12	**Conflict and crisis**		
12.1	Ways of handling conflicts and crisis	4.17	3
11	**Negotiation**		
11.1	Stakeholders means of resolving disagreements concerned with the project	4.06	5
7	**Creativity**		
7.1	The ability to think and behave in an inventive and original manner	3.98	6
15	**Ethics**		
15.1	Morally recognized conduct or behavior of an individual	3.94	7
2	**Engagement and motivation**		
2.1	Making peoples believe in the project and want to be part of it	3.89	8
3	**Self-concept**		
3.1	Systematic and disciplined approach to cope with daily work, changing requirements and to deal with stressful situations	3.87	9
13	**Reliability**		
13.1	Delivering what you have said with the time and quality agreed	3.87	9

Table 10 below, shows that the behavioral competency elements influence on quality performance output and ranked in the first place is efficiency (the ability to use time and resources effectively to bring out the agreed-up outcome) with a mean score of 4.23, in the second place is results orientation (to concentrate the team's attention on key objectives to obtain the optimum outcome for the parties) with a mean score of 4.13, and in the third place is negotiation (stakeholders means of resolving disagreements concerned with the project) with a mean score of 3.96. Such result indicates that inefficiency, poor attention on key objectives, and incapability of resolving disagreements are factors which influence quality performance.

Table 10. Mean and Ranking of Behavioral Competency elements which have influence on the quality

Competencies		Mean	Rank
9	**Efficiency**		
9.1	The ability to use time and resources effectively to bring out the agreed-up outcome	4.23	1
8	**Results orientation**		
8.1	To concentrate the team's attention on key objectives to obtain the optimum outcome for the parties	4.13	2
11	**Negotiation**		
11.1	Stakeholders means of resolving disagreements concerned with the project	3.96	3
1	**Leadership**		
1.1	Providing direction/motivating others in their role to fulfil the project's objectives	3.91	4
13	**Reliability**		
13.1	Delivering what you have said with the time and quality agreed	3.91	4
2	**Engagement and motivation**		
2.1	Making peoples believe in the project and want to be part of it	3.85	6
7	**Creativity**		
7.1	The ability to think and behave in an inventive and original manner	3.85	6
15	**Ethics**		
15.1	Morally recognized conduct or behavior of an individual	3.85	6
3	**Self-control**		
3.1	Systematic and disciplined approach to cope with daily work, changing requirements and to deal with stressful situations	3.77	9
12	**Conflict and crisis**		
12.1	Ways of handling conflicts and crisis	3.74	10

4.4. Measures of project management's efficiency

The environment in which construction activities and/or in general projects undertaken are complex and likely changes, this makes difficult the effectiveness of the project management.

4.4.1. Project Management's efficiency to support and effect change in an organization

As it can be shown in Figure 25 below, 53.19% majority of the respondents confirmed their PM was rated very effective, 31.91% responded their PM rate is moderately effective and 10.64% of the participant responded slightly effective in bringing change. It means that when the project management is efficient it will have a positive effect on overall success of a project.

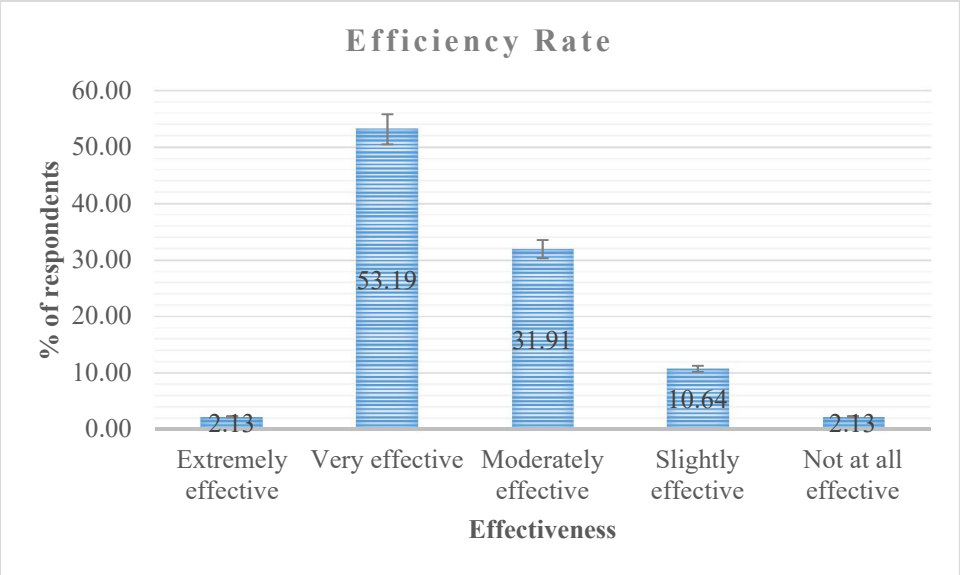


Figure 24. PM efficiency rate to support an effect on change

4.4.2. Project management methodology

According to Figure 26 below, it can be observed that majority of the respondents 51% uses PMBOK based project management based methodology, 28% takes the second place which uses in house methodologies, 19% of the participant didn't respond to the question and only 2% of the respondent uses PRINCE2. This indicates that PMBOK/PMI's project management methodology is a popular adoption in the Ethiopian construction industry.

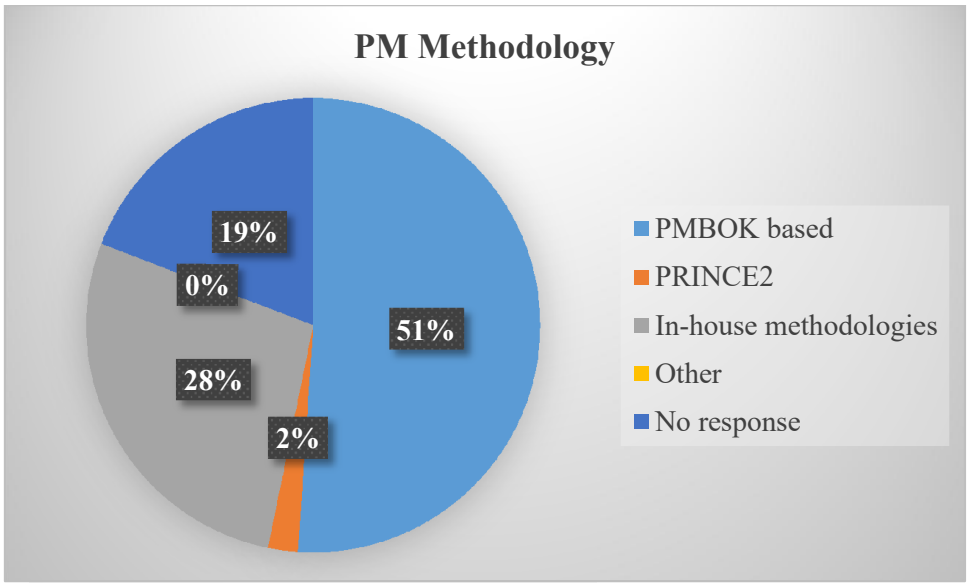


Figure 25. PM methodology in use

4.4.3. The biggest challenge that project management faces to develop competencies

Figure 27 below, clearly shows that technological factor and professionalism of the construction industry takes the first place as the biggest challenge in Ethiopian construction industry with 36.17% response rate for both, the next factor was identified as external factors 25.53% of the responses and only 2.13% goes to other factors (i.e. leadership and mind setup of stakeholders). Rather, some respondents stated all the factors are challenges for the management in the industry.

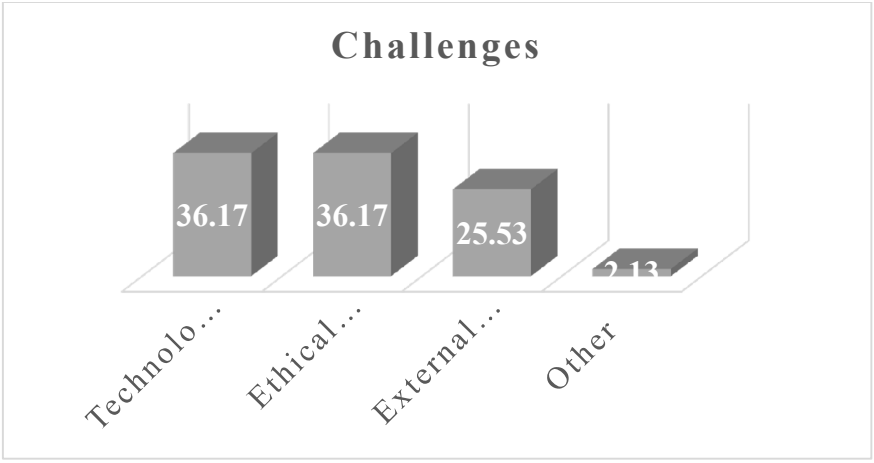


Figure 26. Challenges that PM faces to develop competencies

4.5. Project success criteria

Project success criteria refer to the standards by which the project will be judged at the time of completion either it meets the end-users and stakeholder's expectation or not it has been successful in the eyes of stakeholders along with goals, deliverables, scope, and other requirements.

4.5.1. Achievement or success of the project be a measure

As it has been shown in Figure 28 below, 78.72% of the respondents revealed that success of a project can be measured anytime in the project life cycle, 19.15% believes that success can be measured on project completion and 2.13% stated that other (i.e. quarterly and annually and in a periodic fashion).

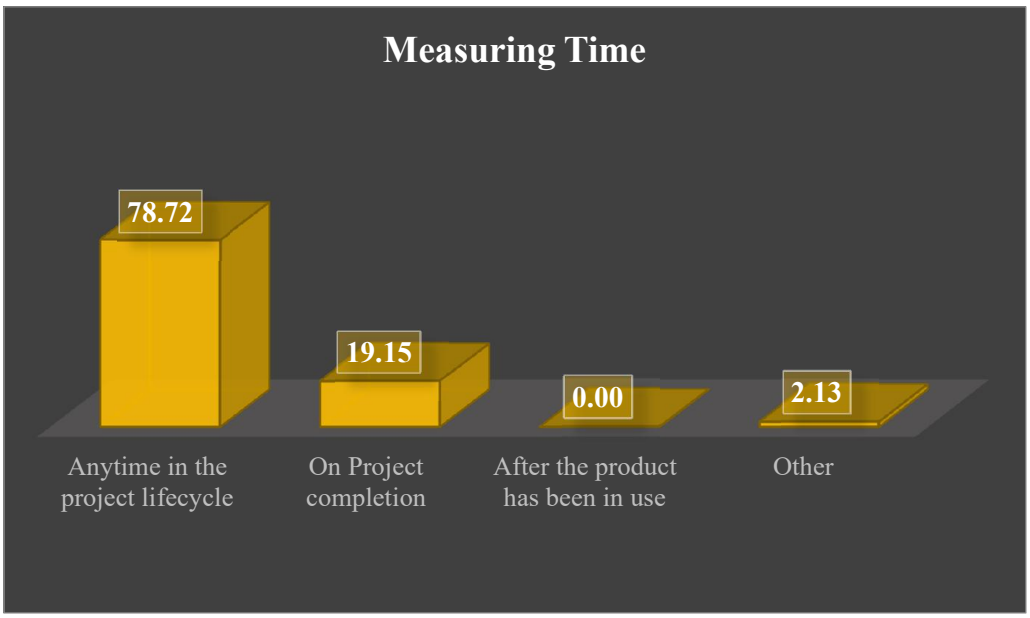


Figure 27. Time to measure project success

4.5.2. Relationship between project management success and Project Success

Figure 4.17 below, shows that 63.83% of the respondents believe when project management is successful, a project is generally successful, 25.53% of the respondent believes that when project management is successful, the project is always successful, 6.38% of the respondent said sometimes successful and 4.26% responded rarely successful.

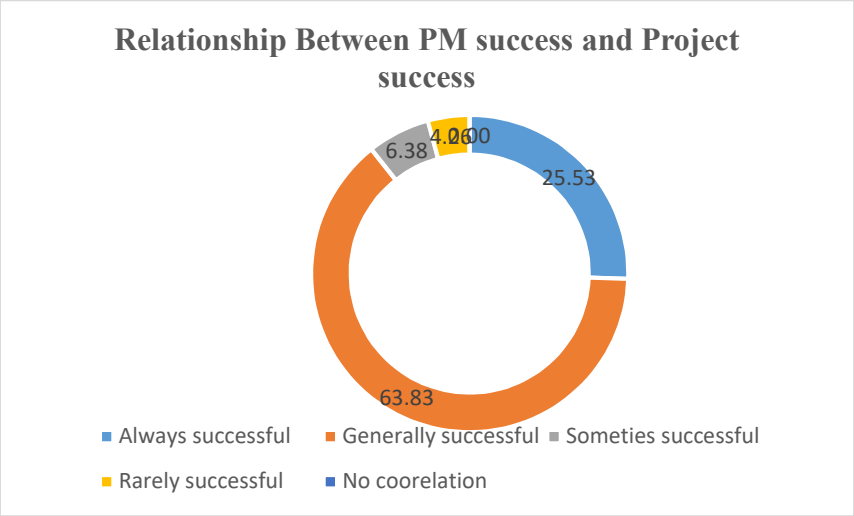


Figure 28. Relationship between PM success and project success

4.5.3. Relationship between project management competency and project success

According to the rank given by the technical and behavioral competency elements existence and time, cost, and quality factors Pearson's correlation analysis was conducted, in order to check the correlation existed between them.

Table 11. Rank of technical competency elements existence across the time factor

	Competencies	Rank	
		Existence	Time
1	**Project success criteria**		
1.1	Understanding objectives within the agreed constraints for overall project success	13	8
2	**Stakeholders and interested parties**		
2.1	Identify the sequence and interests of parties important to the project	16	16
3	**Objectives and Strategies**		
3.1	Identification, definition and agreement of the project to conform the demand and expectations	2	6
4	**Risk: threats and opportunity**		
4.1	Work on lessons learnt in past project has an important contribution to the success of future projects	16	22
5	**Project quality**		
5.1	Ensuring set of inherent characteristics fulfils the project requirements	6	21
6	**Project organization**		

6.1	Design of appropriate roles, organizational structures and capabilities for the project	6	6
7	**Teamwork**		
7.1	Directing and leadership of team making, performing in teams and group heterogeneity	3	3
8	**Problem solving**		
8.1	Identifying the problem and its root cause; developing ideas and options for solving the problem	12	1
9	**Project structures**		
9.1	Creating hierarchical structures serve to ensure nothing is omitted from the project	14	18
10	**Product scope**		
10.1	Defining the deliverable and should deliver all that is described within the scope	5	13
11	**Project lifecycle and phases**		
11.1	Establishing major project deliverables and determination those are important for the succeeding stage	15	15
12	**Schedules**		
12.1	The structuring, sequencing, duration estimating and scheduling of activities	1	2
13	**Resources**		
13.1	Planning, with the designation and assigning of resources with the appropriate acceptable standard	8	4
14	**Cost**		
14.1	The process which is mandatory for planning, monitoring, and controlling costs on project life-cycle	11	19
15	**Procurement and contracts**		
15.1	Incurring improved value from suppliers of goods or services to the project	20	9
16	**Configuration management**		
16.1	Unanticipated occurrences monitored against the original project goals and objectives	22	19
17	**Project control**		
17.1	The integrated control of the project	9	4
18	**Documentation, information and reporting**		
18.1	Modelling, gathering, selecting, storing and retrieving project data and reporting	19	17
19	**Communication**		
19.1	Effective exchange and understanding of information between different parties	4	11
20	**Performance measurement**		

20.1	Summary of the project/system	10	13
21	**Project startup**		
21.1	Providing the basis for a successful project	21	9
22	**Project closeout**		
22.1	Completion of the project	18	12

Table 11 above, presented the correlation between technical competency existence and time factor is a moderate positive correlation with a correlation coefficient value of 0.45. The correlation graph for the technical competency existence and time factor is illustrated in Figure 30 below.

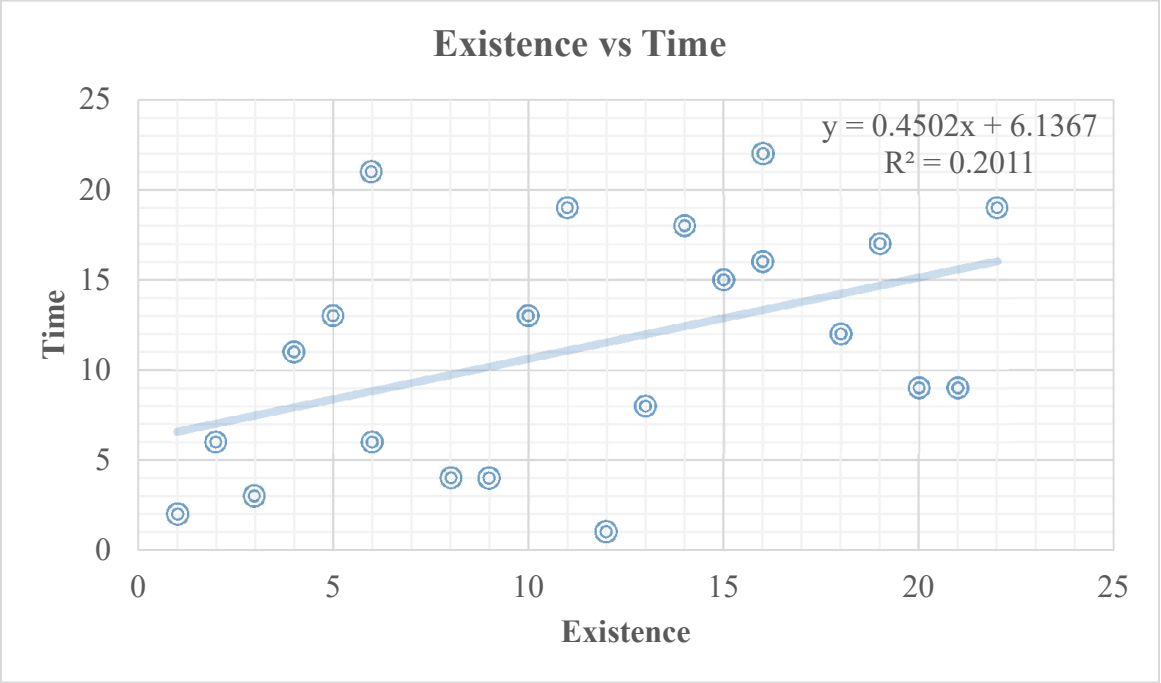


Figure 29. Pearson's correlation graph for rankings of technical competencies existence vs time

Table 12. Rank of technical competency elements existence across the cost factor

Competencies		Rank	
		Existence	Cost
1	**Project success criteria**		
1.1	Understanding objectives within the agreed constraints for overall project success	13	8

2	**Stakeholders and interested parties**		
2.1	Identify the sequence and interests of parties important to the project	16	20
3	**Objectives and Strategies**		
3.1	Identification, definition and agreement of the project to conform the demand and expectations	2	11
4	**Risk: threats and opportunity**		
4.1	Work on lessons learnt in past project has an important contribution to the success of future projects	16	11
5	**Project quality**		
5.1	Ensuring set of inherent characteristics fulfils the project requirements	6	11
6	**Project organization**		
6.1	Design of appropriate roles, organizational structures and capabilities for the project	6	5
7	**Teamwork**		
7.1	Directing and leadership of team making, performing in teams and group heterogeneity	3	1
8	**Problem solving**		
8.1	Identifying the problem and its root cause; developing ideas and options for solving the problem	12	3
9	**Project structures**		
9.1	Creating hierarchical structures serve to ensure nothing is omitted from the project	14	21
10	**Product scope**		
10.1	Defining the deliverable and should deliver all that is described within the scope	5	8
11	**Project lifecycle and phases**		
11.1	Establishing major project deliverables and determination those are important for the succeeding stage	15	17
12	**Schedules**		
12.1	The structuring, sequencing, duration estimating and scheduling of activities	1	10
13	**Resources**		
13.1	Planning, with the designation and assigning of resources with the appropriate acceptable standard	8	5
14	**Cost**		
14.1	The process which is mandatory for planning, monitoring, and controlling costs on project life-cycle	11	2
15	**Procurement and contracts**		
15.1	Incurring improved value from suppliers of goods or services to the project	20	4
16	**Configuration management**		
16.1	Unanticipated occurrences monitored against the original project goals and	22	19

	objectives		
17	**Project control**		
17.1	The integrated control of the project	9	7
18	**Documentation, information and reporting**		
18.1	Modelling, gathering, selecting, storing and retrieving project data and reporting	19	18
19	**Communication**		
19.1	Effective exchange and understanding of information between different parties	4	15
20	**Performance measurement**		
20.1	Summary of the project/system	10	14
21	**Project startup**		
21.1	Providing the basis for a successful project	21	22
22	**Project closeout**		
22.1	Completion of the project	18	15

Table 12 above, presented the correlation between technical competency existence and cost factor is a moderate positive correlation with a correlation coefficient value of 0.49. The correlation graph for the technical competency existence and cost factor is illustrated in Figure 31below.

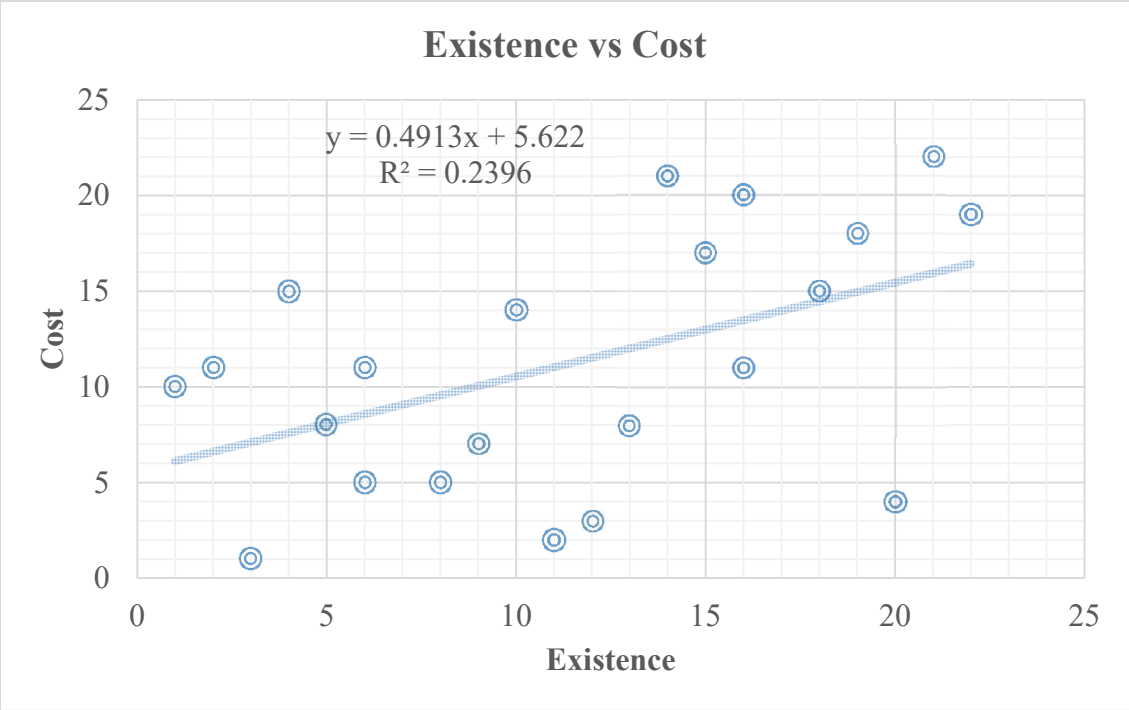


Figure 30. Pearson's correlation graph for rankings of technical competencies existence vs cost

Table 13. Rank of technical competency elements existence across the quality factor

Competencies		Rank	
		Existence	Quality
1	**Project success criteria**		
1.1	Understanding objectives within the agreed constraints for overall project success	13	6
2	**Stakeholders and interested parties**		
2.1	Identify the sequence and interests of parties important to the project	16	14
3	**Objectives and Strategies**		
3.1	Identification, definition and agreement of the project to conform the demand and expectations	2	10
4	**Risk: threats and opportunity**		
4.1	Work on lessons learnt in past project has an important contribution to the success of future projects	16	6
5	**Project quality**		
5.1	Ensuring set of inherent characteristics fulfils the project requirements	6	1
6	**Project organization**		
6.1	Design of appropriate roles, organizational structures and capabilities for the project	6	2
7	**Teamwork**		
7.1	Directing and leadership of team making, performing in teams and group heterogeneity	3	3
8	**Problem solving**		
8.1	Identifying the problem and its root cause; developing ideas and options for solving the problem	12	5
9	**Project structures**		
9.1	Creating hierarchical structures serve to ensure nothing is omitted from the project	14	19
10	**Product scope**		
10.1	Defining the deliverable and should deliver all that is described within the scope	5	9
11	**Project lifecycle and phases**		
11.1	Establishing major project deliverables and determination those are important for the succeeding stage	15	18
12	**Schedules**		
12.1	The structuring, sequencing, duration estimating and scheduling of	1	11

	activities		
13	**Resources**		
13.1	Planning, with the designation and assigning of resources with the appropriate acceptable standard	8	17
14	**Cost**		
14.1	The process which is mandatory for planning, monitoring, and controlling costs on project life-cycle	11	15
15	**Procurement and contracts**		
15.1	Incurring improved value from suppliers of goods or services to the project	20	12
16	**Configuration management**		
16.1	Unanticipated occurrences monitored against the original project goals and objectives	22	22
17	**Project control**		
17.1	The integrated control of the project	9	6
18	**Documentation, information and reporting**		
18.1	Modelling, gathering, selecting, storing and retrieving project data and reporting	19	15
19	**Communication**		
19.1	Effective exchange and understanding of information between different parties	4	4
20	**Performance measurement**		
20.1	Summary of the project/system	10	12
21	**Project startup**		
21.1	Providing the basis for a successful project	21	21
22	**Project closeout**		
22.1	Completion of the project	18	20

Table 13 above, presented the correlation between technical competency existence and quality factor is a moderate positive correlation with a correlation coefficient value of 0.64. The correlation graph for the technical competency existence and quality factor is illustrated in Figure 32below.

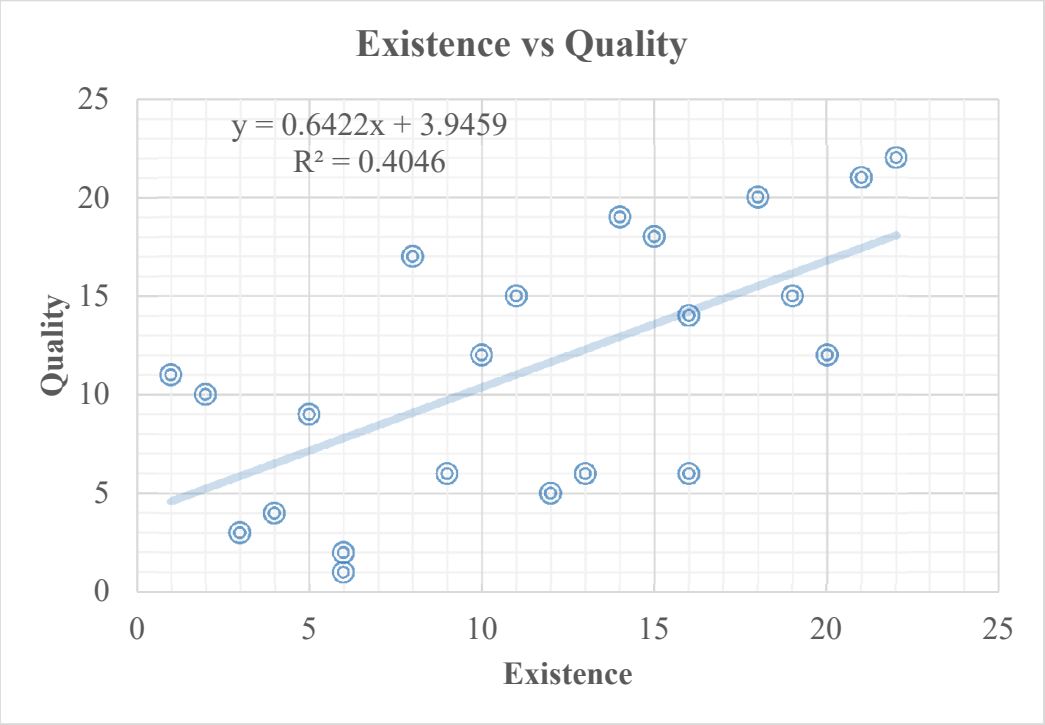


Figure 31. Pearson's correlation graph for rankings of technical competencies existence vs quality

Table 14. Rank of behavioral competency elements existence across the time factor

	Competencies	Rank	
		Existence	Time
1	**Leadership**		
1.1	Providing direction/motivating others in their role to fulfil the project's objectives	4	3
2	**Engagement and motivation**		
2.1	Making peoples believe in the project and want to be part of it	10	6
3	**Self-control**		
3.1	Systematic and disciplined approach to cope with daily work, changing requirements and to deal with stressful situations	12	9
4	**Assertiveness**		
4.1	The ability to state your views persuasively and authoritatively	9	11
5	**Relaxation**		
5.1	The ability to relieve tension in difficult situations	15	14
6	**Openness**		
6.1	To attain others experience they are able to express themselves	14	13

7	**Creativity**		
7.1	The ability to think and behave in an inventive and original manner	6	7
8	**Results orientation**		
8.1	To concentrate the team's attention on key objectives to obtain the optimum outcome for the parties	3	1
9	**Efficiency**		
9.1	The ability to use time and resources effectively to bring out the agreed-up outcome	1	2
10	**Consultation**		
10.1	Reasoning, presenting strong argument, listening others, negotiate, and finding solution	12	15
11	**Negotiation**		
11.1	Stakeholders means of resolving disagreements concerned with the project	2	3
12	**Conflict and crisis**		
12.1	Ways of handling conflicts and crisis	5	3
13	**Reliability**		
13.1	Delivering what you have said with the time and quality agreed	8	8
14	**Values appreciation**		
14.1	Perceiving intrinsic qualities in different people and realize their standpoint	11	12
15	**Ethics**		
15.1	Morally recognized conduct or behavior of an individual	7	10

Table 14 above, presented the correlation between behavioral competency existence and time factor is a strong positive correlation with a correlation coefficient value of 0.89. The correlation graph for the behavioral competency existence and time factor is illustrated in Figure 33below.

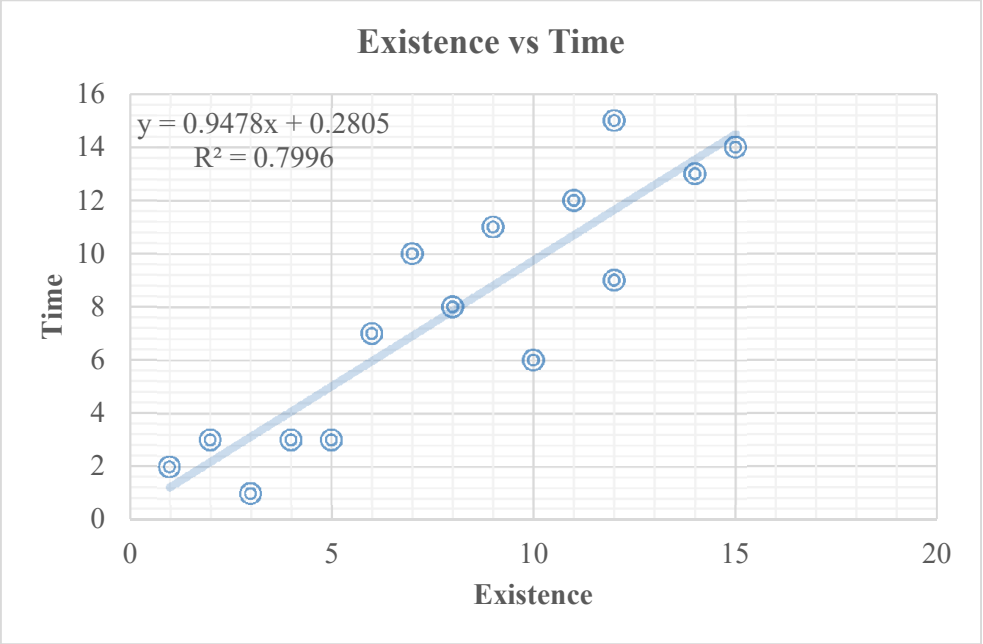


Figure 32. Pearson's correlation graph for rankings of behavioral competencies existence vs time

Table 15. Rank of behavioral competency elements existence across the cost factor

	Competencies	Rank	
		Existence	Cost
1	**Leadership**		
1.1	Providing direction/motivating others in their role to fulfil the project's objectives	4	3
2	**Engagement and motivation**		
2.1	Making peoples believe in the project and want to be part of it	10	8
3	**Self-control**		
3.1	Systematic and disciplined approach to cope with daily work, changing requirements and to deal with stressful situations	12	9
4	**Assertiveness**		
4.1	The ability to state your views persuasively and authoritatively	9	11
5	**Relaxation**		
5.1	The ability to relieve tension in difficult situations	15	13
6	**Openness**		
6.1	To attain others experience they are able to express themselves	14	13
7	**Creativity**		
7.1	The ability to think and behave in an inventive and original manner	6	6
8	**Results orientation**		

8.1	To concentrate the team's attention on key objectives to obtain the optimum outcome for the parties	3	2
9	**Efficiency**		
9.1	The ability to use time and resources effectively to bring out the agreed-up outcome	1	1
10	**Consultation**		
10.1	Reasoning, presenting strong argument, listening others, negotiate, and finding solution	12	12
11	**Negotiation**		
11.1	Stakeholders means of resolving disagreements concerned with the project	2	5
12	**Conflict and crisis**		
12.1	Ways of handling conflicts and crisis	5	3
13	**Reliability**		
13.1	Delivering what you have said with the time and quality agreed	8	9
14	**Values appreciation**		
14.1	Perceiving intrinsic qualities in different people and realize their standpoint	11	15
15	**Ethics**		
15.1	Morally recognized conduct or behavior of an individual	7	7

Table 15 above, presented the correlation between behavioral competency existence and cost factor is a strong positive correlation with a correlation coefficient value of 0.9. The correlation graph for the behavioral competency existence and cost factor is illustrated in Figure 34below.

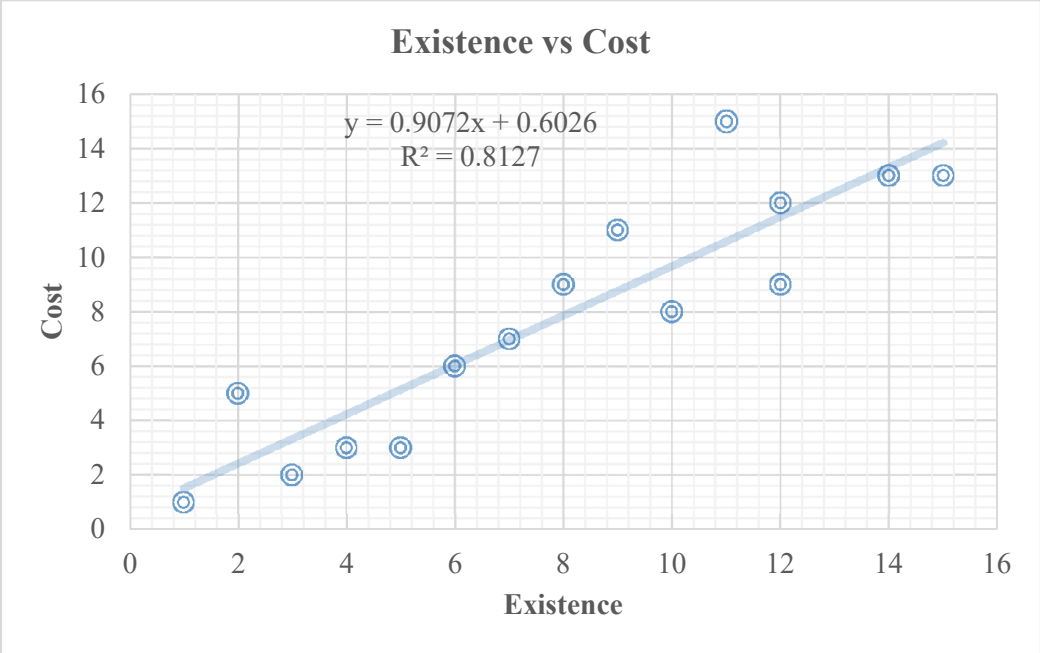


Figure 33. Pearson's correlation graph for rankings of behavioral competencies existence vs cost

Table 16. Rank of behavioral competency elements existence across the quality factor.

	Competencies	Rank	
		Existence	Quality
1	**Leadership**		
1.1	Providing direction/motivating others in their role to fulfil the project's objectives	4	4
2	**Engagement and motivation**		
2.1	Making peoples believe in the project and want to be part of it	10	6
3	**Self-control**		
3.1	Systematic and disciplined approach to cope with daily work, changing requirements and to deal with stressful situations	12	9
4	**Assertiveness**		
4.1	The ability to state your views persuasively and authoritatively	9	13
5	**Relaxation**		
5.1	The ability to relieve tension in difficult situations	15	15
6	**Openness**		
6.1	To attain others experience they are able to express themselves	14	14
7	**Creativity**		
7.1	The ability to think and behave in an inventive and original manner	6	6

8	**Results orientation**		
8.1	To concentrate the team's attention on key objectives to obtain the optimum outcome for the parties	3	2
9	**Efficiency**		
9.1	The ability to use time and resources effectively to bring out the agreed-up outcome	1	1
10	**Consultation**		
10.1	Reasoning, presenting strong argument, listening others, negotiate, and finding solution	12	12
11	**Negotiation**		
11.1	Stakeholders means of resolving disagreements concerned with the project	2	3
12	**Conflict and crisis**		
12.1	Ways of handling conflicts and crisis	5	10
13	**Reliability**		
13.1	Delivering what you have said with the time and quality agreed	8	4
14	**Values appreciation**		
14.1	Perceiving intrinsic qualities in different people and realize their standpoint	11	11
15	**Ethics**		
15.1	Morally recognized conduct or behavior of an individual	7	6

Table 16 above, presented the correlation between behavioral competency existence and quality factor is a strong positive correlation with a correlation coefficient value of 0.85. The correlation graph for the behavioral competency existence and quality factor is illustrated in Figure 35below.

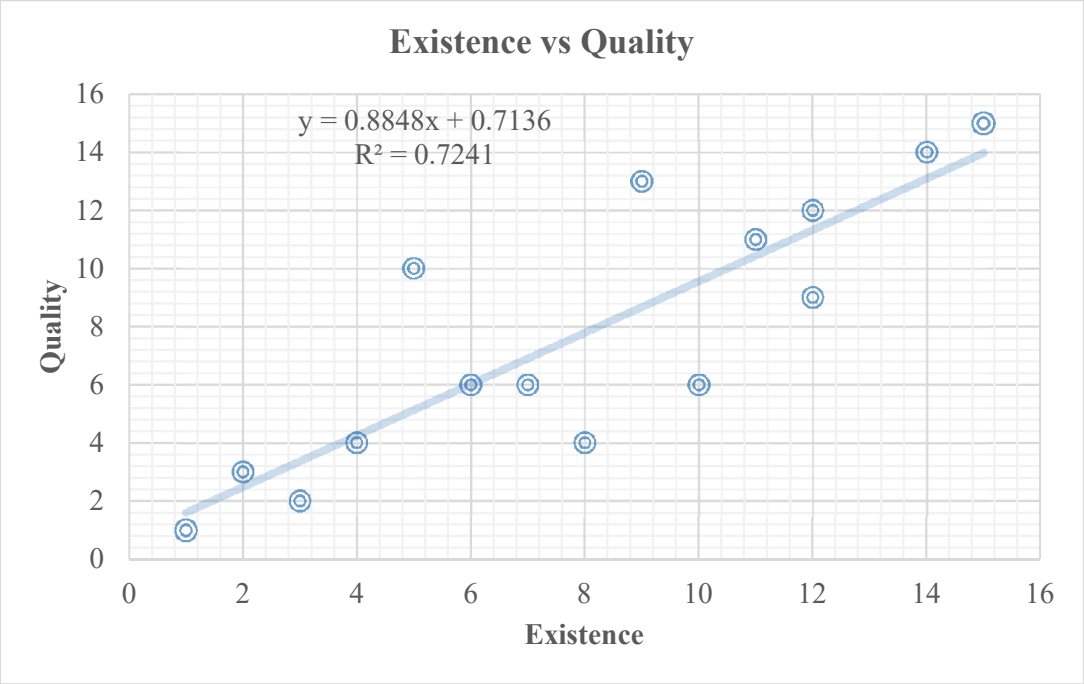


Figure 34. Pearson's correlation graph for rankings of behavioral competencies existence vs quality

4.5.4. Projects performance measurement standards

Table 20 shows that the means from the response about the project's performance measurement standards range from 3.83 to 4.28. From the result the standard, projects meet their technical performance goals has the larger mean 4.28 which implies projects are successful when they meet technical performance goals first and followed by the standard, efficiency of the project management effort which has a mean 4.17 and the standard, projects meet their operational performance goals has a mean 4.15 thirdly.

Table 17. Mean and rank of project performance measurement standards

Standards		Mean	Rank
1	Projects meet their operational performance goals	4.15	3
2	Projects meet their technical performance goals	4.28	1
3	Projects meet their schedule objectives	3.91	7
4	Projects stay within budget limits	3.83	8
5	Project results meet stakeholders expectations	3.94	6
6	Stakeholders are satisfied with project results	4.11	4
7	Alignment to Strategic Business Goals	3.98	5
8	Efficiency of the project management effort	4.17	2

CHAPTER FIVE

5. CONCLUSION AND RECOMMENDATION

5.1. Introduction

This chapter presents a summary of research findings and results set out in chapter 4 in line with research questions outlined in chapter 1. Recommendations are made to construction companies and regulatory bodies who are directly participant in the construction industry. Finally, recommendations for possible future research are identified and forwarded.

5.2. Conclusion

- Professionals develop competencies by experience on site.
- Schedules (the structuring, sequencing, duration estimating and scheduling of activities), objectives and strategies (identification, definition and agreement of the project to meet the needs and expectations), and teamwork (the management and leadership of team building, operating in teams and group dynamics) are the technical competencies that exists in the top which influences the project success.
- Efficiency (the ability to use time and resources cost-effectively to produce the agreed deliverables), negotiation (parties means of resolving disagreements concerned with the project), and orientation (to focus the team's attention on key objectives to obtain the optimum outcome for the parties) are the behavioral competencies that exists in the top which influences the project success.
- Analysis revealed both technological factor and ethical factors are the biggest challenge in Ethiopian construction industry.
- Combination of all the factors (i.e. project management competencies (knowledge, skills, and attitudes), formal education and qualifications, and other characteristics (e.g. health, manners, etc.)) are important characteristics in hiring a project manager or project team member.
- Lack of particular PM competencies has a significant impact on the projects performance.

- Underperformance of a project can be related to competency and incompetent projects often lack to meet project objectives in terms of Time, Cost, and Quality parameters.
- Results revealed that success of a project can be measured anytime in the project life cycle.
- Projects meet their technical performance goals, efficiency of the project management effort, and projects meet their operational performance goals are perceived as successful projects.
- The role of project management technical and behavioral competencies is undeniable in the success of a project.
- Time, Cost, and Quality are the main parameters used to measure project performance in the Ethiopian construction industry.
- Finally there is a strong relationship between project management behavioral competencies and project success and moderate correlation between project management technical competencies and project success.

5.3. Recommendations

- It was noticed mostly professionals develop competencies by experience on site, but also needs to focus on other options. Companies need to focus on establishing properly structured competency development programs.
- From the analysis it was revealed that both technological factors and ethical factors are the biggest challenge in Ethiopian construction industry, therefore companies should introduce ways to overcome these challenges by ensuring efficient and effective performance of construction projects.
- The relationship between project management competency and project success is significant. Therefore, project management competencies have to be enhanced by organizing different trainings and workshops to improve the management competencies that can encounter a particular project with possible complexities.

5.4. Areas of Future Research

This research has not been researched in depth before in the Ethiopian construction industry and should be given more attention in the future research. The following are suggestions for possible future researches:

- This study was conducted on limited category of construction companies; therefore it is recommended the study should be expanded with a larger sample from various construction companies in Ethiopia to validate the findings of this study.
- It would be interesting to use other instruments other than questionnaire survey to assess the role of technical and behavioral competencies in project performance.
- Selective information in this study could be exploited by stakeholders concerned in creating a system for competency based training and development, for instance, ECPMI for different project participants.
- Future studies may consider examining the role of competencies other than technical and behavioral competencies of project management on project performance.

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APPENDIX I: QUESTIONNAIRE

ADDIS ABABA INSTITUTE OF TECHNOLOGY

SCHOOL OF CIVIL AND ENVIRONMENTAL ENGINEERING

DEPARTMENET OF CIVIL ENGINEERING (CONSTRUCTION TECHNOLOGY AND MANAGEMENT)

Questionnaire Survey on

An Assessment of the Role of Project Management Technical and Behavioral Competency in the Success of Construction Projects in Ethiopia

Dear Sir/ Madam

Re: Request to respond to a Questionnaire for MSc. Thesis.

This questionnaire includes statements and questions intended to assess the role of construction project management Technical and Behavioral competencies in project performance. Your participation in the study by way of answering this questionnaire is very vital. Without it, the study will not be complete as it should be. Be honest as possible in giving your responses. Do not leave any questions blank. Tick one response that is closest to what you feel. The study is exclusively use for academic purpose. All collected information will be kept confidential and not be used for commercial purpose.

If you have any question, please email Kifleyohannes Daniel, **Email:** kifleyohannes86@gmail.com or **Phone**: +251 922 473 884as the principal researcher. This survey should not take longer than thirty minute to fill it. Your answers will be used as a baseline data for the intended research.

Kifleyohannes Daniel

Advisor: Abraham Assefa Tsehayae (PhD)

Thank you for your cooperation!

The questionnaire consists of five sections:

1. Part One: Respondent Background

2. Part Two: Competencies of a project management

3. Part Three: Relationship between project management competencies and project success

4. Part Four: Measures of project management's efficiency

5. Part Five: Project success criteria/Measures the efficiency aspects of the project success.

Part One: Respondent Background (Please check the appropriate box)

1. **Name/optional/**……..
2. **Organization/optional/**……..……
3. **Your gender**

Male ☐ Female ☐

4. **Your age**

25-29 ☐ 30-39 ☐ 40-49 ☐ 50 years and older ☐

5. **Your educational qualification**

Diploma/Certificate ☐ Bachelor's ☐ Master's ☐ PhD ☐

6. **Your specialization**

Civil Engineering ☐ Architecture ☐ Other ☐

7. **Designation/Official Title/**

Project Manager ☐ Office Engineer ☐ General Forman ☐ Other ☐

8. **Your years of experience in construction projects**

Less than 5 years ☐ (5 – Less than10 years) ☐ (10 – Less than 15 years) ☐
15 years and above ☐

9. **Your company classification according to the Ethiopian Contractors specialization**

GC ☐ BC ☐ RC ☐ SC ☐

Part Two: Competencies of a project management

1. **Does your company defining sets of project management competencies required when hiring a project manager or project team member?**

Yes ☐ No ☐

/If No, Why?……..…/

2. **Which of the following characteristics of an employee are most important for your organization in hiring a project manager or project team member?**

Project management competencies (knowledge, skills and attitudes) ☐

Formal education and qualifications (certificates, licenses, etc.) ☐

Other characteristics (e.g. health, manners, etc.) ☐

Combination of all these factors ☐

3. **How does the lack of particular project management competencies affect the projects performance of your organization?**

Has a significant impact ☐

Has a moderate impact ☐

Has a low impact ☐

Does not affect ☐

4. **Please rank the following project management competencies according to the importance and effect having on the projects performance.**

Technical competencies ☐

Behavioral competencies ☐

Others ☐

/Please specify……..…/

Part Three: Relationship between project management competencies and project success

1. **How should an employee/professional be exposed/learn competencies?**

Experience on site ☐

Mentorship ☐

External courses and learning ☐

Internal courses and learning ☐

Trial and error ☐

2. **Below is list of typical Technical Competency elements that is associated with project management.**

Please rank the practice of competencies in construction projects for project management in project peformance based on their existence.

Scale Value and Description (Existence):

1; Doesn't Exist, 2; Somehow Exists, 3; Neither Exist/Nor Doesn't exist, 4; Exists, 5; Fully Exists

Also please indicate the influence of competencies on Time, Cost and Quality of project performance outputs.

Scale Value and Description (Influence):

1; No influence, 2; Low influence, 3; Moderate influence, 4; High influence, 5; Very high influence

	Competencies	Existence					Influence														
							Time Management					Cost Control					Quality Control				
		1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
1	**Project success criteria**																				
1.1	Understanding objectives within the agreed constraints for overall project success																				
2	**Stakeholders and interested parties**																				
2.1	Identify the sequence and interests of parties important to the project																				
3	**Objectives and Strategies**																				
3.1	Identification, definition and agreement of the project to conform the demand and expectations																				
4	**Risk: threats and opportunity**																				
4.1	Work on lessons learnt in past project has an important contribution to the success of future projects																				
5	**Project quality**																				
5.1	Ensuring set of inherent characteristics fulfils the project requirements																				
6	**Project organization**																				
6.1	Design of appropriate roles, organizational structures and capabilities for the project																				

7	**Teamwork**																			
7.1	Directing and leadership of team making, performing in teams and group heterogeneity																			
8	**Problem solving**																			
8.1	Identifying the problem and its root cause; developing ideas and options for solving the problem																			
9	**Project structures**																			
9.1	Creating hierarchical structures serve to ensure nothing is omitted from the project																			
10	**Product scope**																			
10.1	Defining the deliverable and should deliver all that is described within the scope																			
11	**Project lifecycle and phases**																			
11.1	Establishing major project deliverables and determination those are important for the succeeding stage																			
12	**Schedules**																			
12.1	The structuring, sequencing, duration estimating and scheduling of activities																			
13	**Resources**																			
13.1	Planning, with the designation and assigning of resources with the appropriate acceptable standard																			
14	**Cost**																			

14.1	The process which is mandatory for planning, monitoring, and controlling costs on project life-cycle																				
15	**Procurement and contracts**																				
15.1	Incurring improved value from suppliers of goods or services to the project																				
16	**Configuration management**																				
16.1	Unanticipated occurrences monitored against the original project goals and objectives																				
17	**Project control**																				
17.1	The integrated control of the project																				
18	**Documentation, information and reporting**																				
18.1	Modelling, gathering, selecting, storing and retrieving project data and reporting																				
19	**Communication**																				
19.1	Effective exchange and understanding of information between different parties																				
20	**Performance measurement**																				
20.1	Summary of the project/system																				
21	**Project startup**																				
21.1	Providing the basis for a successful project																				
22	**Project closeout**																				
22.1	Completion of the project																				

1. **Below is list of typical Behavioral competency elements that is associated with project management.**

Please rank the practice of competencies in construction projects for project management in project peformance based on their existence.

Scale Value and Description (Existence):

1; Doesn't Exist, 2; Somehow Exists, 3; Neither Exist/Nor Doesn't exist, 4; Exists, 5; Fully Exists

Also please indicate the influence of competencies on Time, Cost and Quality of project performance outputs.

Scale Value and Description (Influence):

1; No influence, 2; Low influence, 3; Moderate influence, 4; High influence, 5; Very high influence

	Competencies	Existence					Influence														
							Time Management					Cost Control					Quality Control				
		1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
1	**Leadership**																				
1.1	Providing direction/motivating others in their role to fulfil the project's objectives																				
2	**Engagement and motivation**																				
2.1	Making peoples believe in the project and want to be part of it																				
3	**Self-control**																				
3.1	Systematic & disciplined approach to cope with daily work, changing requirements & to deal with stressful situations																				
4	**Assertiveness**																				
4.1	The ability to state your views persuasively & authoritatively																				
5	**Relaxation**																				
5.1	The ability to relieve tension in difficult situations																				
6	**Openness**																				
6.1	To attain others experience they are able to express themselves																				
7	**Creativity**																				
7.1	The ability to think and behave in an inventive and original manner																				
8	**Results orientation**																				

8.1	To concentrate the team's attention on key objectives to obtain the optimum outcome for the parties																			
9	**Efficiency**																			
9.1	The ability to use time and resources effectively to bring out the agreed-up outcome																			
10	**Consultation**																			
10.1	Reasoning, presenting strong argument, listening others, negotiate, and finding solution																			
11	**Negotiation**																			
11.1	Stakeholders means of resolving disagreements concerned with the project																			
12	**Conflict and crisis**																			
12.1	Ways of handling conflicts and crisis																			
13	**Reliability**																			
13.1	Delivering what you have said with the time and quality agreed																			
14	**Values appreciation**																			
14.1	Perceiving intrinsic qualities in different people and realize their standpoint																			
15	**Ethics**																			
15.1	Morally recognized conduct or behavior of an individual																			

Part Four: Measures of project management's efficiency

1. **How do you rate your Project Management's efficiency to support and effect change in your organization?**

Extremely effective ☐

Very effective ☐

Moderately effective ☐

Slightly effective ☐

Not at all effective ☐

2. **Which project management methodology do you use in your organization?**

PMBOK based ☐

PRINCE2 ☐

In-house methodologies ☐

Other ☐

/Please specify……..…/

3. **In your opininion, what is the biggest challenge that a project management faces to develop competencies?**

Technological factor ☐

Ethical factors ☐

External factors ☐

Other ☐

/Please specify……..…/

Part Five: Project success criteria

1. **When should the achievement or success of the project be measured?**

Anytime in the project lifecycle ☐

On Project completion ☐

After the product has been in use ☐

Other ☐

/Please specify……..…/

2. **Relationship between project management success and project success.**

When project management is successful, project is:

Always successful ☐

Generally successful ☐

Someties successful ☐

Rarely successful ☐

No coorelation ☐

3. **The following are lists of Projects performance measuremenet standards.**

To which degree the statements are reflective of project success.

Scale Value and Description (Agreement):

1; Strongly disagree, 2; Disagree, 3; Neither/Nor, 4; Agree, 5; Strongly agree

Standards		1	2	3	4	5
1	Projects meet their operational performance goals					
2	Projects meet their technical performance goals					
3	Projects meet their schedule objectives					
4	Projects stay within budget limits					
5	Project results meet stakeholders expectations					
6	Stakeholders are satisfied with project results					
7	Alignment to Strategic Business Goals					
8	Efficiency of the project management effort					

END

Thank you Again for your time!

Kifleyohannes Daniel

APPENDIX II: AGGREGATED DATA

A. Technical Competency Elements

	Competencies	Weight				Mean				Rank			
			Influence				Influence				Influence		
		Existence	Time	Cost	Quality	Existence	Time	Cost	Quality	Existence	Time	Cost	Quality
1	**Project success criteria**												
1.1	Understanding objectives within the agreed constraints for overall project success	192	191	191	187	4.09	4.06	4.06	3.98	13	8	8	6
2	**Stakeholders and interested parties**					0.00	0.00	0.00	0.00	23	23	23	23
2.1	Identify the sequence and interests of parties important to the project	187	184	177	175	3.98	3.91	3.77	3.72	16	16	20	14
3	**Objectives and Strategies**					0.00	0.00	0.00	0.00	23	23	23	23
3.1	Identification, definition and agreement of the project to conform the demand and expectations	208	195	186	184	4.43	4.15	3.96	3.91	2	6	11	10
4	**Risk: threats and opportunity**					0.00	0.00	0.00	0.00	23	23	23	23
4.1	Work on lessons learnt in past project has an important contribution to the success of future projects	187	175	186	187	3.98	3.72	3.96	3.98	16	22	11	6
5	**Project quality**					0.00	0.00	0.00	0.00	23	23	23	23

5.1	Ensuring set of inherent characteristics fulfils the project requirements	198	178	186	200	4.21	3.79	3.96	4.26	6	21	11	1
6	**Project organization**					0.00	0.00	0.00	0.00	23	23	23	23
6.1	Design of appropriate roles, organizational structures and capabilities for the project	198	195	193	196	4.21	4.15	4.11	4.17	6	6	5	2
7	**Teamwork**					0.00	0.00	0.00	0.00	23	23	23	23
7.1	Directing and leadership of team making, performing in teams and group heterogeneity	204	210	207	193	4.34	4.47	4.40	4.11	3	3	1	3
8	**Problem solving**					0.00	0.00	0.00	0.00	23	23	23	23
8.1	Identifying the problem and its root cause; developing ideas and options for solving the problem	193	479	201	189	4.11	10.19	4.28	4.02	12	1	3	5
9	**Project structures**					0.00	0.00	0.00	0.00	23	23	23	23
9.1	Creating hierarchical structures serve to ensure nothing is omitted from the project	189	180	175	169	4.02	3.83	3.72	3.60	14	18	21	19
10	**Product scope**					0.00	0.00	0.00	0.00	23	23	23	23
10.1	Defining the deliverable and should deliver all that is described within the scope	199	186	191	185	4.23	3.96	4.06	3.94	5	13	8	9
11	**Project lifecycle and phases**					0.00	0.00	0.00	0.00	23	23	23	23
11.1	Establishing major project deliverables and determination those are important for the succeeding stage	188	185	181	170	4.00	3.94	3.85	3.62	15	15	17	18

12	**Schedules**					0.00	0.00	0.00	0.00	23	23	23	23
12.1	The structuring, sequencing, duration estimating and scheduling of activities	209	213	188	182	4.45	4.53	4.00	3.87	1	2	10	11
13	**Resources**					0.00	0.00	0.00	0.00	23	23	23	23
13.1	Planning, with the designation and assigning of resources with the appropriate acceptable standard	197	198	193	173	4.19	4.21	4.11	3.68	8	4	5	17
14	**Cost**					0.00	0.00	0.00	0.00	23	23	23	23
14.1	The process which is mandatory for planning, monitoring, and controlling costs on project life-cycle	194	179	206	174	4.13	3.81	4.38	3.70	11	19	2	15
15	**Procurement and contracts**					0.00	0.00	0.00	0.00	23	23	23	23
15.1	Incurring improved value from suppliers of goods or services to the project	181	189	196	180	3.85	4.02	4.17	3.83	20	9	4	12
16	**Configuration management**					0.00	0.00	0.00	0.00	23	23	23	23
16.1	Unanticipated occurrences monitored against the original project goals and objectives	157	179	178	156	3.34	3.81	3.79	3.32	22	19	19	22
17	**Project control**					0.00	0.00	0.00	0.00	23	23	23	23
17.1	The integrated control of the project	196	198	192	187	4.17	4.21	4.09	3.98	9	4	7	6
18	**Documentation, information and reporting**					0.00	0.00	0.00	0.00	23	23	23	23

18.1	Modelling, gathering, selecting, storing and retrieving project data and reporting	183	183	180	174	3.89	3.89	3.83	3.70	19	17	18	15
19	**Communication**					0.00	0.00	0.00	0.00	23	23	23	23
19.1	Effective exchange and understanding of information between different parties	200	188	183	191	4.26	4.00	3.89	4.06	4	11	15	4
20	**Performance measurement**					0.00	0.00	0.00	0.00	23	23	23	23
20.1	Summary of the project/system	195	186	184	180	4.15	3.96	3.91	3.83	10	13	14	12
21	**Project startup**					0.00	0.00	0.00	0.00	23	23	23	23
21.1	Providing the basis for a successful project	180	189	166	158	3.83	4.02	3.53	3.36	21	9	22	21
22	**Project closeout**					0.00	0.00	0.00	0.00	23	23	23	23
22.1	Completion of the project	184	187	183	168	3.91	3.98	3.89	3.57	18	12	15	20

B. Behavioral Competency Elements

	Competencies	Weight				Mean				Rank			
			Influence				Influence				Influence		
		Existence	Time	Cost	Quality	Existence	Time	Cost	Quality	Existence	Time	Cost	Quality
1	**Leadership**												
1.1	Providing direction/motivating others in their role to fulfil the project's objectives	197	197	196	184	4.19	4.19	4.17	3.91	4	3	3	4
2	**Engagement and motivation**					0.00	0.00	0.00	0.00	16	16	16	16
2.1	Making peoples believe in the project and want to be part of it	179	194	183	181	3.81	4.13	3.89	3.85	10	6	8	6
3	**Self-control**					0.00	0.00	0.00	0.00	16	16	16	16
3.1	Systematic & disciplined approach to cope with daily work, changing requirements & to deal with stressful situations	173	187	182	177	3.68	3.98	3.87	3.77	12	9	9	9
4	**Assertiveness**					0.00	0.00	0.00	0.00	16	16	16	16
4.1	The ability to state your views persuasively & authoritatively	181	183	179	167	3.85	3.89	3.81	3.55	9	11	11	13
5	**Relaxation**					0.00	0.00	0.00	0.00	16	16	16	16
5.1	The ability to relieve tension in difficult situations	158	166	164	159	3.36	3.53	3.49	3.38	15	14	13	15
6	**Openness**					0.00	0.00	0.00	0.00	16	16	16	16

6.1	To attain others experience they are able to express themselves	169	170	164	160	3.60	3.62	3.49	3.40	14	13	13	14
7	**Creativity**					0.00	0.00	0.00	0.00	16	16	16	16
7.1	The ability to think and behave in an inventive and original manner	192	191	187	181	4.09	4.06	3.98	3.85	6	7	6	6
8	**Results orientation**					0.00	0.00	0.00	0.00	16	16	16	16
8.1	To concentrate the team's attention on key objectives to obtain the optimum outcome for the parties	198	455	203	194	4.21	9.68	4.32	4.13	3	1	2	2
9	**Efficiency**					0.00	0.00	0.00	0.00	16	16	16	16
9.1	The ability to use time and resources effectively to bring out the agreed-up outcome	206	211	211	199	4.38	4.49	4.49	4.23	1	2	1	1
10	**Consultation**					0.00	0.00	0.00	0.00	16	16	16	16
10.1	Reasoning, presenting strong argument, listening others, negotiate, and finding solution	173	164	172	170	3.68	3.49	3.66	3.62	12	15	12	12
11	**Negotiation**					0.00	0.00	0.00	0.00	16	16	16	16
11.1	Stakeholders means of resolving disagreements concerned with the project	200	197	191	186	4.26	4.19	4.06	3.96	2	3	5	3
12	**Conflict and crisis**					0.00	0.00	0.00	0.00	16	16	16	16
12.1	Ways of handling conflicts and crisis	194	197	196	176	4.13	4.19	4.17	3.74	5	3	3	10
13	**Reliability**					0.00	0.00	0.00	0.00	16	16	16	16

13.1	Delivering what you have said with the time and quality agreed	183	188	182	184	3.89	4.00	3.87	3.91	8	8	9	4
14	**Values appreciation**					0.00	0.00	0.00	0.00	16	16	16	16
14.1	Perceiving intrinsic qualities in different people and realize their standpoint	176	178	157	173	3.74	3.79	3.34	3.68	11	12	15	11
15	**Ethics**					0.00	0.00	0.00	0.00	16	16	16	16
15.1	Morally recognized conduct or behavior of an individual	190	186	185	181	4.04	3.96	3.94	3.85	7	10	7	6