ADDIS ABABA UNIVERSITY

COLLEGE OF BUSINESS AND ECONOMICS

SCHOOL OF COMMERCE

EVALUATING PROJECT MANAGEMENT MATURITY IN ETHIOPIAN GOVERNMENT CONSTRUCTION PROJECTS:

THE CASE OF CHAKA PROJECT

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June, 2024

Addis Ababa, Ethiopia

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A Project Work Submitted to Addis Ababa University College of Business and Economics, School of Commerce in Partial Fulfillment of the Requirements for the Degree of Master of Arts in Project Management (MAPM)

Advisor: Seifu Mamo (PhD)

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The undersigned have examined the research paper entitled 'Evaluating Project Management Maturity in Ethiopian Government Construction Projects: The Case of Chaka Project' presented by Nardos Ashenafi, a candidate for the degree of Master of Arts in Project Management, and hereby certify that it is worthy of acceptance, that it complies with the regulations of the University, and that it meets the accepted standards with respect to originality and quality.

Signed by the Examining Committee:

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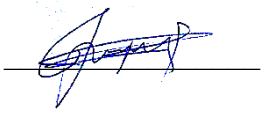
DECLARATION

I, Nardos Ashenafi, declare that this research paper titled "Evaluating Project Management Maturity In Ethiopian Government Construction Projects: The Case Of Chaka Project" is my original work. I have produced this work independently, with the guidance and supervision of my research advisor. Any material borrowed from other sources has been properly acknowledged and referenced according to the guidelines for academic integrity.

Nardos Ashenafi

Signature: 

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Addis Ababa, Ethiopia

CERTIFICATION

This is to certify that Nardos Ashenafi has carried out this project work entitled "Evaluating Project Management Maturity In Ethiopian Government Construction Projects: The Case Of Chaka Project" under my supervision. This work is original in nature and it is sufficient for submission as the partial fulfillment for the award of a Master of Arts degree in Project Management at Addis Ababa University School of Commerce.

Adviser: Dr. Seifu Mamo

Signature: 

Date: Aug 09/2021

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Abstract

This research examines the project management maturity level of the Chaka Project, a significant government-led construction project in Ethiopia. Employing a quantitative approach, the study utilizes the Project Management Body of Knowledge (PMBOK) Guide's ten knowledge areas as a framework for evaluating project management practices. Data was collected through a questionnaire survey administered to a purposively selected population of 81 project team members, representing key individuals with direct involvement and significant experience in project management processes within the project. PM Solutions' Project Management Maturity Model and a five-point Likert scale were employed to assess maturity levels across the ten knowledge areas. Descriptive statistics, including frequency distributions, means, and standard deviations, were used to analyze the data, identifying strengths and areas for improvement within the project's project management practices. The study revealed that the overall average maturity level for the Chaka Project is 3.05, indicating an 'Average' maturity level (Level 3). While this suggests a general understanding and implementation of project management principles, specific areas require further development. Notably, Project Time Management demonstrated a high maturity level, reflecting strong practices in this area. However, the project demonstrated lower maturity in Project Stakeholder Management, indicating a need for significant improvement in engaging stakeholders. This suggests that the project team can enhance its overall performance and contribute to the success of the project by focusing on strengthening stakeholder engagement.

Keywords: Project Management Knowledge Areas, Project Management Maturity, Project Management Maturity Model, Chaka Project

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Acronyms and Abbreviations

EEA	Ethiopian Economic Association
GDP	Gross Domestic Product
IPMA	International Project Management Association
MOUDC	Ministry of Urban Development and Construction
PM	Project Management
PMBOK	Project Management Body of Knowledge
PMI	Project Management Institute
PMMM	Project Management Maturity Model
SPSS	Statistical Package for Social Scientists

CHAPTER ONE
INTRODUCTION

1.1. Background of the Study

The construction industry is credited by the Ethiopian government as a vital economic driver that has a substantial influence on several other sectors. By transforming resources into essential infrastructure, the construction industry contributes to socioeconomic growth. This infrastructure includes but not limited to, buildings, roads, dams, social infrastructure such as healthcare and education facilities, not to forget the aspiration of building a new city. By prioritizing infrastructure development and promoting public-private partnerships, the government aims to stimulate economic growth and job creation, ultimately improving the quality of life for Ethiopians (MoUDC, 2012). Supporting this perspective, (Ofori, 1990) defines the construction industry as an economic activity that includes the planning, designing, acquiring, building or producing, modifying, maintaining, and dismantling of factories, buildings, and the related structures that make up the socioeconomic physical infrastructure.

The Ethiopian construction industry plays a significant role in the nation's economic growth, as evidenced by its contribution to the GDP. A report by the Ethiopian Economic Association highlights that the sector's average share of GDP floated around 5.2%. Notably, construction experienced growth exceeding the overall GDP since (EEA, 2008).

However, despite the industry's potential, (Yimam Hassen, 2011) on his study “Project Management Maturity in The Construction Industry of Developing Countries, The Case Of Ethiopian Contractors” reveals significant challenges. The study found that projects operate in an extremely unstable, irregular, under-resourced, and uncertain/risky environment, resulting in projects that are unfinished, uncontrolled, and unfit to the original plan or goal of the project, and suggested methods of improving project management practices with specific reference to contractors for identified areas of problems. Also, he noted that many projects in developing countries encounter considerable time and cost overruns, with quality issues and fail to realize their intended benefit or even totally terminated and abandoned before or after their completion. Adding to the point, he said “the Ethiopian construction industry shares many of the problems and challenges the industry is facing in other developing countries, perhaps with greater severity.” (Yimam Hassen, 2011)

Moreover, (Werku Koshe, Kumar Neeraj Jha, 2016) further emphasizes the prevalence of these issues, finding that Only 8.25% of Ethiopia's construction projects have been completed by the originally planned schedule. According to this research, the remaining 91.75% missed their contractual deadlines. This is supported by other studies like (Hasan & Jha, 2019) who said Construction projects are known for their lack of following the planned budget and schedule, which can lead to costly delays that negatively impact both project cost and profit margin.

On another study by Tadesse and colleagues showed that the implementation of construction project management practices, including adapting general project management processes, functions, and tools, was deemed inadequate. The practice level regarding safety, risk, and time management was discovered to be unsatisfactory. (Tadesse A, et al, 2016).

Given the complexity and scale (large-scale and mega projects) within the construction sector, it becomes even more crucial to systematically ensure Project management processes to be executed to reach the objectives of mega construction projects (Tesfaye, 2016). A construction project, as any project, is considered successful if it is completed on time, within budget, with high quality, safety, specification compliance, and stakeholder satisfaction. However, achieving all these objectives requires a robust project management approach.

Referring PMBOK, Projects are essential to a country's economic development. They serve as the base for generating capital and maintaining a steady supply of products and services. Project management aims to achieve specific goals such as economic development and capital generation. A project's success is determined by its timely completion, cost-effectiveness, and alignment with the initially established plan (PMI, 2013).

Despite the general principles of project management, (Yimam Hassen, 2011) argued that managing a construction project entails unique variances compared to managing other types of projects. According to him, the variances are primarily due to the nature and attributes of construction projects. Taking into account these variations is crucial for effectively managing construction projects. In contrary, according to (PMI, 2013) Much of the content of PMBOK Guide is also directly applicable to construction projects.

Achieving successful projects requires good project management procedures. Implementing project management practices enables organizations to become more efficient, productive, and competitive in a complex and uncertain environment (PMI, 2017).

The formula for achieving success in project management remains indefinable, and it is unlikely that there is a definitive solution. Success is determined by a variety of factors that can vary between projects and organizations (Rolstadås et al., 2014). Because each project is unique and temporary, it was difficult to establish a universal definition of project success, although it is commonly understood that all projects need to adhere to deadlines, budgets, and quality standards. However, some stakeholders' needs, monitoring criteria, and investment return must be met. Hence, it is up to the project manager to establish the critical factors that determine the success or failure of the project (Egziharia, 2023). And Rodolfo mentioned in project management for development: Definition of Project Success (Rodolfo, n.d.) in order to determine if a project was successful or not, an organization must consider the difference between project success and project management success.

Successful completion of a project is achieved when it is finished as scheduled, meeting quality standards. Nevertheless, evaluating project success proves to be difficult due to the variability and lack of consensus on what constitutes success. Typically, achieving all project goals and meeting expectations is considered a successful project (Senghani et al., 2023). Further, (Kumar et al., 2023) explained that project success is a broad subject and one of the most analyzed topics in project management, yet there is no agreement reached on the steps of successful projects within the construction sector.

In order to establish a strong presence in the construction industry, practitioners need to enhance their construction management by implementing a construction management control system, improving construction planning and organization design, and enhancing the professional skills of construction staff. These measures will optimize project construction management and ultimately enhance the quality of construction projects and obtain economic benefits as stated by (Zhang, 2023).

In order to fully benefit from the construction industry's positive impact on Ethiopia's economy, a strong project management approach is essential. As hinted in the study (Ezzat Othman, 2013) Most developing nations depend on mega construction projects to meet their economic, social, and

environmental goals. However, many of these projects face challenges such as a lack of necessary expertise, inadequate funding, and ineffective project management practices.

However, Recognizing the importance of effective project management is essential in overcoming challenges faced by mega construction projects in developing nations to ensure successful project implementation (Nguyen, 2007). For a project to successfully achieve its desired objectives, it must adhere to specific procedures. Without a structured and scientific approach to project management, organizations will struggle in the arena of institutional development and become unable to face the challenges of the modern age (Wideman, 2009).

Efficient project management involves thorough planning, risk reduction efforts, transparent communication, and efficient allocation of resources. These methods are essential for finishing projects on time, under budget, and meeting the required quality criteria.

This study drives into evaluating the maturity of project management practices employed in the Ethiopian government's latest mega-project, the Chaka development project. Utilizing the Chaka project as a case study, the research aims to understand and assess the effectiveness of the project management maturity of government construction projects. The evaluation will analyze how project management knowledge areas, as defined by the Project Management Institute (PMI, 2017), are utilized within the project.

1.2. Background of the Project

Ethiopia's landscape is marked by historical marvels – from the ancient obelisks of Axum to the intricate rock-hewn churches of Lalibela. These testaments to meticulous planning and skilled project management stand as enduring symbols of the nation's architectural prowess. Today, Ethiopia is embarking on a new chapter of development, aiming to build a future as remarkable as its past. At the heart of this ambition lies the Chaka Project, a massive urban development initiative that promises to transform the country's urban landscape and shape a brighter future for generations to come.

The Chaka Project, envisioned as a new satellite city just outside of Addis Ababa, is set to be Ethiopia's second largest project after the monumental Grand Ethiopian Renaissance Dam (GERD). The scale of this project is staggering, with plans to create a self-contained urban center spanning over 503 hectares of land, stretched from the western part of Entoto (north of 6-Kilo

Road) to Yeka hills (behind Megenagnia) all the way to the hills behind Gurd Sholla a testament to its grand vision. This ambitious undertaking aims to create a vibrant and modern city, offering a high quality of life for its residents while serving as a powerful engine for economic growth.

The Vision and Components of Chaka

The Chaka Project is more than just a construction project; it is a bold vision for Ethiopia's future, a vision that encompasses sustainable development, modern infrastructure, and economic prosperity. To achieve this, the project encompasses a range of crucial components:

A New City Arises: The core of the Chaka Project is the creation of a new satellite city. This city will be a self-contained urban center, complete with residential neighborhoods, commercial zones, and a dynamic mix of public and private spaces. A highlight of this vision is the creation of a new palace, leisure residences and resort villages, hotels, shopping malls, supermarkets, meeting and auditorium halls, artificial lakes, parks, a zoo, and a waterfall. The construction of a new palace, a symbol of national pride, has been widely discussed and is a prominent aspect of the project. The city will also house ministerial office buildings, strategically located to facilitate efficient governance. The project's emphasis on creating a thriving, self-sufficient community reflects a vision for a modern and sustainable urban environment.

Addressing the Housing Crisis: A critical component of the Chaka Project is the construction of numerous affordable housing units for diverse income levels. This addresses one of Ethiopia's in general and Addis Ababa’s in specific most pressing challenges – the shortage of adequate and affordable housing. The project's commitment to providing housing solutions for different communities speaks to its inclusive vision for urban development.

A Legacy of Modern Infrastructure: The Chaka Project aims to construct a new city that boasts state-of-the-art infrastructure. This includes a network of modern roads and transportation systems stretching over 29 km to facilitate efficient movement within the city and beyond. A cable transportation system will also be part of the city's infrastructure. The project also emphasizes access to essential services like water and sanitation facilities, ensuring the city's long-term sustainability. Additionally, the city will have dams to be self-sufficient in power.

Sustainable Living in Green Spaces: The project developers recognize the importance of environmental sustainability and quality of life. They have incorporated extensive green spaces,

parks, and recreational areas into the city's design. This commitment to a green urban environment will enhance the quality of life for residents and promote a healthy and sustainable lifestyle.

Aspirations and Significance

The Chaka Project is a monument to Ethiopia's ambitions for a brighter future, striving to create a city that:

Offers a High Quality of Life: The project aims to provide residents with a modern, sustainable, and livable environment, with amenities and green spaces that enhance their quality of life.

Stimulates Economic Development: The project is expected to create new employment opportunities and attract investment, driving economic growth and contributing to Ethiopia's national development goals. The project is estimated to cost around 900 billion birr to complete, showcasing its significant economic impact.

Showcases Innovative Urban Planning: The project's emphasis on green spaces, public transportation, and sustainable development practices showcases a commitment to modern and innovative urban planning. The project aspires to be a futuristic green city, certified by the UN's sustainable development goals, attracting tourists and providing a model for sustainable urban development. (UN, 2015)

Positions Ethiopia as a Regional Hub: The Chaka Project has the potential to position Ethiopia as a regional hub for investment and innovation, attracting global attention and fostering economic growth. The project's vision to become a resident city for 1 million people, planned to last for the next 20 generations, highlights its long-term vision for a sustainable and thriving urban center.

1.3. Statement of the Problem

The Ethiopian construction industry is a key driver of economic growth, but projects often face significant challenges, including delays, cost overruns, and quality issues. These challenges are particularly pronounced in government-led mega-projects, which demand meticulous planning, effective stakeholder engagement, and robust risk mitigation strategies.

Project Management faces significant challenges in developing countries (Yimam, 2011). These countries often lack the robust infrastructure, advanced technology, and stable institutions needed for effective project implementation. Scarce resources, unreliable communication, and

bureaucratic hurdles further hinder progress. Additionally, high employee turnover, political instability, and a lack of accountability create an environment where PM struggles to flourish. This stands in stark contrast to developed countries, where robust infrastructure, advanced technology, and political stability provide a fertile ground for Project Management to flourish.

However, these ideal conditions are often absent in developing countries, leading to unique challenges for project management. The Ethiopian construction industry, in particular, exemplifies this situation, as research suggests that PM maturity within Ethiopian construction companies remains relatively low. Some companies utilize informal PM practices, while others have adopted more formal approaches, but widespread adoption remains limited. Consequently, many construction projects in Ethiopia experience schedule delays and budget overruns. These issues stem not only from challenging working environments but also from inadequate internal integration and management of essential PM knowledge areas. While achieving high PM maturity does not guarantee project success, failing to effectively utilize key PM principles directly contributes to project execution failure. (Ibid)

Several mega-projects in Ethiopia have faced challenges, underscoring the critical need for effective project management. The Sugar Corporation's projects, intended to boost sugar production, have experienced significant delays and cost overruns, raising concerns about their feasibility and economic viability (Ayele, S., & Mengistu, A, 2019). Similarly, the delayed completion of the Addis Ababa Light Rail Transit system, while operational, has highlighted the complexities of managing large-scale infrastructure projects in a rapidly developing urban environment (Getachew, B, 2018). These examples demonstrate the significant economic and social consequences of inadequate project management practices in government-led construction projects.

Project management maturity, defined as the level of sophistication and effectiveness of an organization’s project management practices, plays a crucial role in achieving project success (Kerzner, 2017; Crawford, 2011). Mature project management organizations typically have a clear and consistent approach to planning, executing, and delivering projects, resulting in a higher likelihood of successful outcomes (Andersen & Jessen, 2003; Jaroslaw, 2014). Recent studies have shown a strong correlation between project management efficiency and project success, highlighting that effective practices are crucial for mitigating risks and achieving project objectives

(Serrador and Turner, 2015). However, research indicates that project management maturity within the Ethiopian construction industry remains relatively low, with many organizations relying on informal practices and lacking standardized procedures (Yimam, 2011; Saron, 2020). This is particularly important in developing countries like Ethiopia, where resource constraints and skill shortages can exacerbate project management challenges (PMI, 2017).

The Chaka Project, envisioned as Ethiopia's second largest construction project, presents a prime example of this challenge. Despite recent announcements indicating improved project management practices (FBC, 2024), the project's substantial budget and high stakeholder interest underscore the importance of ensuring its success.

Research on project management maturity in Ethiopia, particularly within the context of government construction projects, remains limited. Existing studies have predominantly focused on the private contractors, real estates, banks, NGOs and IT related projects. This gap underscores the necessity for targeted research that can provide insights into the current state of project management maturity and offer actionable recommendations for improvement.

This limited research base hinders efforts to develop effective strategies for enhancing project management practices and achieving successful outcomes in this vital sector. Therefore, this study seeks to investigate the maturity of project management practices specifically within the context of the Chaka Project, a government-led construction initiative. By analyzing the project's performance across the ten PMBOK knowledge areas, this research aims to identify both successful practices and areas for improvement, providing valuable insights for enhancing project management in Ethiopian government construction and similar contexts.

1.4. Research Question

1) To what extent and how maturely are the project management knowledge areas being practiced in Chaka project?
2) What are the major challenges encountered in implementing project management practices within the Chaka project?
3) What is the level of Chaka's Project maturity when compared to the industry benchmark in African context?

1.5. Research Objective

1.5.1. General Objective

The general objective of this study is to evaluate the project management maturity level of Chaka project,

1.5.2. Specific Objectives

The study aims to address the following specific objectives:

1) To evaluate the extent and maturity of project management knowledge areas within the Chaka project.
2) To identify the major challenges of project management practices encountered during the implementation of Chaka project.
3) To compare project management maturity of Chaka project with industry benchmark in African context.

1.6. Significance of the Study

This research explores the maturity of project management practices and associated challenges within the Chaka project, a construction project currently underway in Addis Ababa. By examining the project's performance across the ten PMBOK knowledge areas, the study aims to identify both successful practices and areas for improvement. The findings will offer significant value to a range of stakeholders directly and indirectly involved in the Chaka project and similar construction initiatives in Ethiopia.

The study will provide valuable insights for project managers, engineers, contractors, and other team members. By identifying strengths and weaknesses in current practices, the research can guide efforts to refine strategies, enhance effectiveness, and improve project outcomes.

The research findings will offer valuable insights for government agencies responsible for supervising and overseeing large-scale construction projects. This knowledge can support the development of policies, guidelines, and support mechanisms to enhance project success and address common challenges.

The study will also serve as a valuable asset for students and researchers interested in project management, particularly within the construction sector. It will contribute empirical data and

analysis on project management maturity within a government construction project, bridging a gap in existing research. The study's findings can also serve as a foundation for future research exploring the complexities of project management within the Ethiopian construction industry and developing more effective strategies for managing these projects.

1.7. Scope of the Study

This research focuses on assessing the maturity of project management practices within the Chaka project, a significant government-led construction project in Ethiopia. The study employs the framework of the ten knowledge areas outlined in the Project Management Body of Knowledge (PMBOK) Guide (PMI, 2017) to evaluate the project's level of maturity across these key domains.

The study's primary focus is on examining the application of these project management practices from the perspective of the contractor and the consultant directly involved in the project. It does not extend to other aspects of the project, such as the role of government agencies, the perspectives of local communities, or the project's overall financial performance.

This study utilizes a descriptive research design to provide a comprehensive snapshot of current project management practices within the Chaka Project. Data was collected through questionnaire, i.e., quantitative data to a purposive sample of contractors and consultants involved in the project. This methodological scope allows for a robust assessment of the maturity of project management practices to gain a good understanding of the current state of project management within the Chaka Project.

Furthermore, this research is limited to a snapshot of project management practices at a specific point in time. It does not explore into historical trends or the evolution of project management within the Chaka project. The study aims to provide an objective assessment of the project's current state of project management maturity based on the collected data.

1.8. Limitation of the Study

Several limitations inherent in the study's design and data collection methods may affect the generalizability of the findings. Due to the sensitivity and high public/media interest surrounding the Chaka project, access to certain confidential information was restricted. Confidential files, including the project's detailed budget, scope, and internal documents, were not available for review. This limitation restricts the depth of analysis possible in certain areas of the study.

Additionally, the study's sample, composed of project team members from the contractor and consultant, may not be fully representative of all individuals involved in the project, potentially limiting the generalizability of the findings to other project stakeholders. As with any research involving human subjects, there's a possibility of response bias and social desirability bias influencing the data collected through questionnaires. Participants may have provided responses they perceived as more favorable or aligned with expected norms, potentially affecting the accuracy and objectivity of the findings. Furthermore, the study's reliance on the PM Solutions' PMMM, a single-dimensional model focusing solely on knowledge areas, may not fully capture the complexity of project management maturity within the Chaka project. This model may not adequately address implicit knowledge, intangible assets, or the influence of organizational factors beyond the ten knowledge areas. Finally, the study's cross-sectional design, focusing on a snapshot of project management practices at a specific point in time, limits the ability to examine historical trends or the evolution of project management within the Chaka project. This limitation restricts the analysis of long-term impacts or the identification of patterns over time.

1.9. Organization of the Study

This paper is structured into five distinct chapters, each contributing to understanding of the topic. Chapter one lays the groundwork by providing an introduction to the research topic, outlining the background, problem statement, research questions, objectives, significance, scope, and limitations of the study. Chapter two explores into the existing literature on project management, encompassing theoretical foundations, empirical studies, and the identification of research gaps, concluding in the development of a conceptual framework. Chapter three details the research methodology employed in this study. It outlines the research design and approach, specifies the types of data collected, and describes the sources and methods used for data collection. Chapter four presents the results of the data analysis and interpretation. This chapter summarizes the key findings and provides an interpretation of their implications. Finally, Chapter five concludes the work by summarizing the main findings, drawing conclusions based on the research, and presenting recommendations for improving project management practices within and/or similar projects. Additionally, this chapter suggests areas for further research to expand up on.

CHAPTER TWO
RELATED LITERATURE REVIEW

2. Theoretical Literature Review

2.1. Project and Project Management

The concept of a project, while seemingly straightforward, has garnered diverse interpretations and definitions from experts across various disciplines. This multiplicity reflects the multifaceted nature of projects, encompassing unique objectives, timelines, resource constraints, and stakeholder involvement. At its core, a project represents a temporary endeavor undertaken to create a distinct product, service, or outcome (PMI, 2013). This inherent temporality distinguishes projects from ongoing operations, as they possess a defined beginning and end point, driven by the achievement of specific goals.

Delving deeper into the essence of projects, Turner and Muller (2003) posit that they involve the novel organization of human, material, and financial resources to accomplish a unique scope of work within established cost and time constraints. This perspective underscores the element of innovation and the strategic allocation of resources inherent in project execution. Furthermore, projects are often characterized by their complexity, requiring the coordinated efforts of various professionals and departments to achieve successful outcomes (Larson & Gray, 2011).

Project management emerges as the guiding force that navigates the complexities of project execution, ensuring the efficient and effective utilization of resources to achieve desired objectives. The PMBOK Guide defines project management as the application of knowledge, skills, tools, and techniques to project activities to meet project requirements (PMI, 2017). This encompasses a wide array of functions, including planning, organizing, leading, and controlling project activities, all aimed at delivering the project on time, within budget, and to the specified quality standards.

Various experts have offered their perspectives on the core principles and practices of project management. The PMBOK Guide emphasize the implementation of skills, tools, knowledge, and techniques to achieve project objectives within defined parameters. Robert K. Wysocki (2014) highlights the importance of addressing key questions during project management, such as defining project goals, resource requirements, team responsibilities, execution strategies, success metrics, and overall performance evaluation. He further emphasizes the crucial role of client involvement in achieving project objectives and delivering business value.

The Investopedia team (2021) defines project management as the practice of planning, organizing, and managing resources to make continuous progress toward project completion and goal attainment. This perspective underscores the dynamic nature of project management, requiring constant adaptation and adjustment to maintain progress and overcome challenges. Moreover, project management is not solely concerned with resource allocation but also with managing constraints, including time, cost, quality, and scope. These constraints are interdependent, and any changes in one area necessitate adjustments in others to maintain project equilibrium.

Charvat (2003) further emphasizes the role of project management in navigating constraints, defining it as a set of tools, techniques, and knowledge applied to meet estimated limitations. The concept of the "scope triangle"(Figure 1) as presented by Wysocki (2014) illustrates the interrelationship between time, cost, and quality, highlighting the need for careful balance and trade-offs to achieve project success.

Figure 1The scope triangle by Robert K. (2014)

Effective project management is essential throughout the entire project lifecycle, from initiation to closure. It provides a structured framework for project execution, guiding resource utilization, decision-making, and progress tracking (Yarbrough, 2021). Each phase of the project lifecycle can be considered a mini-project, requiring diligent application of project management principles to ensure a smooth and successful transition from one phase to the next (Simplilearn, 2023). Failure to implement effective project management can lead to chaos, resource mismanagement, and ultimately, project failure.

The PMBOK Guide identifies project management process groups and knowledge areas as the fundamental building blocks of project management. Process groups represent a series of actions necessary to achieve project objectives, while knowledge areas encompass the specific expertise

required for effective project management. While process groups focus on the "doing" aspect of project management, knowledge areas represent the "knowing" aspect, providing project managers with the necessary skills and understanding to navigate complex project environments.

2.2. Evolution of Project Management

The roots of modern project management can be traced back to the Industrial Revolution, a period marked by rapid economic growth and large-scale engineering and construction projects (Abbasi & Al-Mharmah, 2000). This era demanded new tools and techniques to organize and manage complex projects across diverse locations. The development of network analysis and planning techniques, such as the Program Evaluation and Review Technique (PERT) and the Critical Path Method (CPM), played a pivotal role in addressing this need, providing structured approaches to project scheduling and resource allocation.

During the 1960s, the focus shifted towards integrating general management theories into project management practices. This included adopting a systems approach, recognizing the interdependence of project components and the importance of organizational factors such as differentiation and integration (Morris, 1994). The latter part of the decade witnessed a transition from a narrow focus on scheduling and organizational aspects to a more comprehensive understanding of project management, encompassing various knowledge areas and process groups. The construction industry, in particular, readily embraced techniques like PERT and CPM, recognizing their value in planning and controlling complex construction projects (Crawford et al., 2005). This era also saw the establishment of prominent professional associations, including the International Project Management Association (IPMA) and the Project Management Institute (PMI), further solidifying the recognition of project management as a distinct profession.

The 1970s marked a shift towards emphasizing teamwork and collaboration in project management. Shenhar (as cited in Crawford et al., 2006) identified teamwork as a defining characteristic of this period, highlighting the importance of effective communication and coordination among project team members. Additionally, the concept of work breakdown structures gained prominence, providing a hierarchical framework for decomposing project activities into manageable units (Stretton, as cited in Crawford et al., 2006).

Project management continued to mature as a discipline during the 1980s, with a growing emphasis on project organization, risk management, and external influences (Crawford et al., 2006). This period witnessed the integration of diverse experiences and practices into a cohesive set of principles applicable across various industries and project types. As Stretton (1994b) notes, the 1980s represented a period of consolidation and standardization, leading to the development of international standards for project management. These standards provided a common framework and language for project management professionals worldwide, promoting consistency and best practices across projects and organizations.

Summarizing, the evolution of project management reflects a journey from simple tools and techniques to a comprehensive and well-defined discipline. From its early roots in the Industrial Revolution to the establishment of professional associations and international standards, project management has continuously adapted to meet the growing complexity and demands of modern projects. The emphasis on teamwork, risk management, and stakeholder engagement underscores the evolving nature of the field and its recognition of the multifaceted challenges inherent in project delivery.

2.3. Project Success

Defining project success is a complex endeavor, often contingent on the unique expectations and perceptions of various stakeholders involved. Traditionally, the "iron triangle" or "triple constraint" of time, cost, and quality has served as the primary metric for project success (Kerzner, 2009). However, this narrow view fails to encompass the broader aspects of project outcomes, such as customer satisfaction, business value, and organizational impact.

While adhering to schedule and budget constraints remains crucial, these factors alone do not guarantee project success (Prabhakar, 2008). Quality plays a vital role, encompassing both technical performance and alignment with stakeholder expectations (Turner, 2009). Project success extends beyond mere completion within time and budget constraints; it requires meeting the intended purpose and delivering value to stakeholders.

Kerzner (2009) proposes an expanded definition of project success, encompassing factors such as customer acceptance, minimal scope changes, and alignment with organizational workflows and

culture. Additionally, successful projects should facilitate commercialization, enhance operational efficiency, and maintain ethical conduct and corporate reputation.

The Project Management Institute (PMI, 2013) provides a comprehensive framework for evaluating project success, encompassing constraints related to scope, time, cost, quality, resources, and risk. Furthermore, project success is influenced by various factors, including project management practices, business alignment, decision-making processes, human resources, stakeholder engagement, and communication strategies (Ozguler et al., 2015).

However, defining project success remains a subject of ongoing debate due to the inherent uniqueness and temporality of projects (Roseke, 2018). While meeting time and budget targets is important, true project success hinges on fulfilling stakeholder expectations and achieving the intended purpose (Siles, 2023).

Koch (2022) differentiates between two key concepts: project success and project management success. Project success focuses on stakeholder satisfaction and the realization of project benefits, encompassing the achievement of objectives, scope, and goals. Project management success, on the other hand, emphasizes efficiency and adherence to constraints within the project lifecycle, ensuring delivery within time, budget, and quality parameters.

Baccarini and Collins (2004) further elaborate on these concepts, identifying three criteria for each:

Project Success:

- ✓ Meeting the project owner's strategic organizational objectives
- ✓ Satisfying users' needs
- ✓ Satisfying stakeholders' expectations related to the project's outcomes

Project Management Success:

- ✓ Meeting time, cost, and quality objectives
- ✓ Ensuring the quality of the project management process
- ✓ Satisfying stakeholders involved in the project management process

The temporal dimension also plays a significant role in evaluating project success. Some projects initially deemed failures may ultimately be recognized as successes over time, highlighting the

long-term nature of project impact (Martin & Xu, 2017). Conversely, project management success is often evaluated in the short term, focusing on immediate delivery and adherence to constraints.

Project management effectiveness, as defined by Wideman (2002), refers to the quality of achieving project objectives and meeting stakeholder expectations. Shenhar et al. (2001) acknowledge that while time and budget goals are commonly used to assess project success, these criteria may not be universally applicable. Lewis (2005) emphasizes the importance of understanding the project's intended purpose and deliverables to effectively measure success.

The traditional "iron triangle" of time, cost, and quality provides a limited view of project success. Incorporating additional dimensions, such as the quality of the management process, integration, scope, communication, risk, and stakeholder management, offers a more holistic perspective (Baccarini, 1999; Schwalbe, 2004). This aligns with the PMBOK framework, which emphasizes the ten knowledge areas of project management as essential components for achieving project success.

Effective project management plays a crucial role in navigating the unpredictable business environment and ensuring project success. By effectively managing constraints, engaging stakeholders, and focusing on both project outputs and outcomes, project managers can contribute significantly to achieving organizational objectives and delivering lasting value.

2.4. Project Management Maturity

Project management maturity is a measure of how well an organization manages its projects. It's essentially the level of sophistication and effectiveness of their project management practices. A mature project management organization typically has a clear and consistent approach to planning, executing, and delivering projects, resulting in a higher likelihood of successful outcomes (Crawford, 2007; Kerzner, 2017; Prado, 2011).

In simpler terms, a mature project management organization has figured out how to do things right and consistently, leading to better project results. This maturity is often reflected in the use of standardized methodologies and processes, allowing the organization to achieve its goals more effectively (Andersen & Jessen, 2003; Jaroslaw, 2014; Mateen, 2015).

Project management maturity signifies a company's potential for improvement in its project management capabilities. It reflects the depth and effectiveness of their project management

processes and how consistently these processes are applied across all projects. A mature organization has established, well-defined practices that are consistently followed, leading to more efficient and successful project outcomes (Crawford, 2011).

Project management maturity is essential for company success because it directly impacts how well projects are managed. This means understanding and improving project management skills and knowledge is crucial. The goal is to develop the organization's ability to manage projects effectively. Maturity models can help assess the current state of project management within an organization and identify areas for improvement (Ferreira & Pereira, 2015). Organizations that cultivate a culture of continuous improvement and have mature project management practices in place are more likely to deliver successful projects (Crawford, 2011).

Sarshar et al. (2000) compared mature and immature construction organizations by adapting the work of Paulk et al. (1993). They found that mature construction organizations have a strong, organization-wide ability to manage design, construction, and maintenance activities. Their processes are clearly communicated to all employees, and work is performed according to these planned processes. These processes are effective, consistent with how work is actually done, and clearly define roles and responsibilities across all projects. In contrast, immature construction organizations rely heavily on improvisation, with project managers and practitioners often developing processes on the fly. Even when processes are defined, they are not consistently followed or implemented. These organizations often react to problems rather than proactively managing them, and quality assurance and reviews are often cut short when projects fall behind schedule, making it difficult to predict the quality of the final product.

While the concept of a fully mature organization is often discussed, it's important to recognize that in reality, achieving absolute maturity is highly unlikely. Andersen and Jessen (2002) argue that the idea of a perfectly mature organization is a theoretical ideal, and that in practice, no organization has ever fully reached this stage, nor is it likely that any organization ever will.

2.5. Project Management Maturity Models

Project management maturity models are used to assess the level of maturity an organization has achieved in its project management practices. These models emerged in the 1990s, inspired by the

Capability Maturity Model Integration (CMMI) model developed by Carnegie Mellon University and the Systems Engineering Institute (SEI) for software development.

Maturity models offer organizations a framework for enhancing their performance across various business areas. When applied to project management, maturity models create the optimal conditions for effectively managing projects (Prado, 2011).

Kerzner (2009) argues that the Project Management Maturity Model (PMMM) provides the foundation for achieving excellence in project management. A maturity model offers a structured framework with different levels of capability. Organizations can use this framework to objectively assess their current project management capabilities. It also provides a clear target for development programs by outlining the next level of capability the organization can strive for.

Crawford (2002) highlights several benefits of using a Project Management Maturity Model (PMMM) within an organization. These benefits include determining the current maturity level of the organization's project management processes, creating a clear roadmap for improvement, prioritizing short-term actions to enhance processes, tracking progress against the organization's project management plan, and fostering a culture of excellence in project management.

2.5.1. Project Management Maturity Levels

Project management maturity models offer a structured approach to assessing and enhancing an organization's project management capabilities. These models typically outline distinct maturity levels, each representing a progressive stage in the development of project management practices. For instance, the widely used five-level model encompasses initial, repeatable, defined, managed, and optimizing levels, providing a clear roadmap for continuous improvement (Cooke-Davies & Arzymanow, 2003; Pretorius et al., 2011). However, it's important to note that the transition between these levels may not be uniform, requiring varying levels of effort and change, as observed by Grant & Pennypacker (2006).

The maturity level of an organization's project management can be evaluated through various methods, including questionnaires, interviews, and the review of project artifacts. These assessments help identify strengths and weaknesses, allowing organizations to prioritize areas for improvement and develop targeted initiatives. Each maturity level represents a milestone in the evolution of project management practices, ultimately contributing to more consistent and

effective project outcomes (Kerzner, 2001). The journey toward greater maturity often involves significant changes that occur gradually, requiring a commitment to continuous improvement (Crawford, 2002; Jugdev & Thomas, 2002).

Ultimately, assessing the project management maturity level of an organization provides valuable insights into its ability to manage projects successfully. By identifying strengths and weaknesses, organizations can develop targeted improvement initiatives and ultimately enhance their project management capabilities and performance.

2.5.2. Limitations of PMMMs

Project Management Maturity Models (PMMMs) have been subject to criticism for various shortcomings. Jugdev and Thomas (2002) provide a comprehensive critique, highlighting that PMMMs often fail to adequately address implicit knowledge and intangible assets within organizations. They focus primarily on tangible assets such as templates, manuals, and surveys, neglecting the "know-how" crucial for achieving higher maturity levels. Moreover, PMMMs are criticized for their inflexibility in adapting to changing needs and for their tendency to focus on problem identification rather than offering solutions.

The five-level framework is deemed insufficiently rough for accurately measuring progress over time. Additionally, the overemphasis on standardized project management methodologies can make them overly rigid and impractical, potentially creating a sense of overwhelming complexity. From a theoretical standpoint, there is a lack of empirical evidence to support the claim that specific competencies are the primary drivers of project success. Furthermore, PMMMs are criticized for their lack of sustainability in creating a competitive advantage, often leading to temporary or parity-based advantages rather than enduring differentiation.

Despite the acknowledged limitations of Project Management Maturity Models (PMMMs), many scholars believe they have made a significant contribution to the field. Jugdev and Thomas (2002) argue that PMMMs have raised awareness about the importance of project management competencies and provide a foundational framework for assessing organizations and their project management maturity.

2.5.3. Project Management Maturity Models

Project management maturity models aim to provide a roadmap for organizations to continuously improve their project management systems and processes. These models allow organizations to assess their current capabilities and identify areas for growth. While there are various maturity models available, they differ in their underlying concepts and recommendations for achieving maturity (Yimam, 2011). Some of the models relevant to this research are outlined below.

2.5.3.1. Capability Maturity Model (CMM)

The Capability Maturity Model (CMM), developed by the Software Engineering Institute (SEI) at Carnegie Mellon University, was the first project management maturity model (PMMM). Introduced in 1991, the CMM was initially designed to assess the capabilities of software contractors for contract awarding and administration. It has since been used to enhance software development processes and has been applied to other areas as well. The CMM defines five maturity levels, each characterized by specific process capabilities, objectives, and practices (Paulk et al., 1993; Sarshar et al., 2000).

The five maturity levels of the CMM are:

- ✓ **Initial Level 1:** This level represents an ad hoc and often chaotic approach to project management, with limited defined processes and success heavily reliant on individual efforts. There's a lack of a supportive environment for software development, and planned procedures are often abandoned during crises.
- ✓ **Repeatable Level 2:** Basic project management processes are established to track functionality, schedule, and cost. There's a focus on repeating successful approaches from previous similar projects. Policies and procedures for managing projects are established, and new projects are planned based on past experiences.
- ✓ **Defined Level 3:** This level involves the development of a standardized software process for the organization, with documented, standardized, and integrated management and engineering activities. All projects utilize a tailored version of this standardized process for development and maintenance.
- ✓ **Managed Level 4:** The organization collects detailed data on product quality and software processes, enabling quantitative understanding and control. This level involves an

organization-wide database for collecting and analyzing data from defined software processes.

- ✓ **Optimizing Level 5:** Continuous process improvement is driven by quantitative feedback and the piloting of innovations. The focus is on identifying weaknesses and strengthening the process to minimize defects.

The CMM provides a framework for organizations to assess their project management maturity and chart a path for continuous improvement.

2.5.3.2. Capability Maturity Model Integrated (CMMI)

The Capability Maturity Model Integration (CMMI) evolved from the earlier Capability Maturity Model (CMM), combining elements from various disciplines. Published in 1993, CMMI aimed to enhance software development processes (de Souza & Gomes, 2015; Yimam, 2011). Research indicates that CMMI is the most frequently used project management maturity model by researchers, particularly within the Information Technology industry (de Souza & Gomes, 2015).

CMMI offers two approaches to process improvement: staged and continuous. The staged approach provides a structured path for organizations to implement process areas in a specific order, moving from the initial level to the optimizing level. In contrast, the continuous approach offers greater flexibility, allowing organizations to select specific process areas for improvement and progress at varying rates (Ahern et al., 2008; Yimam, 2011).

The continuous representation model defines six capability levels, each characterized by specific Generic Goals and Practices. Each process area is also defined by its own Specific Goals and Practices. A process area attains a specific capability level when it meets all its specific goals, as well as the generic goals of the corresponding capability level (Ahern et al., 2008). These capability levels are described as follows:

- ✓ **Level 0**: Incomplete Process: A process that is partially performed or not performed at all, with specific goals unmet.
- ✓ **Level 1:** Performed Process: A process that completes the work necessary to produce a product, meeting the specific goals defined for each process area.
- ✓ **Level 2**: Managed Process: A performed process with basic tools to support its execution. It is planned and executed according to policy, involves relevant stakeholders, uses skilled personnel, produces controlled outputs, and is evaluated against its process description.

- ✓ **Level 3:** Defined Process: A managed process that is tailored according to organizational standards, has a maintained process description, and contributes to process improvement.
- ✓ **Level 4:** Quantitatively Managed Process: A defined process with quantitative or statistical control over attributes like product and service quality, and process performance. Sub-processes are also statistically managed.
- ✓ **Level 5:** Optimizing Process: A quantitatively managed process adapted to meet business objectives. It focuses on innovative and incremental improvements to process performance, identifying and addressing problems related to common causes of process variation and defects.

The CMMI provides a comprehensive framework for organizations to assess their project management maturity and develop strategies for continuous improvement.

2.5.3.3. Kerzner's Project Management Maturity Model (K-PMMM)

The Kerzner Project Management Maturity Model (K-PMMM), developed by Harold Kerzner, is outlined in his 2001 book. Like many other maturity models, K-PMMM consists of five levels, each characterized by specific traits, roadblocks, risks, and actions necessary for advancement (Kerzner, 2001). Each level also includes an assessment instrument, tailored to the specific characteristics of that stage. The five levels of K-PMMM are:

- ✓ **Level 1 (Common Language):** The organization acknowledges the importance of project management and understands its basic principles and terminology. However, there's a lack of executive support, sporadic use of project management practices, limited recognition of benefits, and no investment in project management training. Achieving this level involves acquiring fundamental knowledge of project management principles.
- ✓ **Level 2 (Common Processes):** The organization recognizes the need for standardized processes that allow for the replication of successful projects. This level includes organizational support, recognition of the benefits of project management, a need for processes and methodologies, acknowledgment of cost control, and the development of a project management training plan.
- ✓ **Level 3 (Singular Methodology):** The organization emphasizes the integration of various methodologies into a unified approach, with project management at the core. This level involves integrated processes, a collaborative culture, management support, guidelines and

checklists rather than rigid procedures, financial benefits from training, and a focus on behavioral excellence.

- ✓ **Level 4 (Benchmarking):** The organization recognizes the need for continuous process improvement to maintain a competitive advantage. Benchmarking is implemented, comparing the organization's performance to others, both qualitatively and quantitatively. This level includes the establishment of a project office.
- ✓ **Level 5 (Continuous Improvement):** The organization continuously evaluates benchmarking information to enhance its unified methodology. Lessons learned from projects are documented and shared, and strategic project management planning is an ongoing process.

K-PMMM provides a framework for organizations to assess their project management maturity, identify areas for improvement, and progress towards a more integrated and effective approach to project management.

2.5.3.4. PM Solutions' Project Management Maturity Model

The PM Solutions' Project Management Maturity Model (PMMM), developed by Crawford (2002), combines elements from the Project Management Body of Knowledge (PMBOK) and the Capability Maturity Model (CMM). It utilizes the five levels of maturity from the CMM and breaks down each PMBOK knowledge area into key components. The model's primary focus is on assessing the maturity of these components, providing a comprehensive view of an organization's project management capabilities.

The PM Solutions' PMMM emphasizes the influence of management oversight, the project office, and professional development in adapting project management practices. Assessment strategies for the model include personal or group interviews, artifact collection and evaluation, widespread surveys, and benchmark comparisons to established standards (Crawford, 2002).

The five maturity levels of the PM Solutions' PMMM are described as follows:

- ✓ **Level 1:** Initial Process: This level is characterized by ad hoc processes, limited management awareness of the need for project management, a lack of established practices or standards, and loose documentation.

- ✓ **Level 2:** Structure Process and Standards: Basic processes are established, but they may not be standardized across all projects. Management supports and encourages the use of project management. Information is a mix of intermediate and summary levels. Estimates and schedules are based on expert knowledge and generic tools, with a primarily project-centric focus.
- ✓ **Level 3:** Organizational Standards and Institutionalized Process: All processes are standardized and repeatable across all projects. Management has formally documented and institutionalized standards and processes. Information is detailed and summarized. Baselines and informal collections of actuals are used. Estimates and schedules may be based on industry standards and organizational specifics, with a greater focus on organizational considerations. Informal analysis of project performance is conducted.
- ✓ **Level 4:** Managed Process: Processes are integrated with corporate processes, and management mandates compliance. Management adopts an organizational entity view, and project performance is analyzed in depth. Estimates and schedules are usually based on organization-specific standards. Management uses data to make decisions.
- ✓ **Level 5:** Optimizing Process: Processes are in place to measure project effectiveness and efficiency and improve project performance. Lessons learned are regularly examined and used to enhance project management processes, standards, and documentation. Management focuses on continuous improvement.

The PM Solutions' PMMM provides a framework for organizations to assess their project management capabilities, identify areas for improvement, and build a more robust and effective project management system.

2.5.3.5. Organizational Project Management Maturity Model (OPM3)

The Organizational Project Management Maturity Model (OPM3), developed in 2003 by the Project Management Institute (PMI), provides a comprehensive framework for assessing and improving an organization's project management capabilities. OPM3 is structured around three core elements: knowledge, assessment, and improvement (PMI, 2013).

The knowledge element outlines a set of best practices for organizational project management, encompassing project, program, and portfolio management. The assessment element offers a methodology for comparing an organization's practices against these best practices. Finally, the

improvement element guides organizations in making necessary changes to enhance their project management processes.

Unlike many other PMMMs, OPM3 does not define specific maturity levels in a linear progression. Instead, it offers a multi-dimensional perspective on maturity, assessing an organization's progress from various angles (PMI, 2013). These dimensions include:

Process Improvement Stages: This dimension evaluates the implementation of best practices across five stages:

- ✓ **Level 1 (None):** The practice does not exist.
- ✓ **Level 2 (Standardize):** Standardized processes are documented and communicated, but only used on a limited number of projects.
- ✓ **Level 3 (Measure):** Standardized processes are implemented across all projects, and effectiveness is evaluated through measurement.
- ✓ **Level 4 (Control):** Processes are analyzed to correct poor application of standardized practices, with established upper and lower limits.
- ✓ **Level 5 (Improve):** Continuous process improvement is ongoing.

Domains of Best Practices: This dimension considers the implementation of best practices across three domains: project management, program management, and portfolio management.

Incremental Capabilities: This dimension assesses the progression of capabilities leading to the adoption of each best practice.

Process Groups: This dimension aligns capabilities with the five project management process groups: initiating, planning, executing, controlling, and closing.

Rather than a simple, linear system of maturity levels, OPM3 provides a nuanced assessment, reporting maturity as a percentage of best practices across all dimensions. This multi-dimensional approach allows for flexibility and tailoring to the specific needs of organizations, providing a more comprehensive and detailed picture of their project management maturity. This richer data supports informed decision-making and improvement planning.

2.5.3.6. Project Management Process Maturity Model (PM2)

The PM2 model, developed by Young Kwak and William Ibbs in 1997 and updated in 2002, integrates elements from various maturity models across different industries. Like many PMMMs, it defines five maturity levels, breaking down project management processes and practices into the PMBOK's knowledge areas. It also incorporates the five project management processes to provide a comprehensive assessment of an organization's project management maturity (Kwak & Ibbs, 2002). The model uses a 148-question multiple-choice questionnaire to evaluate these areas.

A summary of the key characteristics of each maturity level:

- ✓ **Level 1 (Ad-hoc)**: Project management processes and practices are inconsistent. PM data is not collected or analyzed systematically. There is functional isolation and a lack of senior management support. Project success relies heavily on individual efforts. The focus at this level is on understanding and establishing basic project management processes.
- ✓ **Level 2 (Planned)**: Project management process definition, problem identification, and data collection are informal. Teamwork is weak. Organizations have strengths in performing similar tasks. The focus is on individual project planning.
- ✓ **Level 3 (Managed at Project Level):** Project planning and control systems, as well as PM data, are formally managed. Teamwork is moderate. Training in PM practices and skills is informal. The focus is on structured project planning and control for a limited number of projects.
- ✓ **Level 4 (Managed at Corporate Level):** Multiple program management exists. PM processes and data are integrated, quantitatively measured, analyzed, and stored. Teamwork is strong. Formal training is provided for project teams. The focus is on professional planning and control across multiple projects.
- ✓ **Level 5 (Continuous Learning):** There is continuous improvement and a thorough understanding of PM processes. Project management data is optimized and sustained. The organization is project-driven, dynamic, and energetic. The focus is on continuous improvement of PM practices and processes, with a focus on innovative ideas.

The PM2 model provides a framework for organizations to assess their project management maturity, identify areas for improvement, and develop strategies to move towards a more sophisticated and effective approach to project management.

Table 2. 1 Summary of Maturity Models

Levels	CMM	CMMI	PM Solutions' PMMM	K-PMMM	OPM3	PM2
1	Incomplete Process	Performed Process	Initial Process	Common Language	None	Ad-hoc
2	Performed Process	Managed Process	Structure Process and Standards	Common Processes	Standardize	Planned
3	Defined Process	Defined Process	Organizational Standards and Institutionalized Process	Singular Methodology	Measure	Managed at Project Level
4	Managed Process	Quantitatively Managed Process	Managed Process	Benchmarking	Control	Managed at Corporate Level
5	Quantitatively Managed Process	Optimizing Process	Optimizing Process	Continuous Improvement	Improve	Continuous Learning

Source (literatures of PM maturity models)

This research aimed to assess a project management maturity by evaluating its performance across knowledge areas outlined in the PMBOK Guide. While OPM3, PM2, and PM Solutions' PMMM all consider knowledge areas, OPM3's multidimensional approach (using four dimensions for maturity progression) was deemed too broad for this specific research. The PM2 model, with its two dimensions (knowledge areas and project processes), provided limited descriptions of maturity levels for each knowledge area and its components.

Therefore, the PM Solutions' PMMM was selected. It is a single-dimensional model, focusing solely on knowledge areas, but offers detailed descriptions of maturity levels for each area and its components. This level of detail and the relative ease of assessment made it the most suitable choice for this research.

2.6. Construction Project Management

Construction project management shares fundamental principles with project management in other industries, drawing upon established methodologies and best practices outlined in the PMBOK

Guide (PMI, 2007; Hendrickson, 2015). However, the distinctive nature of construction projects presents unique challenges and necessitates specialized approaches to ensure successful project delivery.

Unlike many other project types, construction projects are often characterized by their capital-intensive nature, complexity, and the involvement of a diverse range of professionals and stakeholders (Chartered Institute of Building [CIB], 2002). Effective coordination and collaboration among architects, engineers, contractors, subcontractors, and regulatory agencies are essential for navigating the intricate web of activities and dependencies inherent in construction projects.

Furthermore, construction projects are typically executed in outdoor environments, exposing them to external variables such as weather conditions, traffic disruptions, and unforeseen site conditions (Gould & Joyce, 2003). These factors introduce a degree of uncertainty and risk that requires proactive planning and adaptive management strategies. Project managers must account for the project site's geography, environmental considerations, and potential impacts on the surrounding community (PMI, 2007).

Compliance with a myriad of laws and regulations governing public safety, environmental protection, and building codes adds another layer of complexity to construction project management (Bennett, 2003). Project managers must possess a thorough understanding of these regulations and ensure adherence throughout the project lifecycle to avoid costly delays or penalties.

The labor-intensive nature of construction projects, coupled with the significant consumption of materials and equipment, necessitates meticulous planning and resource management (Jekale, 2004). Project managers must optimize resource utilization, ensuring timely procurement of materials, efficient allocation of labor, and effective equipment management to maintain project schedules and budgets.

Recognizing the unique challenges inherent in construction projects, the Project Management Institute has developed a supplemental guide specifically tailored to this industry (PMI, 2017). The Construction Extension to the PMBOK Guide introduces four additional knowledge areas: Project Safety Management, Project Environmental Management, Project Financial Management, and

Project Claim Management. These specialized knowledge areas address the specific risks and complexities associated with construction projects, providing guidance on ensuring safety, mitigating environmental impact, managing project finances, and resolving contractual disputes.

Effective communication and teamwork are critical success factors in construction project management (Chen, Partington, & Qiang, 2009). Project managers must establish clear communication channels among stakeholders, fostering collaboration, managing expectations, and resolving conflicts to ensure project goals are met. Hendrickson (2015) summarizes the key functions of construction project management as:

Specifying Project Objectives and Plans: This includes defining project scope, developing budgets and schedules, establishing performance requirements, and selecting project participants.

Maximizing Resource Utilization: Efficient procurement and allocation of labor, materials, and equipment are crucial for maintaining project schedules and budgets.

Implementing Operations: Effective coordination and control of planning, design, estimating, contracting, and construction activities are essential for successful project execution.

Developing Effective Communication: Establishing clear communication channels and mechanisms for conflict resolution is vital for fostering collaboration among stakeholders and ensuring project success.

By understanding the unique challenges and complexities of construction projects and adopting specialized approaches to address them, project managers can navigate the intricacies of this demanding industry and deliver successful project outcomes.

2.7. Project Management Body of Knowledge Areas

The Project Management Body of Knowledge (PMBOK) serves as a comprehensive framework outlining the fundamental principles, processes, and knowledge areas essential for effective project management. Developed by the Project Management Institute (PMI), the PMBOK Guide provides a standardized and globally recognized approach to project management, promoting best practices and facilitating consistent project delivery across various industries and organizations (PMI, 2013).

The PMBOK Guide outlines ten knowledge areas that encompass the key aspects of project management:

2.7.1. Project Integration Management

Project Integration Management serves as the unifying force that binds all project elements together, ensuring a coordinated and cohesive approach to achieving project objectives. This knowledge area emphasizes the interconnectedness of various project components and the need for a holistic perspective when managing projects (Meredith & Mantel Jr., 2012). Effective integration management involves balancing competing demands, resolving conflicts, and making trade-offs to optimize overall project performance. Project managers must possess strong leadership and communication skills to effectively integrate the efforts of diverse teams and stakeholders towards a common goal.

Key processes within Project Integration Management include developing the project charter, creating the project management plan, directing and managing project work, managing project knowledge, monitoring and controlling project work, performing integrated change control, and closing the project or phase (PMI, 2017). These processes provide a structured framework for managing the project as a whole, ensuring that all project components are aligned and contribute to the successful achievement of project objectives.

2.7.2. Project Scope management

Project Scope Management is crucial for defining and controlling what is included and excluded from the project, establishing clear boundaries and expectations. Effectively managing scope is essential for preventing scope creep, which can lead to project delays, cost overruns, and stakeholder dissatisfaction (Kerzner, 2013). Scope management involves a series of processes, including planning scope management, collecting requirements, defining scope, creating the work breakdown structure (WBS), validating scope, and controlling scope.

These processes provide a structured approach to defining, documenting, and managing project scope throughout the project lifecycle. By involving stakeholders in the scope definition process, project managers can ensure that their needs and expectations are considered and that the project delivers the intended outcomes.

2.7.3. Project Schedule Management

Project Schedule Management focuses on developing and maintaining a realistic and achievable project schedule that guides project activities and ensures timely completion. Effective schedule management involves sequencing activities, estimating durations, allocating resources, and monitoring progress to identify and address any potential delays (Burke, 2013). Project managers

utilize scheduling tools and techniques, such as Gantt charts and the critical path method (CPM), to visualize the project timeline, track dependencies, and optimize resource utilization.

Key processes within Project Schedule Management include planning schedule management, defining activities, sequencing activities, estimating activity resources, estimating activity durations, developing the schedule, and controlling the schedule (PMI, 2017). By carefully managing the project schedule, project managers can ensure that the project progresses efficiently and meets its deadlines.

2.7.4. Project Cost Management

Project Cost Management involves planning, estimating, budgeting, and controlling project costs to ensure completion within the approved budget. Effective cost management is crucial for maintaining financial control and preventing cost overruns, which can negatively impact project profitability and stakeholder satisfaction (Flanagan & Norman, 1993). Cost management processes include planning cost management, estimating costs, determining the budget, and controlling costs.

These processes provide a structured approach to managing project finances, from initial cost estimation to ongoing cost control and reporting. By accurately estimating costs, establishing a realistic budget, and monitoring expenditures, project managers can mitigate financial risks and ensure that the project remains within budget constraints.

2.7.5. Project Quality Management

Project Quality Management focuses on ensuring that project deliverables meet the defined quality standards and satisfy stakeholder expectations. Quality management involves a proactive approach to preventing defects and ensuring that processes and deliverables conform to established quality criteria (Juran & Godfrey, 1999). Key processes within Project Quality Management include planning quality management, managing quality, and controlling quality.

These processes provide a framework for defining quality standards, implementing quality assurance and control measures, and continuously monitoring and improving project quality. By emphasizing quality throughout the project lifecycle, project managers can deliver high-quality outputs that meet stakeholder expectations and contribute to project success.

2.7.6. Project Human Resources Management

Project Resource Management focuses on effectively managing the human resources involved in a project. This includes processes such as planning resource management, estimating activity

resources, acquiring resources, developing the team, managing the team, and controlling resources (PMI, 2017). Effective resource management ensures that the project team possesses the necessary skills and expertise to execute project tasks efficiently.

Project managers must be adept at identifying resource requirements, recruiting qualified individuals, fostering teamwork and collaboration, and addressing any performance issues or conflicts that may arise within the team. By effectively managing human resources, project managers can create a positive and productive work environment that contributes to project success.

2.7.7. Project Communications Management

Project Communications Management involves ensuring timely and appropriate dissemination of project information to stakeholders. This knowledge area encompasses processes such as planning communications management, managing communications, and monitoring communications (PMI, 2017). Effective communication is essential for managing stakeholder expectations, fostering collaboration, and keeping everyone informed of project progress and any potential challenges.

Project managers must develop a communication plan that outlines the communication needs of stakeholders, identifies appropriate communication channels, and establishes a regular cadence for sharing project updates and information. By proactively managing communications, project managers can promote transparency, build trust, and ensure that all stakeholders are aligned and informed throughout the project lifecycle.

2.7.8. Project Risk Management

Project Risk Management focuses on identifying, analyzing, and responding to potential risks that could impact the project. This knowledge area includes processes such as planning risk management, identifying risks, performing qualitative risk analysis, performing quantitative risk analysis, planning risk responses, implementing risk responses, and monitoring risks (PMI, 2017).

Effective risk management involves proactively identifying potential threats and opportunities, assessing their likelihood and impact, and developing strategies to mitigate or respond to those risks. By effectively managing risks, project managers can reduce the likelihood of negative impacts on project objectives and increase the chances of project success.

2.7.9. Project Procurement Management

Project Procurement Management deals with acquiring goods or services from external vendors or suppliers. This knowledge area encompasses processes such as planning procurement management, conducting procurements, and controlling procurements (PMI, 2017). Effective procurement management involves identifying procurement needs, selecting suitable vendors, negotiating contracts, and managing supplier relationships.

Project managers must ensure that procurement activities are aligned with project requirements, adhere to legal and ethical standards, and deliver value for money. By effectively managing the procurement process, project managers can acquire the necessary resources to support project execution and achieve project objectives.

2.7.10. Project Stakeholder Management

Project Stakeholder Management focuses on identifying, analyzing, and engaging stakeholders throughout the project lifecycle. This knowledge area includes processes such as identifying stakeholders, planning stakeholder engagement, managing stakeholder engagement, and monitoring stakeholder engagement (PMI, 2017). Stakeholders can have a significant impact on project outcomes, and effective stakeholder management is crucial for ensuring their support and buy-in.

Project managers must understand stakeholder needs, expectations, and potential influence on the project. By proactively engaging stakeholders, addressing their concerns, and managing their expectations, project managers can build strong relationships, foster collaboration, and increase the likelihood of project success.

2.8. Project Management Practices In Construction Industry

The construction industry plays a vital role in economic development, providing the physical infrastructure necessary for societal and economic growth (Knoepfel, 1992). Construction projects, however, are inherently complex and dynamic, often characterized by their uniqueness, capital-intensive nature, and susceptibility to various external factors. This presents unique challenges for project management within the construction industry, requiring a balance between established practices and innovative approaches to ensure successful project delivery.

Despite the existence of standardized frameworks and project management methodologies, the construction industry has historically struggled with issues related to client satisfaction, supply

chain management, and achieving project objectives within time, cost, and quality constraints (Fewings, 2005). The fragmented nature of the industry, with separate design and construction entities, often leads to communication gaps, coordination challenges, and difficulties in aligning project outcomes with client expectations.

In response to these challenges, the construction industry has witnessed a shift towards a more client-centric approach, emphasizing alternative procurement strategies that promote greater integration between design and construction phases (Fewings, 2005). This collaborative approach allows for greater flexibility in project delivery, enabling adjustments to project scope and specifications to accommodate evolving client needs and business opportunities. Additionally, advancements in project management software, training programs, and industry-specific best practices have provided valuable tools and resources for construction project managers to enhance project planning, execution, and control.

The Ethiopian construction industry, while experiencing significant growth and contributing substantially to the nation's GDP, faces similar challenges to those observed in other developing countries (Tefera, 2014). Projects often encounter delays, cost overruns, and quality issues due to factors such as inadequate project management practices, limited resources, and a shortage of skilled project managers (Tadesse et al., 2016). Recognizing these challenges, the Ethiopian government has emphasized the importance of adopting robust project management practices to improve project outcomes and enhance the efficiency of the construction sector.

Several initiatives have been undertaken to promote project management best practices within the Ethiopian construction industry. These include the establishment of professional associations, such as the Ethiopian Construction Project Management Institute (ECPMI), which provides training and certification programs for project management professionals. Additionally, government agencies and industry stakeholders have collaborated to develop guidelines and standards for project management practices in the construction sector.

Despite these efforts, challenges remain in effectively implementing project management practices across the industry. A lack of awareness and understanding of project management principles among some stakeholders, coupled with resistance to change and traditional ways of working, can hinder the adoption of best practices. Furthermore, limited access to technology and resources,

particularly in remote areas, can pose challenges for implementing advanced project management tools and techniques.

2.9. Construction Project Management Maturity in Developing Countries

Developing countries face unique challenges in construction project management due to factors like limited resources, infrastructure gaps, and institutional weaknesses. Researchers have investigated these challenges and proposed solutions to improve project performance.

The research by (Ofori, 2000) examines the Ghanaian construction industry's evolution and identifies key constraints hindering its development, including limited access to finance, inadequate technology, and a shortage of skilled professionals. Ofori emphasizes the need for government policies that promote local construction firms, invest in infrastructure, and enhance training and education programs.

Focusing on cost performance in Indian construction projects, (Iyer & Jha, 2005) identifies several significant factors, including project size, complexity, procurement method, and contractor experience. Iyer and Jha highlight the need for improved cost estimating techniques, effective contract management, and better communication among project stakeholders to mitigate cost overruns.

Investigating construction time performance in Nigeria, research by (Kaming, Olomolaiye, & Holt, 1997) identifies factors like inadequate planning, poor site management, material shortages, and labor issues as major contributors to project delays. Kaming et al. advocate for improved planning practices, better resource management, and closer collaboration between project participants to enhance time performance.

Another study (Wang, Dulaimi, & Aguria, 2004) proposes a comprehensive risk management framework tailored for construction projects in developing countries. Recognizing the unique risk factors in these contexts, including political instability, economic fluctuations, and natural disasters, Wang et al. emphasize the importance of proactive risk identification, assessment, and mitigation strategies to improve project outcomes.

Furthermore, (Muriithi & Crawford, 2003) explores the cultural influences on project management practices in Africa, highlighting the need to adapt Western methodologies to local contexts.

Muriithi and Crawford emphasize the importance of understanding cultural dimensions such as power distance and uncertainty avoidance when managing projects in developing countries.

The Prosperous Report: African Edition (Marnewick, 2013) provides valuable insights into the state of project management maturity across various industries and countries in Africa. While the report indicates a general trend towards Level 2 and Level 3 maturity, with few organizations reaching Level 4 or 5, it also highlights significant variations across different knowledge areas. This suggests the need for targeted improvement efforts depending on the specific strengths and weaknesses within each domain.

To establish a baseline for comparisons and improvement initiatives, the report provides the actual maturity levels achieved across the nine core knowledge areas of the Project Management Body of Knowledge (PMBOK) as reported in the Prosperous study titled Project management maturity vs. project outcomes in Africa. The table below presents these benchmarks, offering a starting point for organizations to assess their own maturity and identify areas for growth:

Table 2. 2 Actual maturity levels for different knowledge areas in construction industry in Africa

Knowledge Areas	Actual Maturity Level (2010)	Actual Maturity Level (2008)
Project Integration Management	3.02	3.75
Project Scope Management	3.02	3.71
Project Time Management	3.06	3.79
Project Cost Management	3.20	3.61
Project Quality Management	3.24	3.44
Project Human Resource Management	2.83	3.61
Project Communications Management	3.01	3.65
Project Risk Management	2.79	3.38
Project Procurement Management	3.34	3.59
Mean	**3.06**	**3.61**

Source (Marnewick, C. (Ed.). (2013), Project management maturity vs. project outcomes in Africa.)

2.10. Empirical Literature Review

Several studies have investigated the state of project management practices within the Ethiopian construction industry, highlighting both challenges and opportunities for improvement. Ayalew (2016) conducted a comprehensive assessment of the industry's performance and challenges, revealing that the adoption of general project management procedures, functions, tools, and techniques was deemed unsatisfactory. The study, which involved a literature review and a survey of 69 construction professionals, further identified deficiencies in cost, safety, risk, and time management practices compared to planned values.

Yordanos (2021) investigated project management practices within government-initiated mega projects in Addis Ababa, specifically focusing on the Adwa Zero Kilometer Museum Project. The study employed the ten knowledge areas of the PMBOK Guide to assess project management maturity, concluding that the project operated at a level 3 maturity level, indicating an average level of project management practice. Furthermore, the research highlighted a strong correlation between project management maturity and project success, suggesting that higher levels of maturity contribute to improved project outcomes.

Hailu (2016) explored the effectiveness of project management processes in achieving project success by examining case studies of both successful and failed building construction projects in Ethiopia. The research, based on survey questionnaires, revealed that the consistent application of key knowledge areas such as quality, cost, time, and communication management significantly contributes to project success. The study also emphasized the importance of planning processes within the project management framework and concluded that a significant number of projects in Ethiopia fall into the "failed" category.

Melaku (2020) research evaluated the project management practices of the Sheraton Addis hotel's Engineering Department during a maintenance management system upgrading project. The study applied the PMBOK Guide's ten knowledge areas to assess project management maturity, finding that while the department demonstrated strong practices in areas like scope and quality management, it exhibited weaknesses in risk, stakeholder, and integration management. This suggests that the Sheraton Addis, while utilizing the hospitality industry's code of practices, could benefit from formalizing project management structures, implementing dedicated training, and

addressing identified weaknesses in specific knowledge areas to achieve more consistent project success.

Yimam (2011) investigated project management maturity among Ethiopian contractors, assessing the extent to which project management processes, practices, and tools are applied across various knowledge areas. The research, which involved interviews and questionnaires with 18 Grade 1 contractors, revealed a low level of project management maturity among the participants. However, the study found that knowledge areas related to material management, procurement, cost management, time management, financial management, and human resource management exhibited comparatively higher maturity levels. Interestingly, contractors with ISO certification demonstrated higher project management maturity than those without certification.

The research by Egziharia Solomon (2023) examined project management practices within the Meskel Square to City Hall Parking and Street Refurbishment Project (MSCHRP) in Addis Ababa, Ethiopia. The study utilized PMBOK's five process groups and ten knowledge areas to assess project management performance. The research found a moderate level of project management practice overall, with strengths in quality management, human resource management, and communication, but weaknesses in time management, risk management, and project initiation. The study also highlighted a correlation between project management practices and project success, emphasizing the importance of effective risk management, stakeholder engagement, and communication for achieving project goals. The research concluded with recommendations for improving project management practices within Ethiopian mega construction projects, such as strengthening project initiation and planning processes, enhancing risk management capabilities, and providing project management training to staff.

Befkadu (2017) examined the role of project management practices in the Ethiopian real estate industry, focusing on their contribution to project success. The study emphasized the critical importance of both project management process groups and knowledge areas in achieving successful project outcomes. Low levels of practice in these areas were found to directly and negatively impact overall project management effectiveness and project success.

Karlsson (2011) conducted a comparative study on project management practices in Sweden and Ethiopia, focusing on the prominent Ethiopian private organization, Midroc, and its Swedish subsidiary. The research aimed to identify successful project management methods and facilitate

knowledge sharing between the two organizations to enhance efficiency and mitigate risks in construction projects. Through observation, informal interviews, and document analysis, the study revealed several areas for improvement within Midroc Ethiopia compared to its Swedish counterpart. The research highlighted a lack of prioritization of planning processes within the Ethiopian company, with many projects commencing execution without adequate planning. Additionally, project control was not emphasized, with a reactive approach to problem-solving rather than proactive control measures. The study identified further challenges in project management systems, integration management, human resource management, cost management, time management, and procurement management within Midroc Ethiopia.

Saron (2020) assessed the project management maturity of BAMACON Engineering PLC, a Grade I building contractor in Ethiopia, using PM Solutions' Project Management Maturity Model. The study examined the company's performance across ten project management knowledge areas defined by PMBOK, finding an overall maturity level of 3.59, indicating a relatively mature level but with opportunities for enhancement. The research highlighted a need for greater focus on areas like project scope, quality, human resource, risk, and stakeholder management to elevate BAMACON's project management maturity and improve project performance. Further recommendations included conducting more in-depth investigations into how contractors implement PM knowledge areas, refining assessment tools, and exploring the client perspective on project management maturity.

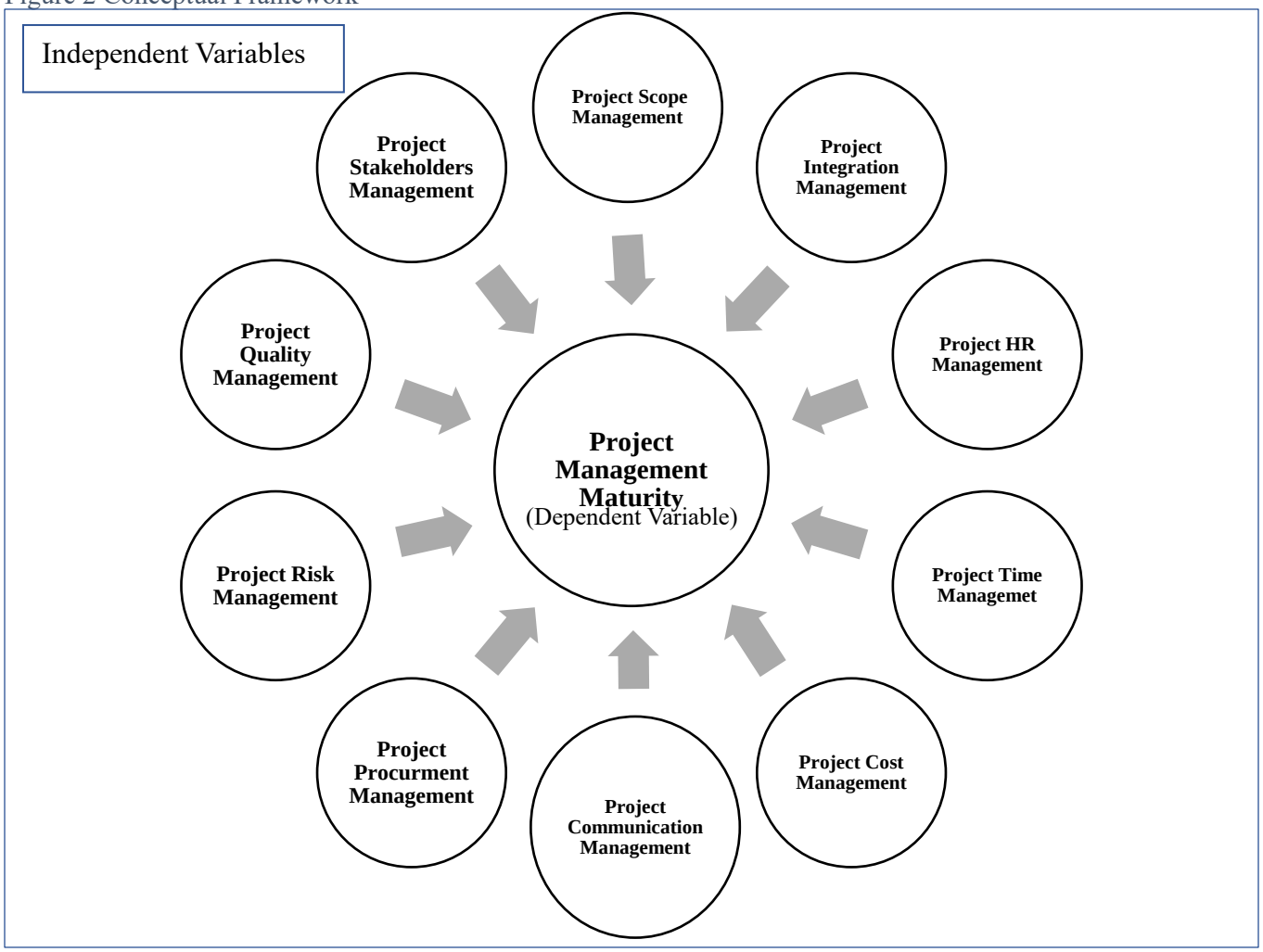
The collective findings from these studies highlight a consistent theme of low project management maturity within the Ethiopian construction industry, with insufficient emphasis placed on managing critical project constraints such as time, cost, and quality. Furthermore, a review of previous studies reveals a recurring theme of challenges related to project management practices in the construction industry, leading to consequences such as poor work quality and project termination. Even when attempts are made to implement project management practices, insufficient awareness of key principles, process groups, and knowledge areas, coupled with a shortage of skilled personnel, often result in average or unsatisfactory levels of project management maturity. However, there is a lack of empirical studies focused on assessing the maturity of project management practices within government-led construction projects in Ethiopia, particularly those of significant scale, using a comprehensive framework like the PM Solutions'

PMMM and the PMBOK Guide. This gap in knowledge highlights the need for further research to investigate the maturity of project management practices across all ten knowledge areas within the context of large-scale government projects in Ethiopia.

2.11. Conceptual Framework

The proposed framework for this research is illustrated in Figure below. It shows assessing the maturity of Project management practices with respect to the ten project management knowledge areas leading to successful delivery of project.

Figure 2 Conceptual Framework



Source: Own Development based on literature review, 2024

Jugdev, K., & Thomas, J. (2002), Andersen, E. S., & Jessen, C. (2003)

CHAPTER THREE
RESEARCH METHODOLOGY

This section is dedicated to explaining the research design and methodology employed in the study. It covers the methodology, research design, sources of data, methods of data collection, and instruments employed in the research. It also explains the reliability and validity of the data, as well as ethical concerns related to the study.

3.1. Research Design and Approach

3.1.1. Research Design

The case study is particularly well-suited for investigating complex phenomena within their real-world context (Yin, 2018). By focusing on the Chaka project as a case, this study aims to provide an in-depth understanding of the project management practices employed and the challenges encountered. This approach allows for contributing valuable insights for improving future endeavors.

Research design acts as a roadmap, guiding the research process from initial assumptions to specific methods for gathering and analyzing data (Creswell, 2009). Descriptive research, as defined by (Kothari, 2004), focuses on characterizing the features of individuals or groups through statistical analysis. This study adopts a descriptive approach due to its objective of examining a particular phenomenon at a specific point in time, employing a cross-sectional design.

This study employs a descriptive research method to provide a comprehensive overview. Descriptive research, as noted by (Kothari, 2004), aims to characterize and summarize features of a particular phenomenon or population. By utilizing this approach, the study seeks to paint a detailed picture of how project management processes and knowledge areas are applied in the project, identifying both effective strategies and potential areas for improvement. This research employs a cross-sectional survey, meaning that data is collected at a single point in time as it allows the researcher to compare many different variables at the same time.

3.1.2. Research Approach

Business and management research often employs quantitative and qualitative methods, each offering distinct advantages depending on the research focus and data type (Saunders et al., 2009). Quantitative methods emphasize numerical data, utilizing tools like questionnaires and statistical analysis to quantify variables and identify patterns. Conversely, qualitative methods dig into the richness of non-numerical data, employing techniques such as interviews and thematic analysis to explore experiences, perspectives, and underlying meanings. While quantitative research excels at measuring and generalizing findings, qualitative research provides deeper insights into complex phenomena and the context-specific factors influencing them.

This research employed a quantitative approach to evaluate and gain an in-depth understanding of the maturity of project management practices and challenges within the Chaka Project. Quantitative research is particularly well-suited for exploring complex phenomena within their real-world context, providing rich descriptions and insights into the perspectives and experiences of participants (Creswell & Poth, 2018; Denzin & Lincoln, 2011). This approach allowed for a nuanced examination of how project management knowledge areas are applied within the specific context of the Chaka Project, considering the unique challenges and opportunities presented by this large-scale government construction initiative.

3.2. Description of Study Variables

This research aims to measure the project management maturity level of the Chaka Project. The project management maturity level is considered the dependent variable, meaning it is the outcome being measured. The ten project management knowledge areas, as defined in the Project Management Body of Knowledge (PMBOK Guide), serve as independent variables, meaning they are the factors that potentially influence the project management maturity level. These ten knowledge areas are: project integration, scope, time, cost, quality, stakeholder, human resource, procurement, communication, and risk management.

3.3. Target Population and Sample Size

Determining the optimal sample size for a survey can be challenging, as there is no single definitive answer (Sekaran, & Bougie, 2016). While an excessively large sample can lead to wasted resources, an inadequate sample size may compromise the accuracy and generalizability of the

findings. Therefore, careful consideration of various sample size estimation methods is crucial to ensure a balance between efficiency and reliable results.

While a large sample size is generally desirable, it is crucial to strike a balance and avoid extremes (Gay et al., 2014). An excessively large sample can lead to unnecessary resource expenditure, while an insufficient sample size may limit the generalizability of the findings to the broader population.

The total population for this study comprised 102 members involved in the Chaka project. While it is often recommended to conduct a census for populations of 100, (in this case slightly over 100), practical constraints such as time and resources necessitated the use of a sample. The sample size was determined to be 81, which aligns with accepted statistical methodologies for ensuring data reliability and representativeness. According to (Krejcie and Morgan, 1970) widely used sample size determination table[1], a sample size of 81 is appropriate for a population of 102 to achieve a confidence level of 95% with a margin of error of ±5%. This statistically sufficient sample size allows for drawing meaningful and generalizable conclusions about the project management maturity within the Chaka Project, while acknowledging the limitations imposed by practical constraints.

Although the Chaka project is vast, encompassing thousands of workers across various initiatives, this survey data focuses specifically on three key projects within the broader Chaka development. The population of interest for this study comprises the project teams directly involved in these three projects. To determine the appropriate sample size, this study employed the simplified formula proposed by (Yemane, 1967) with a 95% confidence level.

$$\mathrm{n} = \frac{N}{1+N(e)^2}$$

Where:

n = Desired sample size

N =Total population size (102 in this case)

e = Accepted error limit (0.05) on the basis of 95 percent degrees of confidences

[1] Table showing how to determine sample size from given population is attached in Appendix II.

$$\frac{102}{1+102(0.05)^2} = 81$$

A total of 81 project team members will be selected to participate in the study. Data will be collected from these participants through questionnaires.

Table 3. 1 Composition of Respondents

Managerial/Administrative	10
Project manager	3
Consultant	10
Office Engineer	12
Construction Engineer	18
Site Engineer	23
Technical Professional	5
Total	81

(Source: Field Survey,2024)

3.4. Sampling Techniques

The target population for this study encompasses diverse teams within the project, including human resources, procurement, finance, engineers, technicians, and others. Given the varying levels of expertise and practical experience related to the research topic across these teams, a purposive sampling technique was deemed most appropriate. This technique, also known as judgmental or selective sampling, is particularly effective in situations where specific expertise and insights are required from a subset of the population (Palinkas et al., 2015). It allows researchers to focus on individuals who are most knowledgeable and experienced about the subject matter, thereby enhancing the richness and relevance of the data collected (Etikan et al., 2016).

In the context of the Chaka Project, this approach was essential to ensure that key informants with direct involvement and significant expertise in project management practices were included. This facilitated the collection of in-depth information and ensured that the study's findings were grounded in the perspectives of those most familiar with the project's intricacies and challenges. As Saunders et al. (2009) emphasize, purposive sampling is particularly valuable for selecting participants who can best address the research questions and objectives, especially when dealing with a specific population. Alternative sampling methods, such as random sampling, were considered less suitable due to the need for targeted expertise and the practical constraints of

reaching a dispersed and varied population. Participants were selected based on their roles, and involvement in key project management processes within the Chaka Project.

3.5. Data Source, Type, and Methods of Data Collection

This study utilized both primary and secondary data sources. Primary data will be collected directly from the field through questionnaires administered to project team members. Secondary data sources will include relevant articles, journals, research papers, and books. This combination of data sources will provide good foundation for analyzing the topic.

3.5.1. Questionnaire

Questionnaires, as noted by Kothari (2004), are a widely utilized and effective data collection method, offering advantages such as ease of administration, cost-effectiveness, and the ability to reach a large population within a limited timeframe. This study will employ questionnaires as the primary data collection tool due to their suitability for gathering information from a dispersed group of project team members. Furthermore, questionnaires minimize interviewer bias, allowing respondents to express their views freely and thoughtfully in their own words. As emphasized by Kothari (2004), questionnaires play a central role in survey research, providing valuable insights into the perspectives and experiences of participants.

The questionnaire for this study is designed by benchmarking the ten knowledge areas defined by PMBOK and based on the review of related literature to meet the objectives of the study. The questionnaire is designed by adopting and modifying surveys from related researches like (Yimam 2011), (Egziharia S.2023), (Nahom W. 2020), (Yordanos T. 2021), (Melaku B. 2020), (Bisrat Z. 2020)

3.6. Methods of Data Analysis

To analyze the collected data, descriptive statistics were employed using SPSS software. Frequency distribution, Mean and Standard deviation were used to calculate and interpret the level of project management maturity within the project. The data was also presented in graphs, tables, and percentages to provide a clear summary of the findings.

To strengthen the analysis, incorporating qualitative data collected from literature with the quantitative data from the questionnaires. The questionnaires were designed based on a thorough

review of relevant literature. Secondary data sources were used to further support and interpret the findings from both the questionnaires.

3.7. Validity and Reliability

3.7.1. Validity

Validity, a key aspect of research methodology, refers to the accuracy and precision of a measuring instrument and its ability to capture true differences among individuals or groups being studied. As stated by Kothari (2004), validity ensures that the results reflect the intended concepts and are not influenced by extraneous factors.

By utilizing various acceptable and established scientific research procedures, the validity of the study was strengthened. the researcher adopted a validated questionnaire from previous studies (Nahom W. 2020, Yordanos T. 2021, Saron M. 2022), conducted a pilot study, ensured questionnaire reliability, obtained ethical approval, and collected and analyzed data using appropriate methods. This approach aimed to gather valid, reliable, and meaningful information to accomplish the research's purpose effectively. In addition, the advisor reviewed all the data and research instruments that the researcher used in the search for any confusing, obscure, or ineffective inquiries. The advisor additionally reviewed and approved the instrument's effectiveness in accomplishing the research's purpose.

3.7.2. Reliability

Reliability, as defined by Kothari (2004), is a measure of consistency and accuracy in research results. It assesses whether findings are stable over time and truly representative of the overall population being studied. To ensure reliable results in this research, the questionnaire responses were compared with the years of service of the project participants, seeking to identify any potential correlation between experience and responses. This approach aimed to determine if the results were consistent across different levels of professional experience, strengthening the confidence in the study's findings.

To assess the internal consistency reliability of the research instrument, Cronbach's Alpha was employed. This widely accepted statistical measure, developed by Lee Cronbach in 1951, calculates the average of all possible split-half reliability coefficients, ranging from 0 (indicating no internal reliability) to 1 (representing perfect internal reliability). A value of 0.7 is generally

considered a satisfactory level of internal consistency. This approach ensured that the items within each knowledge area were measuring the same underlying construct, enhancing the reliability and validity of the collected data.

To assess the reliability of the questionnaire, a Cronbach's Alpha test was conducted using SPSS 27, a widely used statistical software package. This analysis aimed to determine the internal consistency of the instrument, ensuring that the items within each knowledge area were measuring the same underlying construct.

Table 3. 2 Cronbach's Alpha per Knowledge Area

No.	Variables	Cronbach's Alpha	No. of items
1	Project Integration Management	0.901	6
2	Project Scope Management	0.930	6
3	Project Time Management	0.864	6
4	Project Cost Management	0.644	4
5	Project Risk Management	0.801	6
6	Project Quality Management	0.868	5
7	Project Human Resource Management	0.904	6
8	Project Communication Management	0.840	4
9	Project Procurement Management	0.849	7
10	Project Stakeholders Management	0.812	5
	Overall Cronbach's Alpha	0.715	55

Source: Field Survey 2024

Typically, a Cronbach's alpha value above 0.70 is considered acceptable, indicating good internal consistency among the items (Nunnally & Bernstein, 1994). Values between 0.60 and 0.70 are often deemed acceptable for descriptive research, particularly when assessing complex and multifaceted constructs where perfect internal consistency is challenging to achieve (Hinton et al., 2004). Consequently, the obtained Cronbach's alpha value of 0.644 for project cost management, while slightly below the ideal threshold, remains within a tolerable range for descriptive research contexts. This is especially relevant given the complexity of project cost management, which may involve diverse aspects that contribute to lower internal consistency. Furthermore, Cortina (1993) emphasizes that scales with fewer items can naturally result in lower Cronbach's alpha values. It is also worth noting that the other variables in this study demonstrated very good Cronbach's alpha values, well above the 0.70 threshold, which supports the overall reliability of the measurement scales used. Hence, the 0.644 value should be viewed as adequate, reflecting the multifaceted nature of the construct of this research.

3.8. Ethical Considerations

This research followed strict ethical guidelines throughout the entire process, ensuring the protection and respect of all participants. Before engaging in the study, participants were fully informed about the research objectives and their right to decline participation or withdraw at any time without penalty. Confidentiality and anonymity were maintained throughout the data collection and analysis phases. All data was anonymized, and participants were assured that their individual responses would not be identifiable in any reports or publications resulting from the research. Additionally, measures were taken to minimize potential bias from both the researcher and participants. Project-related confidential information will be strictly protected and not disclosed. All collected data will be used exclusively for the purposes of this research study. The researcher also took into account that all the sources used in this research report were properly acknowledged through in-text citations and included in the reference list.

CHAPTER FOUR

DATA PRESENTATION, ANALYSIS AND INTERPRETATION

4.1. Introduction

This chapter presents a detailed analysis of the data collected through a questionnaire survey conducted among 72 key participants involved in Chaka project. The survey focused on assessing the maturity level of project management practices across various knowledge areas using a five-point Likert scale allocating Very Low to level 1 maturity, Low to Level 2 maturity, Average to level 3 maturity, High to level 4 maturity, and Very High to level 5 maturity. The chapter first examines the response rate and participant demographics. Followed by, describing major challenges encountered while practicing Project management as per the respondent's perspective, It then analyzes the overall maturity level of project management practices within Chaka; detailed exploration of the maturity levels of each individual knowledge area.

To analyze the data, statistical techniques such as frequency distributions, means, and standard deviations were calculated using SPSS version 27. These analyses help to understand the distribution of responses, identify key trends, and assess the overall level of maturity within the project management system.

4.2. Response Rate

A total of 81 questionnaires were distributed to project members, aiming to gather comprehensive data on the maturity level of project management practices within. Of these, However, 6 questionnaires were not returned, and 3 were disqualified due to multiple answers or incomplete responses.72 were sufficiently filled and returned, resulting in a response rate of 89%.

Table 4. 1 Response Rate

Questionnaire Distribution Method	**Number Of Distributed Questionnaires**	**Number Of Returned Questionnaires**	**Overall Response Rate (%)**
Using Hard Copy Questionnaires	34	30	88.2%
Using Google Form	47	42	89.3%
Overall	**81**	**72**	**88.9%**

Source: Field Survey 2024

4.3. Demographic Data

To gain a better understanding of the characteristics of the study participants, respondents were asked to provide information about their gender, age, educational background, years of work experience, and their position within the organization.

Table 4. 2 Respondent's Demographic Data

General Information		Frequency	Percent
Gender	Male	43	59.7
	Female	29	40.3
	Total	72	100.0
Age	< 30	25	34.7
	31 - 40	28	38.9
	41 - 50	15	20.8
	> 50	4	5.6
	Total	72	100.0
Education	TVET/Diploma	4	5.6
	BA/BSC	47	65.3
	MA/MSc	21	29.2
	Total	72	100.0
Experience	< 5	12	16.7
	6 - 10	27	37.5
	11 - 15	18	25.0
	16 – 20	11	15.3
	20 <	4	5.6
	Total	72	100.0
Position	Managerial/Administrative	7	9.7
	Project manager	3	4.2
	Consultant	8	11.1
	Office Engineer	12	16.7
	Construction Engineer	16	22.2
	Site Engineer	21	29.2
	Technical Professional	5	6.9
	Total	72	100.0

Source: Field Survey 2024

The above table shows that there are more male participants (59.7%) than female participants (40.3%). This indicates a gender imbalance in the respondent pool, with a slightly higher representation of males.

The age distribution of the respondents reveals a diverse range of experience levels. 25 respondents (34.7%) are under 30, 28 respondents (38.9%) fall between 31 and 40, 15 respondents (20.8%) are between 41 and 50, and 4 respondents (5.6%) are over 50. This data indicates a balance between younger professionals and more seasoned experts within the project team.

The educational backgrounds of the respondents illustrate a significant emphasis on higher education. Of the 72 respondents, 47 (65.3%) hold a BA/BSC degree, indicating a high level of educational attainment amongst the project participants. 21 respondents (29.2%) have a MA/MSc, further demonstrating a high degree of expertise. Only a small percentage (5.6%) have a TVET/Diploma.

Analyzing the experience levels, we find that 27 respondents (37.5%) have 6-10 years of experience, 18 respondents (25%) have 11-15 years of experience, and 12 respondents (16.7%) have under 5 years of experience. The rest have 11-15 years, 16-20 years, or over 20 years of experience. This data signifies the presence of both seasoned professionals and individuals with emerging expertise within the project team.

Examining the respondents' positions, we find that the majority of respondents are Site Engineers (29.2%), Construction Engineers (22.2%), and Office Engineers (16.7%). A small number (9.7%) represent managerial/administrative roles. There are also representatives from project manager, consultant, and technical professional positions. This diversity of roles provides valuable insights into the perspectives and experiences of different individuals within the project team.

This demographic profile suggests that the project team comprises a diverse group of individuals with a wide range of experience levels and educational backgrounds, potentially contributing to a multi-faceted understanding and implementation of project management practices.

4.4. Data Analysis and Interpretation of Major Challenges

This section examines the major challenges faced in implementing project management practices within the Chaka project, as revealed by the responses of project team members in the questionnaire survey. To gain a comprehensive understanding of these challenges from the

perspective of those directly involved in the project, respondents were asked to address concerns related to project management practices and their impact on project success. The analysis of these responses provides valuable insights into the specific challenges hindering effective project management and the implications for achieving project objectives.

Table 4. 3 Major Challenges

		Responses		Percent of Cases
		N	Percent	
Internal Challenges	Lack of clarity in the scope of the project	15	8.1%	20.8%
	Poor Schedule, budget and quality estimate	12	6.5%	16.7%
	Poor resources estimate and distribution	21	11.3%	29.2%
	Organizational culture	43	23.1%	59.7%
External Challenges	Policies and procedures	16	8.6%	22.2%
	Government rules and regulation	9	4.8%	12.5%
	Environmental factors	24	12.9%	33.3%
	Acceptance within the society	46	24.7%	63.9%
Total		186	100.0%	

Source: Field Survey 2024

The data collected from project team members reveals a number of significant challenges affecting project management practices at the project. It's important to remember that respondents were able to select multiple challenges from the provided list, highlighting the complexity and interconnectedness of these issues within a large-scale construction project. The analysis reveals that respondents frequently identified multiple challenges, indicating that a single factor rarely operates in isolation but is often intertwined with other challenges, creating a multifaceted obstacle for project success. This further emphasizes the importance of a holistic approach to addressing these challenges, rather than focusing solely on individual aspects.

The most frequently cited challenge (59.7%) is organizational culture, suggesting that internal processes, communication, and collaboration need improvement. This finding suggests that 59.7% of respondents believe that a dysfunctional organizational culture can lead to inefficiencies, conflicts, and difficulty in implementing effective project management practices. The second most frequently mentioned challenge (29.2%) highlights issues with resource estimation and allocation. A significant proportion of respondents (22.2%) indicated challenges with policies and procedures, suggesting a need for clearer, more consistent, and effectively implemented guidelines. Lack of

clarity in the project scope, cited by 20.8% of respondents, poses another challenge. A well-defined project scope is crucial for avoiding confusion, delays, and budget overruns. While poor schedule, budget, and quality estimates were identified by 16.7% of respondents, this further underscores the need for accurate and realistic planning.

The most frequently mentioned external challenge (63.9%) is the need for social acceptance, highlighting the crucial importance of community engagement. This data suggests that 63.9% of respondents believe that successfully navigating community concerns, obtaining necessary approvals, and minimizing potential environmental impacts are essential for the project's success. A substantial 33.3% of respondents mentioned "environmental factors" as a challenge, emphasizing the crucial role of sustainable practices in construction projects. Navigating complex government rules and regulations (12.5%) can create significant obstacles in implementing construction projects.

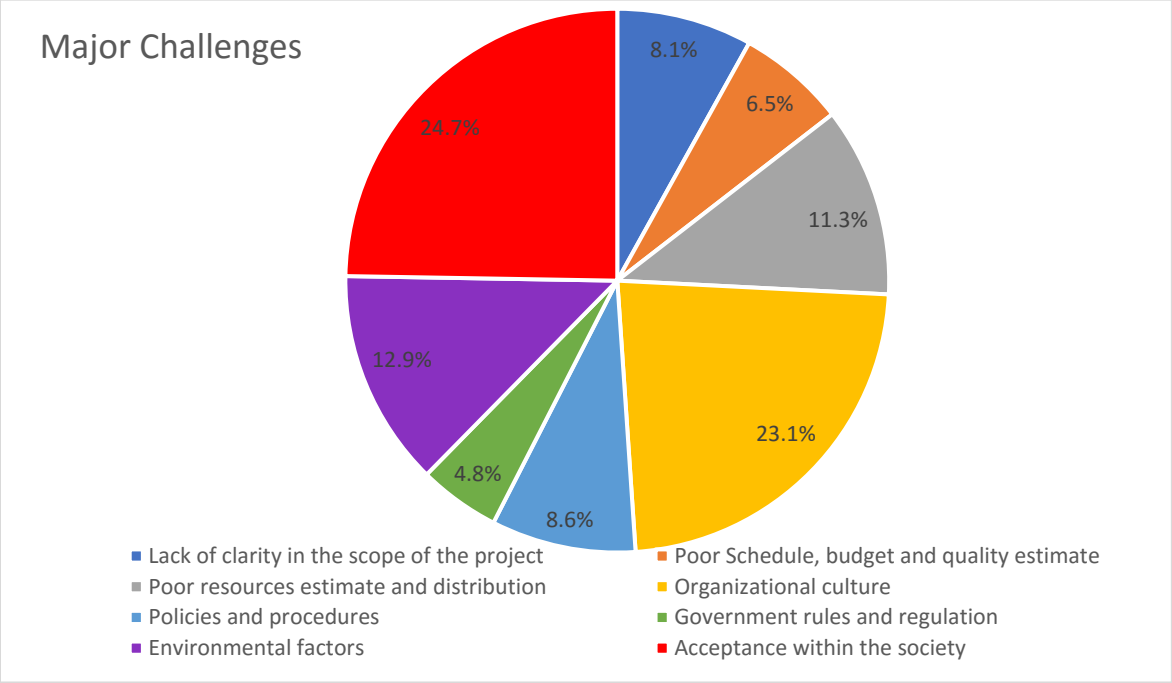


Figure 3 Project Management Challenges

This data suggests that the project team needs to focus on improving internal processes, managing external factors effectively, and strengthening planning practices to overcome the challenges encountered in managing the Chaka project. Addressing these issues will be critical to achieving project goals, ensuring its timely completion, and minimizing potential risks.

4.5. Data Analysis and Interpretation of Project Maturity

To assess the maturity of project management practices within the Chaka project, this paper analyzed the responses of participants using a five-point Likert scale. Each knowledge area was evaluated based on the average score of all responses, with higher scores indicating greater maturity.

The Likert scale ranged from 1 (Very Low Maturity) to 5 (Very High Maturity), reflecting different stages of project management development. A mean score closer to 1 signifies a lower level of maturity, indicating a need for improvement in that area. Conversely, a mean score approaching 5 suggests a higher level of maturity, indicating a more robust and effective project management process.

This analysis provides a comprehensive picture of the project's maturity level across each of the project management knowledge areas. By examining the mean values, we can identify areas where practices are well-established and those that require further attention and development.

Table 4. 4 Likert Scale Interpretation and Mean Values Distribution

Likert Scale	*Likert Description*	*Value Allocation (Range of mean Value)*
1	Very Low (Level 1)	1.0 - 1.49
2	Low (Level 2)	1.5 - 2.49
3	Average (Level 3)	2.5 - 3.49
4	High (Level 4)	3.5 - 4.49
5	Very High (Level 5)	4.5 – 5.00

Source: (AdinoyiYa qoob Moohammad, 2014)

4.1.1. Project Integration Management

Project Integration Management, a fundamental knowledge area in project management, encompasses six interconnected components that work together to ensure project success. These elements include developing a clear project charter, crafting a comprehensive project management plan, effectively directing and managing project work, rigorously monitoring and controlling project progress, implementing a structured approach to managing change, and formally closing projects or phases with a thorough retrospective analysis. By integrating these components, project managers create a unified and cohesive framework for delivering value-driven projects. *(PMI, 2013)*

Table 4. 5 Project Integration Management Maturity Level

No.	**Project Integration Management**	Frequency of Respondents in percentage and in numbers						
		Very Low	**Low**	**Average**	**High**	**Very High**	**Mean**	**Std. Deviation**
1	Project charter was developed that integrates project scope, assumptions and constraints as well as authorizes to utilize organizational resources.	1	14	31	15	11	3.29	0.999
		1.4%	19.4%	43.1%	20.8%	15.3%		
2	Project management plan was developed.	6	21	20	16	9	3.01	1.169
		8.3%	29.2%	27.8%	22.2%	12.5%		
3	Project activities were managed and directed based on the project management plan.	2	11	26	19	14	3.44	1.06
		2.8%	15.3%	36.1%	26.4%	19.4%		
4	Project works were observed, evaluated and controlled against project management plan.	6	22	22	12	10	2.97	1.175
		8.30%	30.60%	30.60%	16.70%	13.90%		
5	Deviations from the project base line were controlled by integrated change control system.	4	16	31	15	6	3.04	0.999
		5.60%	22.20%	43.10%	20.80%	8.30%		
6	Procedures for project phases closure were incorporated in an orderly fashion.		15	24	20	13	3.43	1.019
			20.80%	33.30%	27.80%	18.10%		
						Total mean	**3.20**	

Source: Field Survey 2024

As the above table shows a project charter that integrates project scope, assumptions, and constraints was developed in this project, with 43.1% of respondents stating that it was done at an average level, while 20.8% rated it as high, and 15.3% rated it as very high. This suggests that the project team generally acknowledges and/or agrees the existence of a comprehensive project

charter. The mean score of 3.29 falls within the 'Average' level 3 maturity. However, the standard deviation of 0.999 indicates moderate variability in perceptions, suggesting that some respondents perceive the charter as more effective than others. This highlights the need to ensure consistent understanding and application of the charter across the project team.

Half of respondents (27.8% and 22.2%) rates the development of a project management plan as either average or high. This suggests that a project management plan was generally developed for the project. The mean score of 3.01 also falls within the 'Average' maturity which is level 3. However, a significant portion of respondents (29.2%) indicated that the plan was developed at a low level, highlighting potential gaps in the planning process. The standard deviation of 1.169 is relatively high, indicating greater variability in perceptions about the comprehensiveness and effectiveness of the project management plan. This emphasizes the need to address these variations in understanding and ensure a more consistent approach to planning.

The management and direction of project activities were generally seen as being managed based on the project management plan, with a majority (36.1% and 26.4%) rating it as either average or high. The mean score of 3.44 falls within the 'average' level 3 maturity, but too close to level 4 maturity as level 3 ends with 3.49. This indicates that the team generally follows to the plan during project execution. However, a notable 15.3% of respondents felt the practice was at a low level, suggesting a potential need to enhance commitment to the plan and address any inconsistencies. The standard deviation of 1.06 suggests moderate variability, indicating differences in perceptions about the effectiveness of the team's ability to manage and direct activities based on the plan.

The monitoring and control of project work against the project management plan was rated as average by the majority of respondents (30.6%), indicating that these practices are moderately effective. However, a significant percentage (30.6% and 16.7%) rated monitoring and control as either low or very low, highlighting the need to enhance these processes. The mean score of 2.97 falls within the 'Average' level 3 maturity, but the standard deviation of 1.175 is relatively high, signifying a wider range of opinions on the effectiveness of monitoring and controlling project work. This suggests that some respondents may have concerns about the project's ability to stay on track and within budget.

The control of deviations from the project baseline through an integrated change control system was assessed. While 43.1% rated this practice as average, a significant portion (22.2% and 20.8%)

rated it as either low or high, highlighting a potential inconsistency in how change control is perceived. The mean score of 3.04 falls within the 'Average' level 3 maturity. The standard deviation of 0.999 indicates moderate variability, suggesting that some may view the system as more effective than others. This highlights the need for clearer communication and training to ensure consistent understanding and application of the change control process.

Procedures for closing project phases in an orderly fashion were generally perceived as being well-incorporated, with a majority (33.3% and 27.8%) rating them as either average or high. However, 20.8% of respondents rated the practice as low, highlighting potential inconsistencies in the implementation of closure procedures. The mean score of 3.43 also falls within the 'average' level 3 maturity. The standard deviation of 1.019 suggests moderate variability, indicating that some may have experienced more effective phase closure practices than others.

The overall mean score of 3.20 for Project Integration Management falls within the 'Average' maturity level. This suggests that the project practices are generally moderate, with some strengths and weaknesses. The project team demonstrates a strong commitment to developing foundational documents, such as the project charter and plan, and generally follows to the plan during project execution. However, the project could benefit from improvements in monitoring and control, and change management to ensure the project stays on track, manages changes effectively, and achieves its objectives. The standard deviations across the different questions indicate moderate to high variability in perceptions, suggesting that further investigation into the causes of these variations is warranted.

4.1.2. Project Scope Management

Project Scope Management, another critical knowledge area assessed in this study, is similarly structured into six distinct components. These components work in together to ensure that the project's deliverables are clearly defined, understood, and executed within the agreed-upon boundaries. This includes developing a comprehensive scope management plan, diligently collecting and documenting project requirements, precisely defining the project scope, creating a detailed work breakdown structure (WBS), validating the scope against agreed-upon criteria, and establishing a robust process for managing any necessary scope changes throughout the project lifecycle. (PMI, 2013)

Table 4. 6 Project Scope Management Maturity Level

N0	Project Scope Management	Frequency of Respondent					Mean	Std. Deviation
		Very Low	Low	Average	High	Very High		
1	Scope management plan were developed for measuring the value of the project.	7	15	22	20	8	3.1	1.153
		9.7%	20.8%	30.6%	27.8%	11.1%		
2	Business and technical requirements of a project were collected.	3	16	17	27	9	3.32	1.085
		4.2%	22.2%	23.6%	37.5%	12.5%		
3	The project scope (deliverables or products) was defined beforehand.	2	13	22	22	13	3.43	1.072
		2.8%	18.1%	30.6%	30.6%	18.1%		
4	Work breakdown structure (WBS) were developed that decomposes into work packages and activities.	5	10	13	25	19	3.6	1.218
		6.9%	13.9%	18.1%	34.7%	26.4%		
5	Instruments were developed for validating the project's scope and success.	8	16	24	15	9	3.01	1.181
		11.1%	22.2%	33.3%	20.8%	12.5%		
6	Scope changes were controlled, evaluated and reported.	6	10	21	23	12	3.35	1.165
		8.3%	13.9%	29.2%	31.9%	16.7%		
		Total mean					**3.30**	
		(Source: Field Survey 2024)						

The development of a scope management plan for measuring project value was assessed. The majority of respondents (30.6% and 27.8%) rated this practice as either average or high, suggesting that a scope management plan is generally in place. The mean score of 3.1 falls within the 'Average' maturity which is level 3. However, a significant portion of respondents (20.8% and 9.7%) rated this practice as low and very low, highlighting a potential lack of clarity or effectiveness in the plan. The standard deviation of 1.153 is relatively high, indicating significant variability in perceptions about the plan's effectiveness. This suggests the need for greater consistency and clarity in the scope management plan, ensuring that it is robust and well-understood across the project team.

The collection of business and technical requirements was assessed. The majority of respondents (23.6% and 37.5%) rated this practice as either average or high, suggesting that requirements are generally collected. The mean score of 3.32 falls within the 'Average' maturity level. However, the standard deviation of 1.085 is relatively high, indicating variability in perceptions. A significant portion of respondents (22.2%) rated the practice as low, indicating potential challenges in the

completeness or accuracy of the requirements gathering process. These variations highlight the need for a more structured and consistent approach to collecting and validating requirements.

The definition of the project scope, including deliverables and products, was assessed. While the majority (30.6% and 30.6%) rated this practice as either average or high, a portion of respondents not to be ignored (18.1%) rated it as low. The mean score of 3.43 falls within the 'Average' maturity level 3, suggesting that the project scope is generally well-defined, Organizational Standards and Institutionalized Process. However, the standard deviation of 1.072 is relatively high, indicating variability in perceptions. This suggests that while the project scope is defined, there may be inconsistencies in understanding or commitment to its definition across the project team.

On the other hand, the development of a Work Breakdown Structure (WBS), the majority (18.1% 34.7% and 26.4%) rated this practice as either average, high or very high, suggesting that a WBS is used. The mean score of 3.6 falls within the 'High' maturity which is level 4. This indicates that the project team generally decomposes the project work into manageable packages and activities. However, a portion of respondents (13.9% and 6.9%) rated this practice as either low or very low. The standard deviation of 1.218 is the highest observed so far, highlighting significant variability in perceptions about the effectiveness of the WBS. This emphasizes the need for a more consistent approach to WBS development and ensuring its effective use throughout the project.

Continuing, the use of instruments for validating the project scope and success was assessed. The majority (33.3% and 20.8%) rated this practice as either average or high, suggesting that some form of validation is in place. The mean score of 3.01 falls within the 'Average' maturity of level 3, but the standard deviation of 1.181 is relatively high, indicating substantial variability in how respondents perceive the effectiveness of the validation instruments and their application. This highlights the need to clarify the specific instruments used and to ensure their consistent application for validating the project scope.

Furthermore, the control, evaluation, and reporting of scope changes were asked in the questionnaire. While 29.2% and 31.9% of respondents rated this practice as either average or high, a portion (13.9% and 8.3%) rated it as either low or very low. The mean score of 3.35 falls within the 'Average' maturity level 3. The standard deviation of 1.165 is relatively high, indicating significant variability in perceptions.

In general, the overall mean score for Project Scope Management is 3.30, falling within the 'Average' which is level 3 maturity. This suggests that the project team generally understands the importance of scope management but there are areas for improvement. While a scope management plan is generally in place, the effectiveness of its implementation varies. The project could benefit from greater emphasis on consistent and robust requirements gathering, a more defined approach to scope validation, and clearer processes for managing scope changes. The standard deviations observed across the different questions indicate a significant degree of variability in perceptions about the effectiveness of these practices, highlighting the need for clearer communication, consistent training, and standardized procedures to ensure a more robust and unified approach to scope management.

4.1.3. Project Time Management

Project Time Management, a crucial aspect of successful project delivery, is assessed through six distinct components as defined by (PMI, 2013). These components, activity definition, activity sequencing, activity resource estimation, activity duration estimation, schedule development, and schedule control, collectively form the framework for effective time management within a project. By carefully considering each component, project managers can establish realistic timelines, allocate resources appropriately, and ensure timely project completion.

Table 4. 7 Project Time Management Maturity Level

No.	Project Time Management	Frequency of Respondent					Mean	Std. Deviation
		Very Low	**Low**	**Average**	**High**	**Very High**		
1	Detailed project activities were identified with detailed schedule.	1	5	15	29	22	3.92	0.96
		1.4%	6.9%	20.8%	40.3%	30.6%		
2	Sequencing of the project activities were identified with their deliverables.	2	4	24	20	22	3.78	1.038
		2.8%	5.6%	33.3%	27.8%	30.6%		
3	Resource requirements of the project activities were identified.	1	12	26	20	13	3.44	1.019
		1.4%	16.7%	36.1%	27.8%	18.1%		
4	Project activities duration were estimated in terms of the number of hours or work periods.	3	13	19	24	13	3.43	1.111
		4.2%	18.1%	26.4%	33.3%	18.1%		
5	A baseline project schedule was developed into the project schedule management plan.	1	14	24	22	11	3.39	1.015
		1.4%	19.4%	33.3%	30.6%	15.3%		
6	Changes to the baseline project schedule were controlled and if necessary corrective actions were taken.	5	12	29	18	8	3.17	1.061
		6.9%	16.7%	40.3%	25.0%	11.1%		
						Total mean	**3.52**	

(Source: Field Survey 2024)

Detailed project activities were identified with a detailed schedule. The majority of respondents (40.3% and 30.6%) rated this practice as either high or very high, indicating that detailed project activities are generally well-defined with accompanying schedules. The mean score of 3.92 falls within the 'High' maturity level 4. The standard deviation of 0.96 suggests moderate variability, indicating some differences in perceptions about the comprehensiveness and effectiveness of these schedules.

Next was the sequencing of project activities with their deliverables was assessed. A significant majority of respondents (33.3% 27.8% and 30.6%) rated this practice as either average high, or very high, suggesting that activity sequencing is generally considered effective. The mean score of 3.78 also falls within the 'High' maturity level 4. The standard deviation of 1.038 is relatively high in this group, indicating that there are variations in perceptions.

Then, Resource requirements for project activities were assessed. While the majority of respondents (36.1% and 27.8%) rated this practice as either average or high, a notable portion (16.7%) rated it as low. The mean score of 3.44 falls within the 'Average' maturity level 3, but it’s too close to the next higher level which start at 3.5, indicating that the project team generally identifies resource requirements. The standard deviation of 1.019 is moderate, highlighting some variation in perceptions.

The estimation of project activity durations in terms of hours or work periods was also assessed, and the majority (26.4% and 33.3%) rated this practice as either average or high, a notable portion (18.1%) rated it as low. The mean score of 3.43 falls again within the 'Average' maturity of level 3, suggesting that activity durations are generally well-estimated. However, the standard deviation of 1.111 is relatively high in this group, highlighting significant variability in perceptions about the accuracy and effectiveness of these estimates.

The development of a baseline project schedule into the project schedule management plan was assessed. A significant portion of respondents (33.3% and 30.6%) rated this practice as either average or high, indicating that a baseline schedule is generally incorporated into the plan. The mean score of 3.39 falls within the 'High' maturity level 3. However, the standard deviation of 1.015 is moderate, suggesting variability in how respondents perceive the effectiveness of this practice. This emphasizes the need for a more consistent and robust process for incorporating the baseline schedule into the project schedule management plan.

Respondents were asked about the control of changes to the baseline project schedule, including the implementation of corrective actions when necessary and majority of them (40.3% and 25%) agreed that this practice is as either average or high, suggesting that schedule changes are generally well-controlled. The mean score of 3.17 falls again within the 'Average' maturity level 3. However, a considerable portion of respondents (16.7% and 6.9%) rated this practice as either low or very low. The standard deviation of 1.061, indicating a moderate degree of variability in perceptions about managing schedule changes.

In general, the overall mean score for Project Time Management is 3.52, indicating a 'High' level of maturity which is Level 4. This suggests that the project team generally has a strong understanding and implementation of time management practices. The project demonstrates a good ability to identify and sequence activities, estimate durations, and develop a baseline schedule. However, the standard deviations observed across the different questions highlight variability in perceptions about the specific practices. This suggests that while the project team generally understands the concepts of time management, there is room for improvement in ensuring a more consistent and standardized approach across the project, especially in areas such as resource requirements, activity duration estimations, and managing schedule changes.

4.1.4. Project Cost Management

Project Cost Management, a critical area of expertise in project management, is structured into four key components: developing a comprehensive cost management plan, conducting thorough cost estimations, establishing a detailed project budget, and implementing rigorous cost control measures (PMI, 2013). The following table will demonstrate the result from responses of the questionnaire for project cost management.

Table 4. 8 Project Cost Management Maturity Level

No.	Project Cost Management	Frequency of Respondent					Mean	Std. Deviation
		Very Low	Low	Average	High	Very High		
1	Project cost management policies and procedures were developed.	4	12	27	24	5	3.19	0.988
		5.6%	16.7%	37.5%	33.3%	6.9%		
2	Estimation was made for the cost of products as well as the resources costs for project activities.	-	16	22	19	15	3.46	1.061
		-	22.2%	30.6%	26.4%	20.8%		
3	A baseline project cost was developed so that the project budget was allocated and expended for project activities based on time schedule.	6	18	28	16	4	2.29	1.017
		8.3%	25.0%	38.9%	22.2%	5.6%		
4	Project costs were controlled by the cost of baseline.	5	24	21	19	3	2.88	1.02
		6.9%	33.3%	29.2%	26.4%	4.2%		
						Total mean	**2.96**	

(Source: Field Survey 2024)

The survey results indicate that participants generally perceive project cost management policies and procedures as being moderately developed. The mean score of 3.19 falls within the "Average" maturity of level 3, with a notable proportion of respondents (37.5%) rating the practice as average and another group (33.3%) rating it as high. However, percentage of minority not to be ignored (16.7% and 5.6%) of respondents rated the practice as low and very Low. Showing that there may be room for improvement in the consistency and effectiveness of these policies. The standard deviation of 0.988 reflects a moderate degree of variation in how respondents view these policies and procedures.

Respondents were asked that estimation was made for the cost of products as well as the resource costs for project activities. For this, the mean score of 3.46 falls within the 'Average' maturity level 3 but close to the next higher level which starts at 3.5. This suggests that cost estimations are generally conducted for both products and resources. A majority of respondents (30.6% and 26.4%) rated this practice as either average or high. The standard deviation of 1.061 indicates moderate variability in perceptions, telling some differences in how respondents perceive the estimation process.

Further, it was asked a baseline project cost was developed so that the project budget was allocated and expended for project activities based on the time schedule. The mean score of 2.29 falls within

the 'Low' maturity level 2. This suggests that the development of a baseline project cost and budget allocation may not be consistently implemented. A majority of respondents (38.9% and 25%) rated this practice as either average or low. The standard deviation of 1.017 indicates moderate variability in perceptions, signifying some differences in how respondents perceive the development and use of a baseline project cost.

Project costs were controlled by the cost baseline was also assessed and the mean score of 2.88 falls within the 'Average' maturity level 2. This indicates that cost control practices are moderately implemented. The majority (29.2% and 26.4%) of respondents rated this practice as either average or high. However, a significant portion (33.3%) rated this practice as low. The standard deviation of 1.02 indicates moderate variability, signifying differences in perceptions about the cost control practices.

The overall mean score for Project Cost Management is 2.96, indicating an 'Average' maturity of level 3. This suggests that the project team generally understands the importance of cost management practices. While cost management policies and procedures are generally in place, and cost estimations are typically conducted, there are areas where further improvement is needed. This includes the development of a baseline project cost and budget allocation, as well as the consistent application of cost control practices. The standard deviations across the different questions indicate moderate variability in perceptions, highlighting the need for greater consistency in understanding and implementing cost management practices across the project.

4.1.5. Project Risk Management

Project Risk Management, as defined by the Project Management Institute (PMI) in 2013, involves six crucial steps. These steps include developing a comprehensive risk management plan, identifying potential risks, assessing their likelihood and impact, quantifying their potential impact, crafting a risk response plan, and continuously monitoring and managing risks throughout the project. This structured approach ensures proactive identification and management of risks, contributing to overall project success. The following table will demonstrate the result from responses of the questionnaire for project risk management.

Table 4. 9 Project Risk Management Maturity Level

No.	Project Risk Management	Frequency of Respondent						
		Very Low	**Low**	**Average**	**High**	**Very High**	**Mean**	**Std. Deviation**
1	Procedures for developing risk management plan were defined.	8	18	29	14	3	2.81	1.016
		11.1%	25.0%	40.3%	19.4%	4.2%		
2	Potential risks and their negative impact on a project were identified and documented.	9	17	31	15	-	2.72	0.938
		12.5%	23.6%	43.1%	20.8%	-		
3	Project risks were prioritized for the probability of occurrence.	5	22	28	12	5	2.86	1.011
		6.9%	30.6%	38.9%	16.7%	6.9%		
4	Risks impacts were evaluated numerically and their interactions and relationships were analyzed.	19	24	20	8	1	2.28	1.024
		26.4%	33.3%	27.8%	11.1%	1.4%		
5	Risk response strategies were developed in the risk response planning.	11	15	34	11	1	2.67	0.964
		15.3%	20.8%	47.2%	15.3%	1.4%		
6	Identified risks were tracked and controlled in accordance with the risk management plan.	6	21	28	15	2	2.81	0.959
		8.3%	29.2%	38.9%	20.8%	2.8%		
						Total mean	**2.69**	

(Source: Field Survey 2024)

According to the survey data for the question Procedures for developing a risk management plan were defined, the mean score of 2.81 falls within the 'Average' maturity level 3, indicating that procedures for developing a risk management plan are generally in place. A majority of respondents (40.3%) rated this practice as average, while 25% rated it as low. The standard deviation of 1.016 suggests moderate variability in perceptions about the effectiveness of these procedures.

As per the respondents' assessment, the potential risks and their negative impact on a project were identified and documented averagely. The mean score of 2.72 falls within the 'Average' maturity level 3. The majority of respondents (43.1%) believed this practice as average. However, a significant portion (23.6%) rated it as low. The standard deviation of 0.938 suggests moderate variability, indicating differences in perceptions about the risk identification and documentation

Furthermore, the data reveals, if project risks were prioritized for the probability of occurrence were asked, and the mean score of 2.86 falls also within the 'Average' maturity level. A majority of respondents (38.9%) rated this practice as average. The standard deviation of 1.011 indicates

moderate variability, suggesting that there are variations in perceptions about the risk prioritization.

In addition, whether Risks' impacts were evaluated numerically, and their interactions and relationships were analyzed was the next enquiry. The mean score of 2.28 falls within the 'Low' maturity of level 2, suggesting that the numerical evaluation and analysis of risk impacts and interactions may not be consistently implemented. The 27.8% of respondents rated this practice as average, while 33.3% rated it as low. The standard deviation of 1.024 indicates moderate variability, highlighting differences in perceptions about the risk impact analysis.

Moreover, the survey responses indicate, Risk response strategies were developed in the risk response planning part that the mean score of 2.67 falls within the 'Average' maturity of level 2, suggesting that risk response strategies are generally considered. The majority of respondents (47.2%) rated this practice as average. The standard deviation of 0.964 suggests moderate variability, indicating that there are variations in perceptions about the risk response planning.

Finally, the survey data demonstrates Identified risks were tracked and controlled in accordance with the risk management plan. The mean score of 2.81 falls within the 'Average' maturity level. The majority of respondents (38.9%) rated this practice as average. The standard deviation of 0.959 indicates moderate variability, suggesting differences in perceptions about the effectiveness of risk tracking and control.

The overall mean score for Project Risk Management is 2.69, indicating an 'Average' maturity level. This suggests that the project team generally understands the importance of risk management but further improvement is needed. The project demonstrates a moderate ability to identify and document potential risks, develop a risk management plan, and prioritize risks based on their probability of occurrence. However, further development is needed in the areas of evaluating risk impacts and developing risk response strategies. The standard deviations across the different questions indicate moderate variability in perceptions about the effectiveness of these practices, suggesting a need for greater consistency in understanding and implementing risk management practices across the project.

4.1.6. Project Quality Management

Project Quality Management, unlike some other knowledge areas that are divided into numerous components, is relatively streamlined, encompassing three essential elements as defined by the Project Management Institute (PMI) in 2013. These three elements form a cohesive framework for ensuring high-quality project deliverables. First, a comprehensive quality management plan is developed, outlining the strategies and processes for achieving the desired level of quality throughout the project. Next, quality assurance processes are implemented to ensure that the project's processes and deliverables consistently meet pre-defined quality standards. Finally, quality control focuses on monitoring and verifying the actual outputs of the project to ensure they meet the predetermined quality standards. By effectively integrating these three components, project managers strive to achieve a consistent and high level of quality in all aspects of project execution and delivery. The following table will demonstrate the result from responses of the questionnaire for project quality management.

Table 4. 10 Project Risk Management Maturity Level

No.	Project Quality Management	Frequency of Respondent					Mean	Std. Deviation
		Very Low	Low	Average	High	Very High		
1	Quality management plan was developed and project deliverables standards were defined.	6	10	12	23	21	3.6	1.274
		8.3%	13.9%	16.7%	31.9%	29.2%		
2	Organizational quality standards were assessed in order to ensure the project's outcomes.	2	12	11	30	17	3.67	1.101
		2.8%	16.7%	15.3%	41.7%	23.6%		
3	Regular evaluation of project performance	3	10	19	31	9	3.46	1.02
		4.2%	13.9%	26.4%	43.1%	12.5%		
4	Project deliverables is Checked and monitoring results to comply with quality standards.	4	13	22	24	9	3.29	1.08
		5.6%	18.1%	30.6%	33.3%	12.5%		
5	Controlling of project quality changes	4	9	24	24	11	3.4	1.007
		5.6%	12.5%	33.3%	33.3%	15.3%		
						Total mean	**3.48**	

(Source: Field Survey 2024)

In response to the question: Was a quality management plan developed, and were project deliverables standards defined? The mean score of 3.6 falls within the 'High' maturity which is level 4, indicating that a quality management plan is generally in place, with 31.9% and 29.2% of

respondents rating it as high or very high. The standard deviation of 1.274 indicates a range of opinions, suggesting potential variations in the comprehensiveness of the plan.

The survey reveals that; Organizational quality standards were assessed to ensure the project's outcomes. The mean score of 3.67 falls again within the 'High' maturity of level 4, indicating that organizational quality standards are generally assessed and it’s on Managed Processes level. The majority of respondents (41.7%) rated this practice as high, while 23.6% rated it as very high. The standard deviation of 1.101 suggests some variability, reflecting a range of experiences with the assessment process.

Regarding the question: "Is there a regular evaluation of project performance?" The mean score of 3.46 which also falls within the 'High' maturity of level 4. This suggests that regular evaluations of project performance are generally conducted. A majority of respondents (43.1%) rated this practice as high. The standard deviation of 1.02 suggests moderate variability, indicating differences in perceptions about the regularity or comprehensiveness of performance evaluations.

As per the survey respondents, for the question Are project deliverables checked and monitored results compared to comply with quality standards? The mean score of 3.29 falls within the 'Average' maturity of level 3, indicating that project deliverables are generally checked and monitored against quality standards. The majority of respondents (33.3%) rated this practice as high. The standard deviation of 1.08 suggests some variability, reflecting differences in how respondents perceive this process.

Finally, "Is there a process for controlling project quality changes? Was asked and the mean score of 3.4 falls within the 'Average' maturity level, indicating that project quality changes are generally managed. A majority of respondents (33.3% and 33.3%) rated this practice as average and high. The standard deviation of 1.007 suggests moderate variability, reflecting a range of experiences with controlling quality changes.

The overall mean score for Project Quality Management is 3.48, indicating a 'High' maturity which is level 4. This suggests that the project team generally prioritizes and implements quality management practices. The project demonstrates a solid foundation for quality planning, assessment, and control. However, the standard deviations across the different questions suggest some variability in perceptions and experiences, indicating that further investigation into the specific practices and processes for achieving quality goals might be beneficial.

4.1.7. Project Human Resources Management

Project Human Resource Management, a critical aspect of successful project delivery, involves managing the people and skills necessary for project success. The survey explores the implementation of key practices within this knowledge area, examining how organizations approach aspects like defining human resource needs, acquiring talent, and fostering team collaboration. The following table will further demonstrate the responses to the questionnaire relating to Project Human Resource Management.

Table 4. 11 Project Human Resource Management Maturity Level

No.	Project Human Resource Management	Frequency of Respondent					Mean	Std. Deviation
		Very Low	Low	Average	High	Very High		
1	Project requirements on human skills together with their roles and responsibilities were identified and planned.	4	12	20	25	11	3.38	1.106
		5.6%	16.7%	27.8%	34.7%	15.3%		
2	The human resources requirements were acquired for the project activities.	3	9	31	23	6	3.28	0.938
		4.2%	12.5%	43.1%	31.9%	8.3%		
3	Clear description of positions	4	18	21	23	6	3.12	1.061
		5.6%	25.0%	29.2%	31.9%	8.3%		
4	Teams were developed to create synergy in order to enhance productivity and efficiency.	8	16	24	18	6	2.97	1.126
		11.1%	22.2%	33.3%	25.0%	8.3%		
5	Project team members were encouraged to participate in project activities.	7	17	30	16	2	2.85	0.974
		9.7%	23.6%	41.7%	22.2%	2.8%		
6	Frequency of training (formal or informal) provided to project team members to improve competencies	19	28	20	5	-	2.15	0.899
		26.4%	38.9%	27.8%	6.9%	-		
						Total mean	**2.96**	

(Source: Field Survey 2024)

When asked about identifying project requirements on human skills, roles, and responsibilities; The mean score of 3.38 falls within the 'Average' maturity of level 3, suggesting that human resource requirements are generally identified. The majority of respondents (34.7%) rated this practice as high. The standard deviation of 1.106, while moderate, suggests some variability in perceptions, indicating a range of experiences in identifying these requirements.

The survey results revealed that Human resource requirements were acquired for project activities. The mean score of 3.28 falls within the 'Average' maturity level, indicating that human resource requirements are generally acquired. The majority of respondents (43.1%) rated this practice as average, while 31.9% rated it as high. The standard deviation of 0.938 indicates moderate variability in perceptions, reflecting a range of experiences with acquiring these resources.

Concerning the clarity of position descriptions, the mean score of 3.12 falls within the ‘Average' maturity of level 3, indicating that clear position descriptions are generally available. A majority of respondents (29.2% and 31.9%) rated this practice as either average or high. However, a significant portion (25%) rated this practice as low. The standard deviation of 1.061 indicates moderate variability, suggesting that some respondents may have experienced more comprehensive position descriptions than others.

In exploring the development of teams, if teams developed to create synergy and enhance productivity and efficiency, the mean score of 2.97 falls again within the 'Average' maturity level 3, suggesting that teams are generally developed to enhance productivity and efficiency. A majority of respondents (33.3%) rated this practice as average. However, 22.2% rated it as low. The standard deviation of 1.126 relatively high in this group suggests variability, reflecting a range of experiences in team development processes.

The survey indicates that; Project team members were encouraged to participate in project activities. The mean score of 2.85 falls within the 'Average' maturity level 3, suggesting that team members are generally encouraged to participate. The majority of respondents (41.7%) rated this practice as average, while 22.2% rated it as high. The standard deviation of 0.974 suggests moderate variability, indicating differences in perceptions about the level of encouragement and involvement.

Further, the respondents were asked about frequency of training (formal or informal) was provided to project team members to improve competencies. The mean score of 2.15 falls within the 'Low' maturity level 2, suggesting that the frequency of training may not be there or not consistent. A majority of respondents (38.9%) rated this practice as low, while 26.4% rated it as very low. The standard deviation of 0.899 indicates moderate variability, reflecting a range of experiences with the frequency and effectiveness of training programs.

The overall mean score for Project Human Resource Management is 2.96, indicating an 'Average' maturity level 3. This suggests that the project team generally demonstrates a moderate understanding and application of human resource management practices. The project team generally identifies and acquires human resources, develops teams, and encourages participation, but need to improve providing trainings to the team. However, the standard deviations across the different questions indicate moderate variability in perceptions and experiences, suggesting that further investigation into the specific practices and processes for managing human resources might be beneficial. The provision of training, in particular, appears to require further attention and development.

4.1.8. Project Communication Management

Project Communications Management, as outlined by the Project Management Institute (PMI) in 2013, is a crucial aspect of project success, ensuring effective information flow between stakeholders. This knowledge area is structured into three core components: developing a Communications Management Plan, managing communication activities, and controlling the effectiveness of communication throughout the project. The following table will further demonstrate the responses to the questionnaire relating to Project Communication Management.

Table 4. 12 Project Communication Management Maturity Level

No.	**Project Communication Management**	Frequency of Respondent					**Mean**	**Std. Deviation**
		Very Low	**Low**	**Average**	**High**	**Very High**		
1	Determination of needed information and communication	2	12	25	25	8	3.35	0.981
		2.8%	16.7%	34.7%	34.7%	11.1%		
2	Means for collections, storing, retrieving and disposing project information were developed.	-	6	26	26	14	3.67	0.888
		-	8.3%	36.1%	36.1%	19.4%		
3	Formal communication methods were developed in order to address the project's report.	5	16	17	23	11	3.26	1.175
		6.9%	22.2%	23.6%	31.9%	15.3%		
4	Availability of needed information to project stakeholders	7	15	31	16	3	2.9	0.995
		9.7%	20.8%	43.1%	22.2%	4.2%		
						Total mean	**2.90**	

(Source: Field Survey 2024)

Based on the survey data, respondents believe exploring the effectiveness of determining needed information and communication, the mean score of 3.35 falls within the 'Average' maturity level

3, suggesting that this aspect of communication management is moderately established. A majority of respondents (34.7%) rated this practice as average, and another 34.7% rated it as high. The standard deviation of 0.981 reflects a moderate range of opinions, indicating variations in how respondents perceive the process of identifying communication needs.

The survey data reveals that, means for collecting, storing, retrieving, and disposing of project information were developed. The mean score of 3.67 falls within the 'High' maturity level 3, suggesting that these means are generally in place. A majority of respondents (36.1%) rated this practice as average, while another 36.1% rated it as high. The standard deviation of 0.888 reflects moderate variability, suggesting differences in the comprehensiveness of these information management methods.

When assessing formal communication methods, were they developed to address the project's report? The mean score of 3.26 falls within the 'Average' maturity level 3, suggesting that formal communication methods are generally established. The majority of respondents (23.6% and 31.9%) rated this practice as either average or high. The standard deviation of 1.175 is moderate, reflecting potential differences in the effectiveness and consistency of these methods.

As per the survey: The availability of needed information to project stakeholders was assessed. The mean score of 2.9 falls within the 'Average' maturity level 3, suggesting that stakeholders are generally able to access necessary information. A majority of respondents (43.1%) rated this practice as average. The standard deviation of 0.995 reflects moderate variability, suggesting some differences in perceptions about the effectiveness of information dissemination.

The overall mean score for Project Communication Management is 2.90, indicating an 'Average' maturity level. This suggests that the project team generally understands the importance of effective communication and has developed some communication management practices. The project demonstrates strengths in defining communication needs, developing information management methods, and establishing formal communication channels. However, further development is needed in ensuring that stakeholders have consistent access to necessary information. The standard deviations across the different questions indicate moderate variability in perceptions, suggesting that a more standardized and consistent approach to communication management practices might be beneficial.

4.1.9. Project Procurement Management

Project Procurement Management, as defined by the Project Management Institute (PMI) in 2013, involves effectively acquiring goods and services from external sources. This process is broken down into four key components: developing a Procurement Management Plan, managing procurement activities, controlling procurement processes, and formally closing out procurements. These components ensure that procurements are managed efficiently, effectively, and within the project's scope and budget.

Table 4. 13 Project Procurement Management Maturity Level

No.	Project Procurement Management	Frequency of Respondent					Mean	Std. Deviation
		Very Low	Low	Average	High	Very High		
1	Determination of Needed resources	4	18	19	22	9	3.19	1.121
		5.6%	25.0%	26.4%	30.6%	12.5%		
2	Documentation of requirements	5	19	22	18	8	3.07	1.117
		6.9%	26.4%	30.6%	25.0%	11.1%		
3	Identification of potential sources	10	16	17	16	13	3.08	1.319
		13.9%	22.2%	23.6%	22.2%	18.1%		
4	Appropriateness of obtaining quotations, bid, offers or proposal	8	18	19	16	11	3.06	1.243
		11.1%	25.0%	26.4%	22.2%	15.3%		
5	Choosing among potential suppliers	3	20	21	20	8	3.14	1.079
		4.2%	27.8%	29.2%	27.8%	11.1%		
6	Management of relationship with suppliers	7	10	27	18	10	3.19	1.146
		9.7%	13.9%	37.5%	25.0%	13.9%		
7	Proper completion and settlement of contract	2	10	30	26	4	3.28	0.876
		2.8%	13.9%	41.7%	36.1%	5.6%		
						Total mean	**3.14**	

(Source: Field Survey 2024)

When assessing the determination of needed resources, the mean score of 3.19 falls within the 'Average' maturity level 3, suggesting that this practice is generally in place. A majority of respondents (26.4% and 30.6%) rated this practice as either average or high. The standard deviation of 1.121 indicates moderate variability in perceptions, suggesting a range of experiences in defining resource needs.

As per the survey data, regarding, for documentation of requirements, the mean score of 3.07 falls within the 'Average' maturity of level 3, suggesting that requirement documentation practices are

generally in place. A majority of respondents (30.6% and 25%) rated this practice as either average or high. The standard deviation of 1.117 indicates moderate variability in perceptions, suggesting some differences in the comprehensiveness and effectiveness of these documentation practices.

When asked about the identification of potential sources, The mean score of 3.08 also falls within the 'Average' maturity level 3, indicating that potential sources are generally identified. A majority of respondents (23.6% and 22.2%) rated this practice as either average or high. The standard deviation of 1.319, the highest observed so far, suggests a wider range of experiences with this practice. This indicates that while potential sources are generally identified, there may be variations in the effectiveness and comprehensiveness of the process.

The survey data reveals that, the appropriateness of obtaining quotations, bids, offers, or proposals perception. The mean score of 3.06 falls within the 'Average' maturity level 3, suggesting that the appropriateness of obtaining quotes, bids, offers, or proposals is generally considered. The majority of respondents (26.4% and 22.2%) rated this practice as either average or high. The standard deviation of 1.243 indicates high variability, suggesting differences in how effectively this process is evaluated.

In response to the question, are potential suppliers chosen among? The mean score of 3.14 falls within the 'Average' level of maturity which is Level 3, suggesting that choosing among potential suppliers is generally in place. The majority of respondents (29.2% and 27.8%) rated this practice as either average or high. The standard deviation of 1.079 indicates moderate variability in perceptions, suggesting some differences in how the supplier selection process is conducted.

The survey also indicates that, the management of relationships with suppliers. The mean score of 3.19 falls within the 'Average' maturity level 3, suggesting that supplier relationships are generally managed. A majority of respondents (37.5% and 25%) rated this practice as either average or high. The standard deviation of 1.146 is moderate, suggesting some variability in how these relationships are managed.

According to the survey, the contract properly completed and settled has scored mean value of 3.28 which falls within the 'Average' maturity level 3. The majority of respondents (41.7% and 36.1%) rated this practice as either average or high. The standard deviation of 0.876 suggests less

variability compared to other questions, suggesting that the project team demonstrates a greater consistency in contract completion and settlement.

The overall mean score for Project Procurement Management is 3.14, indicating an 'Average' maturity level, suggesting that the project team generally understands and implements procurement practices effectively. The project demonstrates strong practices in determining needed resources, documenting requirements, identifying potential sources, and managing supplier relationships. The standard deviations across the different questions indicate moderate variability in perceptions, suggesting that further investigation into specific practices and processes related to procurement management will be beneficial.

4.1.10. Project Stakeholders Management

The final knowledge area assessed in this study is Project Stakeholder Management, which explores how organizations manage relationships with individuals and groups who have an interest in the project. The table examines five key aspects of stakeholder management, evaluating the extent to which organizations identify stakeholders and their interests, develop stakeholder engagement plans, ensure effective communication, monitor engagement, and regularly share project progress with stakeholders.

Table 4. 14 Project Stakeholders Management Maturity Level

No.	**Project Stakeholders Management**	Frequency of Respondent						
		Very Low	**Low**	**Average**	**High**	**Very High**	**Mean**	**Std. Deviation**
1	All the project stakeholders were identified with their influences, interests and potential impacts.	14	28	19	10	1	2.39	1.001
		19.4%	38.9%	26.4%	13.9%	1.4%		
2	Stakeholder management plan was developed to determine their engagement levels as well as to identify their relationships.	8	17	24	17	6	2.94	1.124
		11.1%	23.6%	33.3%	23.6%	8.3%		
3	Effectiveness of communication between stakeholders	7	18	31	13	3	2.82	0.983
		9.7%	25.0%	43.1%	18.1%	4.2%		
4	Stakeholders' engagements were monitored and controlled.	15	22	21	9	5	2.54	1.162
		20.8%	30.6%	29.2%	12.5%	6.9%		
5	Frequent revision of project progress with stakeholders	11	31	24	5	1	2.36	0.877
		15.3%	43.1%	33.3%	6.9%	1.4%		
						Total mean	**2.36**	

(Source: Field Survey 2024)

According to the survey, the respondents score mean value of 2.39 which falls within the 'Low' maturity of level 2 for the question, whether all project stakeholders identified, including their influences, interests, and potential impacts. This suggests that this practice needs further improvement. A significant portion of respondents (38.9% and 26.4%) rated this practice as either low or average. The standard deviation of 1.001 indicates moderate variability in perceptions, suggesting a range of experiences in identifying stakeholders and understanding their influence.
The survey data reveals that A stakeholder management plan was developed to determine their engagement levels and identify their relationships. The mean score of 2.94 falls within the 'Average' maturity level 3, suggesting that a stakeholder management plan is generally in place. The majority of respondents (33.3% and 23.6%) rated this practice as either average or high. The standard deviation of 1.124 indicates moderate variability in perceptions, reflecting differences in the comprehensiveness of these plans.
Regarding the effectiveness of communication between stakeholders, the mean score of 2.82 also falls within the 'Average' maturity level 3, suggesting that stakeholder communication is generally in place. The majority of respondents (43.1%) rated this practice as average. The standard deviation of 0.983 suggests small variability, suggesting that stakeholder communication is effective, but there may be variations in how effectively communication is carried out among different stakeholders.

As per the survey, if engagements of stakeholder monitored and controlled, and score mean of 2.54 which is 'Average' maturity level 3, suggesting that stakeholder engagement is generally monitored and controlled. The majority of respondents (29.2% and 30.6%) rated this practice as either average or low. The standard deviation of 1.162 indicates moderate variability, suggesting a range of experiences with monitoring and controlling stakeholder engagement.

When asked about the frequent revision of project progress with stakeholders. The mean score of 2.36 falls within the 'Low' maturity level (1.5-2.49), suggesting that this practice needs further improvement. The majority of respondents (43.1% and 33.3%) rated this practice as either average or low. The standard deviation of 0.877 suggests moderate variability in perceptions, reflecting differences in how frequently and effectively progress is revised with stakeholders.

The overall mean score for Project Stakeholder Management is 2.36, indicating a 'Low' maturity level 2. This suggests that the project team needs to improve its stakeholder management practices.

The project team demonstrates a moderate ability to communicate effectively and develop management plans. However, the consistent monitoring and control of stakeholder engagement, as well as frequent revisions of project progress with stakeholders, need significant attention. The standard deviations across the different questions indicate moderate variability in perceptions, suggesting that further investigation into specific practices and processes related to stakeholder management might be beneficial.

4.6. Discussion

This study aimed to evaluate the maturity of project management practices within the Chaka project, a significant construction project in Ethiopia recently undertaking. The research employed a questionnaire survey to gather data from project participants, which was then analyzed using a five-point Likert scale and a defined framework for assessing maturity levels. The overall objective was to identify strengths and areas for improvement within project management practices at the Chaka project, contributing to a better understanding of project management maturity in the government construction practices.

The overall average maturity level across the ten knowledge areas studied was 3.05, indicating an 'Average' or level 3 maturity. This suggests that while the project team demonstrates a general understanding of project management principles, there are specific areas where further development and refinement are necessary to improve overall effectiveness and efficiency and ensure the successful completion of the project.

A closer examination of the individual knowledge areas reveals several recurring themes that point to potential weaknesses and areas for improvement in the project's overall management practices. Both Project Stakeholder Management and Project Risk Management exhibit low maturity levels. One common theme is the inadequacy in proper documentation practices. This includes insufficient documentation of stakeholder requirements and risk management plans, leading to a lack of clear guidelines and actionable steps. The implication of lack of such practice is doomed by different scholar. Poor documentation leads to communication breakdowns between team members and stakeholders, resulting in misunderstandings, misinterpretations, and potential conflicts (Meredith & Mantel Jr., 2012). Without proper documentation, valuable knowledge gained during the project is lost, hindering the ability to learn from past experiences and improve future projects (Crawford, 2002). Lack of clear documentation makes it difficult to track progress,

identify responsibility for decisions, and hold individuals accountable for their actions (Kerzner, 2009).

Beyond the need for stronger documentation practices across multiple areas, a consistent pattern emerges regarding the project's approach to managing change and deviations. The project's ability to effectively monitor and control project work, particularly in response to unexpected circumstances, appears to be a recurring area for improvement. This suggests that the project's current processes for managing change may be inadequate, potentially leading to challenges in maintaining project schedules, budgets, and quality. The Project should be caution that Ineffective change management can lead to delays and cost overruns as project plans are frequently disrupted by unmanaged changes (Iyer & Jha, 2005). Uncontrolled changes can compromise project quality as modifications are made without proper assessment or oversight (Hendrickson, 2015). Frequent changes can erode stakeholder confidence, as they may perceive the project as lacking direction or control (Baccarini & Collins, 2004).

A recurring theme throughout the analysis is the presence of weaknesses in planning practices across multiple knowledge areas. This suggests a lack of comprehensive and well-defined plans, which can contribute to inconsistencies in implementation and ultimately hinder the project's ability to achieve its objectives (Meredith & Mantel Jr., 2012). The absence of robust planning can lead to difficulties in anticipating and managing changes, a critical element in construction projects known for their dynamic nature (Iyer & Jha, 2005).

For instance, Project Cost Management highlights a need for improvement in the development of a baseline project cost and budget allocation, as well as the consistent application of cost control practices. This indicates that the project may not have a sufficiently detailed and realistic budget or a formalized system for tracking expenditures and managing variances (Flanagan & Norman, 1993). Similarly, the need for a robust system for monitoring and controlling project work against the plan, particularly in response to changes, was identified within Project Integration Management. This suggests that the project team may not have clearly defined procedures for managing deviations, potentially leading to delays and inefficiencies as the project progresses (Kerzner, 2009).

The interconnectedness of these knowledge areas underscores the crucial need for a holistic and integrated approach to project management (PMI, 2017). Effectively addressing the identified weaknesses in planning, documentation, and change management processes across multiple areas is paramount for the Chaka project to optimize its performance, reduce risks, and ultimately achieve its objectives.

The most frequently mentioned external challenge (63.9%) is the need for social acceptance, highlighting the critical importance of community engagement in construction projects, particularly large-scale endeavors like the Chaka project (Kumar et al., 2023). This finding underscores the necessity for navigating community concerns, obtaining necessary approvals, and minimizing potential environmental impacts to ensure project success (Flyvbjerg, 2014).

Furthermore, a substantial 33.3% of respondents identified "environmental factors" as a challenge, emphasizing the growing importance of sustainable practices in construction projects (Koshe & Jha, 2016). This resonates with the increasing global focus on environmentally responsible development, particularly in the context of mega-projects that have significant impacts on ecosystems and communities (United Nations Department of Economic and Social Affairs Sustainable Development, 2015). Finally, navigating complex government rules and regulations (12.5%) can create obstacles in implementing construction projects, especially in developing countries with evolving regulatory landscapes (Tadesse et al., 2016). This underscores the need for strong communication and collaboration between the project team and government agencies to ensure compliance and minimize delays.

4.7. Project Management Maturity Level

Table 4.15 presents analysis of the Chaka project's maturity levels across the ten project management knowledge areas, ranked in order of their overall mean scores, alongside with key findings and potential improvement areas.

Table 4. 15 Project Management Maturity Level

No.	Knowledge Areas	Mean	Rank	Key Finding
1	Project Integration Management	3.2	4	Strong commitment to developing a project charter and plan and managing activities based on the plan. Areas for improvement include enhancing monitoring and control practices and strengthening change management systems.
2	Project Scope Management	3.3	3	Generally good practices in defining project scope, developing a WBS, and managing scope changes. However, inconsistencies in requirements gathering and validation require further attention.
3	Project Time Management	3.52	1	Strong performance in identifying, sequencing, and estimating activities, developing a baseline schedule, and managing schedule changes. Variability in perceptions about the accuracy of estimates and managing changes highlights the need for further standardization.
4	Project Cost Management	2.96	6	Demonstrates general understanding of cost management principles. Further improvement needed in developing a baseline project cost and budget allocation, as well as consistent cost control practices.
5	Project Risk Management	2.69	9	Moderate ability to identify, document, and prioritize risks. Further development needed in evaluating risk impacts and developing risk response strategies.
6	Project Quality Management	3.48	2	Strong emphasis on developing a quality management plan, assessing organizational quality standards, and regularly evaluating project performance. Moderate variability in perceptions about specific practices suggests potential differences in implementation.
7	Project Human Resource Management	2.96	6	Demonstrates strong practices in identifying and acquiring human resources, as well as defining positions. Further attention needed to develop effective teams and ensure frequent and relevant training.
8	Project Communication Management	2.9	8	Strong foundation in defining communication needs, developing information management methods, and establishing formal communication channels. Further attention needed to ensure stakeholders have access to necessary information.
9	Project Procurement Management	3.14	5	Demonstrates strong practices in determining needed resources, documenting requirements, identifying potential sources, and managing supplier relationships. Further investigation into specific practices and processes might be beneficial.
10	Project Stakeholders Management	2.36	10	Moderate ability to communicate effectively and develop management plans. Significant attention needed for consistent monitoring and control of stakeholder engagement, as well as frequent revisions of project progress with stakeholders.
	Project Management Maturity Level	**3.05**		

(Source: Field Survey 2024)

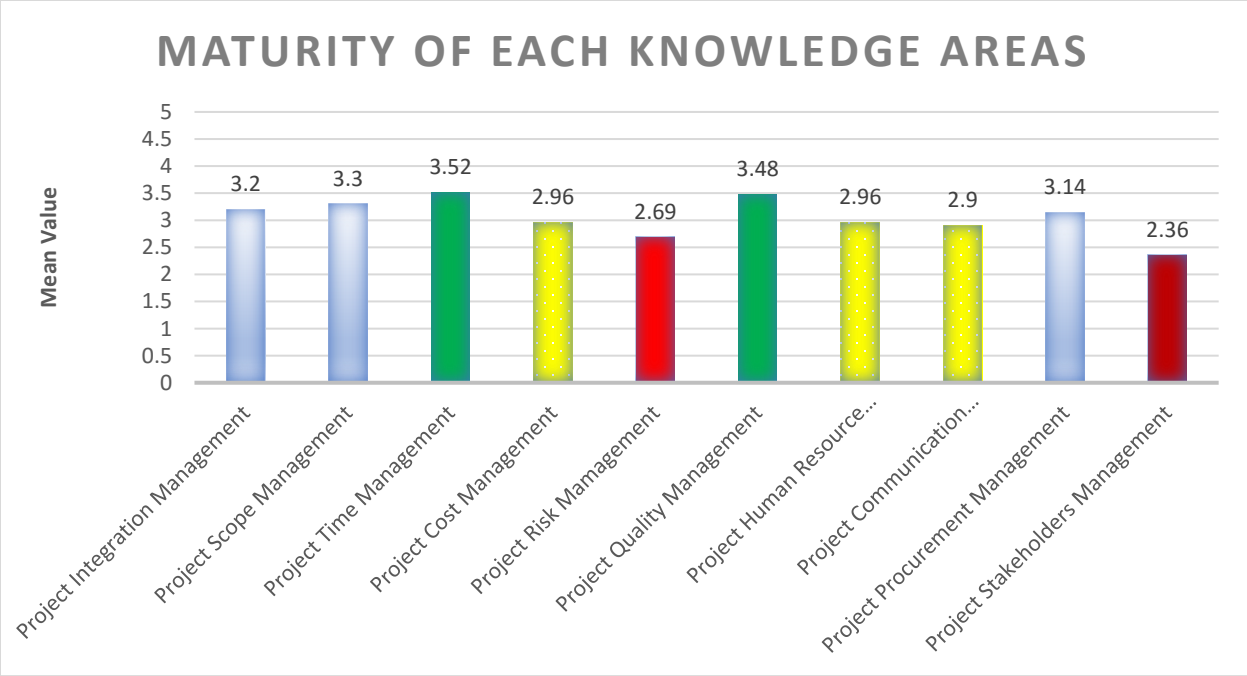


Figure 4 Maturity Level of Each Knowledge Areas (Source: Field Survey 2024)

The highest mean scores indicate a "High" maturity level in Project Time Management (3.52), corresponding to Level 4 maturity, and Project Quality Management (3.48), which is very close to achieving Level 4 maturity. This suggests that the project team demonstrates a strong understanding of these critical areas, which is essential for delivering successful construction projects (Hendrickson, 2015).

The high level of maturity in Project Time Management is particularly noteworthy, as effective time management is a cornerstone of successful construction projects, known for their complex timelines and numerous dependencies (Kaming et al., 1997). The project's ability to identify, sequence, and estimate activities, develop a baseline schedule, and manage schedule changes effectively contributes to its ability to stay on track and avoid costly delays (Burke, 2013). This finding aligns with research highlighting the positive impact of robust time management practices on project performance and success (Serrador & Turner, 2015).

While Project Quality Management is also a strength, it's worth noting that the project's near-Level 4 maturity indicates a focus on achieving quality goals, but may need to further refine its processes to maintain consistent high quality throughout the project lifecycle (Juran & Godfrey, 1999).

Project Integration Management, Project Scope Management, and Project Procurement Management have mean scores within the 'Average' maturity level. This indicates moderate levels

of understanding and implementation, suggesting these areas are functioning adequately but still have room for improvement.

Project Cost Management, Project Human Resource Management, and Project Communications Management all have mean scores around 2.96, indicating a Level 3 maturity. However, since these scores are below the midpoint of the 'Average' range, there is a clear need to enhance practices in these areas to reach a higher level of maturity. Effective cost management is essential for successful construction projects, as they often require substantial financial investments (Iyer & Jha, 2005). The project could benefit from more robust team development practices and a commitment to frequent and relevant training to enhance overall team effectiveness and productivity (Abbasi & Al-Mharmah, 2000). This aligns with research emphasizing the vital role of effective human resource management in project success (Wideman, 2009). Also, Effective communication is critical for managing complex construction projects, where a range of stakeholders need to be kept informed and engaged (Chen et al., 2009).

On the other hand, Project Stakeholder Management (2.36) and Project Risk Management (2.69) stand out with lower mean scores, reflecting a "Low" maturity level at Level 2. These scores highlight significant deficiencies, underscoring the necessity for substantial development and refinement in these knowledge areas to align them with industry best practices and improve overall project effectiveness. Without effective engagement, stakeholders may not understand the project's goals or see the value in its outcomes, leading to reduced support and potential opposition (Ozguler et al., 2015). A lack of engagement can escalate conflicts between the project team and stakeholders, as their needs and concerns are not effectively addressed (Shenhar et al., 2001). Unengaged stakeholders can significantly hinder project success by creating delays, undermining communication, and reducing the overall effectiveness of project management (Turner & Zolin, 2012).

Poor risk management leaves the project more susceptible to unforeseen challenges, leading to instability and unpredictable outcomes (Flanagan & Norman, 1993). Unidentified or unmanaged risks can result in significant cost overruns and delays as the project struggles to adapt to unexpected circumstances (Wang et al., 2004). In extreme cases, poorly managed risks can lead to project failure as the project becomes unable to overcome challenges and achieve its objectives (Pinto & Slevin, 1998).

4.8. Comparison of Results with Industry Benchmark

This research aimed to evaluate the project management maturity of the Chaka Project in relation to industry benchmarks within the African context. The study utilized the benchmark defined in the "Prosperous Report: The African Edition" (Labuschagne et al., 2013), which analyzed project management maturity across 218 construction projects in 13 developing African countries. For the purpose of comparison, the research focused on the nine knowledge areas covered in the benchmark report, aligning with the scope of the analysis. The following table and figure present a comparative analysis of the benchmark report's findings with the maturity levels observed in the Chaka Project, providing insights into the project's strengths and areas for potential improvement.

Table 4. 16 Comparison of Results with Industry Benchmark Values

Knowledge Areas	Benchmark PM Maturity Levels	Chaka Project Maturity Levels
Project Integration Management	3.02	3.20
Project Scope Management	3.03	3.30
Project Time Management	3.06	3.52
Project Cost Management	3.20	2.96
Project Quality Management	3.24	3.48
Project Human Resource Management	2.83	2.96
Project Communications Management	3.01	2.90
Project Risk Management	2.79	2.69
Project Procurement Management	3.34	3.14
Average	**3.06**	**3.13**

(Source: Field Survey 2024)

A comparison of the Chaka project's maturity levels with the African benchmark reveals a mixed picture. While the Chaka project demonstrates higher maturity levels in several areas, it also exhibits areas of lower maturity compared to the benchmark.

The Chaka project outperforms the benchmark in Project Time Management (3.52 vs. 3.06), Project Quality Management (3.48 vs. 3.24), Project Scope Management (3.03 Vs 3.30) and Project Human Resource Management (2.96 vs. 2.83). This suggests that the project has a stronger understanding and implementation of practices related to time management, quality control, scope and human resource management compared to the average African benchmark.

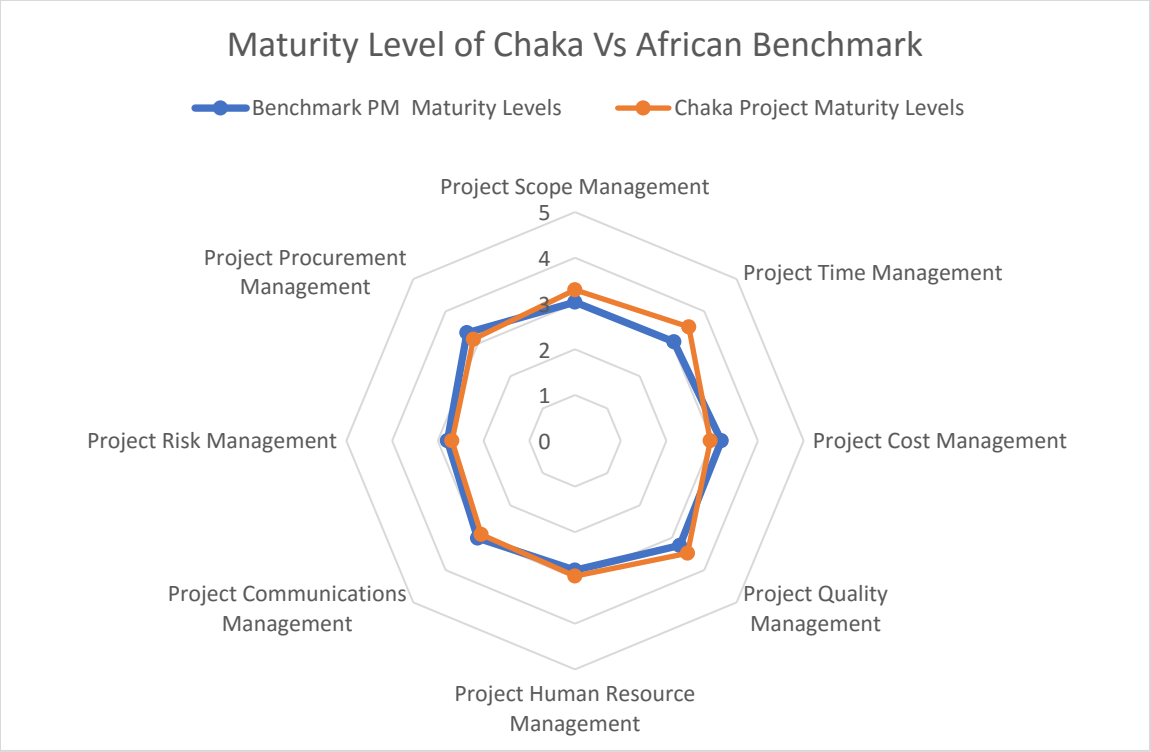


Figure 5 Comparison of Results with Industry Benchmark Values (Source: Field Survey 2024)

The Chaka project falls below the benchmark in Project Cost Management (2.96 vs. 3.2), Project Risk Management (2.69 vs. 2.79), and Project Stakeholder Management (2.36 vs. 3.03). This indicates that the project has room for improvement in these areas, particularly in managing project costs effectively, implementing robust risk management practices, and engaging stakeholders more strategically.

The overall average maturity level for the nine knowledge areas for the Chaka project (3.13) is slightly higher than the African benchmark (3.06). While this difference is subtle, it indicates that the Chaka project, on average, exhibits a slightly more mature approach to project management compared to the broader African context. However, it is crucial to consider the specific areas of strength and weakness within each knowledge area, as highlighted in the previous analysis.

While the Chaka project's average maturity level is generally aligned with the benchmark, the project could still benefit from focusing on areas where it lags behind, particularly in cost management, risk management, and stakeholder management. By addressing these specific areas, the project can further enhance its overall performance and demonstrate greater alignment with industry best practices.

CHAPTER FIVE
SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.1. Summary

This study investigated the maturity of project management practices within the Chaka project, a mega government construction project in Ethiopia currently undertaking. Using a questionnaire survey of 72 project team members, the study assessed maturity levels across ten knowledge areas.

The analysis revealed that the overall average maturity level for the Chaka project is 3.05, indicating an 'Average' maturity level or Level 3. While this suggests a general understanding and implementation of project management principles, specific areas require further development. Project Time Management, Project Quality Management, High maturity levels, reflecting strong practices in these areas. However, the project demonstrated lower maturity in Project Stakeholder Management and Project Risk Management, indicating a need for significant improvement in these areas. The remaining knowledge areas, Project Integration Management, Project Human Resource Management, Project Communications Management, and Project Cost Management, showed 'Average' maturity levels, suggesting that further development and refinement are necessary to optimize their effectiveness.

Analysis of the major challenges encountered in implementing project management practices revealed a complex interplay of both internal and external factors. The most prominent internal challenge was organizational culture, underscoring the need for improved communication, collaboration, and efficient processes. Challenges related to resource estimation and allocation, as well as inconsistencies in policies and procedures, were also highlighted. External challenges included navigating community acceptance, addressing environmental concerns, and managing complex government regulations. These findings emphasize the need for the project team to focus on improving internal processes, managing external factors effectively, and strengthening planning practices to overcome these obstacles and achieve project goals.

A comparison with industry benchmarks in the African construction sector revealed that the Chaka project, while demonstrating strengths in some areas, lags behind the benchmark in Project Cost Management, Project Risk Management, and Project Stakeholder Management. This indicates a need to enhance the project's approach to cost control, risk mitigation, and stakeholder engagement to align with industry best practices.

5.2. Conclusion

This study investigated the project management maturity level of the Chaka Project, a mega government-led construction initiative in Ethiopia, with the aim of identifying both successful practices and areas for improvement. By evaluating the project's performance across the ten knowledge areas defined by the PMBOK Guide, the research sought to provide valuable insights for enhancing project management effectiveness within the Ethiopian construction industry and similar contexts.

Evaluating the Extent and Maturity of PM Knowledge Areas: The study revealed an overall average maturity level of 3.05 for the Chaka Project, indicating an 'Average' level of maturity (Level 3). While this suggests a general understanding and implementation of project management principles, the findings highlight significant variations in maturity levels across the different knowledge areas. Project Time Management and Project Quality Management emerged as areas of strength, demonstrating relatively high maturity levels, while Project Stakeholder Management and Project Risk Management exhibited lower maturity levels, indicating a need for substantial improvement.

The analysis identified specific areas within each knowledge area where project management practices could be enhanced. These included strengthening documentation practices, developing more robust change management systems, improving stakeholder engagement strategies, and implementing more comprehensive risk management processes. The findings underscore the importance of a holistic and integrated approach to project management, where weaknesses in one knowledge area can have a ripple effect on the effectiveness of others.

Identifying Major Challenges: The research revealed a complex interplay of internal and external challenges impacting project management practices within the Chaka Project. Internal challenges included organizational culture, resource estimation and allocation, and inconsistencies in policies and procedures. External challenges included navigating community acceptance, addressing environmental concerns, and managing complex government regulations. These findings emphasize the importance of considering both internal and external factors when developing strategies to improve project management effectiveness.

Comparing to Industry Benchmarks: A comparison with industry benchmarks in the African construction sector revealed that the Chaka Project generally performs well in areas such as time management and quality management. However, it lags behind the benchmark in crucial areas such as cost management, risk management, and stakeholder management. These findings highlight specific knowledge areas where the project team could benefit from adopting best practices and learning from other successful projects in the region.

This study provides valuable empirical evidence on the current state of project management maturity in a major Ethiopian government construction project. The findings underscore the importance of a comprehensive and integrated approach to project management, highlighting the need for continuous improvement and a commitment to addressing both internal and external challenges. By implementing the recommendations outlined in this research, the Chaka Project team can enhance its project management practices, mitigate risks, and increase the likelihood of achieving successful project outcomes, ultimately contributing to the project's broader goals of economic growth and development in Ethiopia.

5.3. Recommendations

The following recommendations highlight potential areas for improvement for Chaka project based on the identified gaps in project management maturity across various knowledge areas. These recommendations focus specifically on those components that scored lower maturity levels, signifying areas where focused efforts could lead to greater overall project management effectiveness and success.

- To enhance Project Cost Management, it is crucial to implement rigorous budgeting processes that encompass all potential costs, contingencies, and financial buffers. These budgets should be regularly reviewed and updated to reflect actual expenses and forecasted needs. Integrating advanced cost management tools, such as project management software with cost tracking features, can facilitate real-time monitoring of expenditures and provide early warnings of cost variances. Regular financial audits are essential to identify discrepancies and ensure that project funds are used efficiently, maintaining financial discipline and accountability. Additionally, providing training for project managers and financial staff on cost management techniques and tools can significantly improve their skills in cost estimation, budgeting, and financial control.

- Improving Project Communications Management requires the development of a comprehensive communication plan that outlines the communication needs of the project, including the frequency, methods, and content of communication with various stakeholders. Leveraging modern communication platforms and tools, such as Slack or Microsoft Teams, can facilitate real-time, transparent, and efficient communication among project team members and stakeholders. Regular meetings with stakeholders should be scheduled to update them on project progress, address concerns, and gather feedback. Ensuring stakeholders are well-informed enhances their engagement and support. Implementing feedback mechanisms to gather insights on communication effectiveness can further refine communication strategies, fostering continuous improvement.
- Adopting comprehensive risk management frameworks, such as ISO 31000 or COSO ERM, can provide a structured approach to systematically identify, assess, and manage project risks. Conducting regular risk assessment sessions to identify new risks and reassess existing ones is crucial. Using both qualitative and quantitative methods to evaluate risk impacts and likelihood can enhance the robustness of these assessments. Developing detailed risk response plans that outline mitigation strategies, contingency plans, and responsible personnel for each identified risk is essential. These plans should be communicated to all relevant team members to ensure preparedness. Providing risk management training for project team members can lead to more proactive identification and mitigation of risks, significantly improving the project's risk management practices.
- Refining procurement strategies to include clear supplier evaluation criteria, contract management plans, and procurement timelines is vital. These strategies should align with the overall project objectives to ensure coherent procurement practices. Enhancing supplier management through regular communication, performance evaluations, and feedback mechanisms can ensure timely delivery of quality goods and services. Implementing procurement management software can automate and streamline procurement processes, including supplier selection, contract management, and purchase order tracking. Regular audits of procurement processes are necessary to ensure compliance with policies and to identify areas for improvement, minimizing procurement risks and inefficiencies. Providing training for procurement personnel on best practices in procurement

management, negotiation, and contract management can further equip them to handle procurement challenges effectively.

- Strengthen Documentation: Develop a comprehensive documentation system for key project information, including plans, procedures, decisions, and changes, to improve communication, knowledge sharing, and accountability.
- Develop Robust Change Management: Implement a robust change management system to effectively manage deviations from the planned schedule, budget, and scope, ensuring that changes are properly assessed, approved, and implemented.
- Focus on Continuous Improvement: Establish a culture of continuous improvement by regularly reviewing and evaluating project management practices, identifying areas for improvement, and implementing necessary changes.
- Enhance Stakeholder Engagement: Develop a more proactive and systematic approach to stakeholder engagement, including clear communication strategies, regular updates on project progress, and processes for addressing stakeholder concerns and expectations.

5.4. Recommendations for Future Research

The study revealed that the Chaka project has visible limitations in the areas of cost management, communications management, risk management, and procurement management. More in-depth studies are recommended to explore the implications of these deficiencies and to develop tailored strategies for improvement in these specific knowledge areas. Additionally, because project management practices in the region are still evolving, it is recommended that a more comprehensive investigation be conducted by integrating several projects across different sectors to assess their project management maturity and practices. This broader analysis will provide a more robust understanding of the current state of project management and identify common challenges and opportunities for improvement.

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APPENDIX I
Questionnaire

ADDIS ABABA UNIVERSITY

COLLEGE OF BUSINESS AND ECONOMICS

SCHOOL OF COMMERCE

DEPARTMENT OF PROJECT MANAGEMENT

Dear Respondent,

I am a graduate student at Addis Ababa University School of Commerce, conducting research on project management practice in Chaka Project with the title "Evaluating Project Management Maturity In Ethiopian Government Construction Projects: The Case Of Chaka Project'".

I kindly request your participation by completing the questionnaire (attached and should only take a few minutes to complete), as it will serve being a primary data. Your honest answers will be invaluable in understanding the current state of project management practices and identifying areas for improvement.

All responses will be kept strictly confidential and used for academic purposes only.

Thank you for your time and valuable contribution to this research.

Kindly,

Nardos Ashenafi

Tel: 251-913-06-2461
Email: meetnardos@gmail.com

Direction

- No need of writing your name;
- Put "✓" mark or circle your choice;
- For the open-ended items, give brief answer in the space provided.

Part I: Demographic characteristics and general background of the respondents

1, Gender

Male [__] Female [__]

2, Age

<30 [__] 31-40 [__] 41-50 [__] Above 50 [__]

3, Education Level

TVET/Diploma [_] BA/ BSc [__] MA/ MSc [__] PHD [__] Other [_]

4, Field of Specialization_____

Project management [__] COTM [__] Engineering [__] other [__]

5, Experience in years

< 5 [__] 6 – 10 [__] 11 – 15 [__] 16 – 20 [__] 20 < [__]

8, Position/role at the project or your organization?

Managerial/Administrative [__] Office engineer [__] Site engineer [__]

Project manager [__] Construction engineer [__] Technical Professional [__]

Consultant [__] Other [_]

Part II

1. what are the major challenges of the project (you can choose more than one)

Internal challenges	External challenges
Lack of clarity in the scope of the project [ ]	Policies and procedures [ ]
Poor Schedule, budget and quality estimate [ ]	Government rules and regulation [ ]
Poor resources estimate and distribution [ ]	Environmental factors [ ]
Organizational culture [ ]	Acceptance within the society [ ]

Other_____

Part III Questions related to the Knowledge Areas of Project Management according to PMBOK

General direction

Please indicate your opinion by marking a "✓" on the appropriate number for the five-point scale questions that best describes how you perceive the project maturity of the application of project management knowledge areas where: **Very Low = 1 (Initial process), Low = 2 (Structured Processes and standards), Average = 3(Organizational Standards and Institutionalized Process), High = 4 (Managed Process) and Very High = 5. (Optimizing Process)**

No.	Project Integration Management	Very Low	Low	Avg.	High	Very High
1	Project charter was developed that integrates project scope, assumptions and constraints as well as authorizes to utilize organizational resources.					
2	Project management plan was developed.					
3	Project activities were managed and directed based on the project management plan.					
4	Project works were observed, evaluated and controlled against project management plan.					
5	Deviations from the project base line were controlled by integrated change control system.					
6	Procedures for project phases closure were incorporated in an orderly fashion.					

No.	Project Scope Management	Very Low	Low	Avg.	High	Very High
1	Scope management plan were developed for measuring the value of the project.					
2	Business and technical requirements of a project were collected.					
3	The project scope (deliverables or products) was defined beforehand.					
4	Work breakdown structure (WBS) were developed that decomposes into work packages and activities.					
5	Instruments were developed for validating the project's scope and success.					
6	Scope changes were controlled, evaluated and reported.					

No.	Project Time Management	Very Low	Low	Avg.	High	Very High
1	Detailed project activities were identified with detailed schedule.					
2	Sequencing of the project activities were identified with their deliverables.					
3	Resource requirements of the project activities were identified.					
4	Project activities duration were estimated in terms of the number of hours or work periods.					
5	A baseline project schedule was developed into the project schedule management plan.					
6	Changes to the baseline project schedule were controlled and if necessary corrective actions were taken.					

No.	Project Cost Management	Very Low	Low	Avg.	High	Very High
1	Project cost management policies and procedures were developed.					
2	Estimation was made for the cost of products as well as the resources costs for project activities.					
3	A baseline project cost was developed so that the project budget was allocated and expended for project activities based on time schedule.					

4	Project costs were controlled by the cost of baseline.					

No.	Project Risk Management	Very Low	Low	Avg.	High	Very High
1	Procedures for developing risk management plan were defined.					
2	Potential risks and their negative impact on a project were identified and documented.					
3	Project risks were prioritized for the probability of occurrence.					
4	Risks impacts were evaluated numerically and their interactions and relationships were analyzed.					
5	Risk response strategies were developed in the risk response planning.					
6	Identified risks were tracked and controlled in accordance with the risk management plan.					

No.	Project Quality Management	Very Low	Low	Avg.	High	Very High
1	Quality management plan was developed and project deliverables standards were defined.					
2	Organizational quality standards were assessed in order to ensure the project's outcomes.					
3	Regular evaluation of project performance					
4	Project deliverables is Checked and monitoring results to comply with quality standards.					
5	Controlling of project quality changes					

No.	Project Human Resources Management	Very Low	Low	Avg.	High	Very High
1	Project requirements on human skills together with their roles and responsibilities were identified and planned.					
2	The human resources requirements were acquired for the project activities.					
3	Clear description of positions					
4	Teams were developed to create synergy in order to enhance productivity and efficiency.					
5	Project team members were encouraged to participate in project activities.					

6	Frequency of training (formal or informal) provided to project team members to improve competencies					
No.	Project Communications Management	Very Low	Low	Avg.	High	Very High
1	Determination of needed information and communication					
2	Means for collections, storing, retrieving and disposing project information were developed.					
3	Formal communication methods were developed in order to address the project's report.					
4	Availability of needed information to project stakeholders					

No.	Project Procurement Management	Very Low	Low	Avg.	High	Very High
1	Determination of Needed resources					
2	Documentation of requirements					
3	Identification of potential sources					
4	Appropriateness of obtaining quotations, bid, offers or proposal					
5	Choosing among potential suppliers					
6	Management of relationship with suppliers					
7	Proper completion and settlement of contract					
No.	Project Stakeholder Management	Very Low	Low	Avg.	High	Very High
1	All the project stakeholders were identified with their influences, interests and potential impacts.					
2	Stakeholder management plan was developed to determine their engagement levels as well as to identify their relationships.					
3	Effectiveness of communication between stakeholders					
4	Stakeholders' engagements were monitored and controlled.					
5	Frequent revision of project progress with stakeholders					
No.	Project Equipment Management	Very Low	Low	Avg.	High	Very High
1	Comprehensiveness of policy that guides equipment acquisition, use, maintenance and replacement decisions					
2	Practice of economic and risk analyses done to decide between buy or rent options in acquiring equipment					
3	Practice to track and monitor performance of project's equipment, including their time worked, productivity, and maintenance cost					
4	Practice of using software tools to plan, assign and track equipment					

5	Availability of formal procedures for equipment sharing among the organization's projects					
No.	Project Materials Management	Very Low	Low	Avg.	High	Very High
1	Level of planning done for acquiring and use of project materials					
2	Considerations of purchase costs, order cost, holding cost (cost of storing materials), unavailability cost, unavailability risk, and cost increase in material planning					
3	Considerations of special planning and monitoring for critical items and materials requiring long lead-time (long process to acquire)					
4	Formal process to track, monitor and follow up material purchases, in order to assure the timely supply of materials					
5	Application of computer software tools in material planning, assignment and tracking					
6	Efforts in monitoring and tracking material availability and use in the project					
7	Practice of using a documented process to approve, check and test materials in the project site					

No.	Project Safety Management	Very Low	Low	Avg.	High	Very High
1	Application of organizational policies, procedures and guidelines for safety management					
2	Level of safety planning performed (includes determining safety standards & requirements, devising action plans or strategies, staffing, allocating budget)					
3	Level of site neighborhood safety characteristics study done					
4	Level of hazard analysis performed for project activities					
5	Level of safety control process implemented (inspecting whether project activities comply with safety standards)					
6	Application of safety audit (a review whether project activities complied with safety requirements)					
7	Provision of personal protective equipment (such as helmets, safety shoes, safety vests) for all workers in the project site					
8	Level of safety training provided for workers					

Thank You for Your Time and Cooperation!

Appendix II
Determining Sample Size From a Given Population

TABLE 1

Table for Determining Sample Size from a Given Population

N	*S*	*N*	*S*	*N*	*S*
10	10	220	140	1200	291
15	14	230	144	1300	297
20	19	240	148	1400	302
25	24	250	152	1500	306
30	28	260	155	1600	310
35	32	270	159	1700	313
40	36	280	162	1800	317
45	40	290	165	1900	320
50	44	300	169	2000	322
55	48	320	175	2200	327
60	52	340	181	2400	331
65	56	360	186	2600	335
70	59	380	191	2800	338
75	63	400	196	3000	341
80	66	420	201	3500	346
85	70	440	205	4000	351
90	73	460	210	4500	354
95	76	480	214	5000	357
100	80	500	217	6000	361
110	86	550	226	7000	364
120	92	600	234	8000	367
130	97	650	242	9000	368
140	103	700	248	10000	370
150	108	750	254	15000	375
160	113	800	260	20000	377
170	118	850	265	30000	379
180	123	900	269	40000	380
190	127	950	274	50000	381
200	132	1000	278	75000	382
210	136	1100	285	1000000	384

Note.—*N* is population size.
S is sample size.

source: (Krejcie and Morgan, 1970)