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St. Mary's University, Ethiopia

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

**ASSESSMENT OF PROJECT MANAGEMENT MATURITY LEVEL:  
THE CASE OF ETHIOPIAN RAILWAYS CORPORATION (ERC)**

**BY**

**SOLOMON BIRHANU**

**JULY, 2020**

**ADDIS ABABA, ETHIOPIA**

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**SOLOMON BIRHANU**

**A THESIS SUBMITTED TO SAINT MARY'S UNIVERSITY,  
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## **ABBREVIATIONS/ACRONYMS**

<b>PM</b>	Project Management
<b>PMBOK</b>	Project Management Body of Knowledge
<b>PMI</b>	Project Management Institute
<b>GTP</b>	Growth and Transformation Plan
<b>FDRE</b>	Federal Democratic Republic of Ethiopia
<b>AIHSRN</b>	African Integrated High Speed Railway Network
<b>GDP</b>	Gross Domestic Product
<b>KPA</b>	Key Process Area
<b>LRT</b>	Light Rail Transit
<b>ERC</b>	Ethiopian Railways Corporation
<b>NRNE</b>	National Railway Network of Ethiopia
<b>CMM</b>	Capability Maturity Model
<b>PMMM</b>	Project Management Maturity Model
<b>OPM</b>	Organizational Project Management Maturity Model

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## ABSTRACT

*Organizations use systematic and methodological project management maturity models to improve their project performance. Project management Institute's PM solution's Maturity model was used to assess the Project management body of knowledge areas practice and process maturity level in Ethiopian Railways Corporation. Time overrun; serious quality defects; poor definition of project scope and cost overrun; are the main problems depicted as defects seen in railway construction projects on literatures and government reports. Keeping in mind the fact that there is a relationship between Project success and project maturity level, the objective of the study was to assess project management practice and process maturity level and scrutinize the level of maturity of the organization. The study used standard questionnaires for employees of the corporation with better project management knowledge, selected on the basis of their position for sound understanding of the result of the study with directions of future improvement. Project management Institute's PM solution's Maturity model uses levels 1-5 in increasing order. Level 1 is the lowest project performance of the organization with lack of structured approach to implement projects while level 5 is the highest performance by the organization with continuous improvement. The research shows that the overall maturity of project management knowledge areas averages found to be 2.95 which almost reaching level 3 Organizational standards and institutionalized process. Among the knowledge areas Integration Management, Scope Management, Human Resource Management, Risk Management, and Procurement Management have shown comparatively higher level of maturity compared with other PM knowledge areas. These knowledge areas are more or less being performed in better maturity by the organization. Whereas the knowledge areas of Time Management, Cost Management and Project Quality Management, Risk Management maturities and Project Stakeholders Management are comparatively at lower level and could be considered low and to be performed informally by the organization. Such low maturity score results when the organization perform the knowledge areas without continuity, lacking structured approach or guide line, and relying exclusively on the knowledge and experience of the project manager or project teams. Thus, the corporation should have to undertake major enhancement to improve the current low state of project management maturity with particular emphasis on project quality, cost, communications and time management; areas resulted with lower maturity level. Key words: Maturity level, Maturity Model, Ethiopian Railways Corporation*

# CHAPTER ONE

## 1. Introduction

### 1.1 Background of the study

Organizations with more defined and deeply anchored standards, principles and practices are considered to be matured and more likely to achieve the objective they are founded for. Abere, (2017) described that “Maturity is a comparative level of advancement an organization has achieved with regard to any given process or set of activities”.

Moges, (2018) argued that the effective implementation and usage of project management process plays a great role in increasing deliverables derived from project management. A well-executed project will be completed on time, within its approved budget, delivers higher product quality by managing the time to design and test the new product. It will also maximize the project team’s satisfaction and contributes in meeting or even exceeding beneficiaries’ satisfaction.

All regions of the world heavily depend on railway transport for their socio-economic development. Accelerated growth of industrialization and trade especially in the Europe, North America and Asia has always been well facilitated by railway networks. Railway transport is the most suited mode for the conveyance of bulky freight over long distances. Furthermore, railway transport has a great potential to help minimize the extensive and costly deterioration of road infrastructure in the continent (AU, 2019).

The construction industry plays a significant role in the economy of developing countries. Ethiopia’s first Growth and transformation plan (2010/11 -2014/15) performance report shows average growth of construction sector is 28.7% having 8.5% of Nation’s GDP contribution. Because of railways significant role in enhancing transportation services by enabling mass transportation of people and bulk commodities, as well as expanding regional and continental inter linkages and providing a cost effective and zero carbon emission transportation system, development of the railway sector is given a high priority by the country’s growth and transformation plan (FDRE,2018).

Since its foundation in 2007 under the ministry of transport by regulation number 141/2007 Ethiopian Railways corporation (ERC), is a quasi-public corporation in charge of the construction of different railway projects throughout the country. Reports prevail poor project management practice is one of the problems seen in the execution of those projects completed and also those which are currently under construction by the corporation. Inadequate planning and scheduling, poor project management system and late possession of working site and others are the gaps identified as the most important factors causing poor time and cost performance of the railway construction projects (ERC, 2019).

Because of the complexity and challenges arising from time to time project management knowledge and practices have become the core requirements in managing projects now days. Asnake, (2017)

The project management maturity model provides best practices to assess the maturity level of organization's project management processes; map a logical path to improve organization's processes; set priorities for short-term process improvement actions; discern the need for a project management office and assess where it fits in an organizational structure; track progress against project management improvement plan; and build a culture of project management excellence (Crawford, 2014).

Project management maturity models are amongst the different initiatives which assess the maturity level of the performing project organizations and create a realistic benchmark and direction for improvement (Haile, 2018).

There are several models for the project management maturity like Kerzner's PM maturity model –PMMM, Organizational project management maturity Model-OPM 3, Capability maturity model –CMM, Project management process maturity model –PM2, PM solution's maturity model which will be reviewed in detail in literature review. Because the model's developers have given a detailed description of the characteristics across the nine knowledge area at each maturity level which will be coherent with the purpose of the study this study has utilized the PM solution's maturity model with level 1 up to Level 5 illustrating with increasing order of maturity to show Ethiopian Railways Corporations process group and PMBOK areas maturity level.

Assessing the maturity level of the organization using the model will help to realize current maturity level and identify areas which are hindering the successful implementation of its projects and pave a way to sort out areas requiring emphasis for the overall performance of the organization

## **1.2 Statement of the problem**

Railway Project constructions are a new scheme of construction being heavily invested on, holding the major part of Ethiopian government's loan. Government reports show that there is difficulty in meeting goals because of problems emerging in the management of the project like; cost overrun, time overrun, quality defects, improper procurement, poor definition of project scope and others. Ethiopian railways corporation (ERC) has fully completed and engaged in operation of two railway projects which are Addis Ababa – Djibouti railway project and Addis Ababa Light Rail Train (LRT), out of the Eight major railway projects planned by the corporation to construct in different regions of the country. Currently there are two projects under construction by the corporation, namely the Awash – Weldia project; a project which is on the verge of completion, and Haragebeya – Mekele project. As an organization highly depending on projects for its overall success and holding the major loan share of the country, there should have to be effective project management practices and tangible improvements from project to project. But, reports show that the major problems and gaps seen in each projects undertaken by the corporation are the same which are time overrun, cost overrun or high variation of costs, design problems, late land acquisition completion and quality issues (ERC, 2019). Similarly, projects that have already completed and being constructed by Ethiopian Railways Corporation face high stakeholders and beneficiaries dissatisfaction and complaints, they go beyond their planned schedule, and generally deliver products that are not fully satisfying their customers. Organizations facing these challenges in delivering their projects are categorized as organizations with low and imperfect maturity level of Project Management (Abere, 2017).

There are numerous project management maturity assessments and analysis studies undertaken in different sectors like road construction and banking projects. Sheko, 2019 on research entitled “Assessment of Project management on Implementing E-Banking Technology: The case of commercial bank of Ethiopia” concluded that developing and practicing project management knowledge areas; devising procedure; carefully collecting, compiling and disseminating lessons

learned from past project implementation plays a great role in improving the maturity level of project management in the banks project offices and successful delivery of overall project objectives. Hadgu, & Abere have also assessed project management level and practices of Ethio - telecom and Ethiopian construction works respectively and their findings suggest that basic project processes exist in the two companies but are not considered an organizational standard and management supports the implementation of projects management but understanding and involvement is not consistent. However, as a mega project being undertaken by the government with high investment cost, there is no much empirical research done to investigate project management maturity level in the railway construction sector. The absence of adequate empirical inquiries points to the fact that it is worth conducting project management maturity level studies on projects implemented by the corporation in order to bridge the knowledge gap via in-depth investigation. The main trust of this study is therefore to examine the project management practice and process maturity level of Ethiopian Railways Corporation in undertaking its railway projects.

## **1.3 Research Objectives**

### **1.3.1 General Objectives**

The main objective of this research is to assess the general practice level and project management maturity of each Project management body of knowledge areas (PMBOK's) of Ethiopian Railways Corporation in management of its projects.

### **1.3.2 Specific objectives**

- To assess the project management body of knowledge areas practice and project management maturity level of the organization.
- To assess project management process groups' maturity level of the organization.
- To identify project management body of knowledge (PMBOK) areas that needs the attention of the management for improvement.



## **1.4 Research Questions**

The study has tried to answer the following research questions:

1. What is the project management knowledge areas practice and project management maturity level of the organization?
2. What is the project management process groups' maturity level of the organization?
3. Which Project Management Body of Knowledge (PMBOK) areas require improvements?

## **1.5 Significance of the Study**

Project management maturity provides a path and framework which enable firms to achieve excellence in project management and in project performance (Mateen, 2015). Measure of project management maturity enables the company to identify how to improve project performance and how to deliver project with effectiveness and efficiency (Albrecht & Spang, 2014).

The maturity level assessment result of this research will be used by the organization under study as initial benchmark to acquire a clear picture of current state of project management maturity level and project management process groups' maturity level, and design improvement actions in low performance areas to deliver successful projects. It is also significant in helping the researcher to understand in-depth the application of the theoretically acquired knowledge during the lecture of the courses in reality. Moreover, it will be used by academicians and researchers as an input to carry out studies in measuring project management maturity of various organizations.

## **1.6 Scope of the Study**

This study is limited to assess the project management process group and project management maturity level of Ethiopian Railways Corporation and its practice in undertaking different railway projects. The study comprised all employees of the corporation holding positions above the level of team leader including the management as they have the rationale

theoretical and practical knowledge on project management.

## **1.7 Limitations of the Study**

The limitation of the study were having of limited access to secondary data from the organization on partial close up of offices and unavailability of some employees because of the pandemic outbreak COVID-19 that the world have experienced. This situation may have also impacted the attention of the respondent on the questionnaire with the tendency to tick similarly to all the questions in a measure to respond carelessly. So, to increase respondent's interest in answering the questions, the questionnaire was sent to respondents in different applications and emails so that they can answer the questions liberally.

## **1.8 Organization of the Study**

The research paper consists five chapters. The first chapter contains introductory part; which introduces the background of the study, the organization under study, statement of the problem, objective of the study, scope and limitation, the second chapter focuses on the review of literatures, which is relevant to the topic under investigation. Chapter three presents research design & methodology. Chapter four deals with data presentation, analysis and interpretation. Finally Chapter five presents the summary of findings, conclusion and recommendation

# CHAPTER TWO

## 2. Review of Related Literature

### 2.1 Introduction

In this part of the research, theoretical and conceptual literatures related to the concept of project and project management, project management Process Groups, Project Management maturity are discussed in detail. Furthermore, previous studies on Project Management Maturity that provide empirical foundations are compared and elaborated with comparison offindings.

### 2.2 Review of Theoretical Literatures

#### 2.2.1 Project and Project Management

Project is viewed and defined by different authors in different ways containing some major aspects as basic elements. The PMBOK Guide defines project as a temporary endeavor undertaken to create a unique product, service or result (PMI, 2004). Wysocki elaborated that “Project is a sequence of unique, complex and connected activities having one specific goal and must be completed according to specifications, within predefined time and budget”(Wysocki, 2014). Moreover, Project is an activity undertaken temporarily to achieve a specific deliverables and it comprises different sequential steps or phases like Initiation, Planning, Execution and Closeout. All those cycles or phases of the project are interlinked and undertaken towards the achievement of one specific goal ordeliverable.

Likewise, scholars and authors have defined project management in many different ways. Project management is the application of knowledge, skills, tools and techniques to project activities to meet project goals and it is achieved through application and integration of the project management processes which includes initiating, planning, executing, monitoring and controlling and closing(PMI, 2004). A similar definition is given by the association of project management. It defined project management as “application of knowledge, process, methods, experience and skills which leads to achieve project objectives” (APM, 2012). From those two definitions forwarded on project management we can clearly understand that project management involves the additionof

different techniques contributing for the achievement of project goal. The difference between project management and general management is in that project management is concerned in managing projects which are unique and temporary, where as general management deals with management of operations which are ongoing and repetitive by their nature. This means their deference is emanated from the type of work they manage (Abere,2017).

### **Project Management Process groups**

For any project to be completed successfully and meet or exceed stakeholders' expectations, must have and executed in accordance with the five projects management process groups. The process group contains the tools and techniques involved in applying the skills and capabilities described in the project management knowledge areas, and they ensure the effective flow of project throughout its life cycle (PMI, 2013). PMI has identified five project management process groups in any projects lifecycle:

**The Initiating Process group:** Initiating process group consists of processes performed to define a new project or a new phase of an existing project by acquiring authorization to commence the project or phase. The initial scope is defined and the initial financial resources are committed within this process group. The key purpose of this process group is to align stakeholders' expectations with the project purpose, show them visibility about the scope and objective and more over how their participation contributes for the successful achievement of the project (PMI,2013).

**Planning Process Groups:** this group consists of those processes performed to establish the total scope of the effort, define and refine the objectives and develop the course of action required to attain those objectives. The planning process develops the project management plan and the project documents that will be used to carry out the project (PMI, 2013). According to Kerzner (2009) defining the work requirements, definition of the quality and quantity of works, definition of the resource needed , scheduling the activities, evaluation of the various risks are activities undertaken under thisgroup.

**The Executing Process Groups:** The PMI elaborates that this process group consists of those processes performed to complete the work defined in the project management plan to satisfy the project specifications. It involves coordinating people and resources, managing stakeholder expectations, as well as integrating and performing the activities of the project in accordance with

project management plan. During execution, results may require planning updates and forming new baseline (PMBOK, 2013).

**The Monitoring and Controlling Process Groups:** This process group consists processes required to track, review and orchestrate the progress and performance of the project; identify any areas in which changes to the plan are required; and initiate the corresponding changes (PMI, 2013).

**The closing process group:** processes undertaken to wrap up across all project management process groups to formally complete the project, project phases, or contractual obligations come under the closing process groups. This process group verifies that the predefined processes are completed within all process groups to close the project or the project phase, as appropriate and formally establishes that the project is completed (PMI,2013).

## 2.2.2 Project Management Body of Knowledge Areas

Nine core knowledge areas in three functions are identified by PMBOK (2008). These nine knowledge areas are Integration management, Scope management, Time management, Cost management, Risk management, Quality management, Human resource management, Communication management and Procurementmanagement.

The first is Integration management which is a facilitating function and it includes the process and activities to identify, combine, define, unify and coordinate the various process and project management activities within the process management groups. It includes all the process required to ensure that all the elements of the project are properly coordinated and involves making tradeoffs among competing objectives and alternatives to meet or exceed stakeholder expectations (PMI, 2013).

Project Scope, time, cost and quality management rests in the second group as a core function. Project Scope management includes the process required to ensure that the project includes all the work required and only the work required to complete the project successfully. Generally, managing the project scope is concerned with defining and controlling what is and is not included in the project (PMI, 2013). Project time management includes processes required to manage timely completion of the project. Activity definition, Plan schedule, sequence activity, resource and duration estimation, develop and control schedule are the processes required in project time management. Project cost management involves the processes involved in planning,budgeting,

financing, funding, managing and controlling costs so that the project can be completed with the approved budget. These processes interact with each other and with other knowledge areas as well (PMI 2013). Project quality management includes processes and activities of performing organization required to ensure that the project will satisfy the needs for which it was undertaken. It includes all activities of the overall management function that determine the quality policy, objectives and responsibilities and implements them by means such as quality planning, quality assurance, quality control and quality improvement within the quality system (PMI,2013)

The third support function consists of human resource, procurement, communication and risk management. Project human resource management includes the processes that organize, manage, and lead the project team (a team which comprises of peoples with assigned roles and responsibilities for completing the project) (PMI, 2013). Project communication management employs the processes required to ensure timely and appropriate collection, creation and distribution, storage, retrieval, management, control, monitoring and the ultimate disposition of project information. Project risk management is the process of conducting risk management planning, identification, response planning and controlling risk on the project. The objective of project risk management is to increase the likelihood and impact of positive events and decrease the likelihood and impact of adverse events on the project (PMI, 2013). Project procurement management includes the processes necessary to purchase or acquire products, services or results needed from outside to the project team. The organization can be either the buyer or seller of the product, service or results under a contract (PMI,2013).

### **2.2.3 Project Management Maturity**

Maturity is defined by many writers in closely related ways. Maturity is a comparative level of advancement an organization has achieved with regard to any given process or activity. Organizations whose policies, standards, and practices are well defined tend to be considered more mature (PMI, 2008). According to Crowford, (2005), Maturity as a concept is used to describe the state of organization's effectiveness. Coke Davies (2005) cited "Maturity explains the sophistication indicating organizations current project management processes and practices". According to Mateen (2015), in organizational context, Maturity is a state that creates perfect conditions for organizations to achieve their objectives. It is a progressive development of an enterprise – wide project management approach, methodology, strategy and decision making

process (PMBOK, 2013). Maturity is the extent to which a specific process is explicitly defined, managed, controlled and effective. Maturity implies a potential for growth in capability and indicates both the richness of an organization in project management process and consistency with which it is applied throughout the organization (Curtis, Paulket *al*1993).

Project management maturity entails how organizations with project are able to successfully deliver its project performance with in time budget, time, and specifications in a consistent manner. Organizations project management capability will be improved in many different ways like training, benchmarking, mentoring, and by using different tools and techniques and maturity models. So that organizations could be benefited from project management, continuous effort has been made by practitioners and researchers to look ways that will improvethair project management capability (Hadgu, 2018).

Maturity models are measurement tools developed to assess the maturity of organizations processes and practices to identify opportunities and sort out strengths and weaknesses for future improvements. The use of maturity models provide a framework for purposeful and progressive development of project management capability of delivering successful project results and they also play a great role in framing improvement efforts by prioritizing and identifying areas in need of improvements (Coke- Davies, 2005). Hadgu, (2017) cited and made a comparison on that “In a matured organization, a disciplined process is regularly followed, because all participants understand the value of doing so, and there is infrastructure and policy to support the process (Sarshar,*et.al*2000). An immature organization, on the other hand, is an organization that does not have or use consistent and well defined processes in the management of its projects (Sarshare*et.al*, 2000)”. Organizations undertaking different projects might be successful in one specific project result, but that doesn’t imply that the maturity level of the organization is high or there is a defined and organized way of managing projects in that organization, rather it might be successful because of many reasons it can be the ability of the manager and the project team working reactively and focusing on solving problems immediately rather than acting proactively to control theproject.

Assessment of project management maturity includes personal and/or group interviews, artefact collection and evaluations, surveys and comparing benchmarks to already established standards (Crowford, 2002). But, it requires starting the assessment with baseline assessment of their current situations. In Crowford’s (2002) view assessing the baseline enables organizations to pick out areas

that require immediate action and areas that have impact and provide great return on investment. The trend of using maturity models for increasing organization's performance has been increasing in recent years. The project management maturity level is determined by the extent of implementation of project management body of knowledge areas and, the maturity level is determined by the application of project management maturity models. To deliver successful projects in the long run, organizations develop their capability using project management maturity models as guiding framework (Jugdev& Thomas,2002).

There are numerous maturity models and majority of them have adapted five levels of maturity stages beginning from the initial (Level - 1) to the highest level of maturity which is, continuous improvement (Level – 5). Some of the major maturity models namely, Capability maturity model integration – CMMI, Project management maturity model by H. Kerzner – PMMM by H. Kerzner, Project management process maturity model – PM2, Project management maturity model by PM Solutions' and Organizational project management maturity model by project management institute – OPM3 will be reviewed below in detail.

#### **2.2.4 Review of Maturity Models**

In this section some of the pertinent project management maturity models will be assessed and summarized.

##### **Capability Maturity Model Integration – CMMI**

It is the first maturity model developed by the Software engineering department at Carnegie Mellon University initially for the use in improvement of software development process. Later on it is extended for use in other areas of systems, software engineering and procurement. It has been used by software developers as a guide for improvement of their process (SEI, 2006). Moreover, it applies for organizations undertaking software development and product development using a single tool to assess maturity and capability and to give direction for the sophistication of their process (Pane &Sarno, 2015). Basically developed to evaluate software contractors' capability for contract award and administration purpose. This model has served as a basis for the development of several maturity models in different fields including project management. Unlike project management maturity models; this model assesses the entire software development processes including the Project management part and other technical parts. However, because of the



descriptive nature of the model, it does not tell organizations how to improve rather it describes essential attributes that would be expected to characterize an organization at a particular maturity level (Paulket *al*,1993).

The CMMI has five Maturity levels;

1. **Level–1:Initialstage:**Processesareunpredictable,poorlycontrolledandreactive.
2. **Level–2:Managed:**Processesarecharacterizedforprojectsandareoftenreactive.
3. **Level – 3: Defined:** Processes are characterized for the organization and are often proactive.
4. **Level – 4: Quantitatively Managed:** Processes are measured and controlled.
5. **Level – 5: Optimizing:** There is a focus on process improvement.

### **Project Management Maturity Model (PMMM) Kerzner (2014)**

Kerzner (2014), put forward that to perform strategic planning and achieve maturity in a reasonable period of time, corporations are assisted by maturity models. The project management maturity model (PMMM) used to realize excellence in project management is described as the foundation for achieving excellence in managing projects. Unlike other models, this model emphasizes on benchmarking and includes it as the fourth level in its maturity model. This model also has five levels each of them representing different level of maturity in managing projects described as follows:

1. **Common Language:** In this level the organization recognizes the importance of project management and the need for understanding the basic knowledge on project management including the accompanying languages or terminologies.
2. **Common Process:** In this level the organization recognizes that common processes need to be defined and developed so that success on the project can be repeated on other projects. The application and support of project management principles to other methodologies employed by the organization are recognized and included in this level.
3. **Singular Methodology:** In this level by making Project management the centre, organizations recognize the synergistic effect of combining all corporate methodologies in to a singular methodology. Process control will be easier with a single methodology than with multiple methodologies because of the synergistic effect.

4. **Benchmarking:** This level contains the recognition that to maintain competitive advantage, process improvement is necessary. Benchmarking must be performed in a continuous basis. The company must decide whom and what to benchmark (Kerzner,2002).
5. **Continuous Improvement:** In this level, the information obtained by benchmarking will be evaluated by the organization and then must decide whether or not this information enhances the singular methodology (Kerzner, 2014).

These levels do not need to be performed sequentially, rather some of the above levels can and do overlap. But, although overlapping does occur, the phases in which the levels are completed doesn't change. For example, even though Level 1 and Level 2 can overlap, Level 1 must still be completed before Level 2 can be completed (Kerzner, 2014).

### **Project Management Process Maturity Model – PM2**

PM2 Model is developed by William C.Ibbs&Kwak, and it is the pioneer PM Model developed by integrating previous maturity models that measures PM levels of different companies and industries. PM2 would allow the project management process information for a number of organizations to be collected and compared (Ibbs&Kwak, 1998). The PM2 Model breaks PM process and practices in to nine PM knowledge areas and five PM Processes by adopting PMI's PMBOK. Each PM maturity level contains key PM Processes, organization characteristics, and focus areas.

Table 2.1 Key PM Process, Organizations characteristics, and focus areas of PM2 Model

Maturity Level	Key PM Processes	Major Organizational Characteristics	Key focus areas
<b>Level – 1 (Ad-hoc Level)</b>	No PM processes or practices are consistently available. No PM data are consistently collected or analyzed.	Functionally isolated. Lack of senior management support. Project success depends on individual efforts.	Understand and establish basic PM processes.
<b>Level – 2 (Planned Level)</b>	Informal PM processes are defined. Informal PM problems are	Team oriented (Weak). Organizations possess strength in doing similar	Individual Project planning.

	identified. Informal PM data are gathered.	work.	
<b>Level – 3 (Managed at Project Level)</b>	Formal project planning and control system are managed. Formal PM data are managed.	Information training of PM skills and practices. Team oriented (Medium).	Systematic and structured project planning and control for individual project.
<b>Level – 4 (Managed at Corporate Level)</b>	Multiple PM (Program Management). PM data and process are integrated. PM process data are quantitatively analyzed, measured and sorted.	Strong teamwork. Formal PM training for project team.	Planning and controlling multiple projects in a professional manner.
<b>Level – 5 (Continuous Learning)</b>	PM processes are continuously improved. PM processes are fully understood. PM data are optimized and sustained.	Project- driven organization. Dynamic, energetic, and fluid organization. Continuous improvement of PM processes and practice.	Innovative ideas to improve PM processes and practices.

Adapted from Kwak&Ibbs (2002)

### **Project Management Maturity Model by PM Solutions'**

Like PM2 Model, this model is developed from PMBOK's knowledge areas with CMM's five maturity stage. The model is used to measure organizations project management maturity and direct organizations towards important PM capabilities that organizations should acquire in order to achieve project management growth and excellence. It examines organizations PM implementations across the nine PM knowledge areas, which are in turn broken down in to components (Crowford, 2002). Once the initial level of maturity and other areas of improvement have identified, PMMM

provides a roadmap, defining the necessary measures to be taken towards maturity in project management (PM solution, 2014). The five maturity levels and their attributes are depicted below:

- 1. Level -1 (Initial Process):** Attributed by ad-hoc process with low management awareness.
- 2. Level – 2 (Structured Process and Standards):** Attributed by basic process; not standards on all project; used on large and highly visible projects. Management supports and encourages use of process. Estimate and schedules are based on expert knowledge and generic tool. Mostly project centric focus.
- 3. Level – 3 (Organizational Standard and institutionalized Process):** All processes are standard for all projects and repeatable. Institutionalized process. Summary and detailed information. Informal collection of actual data. Estimates and schedules based on industry standards. More of an organizational focus. Informal analysis of project performance.
- 4. Level – 4 (Managed Process):** Processes are integrated with corporate process. Management mandates compliance. Management takes organizational entity views. Solid analysis of project performance. Estimate and schedules based on organization specifics. Management uses data to make decisions.
- 5. Level – 5 (Optimizing process):** Processes to measure effectiveness and efficiency. Processes in place to improve project performance. Management focuses on continuous improvement.

Since this model is developed by mirroring the PMBOK knowledge areas which are the foundation of project management and the developers of the model have provided detailed attributes of the stages, this study will employ PM solutions' Maturity Model to assess the project management maturity level of Ethiopian Railways Corporation (ERC).

### **Organizational Project Management Maturity Model by Project Management Institute – OPM3**

The organizational project management maturity model is a framework providing organizational wide view of portfolio, program and project management to support achieving best practice in each domain and it is developed by PMI (PMI, 2008). OPM3 evaluation framework integrates portfolio, program and project management for the successful attainment of the organization strategic objectives using the best practices. The integration defined by

OPM3 includes: Knowledge (of the portfolio, program, and project processes), organizational strategy (mission, vision, objectives and goals), people (having competent resources), and processes (the application of the stages of process improvements) (PMI-OPM3, 2013).

OPM3 framework cycle consists of the following steps to measure maturity level: Acquire knowledge, perform assessment, manage improvements, and repeat the process. There are five maturity levels to assess maturity level of portfolio program and projects collectively or individually defined by OPM3.

**Level 1: None**- No such practice exists.

**Level 2: Standardized**- Standardized way of doing projects have been documented and communicated within organization. Not used by all projects but only few.

**Level 3: Measure** – Standardized process is used in all projects and processes are measured to evaluate organizational performance.

**Level 4: Control** – processes measured are corrected for poor application of the standardized practices. Processes are analyzed by establishing upper and lower limits.

**Level 5: Improve**- Continuous improvement of processes becomes a practice for outcome of Best practice standards.

According to this model organizations may have high maturity level for project management practices but not necessarily have to excel in portfolio or program management as well.

### 2.2.5 Uses and Benefits of Project Management Maturity Models

Maturity models are designed to provide a framework that organization needs to develop its capabilities in order to deliver projects in the long term (Jugdev& Thomas, 2002; Mittermaier&Steyn, 2009; cited in Backlund *et al*, 2014). Backlund and *et al*, 2014 identified the following points as the importance of using PM Maturity model;

- Rather than primarily identifying the current level at which an organization is performing, it helps to set directions, prioritize action and begin cultural changes.
- To compare project capability between organizations, or between specific organization and industry norms as a benchmark their maturity relative to others.

- PM maturity assessment can be utilized as a “check-up” tool to measure progress and to identify the next logical step to move forward and achieve organizations strategic objective using PM.

### 2.2.6 PM Model Selection

The evaluation of maturity models for PMMMs could be developed based on three dimensions (Man, 2007): A) Structure, B) Applicability, and C) Usage.

To meet the goal of this research the project management maturity model (PMMM) developed by PM Solutions’ will be employed in that it is well structured in two dimensional framework based on accepted industry standards. The first dimension shows the level of maturity, based on the structure of SEI capability maturity model. And the second dimension indicates the key areas of project management addressed by adopting PMI’s nine knowledge areas.

Shako(2019), listed the following as additional advantages of using PMMM by PM solutions’

- Has well defined knowledge areas and processes devised by the PMI.
- Has well defined maturity levels.
- Integrate various project management maturity models.
- It illustrates a series of steps to help an organization improve its overall PM effectiveness.
- Up to date knowledge areas and processes can be included.

### Critics in applying Project Management Maturity Models

Jugdev & Thomas cited in Backlund *et al*, (2014), illustrated the following as a criticism of using Project Management Maturity Models;

- High focus on PM knowledge areas and not on other factors that contributes to mature PM capability.
- Flexible model is required to manage change and improvements, but the models are inflexible.
- As methodologies the methods are overly disciplinary, impractical and overwhelming.

- Most of the models ignore the organizational or human resource aspect and emphasize on workprocess.
- Complex frameworks may prevent users to apply the models.

## 2.3 Review of Empirical Literature

According to PM solutions research centre, (2014) there is a relation between how long there is Project management in place in a given organization and its project management maturity and overall performance. High performing firms are mature in their project management practices than low performers and vice versa. A majority of firms (91%) have project management practices in place. Most organizations (76%) have improved in PM maturity over the past five years with 33% moving from Level 1 to Level 2. By increasing their level of project management maturity level they have seen considerable value.

In 2004 Price water house Coopers conducted study on project management maturity involving 200 organizations from 30 different countries across the globe, and found existence of a positive relationship between maturity level and project performance, i.e., a higher project management maturity level will in most cases deliver superior performance in terms of the project delivery and business benefits.

Tekalign (2014), in his study of the role of project planning on project performance in Ethiopia, show that 79.1 % of the construction project fails to meet its objectives in Ethiopia and if completed it is with an average cost overrun of more than 26.2%.

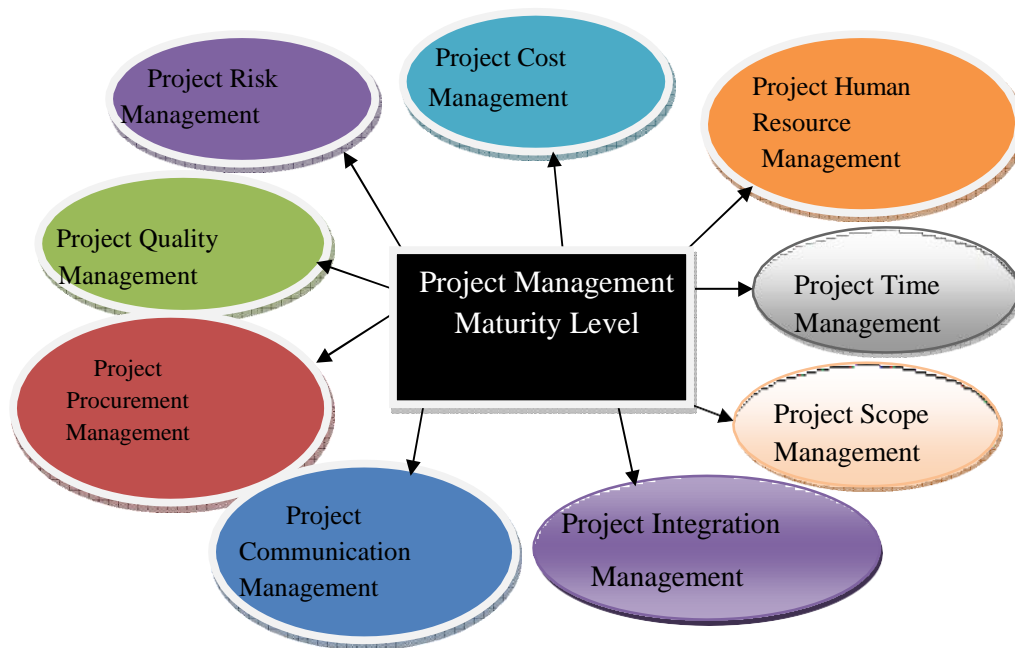
Asnakew A, (2016), on his research entitled “Challenges and Success Factors of Railway Megaprojects in Ethiopia” demonstrated that some of the problems resulting in delay, poor quality and overrun of projects in Ethiopian case are absence of well trained and professionally qualified staff, offensive and poor attitude and behavior on project management works, inadequate facilities and equipment required, and others have been considered as constraints which make our situation different from other developed countries in completing the project successfully. In addition, high investment cost, lack of skilled manpower in the sector, problems related to project Integration management, poor participation of relevant stakeholders, Project scope management problems, Contract administration constraints, geological and weather challenges as the major challenges facing Ethiopian railway projects.

The theoretical and empirical reviews reflect that though there have been debates on the extent of the role of project management maturity for organizational project management effectiveness and efficiency, many have agreed that matured project management process and practice has significant contribution to the success of project objectives and assessment of PM maturity helps in identifying the current level of performance and setting direction for improvement.

## **2.4 Conceptual Framework**

Project management maturity models doesn't provide a quick solution for projects which are in trouble, rather by assessing overall project management practices improvements will be made through time on areas sorted out needing improvement. This research will employ nine project management bodies of knowledge areas mainstreamed by PM solutions' model to assess maturity level of the organization. Based on the literature review, to put the research in to perspectives the following framework has developed. In this context, the effective application and maturity of each of the nine PMBOK areas will directly contribute for the organization to have a matured project management maturity level. Furthermore, most of these knowledge areas tend to be interdependent and inefficiency in application of one of the components hinders the smooth and successful delivery of the projects output, leading the organization to have complicated and lower project management maturity level.





**Figure 2.1 Conceptual framework**

Generally, from the literatures reviewed in this chapter it is understandable that taking into account the features of projects and project management, successful implementation of each PMBOK areas in execution of projects with procedures and tools in place will lead to better performance and successful delivery of outputs timely, within budget and with the expected quality satisfying every stakeholders. Organizations can evaluate the level of their project management process groups and PMBOK areas maturity to tackle factors hindering the organization in successfully delivering project outputs and for future improvements in managing projects executed by the organization. In doing so, models like capability maturity model integration – CMMI, Project management maturity model by Kerzner (2014), Project management process maturity model-PM2, Project management maturity model by PM Solutions’ and Organizational project management maturity model by project management institute – OPM3 reviewed above can be useful in measuring maturity level of any project oriented organization. Project management maturity model by PM Solutions’ model was used in evaluating the project management maturity level of Ethiopian Railways Corporation in this study.

# CHAPTER THREE

## 3. Research Methodology

This chapter of the research report provides an outline on the research methodology employed for the study. It describes the research design, source of data, sample and sampling techniques, instruments of data collection, and methods and procedures of data analysis.

### 3.1 Description of the Study Area

There is an extensive effort made by the government of Ethiopia to expand railway infrastructure throughout the nation. The Government of the Federal Democratic Republic of Ethiopia (FDRE) has for many years recognized the need to improve and expand the existing transportation network throughout Ethiopia. In its national Five Year Plan (2010/11 – 2014/15), referred as the “Growth and Transformation Plan” issued in September 2010, FDRE has confirmed its commitment to improve the country’s transportation infrastructure with the proposed development of a standard gauge railway network for Ethiopia. The target for construction of new rail infrastructure during this period consists of a 5,000 km of National Railway Network of Ethiopia (NRNE), which will be constructed along eight corridors in two phases, and a 34 km Light Rail Transit (LRT) system in the capital city of Addis Ababa. As part of the Growth and Transformation Plan (GTP) 2,500 km of the proposed railway network has been given first priority to be implemented between 2010/11 to 2014/15 (MOT,2015).

To achieve this strategy the railway projects are being contracted to foreign contractors because of many reasons like lack of updated knowledge and the capability and maturity of local contractors to construct mega railway projects. By prioritizing two railway corridors the corporation has started the construction of a new standard gauge railway line from Addis Ababa (Sebeta) to Dewele covers 666km in Ethiopia(Completed and operational currently) and Awash – Kombolcha – Haragebeya (392 km) and Haragebeya - Mekele (216 km which is under construction) railway projects. Railway projects Railway infrastructure development is needed for the achievement of effective development, its provision of efficient, cost effective, limited land use and bulk transportation with limited time and environmentally friendly way. In addition train travel endows much safety,

convenience and comfort to passengers and freights than other means of transportation (Gudeta A, 2015). The effort being made by the government of Ethiopia to meet the objective and strategy kept forward has been affected by different factors emanating from numerous sources ranging from lack of loan to problems arising from lack of effective project implementation. So this study will assess the project management maturity of Ethiopian Railways Corporation and put forward areas that need immediate improvement for the success of projects under construction, and planned to be constructed in the nearfuture.

### **3.2 Research Approach**

A mixed methods approach was utilized to assess the project management maturity level of the organization under study in that it is helpful to understand the contradictions between quantitative results and qualitative findings by collecting and analyzing open-ended and close-ended data. So that the overall strength of the study will be greater, using mixed research approach in a single study is advantageous than using either one of qualitative or quantitative approach (Creswell, 2009). The qualitative approach was helpful to interpret and comprehend the data collected through interview and describe the actual project management practices, whereas the quantitative approach were useful in understanding questionnaire data and computing mean relative importance index, percentage and other ways of data presentation.

### **3.3 Research Design**

Research design is the blueprint for fulfilling research objectives and to answer research questions (Adams, *et.al*,2007). One of the types of research design is descriptive research, which is concerned with describing the characteristics of a particular individual, or of a group (Kothari, 2004). Descriptive research presents a picture of specific details of a situation, social setting or relationship. This research has employed descriptive research design since it tries to describe current status of the project management maturity level of Ethiopian Railways Corporation.

### **3.4 Target Population**

Since the study is trying to assess the Project management maturity level of Ethiopian Railways Corporation in executing railway projects, the population of the study were 103 employees of the organization those who are holders of team leader position level and above, having efficient background in project management excluding teams working operational works of already completed projects like AALRT and Addis Ababa –Sebeta - Mieso – Dewelle railway projects.

### **3.5 Sample and Sampling Techniques**

Out of 260 total employees of the corporation's head office, only 103 of them are holder of positions above team leader, because of this census sampling; a method that studies all the units or members of the population is employed by including all of the employees those who are team leaders and above to fill the questionnaires prepared for the study, this helps the data obtained to be representative. Conducting a census often results in enough respondents to have a high degree of statistical confidence in the survey result and increase confidence interval. To meet the research objectives and answer research questions raised, it's better to utilize a purposive or judgmental sampling technique which is one of non-probability sampling techniques to select our sample (Saunders et al, 2009). Projects executed by the corporation are mainly controlled by the Rail Network Division of the corporation, so managements of the corporation, Project managers, Section project managers with direct involvement in execution of projects and background of project management were selected for interview purposively. So, to select a sample who has detailed information and knowledge of project management practices for interview purposive sampling technique is employed.

### **3.6 Data Collection Methods**

There are two types of data; primary and secondary data. Primary data is a data which is fresh and collected for the first time and are original in character. Whereas secondary data are data collected by someone else and passed through statistical process. There are several ways to collect data like

survey (supervised, postal or via internet), structured interview, direct observation, and document analysis. For the proper achievement of the research objectives questionnaire survey and interview were used. Questionnaire is selected because it requires lower cost and time compared to others and also helpful in gathering more accurate data within short time, and an interview is employed to cover areas unaddressed by questionnaire and requiring further details and validation. Also both primary and secondary data sources were used for the sake of triangulation and data credibility by overlaying secondary data obtained from documents with the data gathered through interview and questionnaires. The primary data were gathered from employees of the organization and secondary data is obtained from accessible documents from the organization. The questions were prepared using project management body of knowledge areas and the components found in each knowledge area.

### **3.7 Methods of Data Analysis**

Data analysis is the procedure of coding, classifying and tabulating information required to perform quantitative or qualitative analysis according to the research design and appropriate to the data (Mosby, 2009). Descriptive method was followed in analysis of the data. Missing data and entry errors was checked for variables frequency distribution. Summary statistics, including the mean, relative importance index (RII), percentages and frequency counts of all demographic and project maturity level data evaluation was computed using Microsoft Excel. Data were presented using tables, charts, and graphs to help readers to easily make meanings.

### **3.8 Validity and Reliability**

Using existing maturity models and standard questions derived from project management Body of Knowledge (PMBOK) it is possible to evaluate and asses project management maturity of organizations. Pre test questionnaire has administered to numerous respondents via email to check reliability of the data collected and participant error and bias are avoided by presenting the questionnaire through a platform encouraging for the respondents to respond freely.

The validity of the data collection instruments were checked against available literatures. Moreover, the sampling technique used is census; involving each population the result will be externally valid for generalization in that it is representative of the group. According to Creswell, (2009) using

different data collection tools helps to crosscheck information obtained. In addition, since various data collection methods are utilized triangulation is undertaken by overlaying interview responses, data gathered by questionnaire and secondary data obtained from different documents for its help in ensuring reliability of the data by minimizing overlooked errors.

### **3.9 Ethical Considerations**

The confidentiality of information about the organization and respondents were maintained in this study. Furthermore, the gathered data were only used for this study, not used for other purpose, or not transferred to other party. Additionally, the respondents were ordered not to write any information like their name and other personal code while responding to the questionnaire.

Generally, this chapter emphasizes on procedures undertaken to achieve the objective of the research, mixed research approach is employed and the research has a descriptive design. The population of the research is 103 employees of Ethiopian railways corporation in possession of Team Leader position and above for the fact that they are experienced and have trainings of project management which will help them to understand and respond to the research questions. Since, all of the population is involved in responding to the questionnaires census sampling technique is employed for the questionnaire and respondents from the corporations' management and experienced project managers are purposively selected for interview. The data collected from primary sources through interview and questionnaire and secondary documents were analyzed descriptively and presented using tables and charts to help readers grasp a meaning easily.

# CHAPTER FOUR

## 4. DATA ANALYSIS AND PRESENTATION

In this chapter the results of the data obtained from respondents regarding the project management maturity level of Ethiopian Railways Corporation are presented and analyzed. In the first part, the demographic profiles of the respondents are explained. In the second part, the PM process groups' maturity level of the corporation is evaluated. Then the project management maturity level and average project management maturity level of each knowledge area of railway projects are evaluated by analyzing the detail responses of the respondents in comparison with the maturity model.

### 4.1 Responserate

Response rate refers to number of subjects sampled in a study those of who responded to the research instruments. A total of 103 questionnaires were administered in person and through email to be filled by respondents and out of which 88 were completed and returned rendering 85.4% response rate. According to Mugenda & Mugenda, as cited by Gebrewahid Hadgu (2018), response rate of 50% was adequate, response rate of 60% was good and response rate of 70% was considered very well for analysis and reporting.

### 4.2 Respondents General Information

This section summarizes the general demographic characteristics of the respondents, which includes sex, service year in the corporation, educational level, position in the corporation, project management trainings taken before joining the corporation and after joining the corporation, involvement in project management or project teams and their opinion in application of project management knowledge in railway projects. This is helpful to get insight of the characteristics of the respondent.

Table 4.1 Respondents general information

Characteristics	Response	Frequency	Percentage (%)
Gender	Male	31	35
	Female	57	65
Service year in the corporation	0-3 Years	4	4.5
	4-6 Years	10	11.4
	7-9 Years	21	23.9
	>10 Years	53	60.2
Educational Level	Diploma	0	0
	First degree(Bachelors	19	22
	Second degree/Masters	69	78
	Others	0	0
Current position of respondents	DCEO	2	2.27
	Directors	5	5.68
	Chief Officers	6	6.81
	Team Leader	59	67.04
	Project Managers	4	4.54
	Section Project Manager	10	11.36
	Business Unit Manager	2	2.27

Source: Own survey (2020)

As described in Figure 4.1, out of 88 respondents 57(65%) are male and 31(35%) of them are female. This shows that there is slight participation of females in leading and managing positions of the railway projects and the corporation in general. (60.2%) 53 of the respondents have a work experience of more than 10 years, 21 (23.9%) are with a work experience of 7 to 9 years, additionally 10(11.4%) and 4(4.5%) of respondents have a work experience of 4 to 6 and 0 to 3 years in the corporation. From this we can understand that significant numbers of respondents are familiar with the corporations' project management practice.



In terms of their educational level majority of the respondents 69(78%) are holders of second degree or masters and 19(22%) respondents have first degree or bachelors (Table 4.1). This shows that the respondents are well educated and fit to respond to the questionnaire provided. Furthermore, almost 67.04% of the respondents are team leaders, 11.36% of them are Section project managers, 6.81% of them are chief officers and 5.68% of them are directors whereas, the least same percentages of 2.27% are business unit managers and deputy chief executive officers. This implies that the employees are familiar or capable of understanding theoretical explanations given in project management maturity level and its role in successful delivery of projects and overall effort of creating matured organization.

### Trainings related to Project Management

Respondents were asked to testify if they have got any training outside the corporation in project management. In this regard, 56% of the respondents have not received any training related to project management, and 44% of the respondents have taken some training related to project management outside the corporation (Table 4.2). It is understandable that most of the employees don't have exposure to trainings related to project management prior to joining the corporation.

Table 4. 2 Trainings related to project management

Characteristics	Response	Frequency	Percentage (%)
Training related to project management outside the corporation	Yes	39	44
	No	49	56
Training related to project management by the corporation	Yes	62	70
	No	26	30

*Source: Own survey (2020)*

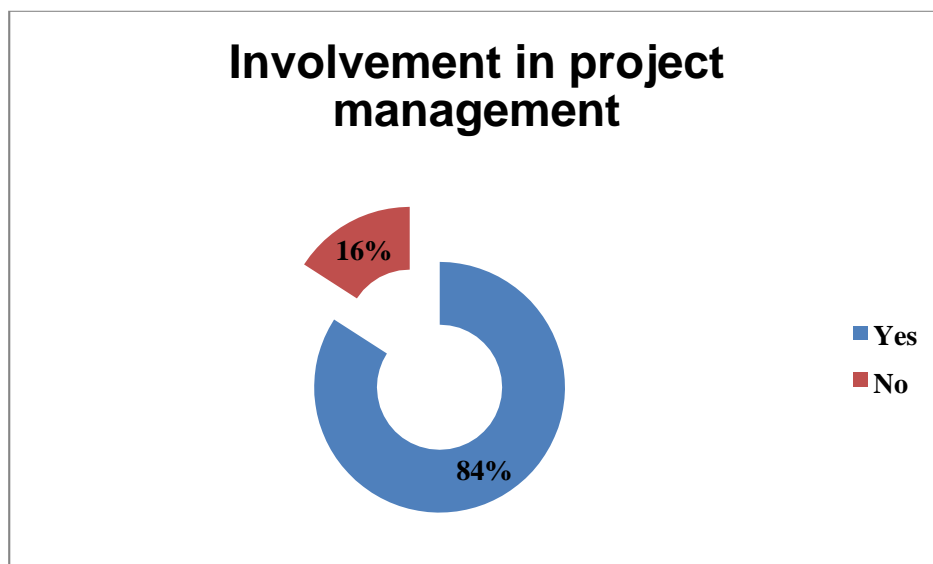
Respondents were asked to respond if they have taken any trainings related to project management provided by the corporation and as shown in Table 4.2, majority of the respondents 62(70%), of them have taken and 26(30%) of the respondents did not take trainings associated with deferent components of project management. Secondary information from human resource of the corporation shows that trainings in different schemes including project management are being given to every employees in their respective expertise, and equipping employees with the required developmental trainings, this is helpful to pave the way to achieve organizational

objectives and in this case playing a role in contributing to improvement of project management maturity level.

### Direct involvement in Project Management or Project teams

Respondents are asked whether they are directly involved in project management or project teams and when it comes to respondents experience and involvement in project management or project teams, significant number 84% of them had prior involvement experience in projects and project teams, whereas only 16% of the respondents have not involved in projects or project teams. From this we can assume that majority of the respondents are familiar with questions raised and experienced in project management practices ingeneral.

Figure 4.1: Direct involvement of respondents in project management or project teams.



*Source: Own survey (2020)*

### Perception in application of project management knowledge for railway projects

The respondents were asked about their perception in application of project management knowledge for railway projects and all of the respondents 88(100%) have responded that they believe applying project management knowledge for railway project is necessary to insure continued process improvement for future railway projects. This implies that the employees are

open to directions given in blending PMBOK areas in railway projects of the corporation for the overall improvement in project management maturity level.

Table 4.3: Respondents perception in application of PMK for Railway Projects

<b>Belief in application of PMK for Railway Projects</b>	<b>Frequency</b>	<b>Percentage (%)</b>
Yes	88	100
No	0	0
<b>Total</b>	<b>88</b>	<b>100</b>

*Source: Own survey (2020)*

### 4.3 Discussion of Maturity Level Assessment Results

This part presents results obtained from respondents through questionnaire as shown in each respective Table. Respondents were asked to choose where the corporation lies in terms of the five categories of project management process groups (Initiating, Planning, Executing, Controlling and Closing), involving some sub elements of the process group. The same step and method is employed on the questionnaire to get the respondents insight on the ten project management body of knowledge areas maturity level of the corporation elaborated with their particular sub elements. The maturity level of each project management process group and knowledge areas within the corporation is estimated by calculating the mean value of each sub elements included underthem.

The mean of the five maturity levels given by the respondents on each sub elements of the process groups and knowledge areas was used to decide the maturity level of each project management process groups and knowledge areas. Similarly, the mean of each ten knowledge areas were used to measure maturity level of the corporation in managing its projects as shown in the sections below.

## Assessment of Maturity level of PMBOK process groups

As can be seen in Table 4.4, the research findings indicate that the overall maturity of the project management process group of the corporation stands at level 2 with mean maturity result of **2.65**. This implies that the process maturity level of the organization is at basic process and much work is needed to reach even the industry standards. The relative importance index of the project management process group result of the organization shows that the process groups of planning, executing and initiating are resulted somehow with higher importance index, implying better implementation in the corporation where as process groups of controlling and closing are resulted relatively with lower relative importance index.

Table 4.4: Response in project management process group and sub components. (Adopted from A.Tewodros 2018)

No	Variables	Mean(Maturity Level)	RII
<b>1</b>	<b>Initiating</b>		
1.1	Project/organization defined, standard or generic Project management Process.	<b>2.23</b>	<b>0.45</b>
1.2	Policy or direction or guide line that requires or recommends planning and performing projects.	<b>2.23</b>	<b>0.45</b>
1.3	Identification of all stake holders	<b>3.45</b>	<b>0.69</b>
	<b>Mean</b>	<b>2.63</b>	<b>0.53</b>
<b>2</b>	<b>Planning</b>		
2.1	Comprehensive planning to perform projects to achieve goals.	<b>3.64</b>	<b>0.73</b>
2.2	Tailored or adapted organizational guide line to the need of specific projects.	<b>3.42</b>	<b>0.68</b>
2.3	Risk Management Plan	<b>2.54</b>	<b>0.51</b>
	<b>Mean</b>	<b>3.2</b>	<b>0.64</b>
<b>3</b>	<b>Executing</b>		
3.1	Organization/project resources needed to perform project	<b>2.59</b>	<b>0.52</b>

	activities		
3.2	Knowledge or experience of Peoples involved in performing projects	<b>3.02</b>	<b>0.59</b>
3.3	Performance of quality assurance	<b>1.76</b>	<b>0.52</b>
	<b>Mean</b>	<b>2.45</b>	<b>0.54</b>
<b>4</b>	<b>Controlling</b>		
4.1	Project monitoring, controlling and review the process to ensure that it complies standards and procedures in the process description/the plan/	<b>2.15</b>	<b>0.59</b>
4.2	Updating plan or taking remedial measures after controlling processes	<b>2.31</b>	<b>0.35</b>
4.3	Project scope control	<b>2.51</b>	<b>0.43</b>
	<b>Mean</b>	<b>2.32</b>	<b>0.45</b>
<b>5</b>	<b>Closing</b>		
5.1	Effectiveness of Contract close out procedures	<b>2.30</b>	<b>0.46</b>
5.2	Project collection of data and lessons learned from planning and performing for the purpose of future use in improvement of the process	<b>2.01</b>	<b>0.40</b>
5.3	Effectiveness of Closing Project or phase	<b>3.55</b>	<b>0.71</b>
	<b>Mean</b>	<b>2.62</b>	<b>0.52</b>
	<b>Grand Mean</b>	<b>2.65</b>	

*Source: Own survey (2020)*

## 4.4 Maturity across each Project Management Knowledge Areas

### Maturity Level of Project Scope Management Knowledge Area

Project scope management encompasses the activities required to ensure that the project includes all the works required, and only the works required to complete the project successfully. Scope planning, scope definition, scope verification, creating WBS and scope control are the main components of project scope management (Asnakew, 2016).

To measure the project scope management level of the corporation, opinions of the respondents are collected using six major variables. Some of the variables are developing detailed description of the project and product, subdividing project deliverables and project work into smaller, more manageable components and monitoring the status of the project and product scope and managing changes to the scope baseline as elaborated in Table4.6.

Table 4.5: Respondents project scope management maturity level

No	Variables		
1	Project Scope Management Knowledge area	Mean	RII
1.1	Developing a detailed description of the project and product	3.87	0.78
1.2	Creating a scope management plan that documents how the project scope will be defined, validated, and controlled	3.13	0.63
1.3	Determining, documenting, and managing stakeholder needs and requirements to meet project objectives	2.18	0.44
1.4	Subdividing project deliverables and project work into smaller, more manageable components	2.18	0.44
1.5	Formalizing acceptance of the completed project deliverables	2.79	0.56
1.6	Monitoring the status of the project and product scope and managing changes to the scope baseline	3.67	0.73
	<b>Average Project Scope Management Maturity Level</b>	<b>2.97</b>	<b>0.59</b>

*Source: Own survey (2020)*

As presented in Table 4.5, the mean value of all the variables taken into account rests between 2.18 (Level-2) and 3.87 (Level-3) with the total average project scope management maturity level of 2.97 resulting approximately Level 3 maturity level. The survey implies that the scope management practice of the corporation is found to be at organizational standards and institutionalized processes. Scope management practices are rarely applied; there is a huge gap

mainly in determining, documenting and managing stakeholders' need of the project objectives, subdivision of project deliverables and works in to manageable components, and formalizing acceptance of the completed project deliverables.

According to information obtained through interview with project managers, since Ethiopian railways corporation outsources its projects to contractors mainly the corporation undertakes scope management by trying to ensure that all the works and activities carried out by the contractor is compatible with the originally agreed up on and the contract documents.

### **Maturity Level of Project Integration Management Knowledge Area**

Integration Management describes the processes required to ensure that various elements of the project are properly coordinated. It consists of plan development, plan execution, and integrated change control (PMI, 2004). Project integration management consist of the processes and activities needed to identify, define, combine, unify, and coordinate the various processes and project management activities within the project management process groups (Asnakew, 2016). In the project management context, integration includes characteristics of unification, consolidation, articulation and integrative actions that are crucial to project completion, successful management of stakeholder expectations and meeting requirements.

Eight variables were used to gain the respondents insight about Project Integration management practice of Ethiopian railways corporation (ERC). Using this variables the corporations' project integration management maturity level is measured. The mean response of respondents is shown in Table4.6.

Table 4.6: Respondents project integration management maturity level

No	Variables		
<b>1</b>	<b>Project Integration Management Knowledge area</b>	<b>Mean</b>	<b>RII</b>
<b>1.1</b>	Developing a document that formally authorizes the existence of a project and provides the project manager with the authority to apply organizational resources to project activities.	<b>3.27</b>	<b>0.65</b>
<b>1.2</b>	Defining, preparing, and coordinating all subsidiary plans and integrating them into a comprehensive project management plan.	<b>2.34</b>	<b>0.51</b>

<b>1.3</b>	Coordinating changes across the entire project.	<b>3.19</b>	<b>0.64</b>
<b>1.4</b>	Tracking, reviewing, and reporting project progress against the performance objectives defined in the project management plan.	<b>3.81</b>	<b>0.76</b>
<b>1.5</b>	Leading and performing the work defined in the project management plan and implementing approved changes to achieve the project's objective.	<b>3.40</b>	<b>0.68</b>
<b>1.6</b>	Finalizing all activities across all of the Project Management Process Groups to formally complete the phase or project.	<b>3.64</b>	<b>0.73</b>
	<b>Average Project Integration Management Maturity Level</b>	<b>3.28</b>	<b>0.66</b>

*Source: Own survey (2020)*

Table 4.6 depicts that all of the illustrated variables are approximately at the same level which is level-3, only the second variable defining, preparing, and coordinating all subsidiary plans and integrating them into a comprehensive project management plan lies at maturity level-2. The mean maturity level of project integration management knowledge area of the corporation is 3.28. This means, all project management standards are in place and are organizational standards, documentations exists and management is regularly involved in input and approval of keydecisions.

Additional information from project managers and project section managers shows that projects are consistently started with the defined project charter, and there is a defined and documented change control process for scope changes, but all project processes management is not applied to all projects and there is lack of consistent improvements in cascading changes across the entire project.

### **Maturity Level of Project Time Management Knowledge Area**

Project time management includes the processes required to manage the timely completion of the project. It includes activity definition, activity sequencing, activity resource estimation, activity duration estimation, schedule development and schedule control of a project (PMI, 2004).The time management Knowledge area mainly refers to the skills, tools, and techniques used to manage time when undertaking specific tasks, projects and goals (Kerzner,2013).



The project time management practices of the corporation were shown by the following eight variables presented for the respondents in the Table 4.8.

The overall time management knowledge area maturity level of the corporation is 2.88 somewhere between Level-2 (structured process and standards) and Level-3 (organizational standards and institutionalized process), approximately striving to reach the industry standard.

Table 4.7: Respondents project time management maturity level

No	Variables	Mean	RII
<b>1</b>	<b>Project Time Management Knowledge area</b>	<b>Mean</b>	<b>RII</b>
<b>1.1</b>	Establishing the policies, procedures, and documentation for planning, developing, managing, executing, and controlling the project schedule.	<b>3.34</b>	<b>0.41</b>
<b>1.2</b>	Identifying and documenting relationships among the project activities.	<b>2.60</b>	<b>0.52</b>
<b>1.3</b>	Identifying the specific activities that must be performed to produce various project deliverables	<b>2.94</b>	<b>0.59</b>
<b>1.4</b>	Estimating the type and quantities of material, human resources, equipment, or supplies required to perform each activity.	<b>2.96</b>	<b>0.46</b>
<b>1.5</b>	Estimating the number of work periods needed to complete individual activities with estimated resources.	<b>2.89</b>	<b>0.58</b>
<b>1.6</b>	Analyzing activity sequences, durations, resource requirements, and schedule constraints to create the project schedule model.	<b>2.86</b>	<b>0.57</b>
<b>1.7</b>	Monitoring the status of project activities to update project progress and manage changes to the schedule baseline to achieve the plan.	<b>2.56</b>	<b>0.51</b>
	<b>Average Project Time Management Maturity Level</b>	<b>2.88</b>	<b>0.52</b>

*Source: Own survey (2020)*

Even though much of project time management processes exist in the organization, they are not considered an organizational standard and executed as they are planned consistently. In this occasion it is also doubtful to say that processes are in place to improve project performance considering the highest maturity level focusing on continuous improvement.

Some respondents in the management and experienced project managers have clarified through interview that even if there are policies, procedures, and documentation for planning, developing, managing, executing, and controlling the project schedule in place, because of the nature of the contract and some other factors the managers doesn't have full control over the project activities in making major decisions on how the activities of the project should have to go forward and achieve timely deliverables.

Scheduling and sequencing of activities will usually use to manage the time to be used in the appropriate utilization of the project schedule time. Previous study revealed that the contribution of time management for overall success of the project by descriptive analysis was 92% with the mean value of project time was 4.64 (Abednego,2015).

### **Maturity Level of Project Cost Management Knowledge Area**

According to PMI (2013), cost management is concerned with the process of planning and controlling the budget of a project or business. It includes activities such as planning, estimating, budgeting, financing, funding, managing, and controlling costs so that the project can be completed within the approved budget. Cost management covers the full life cycle of a project from the initial planning phase towards measuring the actual cost performance and project completion.

As shown in Table 4.8 the project cost management practice of the corporation is evaluated using four major variables. The respondents gave their opinion on each variable and the mean maturity level of the corporation is 2.75 which are at Level-2 structured process and standards.

Approximately all of the variables have the same mean maturity value according to the respondents' opinion which shows that processes exist but they are not considered organizational standards.

In managing the cost of the projects some intervention of governmental officials is seen previously on payments prohibiting project managers' full decision and responsibility in managing almost all of the railway projects, this might emanate from controlling the infrastructure development sector in cost expenditure.

Table 4.8 : Respondents project cost management maturity level

No	Variables		
<b>1</b>	<b>Project Cost Management Knowledge area</b>	<b>Mean</b>	<b>RII</b>
<b>1.1</b>	Establishes the policies, procedures, and documentation for planning, managing, expending, and controlling project costs.	<b>2.48</b>	<b>0.50</b>
<b>1.2</b>	Developing an approximation of the monetary resources needed to complete project activities.	<b>2.71</b>	<b>0.54</b>
<b>1.3</b>	Aggregating the estimated costs of individual activities or work packages to establish an authorized cost baseline.	<b>2.68</b>	<b>0.54</b>
<b>1.4</b>	Monitoring the status of the project to update the project costs and managing changes to the cost baseline	<b>3.12</b>	<b>0.63</b>
	<b>Average Project Cost Management Maturity Level</b>	<b>2.75</b>	<b>0.55</b>

*Source: Own survey (2020)*

### **Maturity Level of Project Quality Management Knowledge Area**

Quality Management includes the processes and activities of the organization that determine quality policies, objectives, and responsibilities so that the project will satisfy the needs for which it was undertaken. Project quality management includes the processes such as Plan quality; Perform quality assurance and perform quality control (PMI, 2004).

Project quality management is applied to ensure that both the outputs of the project and the processes by which the outputs are delivered to meet the required needs of stakeholders. Quality is broadly defined as fitness for purpose or more narrowly as the degree of conformance of the outputs and process (Asnakew, 2016).

Table 4.9: Respondents project quality management maturity level

No	Variables		
<b>1</b>	<b>Project Quality Management Knowledge area</b>	<b>Mean</b>	<b>RII</b>
<b>1.1</b>	Identifying quality requirements and/or standards for the project and its	<b>2.35</b>	<b>0.47</b>

	deliverables and documenting how the project will demonstrate compliance with quality requirements.		
<b>1.2</b>	Auditing the quality requirements and the results from quality control measurements to ensure that appropriate quality standards and operational definitions are used.	<b>1.93</b>	<b>0.39</b>
<b>1.3</b>	Monitoring and recording results of executing the quality activities to assess performance and recommend necessary changes.	<b>2.43</b>	<b>0.49</b>
	<b>Average Project Quality Management Maturity Level</b>	<b>2.23</b>	<b>0.45</b>

*Source: Own survey (2020)*

As it is shown in Table 4.10, the quality management practice of the corporation as perceived by respondents has the mean value of 2.23 which imply it is at Level-2 maturity level structured process and standards level striving and much more effort is a head to reach Level-3 organizational standards and institutionalized process. Even though all of the variables mean maturity level rests in the same area one of the variables which is auditing the quality requirements and the results from quality control measurements to ensure that appropriate quality standards and operational definitions are used is at Level-1 with mean value of 1.93.

It is seen that much of the processes and instruments required for quality control is slightly in place because of the contract type that limits the corporations say and decision making power in major activities of the project. There is also insignificant effort being made in changing this scenario to increase inspection of every activity in projects and utilize basic instrument to make sure that projects delivered are in conformance with pre-defined quality.

## **Maturity Level of Project Human Resource Management KnowledgeArea**

Human resource management includes the processes that organize, manage, and lead the project team. Project human resource management involves the processes: develop human resource plan, acquire project team, develop project team and manage project team. Project human resource management includes the processes of organizational planning, staff acquisition, and team development (PMI, 2004).

The project human resource management practice and maturity of the organization is evaluated based on respondents opinion on four basic variables or components elaborated in table 4.11 below.

Table 4.10: Respondents project human resource management maturity level

No	Variables	Mean	RII
<b>1</b>	<b>Project Human Resource Management Knowledge area</b>		
<b>1.1</b>	Identifying and documenting project roles, responsibilities, required skills, reporting relationships, and creating a staffing management plan.	<b>3.53</b>	<b>0.71</b>
<b>1.2</b>	Confirming human resource availability and obtaining the team necessary to complete project activities.	<b>3.59</b>	<b>0.72</b>
<b>1.3</b>	Improving competencies, team member interaction, and overall team environment to enhance project performance.	<b>2.71</b>	<b>0.54</b>
<b>1.4</b>	Tracking team member performance, providing feedback, resolving issues, and managing changes to optimize project performance.	<b>2.82</b>	<b>0.57</b>
	<b>Average Project Human Resource Management Maturity Level</b>	<b>3.16</b>	<b>0.63</b>

*Source: Own survey (2020)*

The result shows that the mean human resource management maturity level of the corporation is 3.16 which is at Level-3, organizational standards and institutionalized process. The response showed that improving competencies, team member interaction, and overall team environment to enhance project performance (with mean value of 2.71) and tracking team member performance, providing feedback, resolving issues, and managing changes to optimize project performance (2.82) are inadequately being undertaken and more enhanced processes and support from the management is required to increase the human resource maturity of the corporations project management and overall matured project management practice.

From the responses of the participants interviewed it is possible to conclude that there are some human resource management standards and processes in place but still there is a huge gap in its execution and managing human resources effectively, also all the concerned and responsible bodies are not involved in project planning development process and staffing is not consistently

created and followed for each project, there is also a human resource handling mismatch in that some people are “accidentally” assigned to different positions in projects and other positions.

## **Maturity Level of Project Communications Management Knowledge Area**

By definition, project communication management refers to the set of activities concerned with the generation, collection, presentation, distribution, and secure storage of information within a project and its environment. Project communication is the exchange of project-specific information with the emphasis on creating understanding between the sender and thereceiver.

Project communication management is thus the backbone to effective decision making during the lifecycle of a project. Effective communication is one of the most important factors contributing to the success of a project. Communication is the fuel that keeps the project running efficiently to complete in time, with budgeted cost and with specification according to planed quality (PMI, 2004).

The project communications management practice of the corporation is evaluated based on three basic variables shown in the table below, which are used to get respondents opinion. According to the result obtained the total mean maturity level of the corporation is 2.78 which is at level-2, structured process and standards (See Table4.11).

Table 4.11: Respondents project communications management maturity level

<b>No</b>	<b>Variables</b>		
<b>1</b>	<b>Project Communications Management Knowledge area</b>	<b>Mean</b>	<b>RII</b>
<b>1.1</b>	Developing an appropriate approach and plan for project communications based on stakeholder’s information needs and requirements, and available organizational assets.	<b>3.01</b>	<b>0.60</b>
<b>1.2</b>	Creating, collecting, distributing, storing, retrieving and the ultimate disposition of project information in accordance with the communications management plan.	<b>2.25</b>	<b>0.45</b>
<b>1.3</b>	Monitoring and controlling communications throughout the entire project life cycle to ensure the information needs of the project stakeholders are met.	<b>3.07</b>	<b>0.62</b>
	<b>Average Project Communications Management Maturity Level</b>	<b>2.78</b>	<b>0.56</b>

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*Source: Own survey (2020)*

The main constraint of the corporations' project communications management is seen in Creating, collecting, distributing, storing, retrieving and the ultimate disposition of project information in accordance with the communications management plan which resulted in mean maturity level of 2.25.

Some employees of the corporation interviewed responded that overall there is major gap seen in collecting information about planned activities in advance and in detail, communicating changes, responding to requested changes by stakeholders, disseminating planned activities information to the concerned stakeholder ahead of execution, and thorough documentation problems throughout projects and the corporation in general. Also internal communication occurs through the top management meetings, but employees who are not part of the meetings do not get the required information timely, and Project status reporting procedures are not consistently followed.

### **Maturity Level of Project Risk Management Knowledge Area**

Project risk management includes the processes of conducting risk management planning, identification, analysis, response planning, and monitoring and control of project risk. The objectives of risk management are to increase the probability and impact of positive events, and decrease the probability and impact of negative events in the project. Risk management processes are: plan risk management, identify risks, perform qualitative and quantitative risk analysis, plan risk responses, monitor and control risks (PMI, 2004). Major risks anticipated in railway construction projects are: geological risk, stakeholder conflict, weather, economic, political, law, and physical site, scope of work, construction contract, designing, materials, and financial and human resource risks (Asnakew, 2016).

Table 4.12 shows the six main variables considered to evaluate the project risk management mean maturity level of Ethiopian Railways Corporation and opinion of the respondents.

Table 4.12: Respondents project risk management maturity level

No	Variables		
<b>1</b>	<b>Project Risk Management Knowledge area</b>	<b>Mean</b>	<b>RII</b>
<b>1.1</b>	Deciding how to approach and plan the risk management activities for a project.	<b>2.92</b>	<b>0.58</b>
<b>1.2</b>	Determining which risks might affect the project and documenting their characteristics.	<b>3.46</b>	<b>0.69</b>
<b>1.3</b>	Prioritizing risks for further analysis or action by assessing and combining their probability of occurrence and impact.	<b>3.02</b>	<b>0.60</b>
<b>1.4</b>	Numerically analyzing the effect of identified risks on overall project objectives.	<b>3.01</b>	<b>0.60</b>
<b>1.5</b>	Developing options and actions to enhance opportunities and to reduce threats to project objectives.	<b>2.88</b>	<b>0.58</b>
<b>1.6</b>	Implementing risk response plans, tracking identified risks, monitoring residual risks, identifying new risks, and evaluating risk process effectiveness throughout the project.	<b>3.07</b>	<b>0.62</b>
	<b>Average Project Risk Management Maturity Level</b>	<b>3.06</b>	<b>0.61</b>

*Source: Own survey (2020)*

The total mean project risk management maturity level of the corporation is 3.06 which is at Level-3, organizational standard and institutionalized process. As shown in Table 4.13, almost all of the variables have the same mean maturity level striving to reach industry standard or organizational standard. Processes are in place, documentation exists but still much more effort is required in execution, identifying and planning risks ahead of project execution. Deciding how to approach and plan the risk management activities for a project with mean value of 2.92 and developing options and actions to enhance opportunities and to reduce threats to project objectives resulting with mean maturity level of 2.88 are the two major areas requiring improvements.

Experienced project managers explained that the corporation needs to undertake revolutionary replacement of risk planning and management approaches to forecast possible risks during risk



planning and work to reduce possible risks for the overall delivery of project outputs and stakeholders satisfaction. Prioritizing risk for further analysis or action by assessing and combining their probability of occurrence and impact should have to be things the project risk management teams should have to do rather than reacting to most risks when they happen, because that is how currently the projects undertaken by the corporation is being carried out. Risks are not consistently identified, documented or tracked and project risks are not always evaluated for priority and probability.

### **Maturity Level of Project Stakeholders Management Knowledge Area**

Project Stakeholder Management knowledge area includes the processes required to identify the people, groups, or organizations that could impact or be impacted by the project, to analyze stakeholder expectations and their impact on the project, and to develop appropriate management strategies for effectively engaging stakeholders in project decisions and execution. This knowledge area also focuses on continuous communication with stakeholders to understand their needs and expectations, addressing issues as they occur, managing conflicting interests and fostering appropriate stakeholder engagement in project decisions and activities (Hadgu,2018). Stakeholders are those with a particularly significant interest in the project’s outcome, including those providing funding or right of way for the project and property owners who are affected by the project. Or it is an individual, group, or organization who may affect, be affected by, or perceive itself to be affected by a decision, activity, or outcome of a project which have significant influence on project success (PMI, 2013).

As shown in Table 4.13, the corporations project stakeholders’ management maturity level were assessed based on opinion of respondents using four major components. The mean stakeholders’ management maturity level is 2.91, which is at Level-2 structured process and standards almost striving and close to reach Level-3.

Table 4.13: Respondents project stakeholders’ management maturity level

No	Variables		
<b>1</b>	<b>Project Stakeholders Management Knowledge area</b>	<b>Mean</b>	<b>RII</b>
<b>1.1</b>	Identifying the stakeholders that could impact or be impacted by a decision,	<b>3.36</b>	<b>0.67</b>

	activity, or outcome of the project; and analyzing and documenting relevant information.		
<b>1.2</b>	Developing appropriate management strategies to effectively engage stakeholders throughout the project life cycle, based on the analysis of their needs, interests, and potential impact on project success.	<b>3.01</b>	<b>0.60</b>
<b>1.3</b>	Communicating and working with stakeholders to meet their needs/expectations, address issues as they occur, and foster appropriate stakeholder engagement in project activities throughout the project life cycle.	<b>2.47</b>	<b>0.50</b>
<b>1.4</b>	Monitoring overall project stakeholder relationships and adjusting strategies and plans for engaging stakeholders.	<b>2.80</b>	<b>0.56</b>
	<b>Average Project Stakeholders Management Maturity Level</b>	<b>2.91</b>	<b>0.58</b>

*Source: Own survey (2020)*

Mainly two process areas which are communicating and working with stakeholders to meet their needs/expectations, address issues as they occur, and foster appropriate stakeholder engagement in project activities throughout the project life cycle resulted with mean value of 2.47, and monitoring overall project stakeholder relationships and adjusting strategies and plans for engaging stakeholders with mean value of 2.80 according to the respondents opinion needs continuous and strategic effort to result in an acceptable project deliverables that can satisfy every stakeholder involved.

There is little being done in identifying project stakeholders during the planning stage, mostly the corporation engages in communicating the stakeholders reactively when they are needed rather than proactively planning out and communicating them ahead. There is also no continuous involvement of every stakeholders during decision making, rather some stakeholders are forced to accept the decisions made without their presence that results with the feelings of disrespected and minimal or no feeling of deliverables ownership.

## Maturity Level of Project Procurement Management Knowledge Area

Procurement management includes the processes necessary to purchase or acquire products and services. Procurement management includes the contract management issued by an outside organization (buyer) or issued by the performing organization to an outside organization (sub contract management) and change control processes required to develop and administer contracts or purchase orders. Procurement management the processes: plan procurements, conduct procurement, contract administration, and contract closeout. From contractors perspective procurement management is concerned mainly with subcontract management, supply purchase management and administering the contract that it entered with the client (PMI, 2004).

As shown in Table 4.14, of all project management body of knowledge areas project procurement management knowledge area of the corporation have the highest mean maturity level based on respondents' opinion.

Table 4.14: Respondents project procurements management maturity level

No	Variables	Mean	RII
<b>1</b>	<b>Project Procurement Management Knowledge area</b>	<b>Mean</b>	<b>RII</b>
<b>1.1</b>	Documenting project procurement decisions, specifying the approach, and identifying potential sellers.	<b>3.69</b>	<b>0.74</b>
<b>1.2</b>	Obtaining seller responses, selecting a seller, and awarding a contract.	<b>3.67</b>	<b>0.73</b>
<b>1.3</b>	Managing procurement relationships, monitoring contract performance, and making changes and corrections as appropriate.	<b>3.55</b>	<b>0.71</b>
<b>1.4</b>	Completing each project procurement.	<b>3.38</b>	<b>0.68</b>
	<b>Average Project Procurement Management Maturity Level</b>	<b>3.57</b>	<b>0.72</b>

*Source: Own survey (2020)*

The respondents gave their opinion on four major procurement management areas and the response resulted with mean maturity value of 3.57. This shows that the procurement maturity level is considered to be Level - 3 (Organizational Standards and institutionalized process),

which implies that procurement management practices are in place and are organizational standards.

Project managers and procurement management teams elaborated that mostly all of the bulky procurements are undertaken by the contractors with the approval of consultants and the corporation, this shows that the corporation haven't engaged in obtaining seller responses, selecting a seller, and awarding a contract for major imported procurements rather than few simplified procurements. Because of this the corporations' project procurement management has taken the highest maturity level.

#### 4.4 Overall Project Management Maturity Level of ERC

As indicated in Table 4.15, the mean maturity level results of each project management knowledge area shows that project management maturity levels of the nine knowledge areas are between 2.28 and 3.57. Project time management, cost management and project quality management, risk management maturities and project stakeholders' management are at Level-2 (Structured process and Standards). Project integration management, scope management, human resource management, risk Management, and procurement management maturities reached the next maturity ladder, which is Level-3 organizational standards and institutionalized process. From the relative importance index results it is possible to understand that knowledge areas those who resulted with higher relative importance index level are somehow structured and being implemented in the corporation.

Table 4.15: Overall project management maturity level of ERC

No	Project Management Knowledge Area	Mean maturity level	RII
1	Project Procurement Management	3.57	0.72
2	Project Integration Management	3.28	0.66
3	Project Human Resource Management	3.16	0.63
4	Project Risk Management	3.06	0.61
5	Project Scope Management	2.97	0.59
	<b>Average Maturity Level</b>	<b>2.95</b>	
6	Project Stakeholders Management	2.91	0.58
7	Project Time Management	2.88	0.52

<b>8</b>	Project Communications Management	<b>2.78</b>	<b>0.56</b>
<b>9</b>	Project Cost Management	<b>2.75</b>	<b>0.55</b>
<b>10</b>	Project Quality Management	<b>2.23</b>	<b>0.45</b>

*Source:Own survey (2020)*

In general, average maturity value of the ten project management knowledge areas is **2.95**. This score is equivalent to 59% of the total score of 5 points assigned as the maximum point achievable. Hence, it is possible to conclude that project management maturity of the company is **Level - 3** (Organizational Standards and institutionalized process). All project management standards are in place and are organizational standards. Almost all projects use these standards and management is regularly involved in the input and approval of key decisions and issues.

The knowledge areas of procurement management integration management, scope management, human resource management, and risk management have shown comparatively higher level of maturity and relative importance index compared with other PM knowledge areas. These knowledge areas are more or less being performed with organized procedure and better maturity by the organization. Whereas the knowledge areas of project quality management, project cost management, project time management, project risk management and project stakeholders' management are resulted comparatively with lower mean maturity level and relative importance index implying they are at lower maturity level and could be considered to be performed informally by the organization.

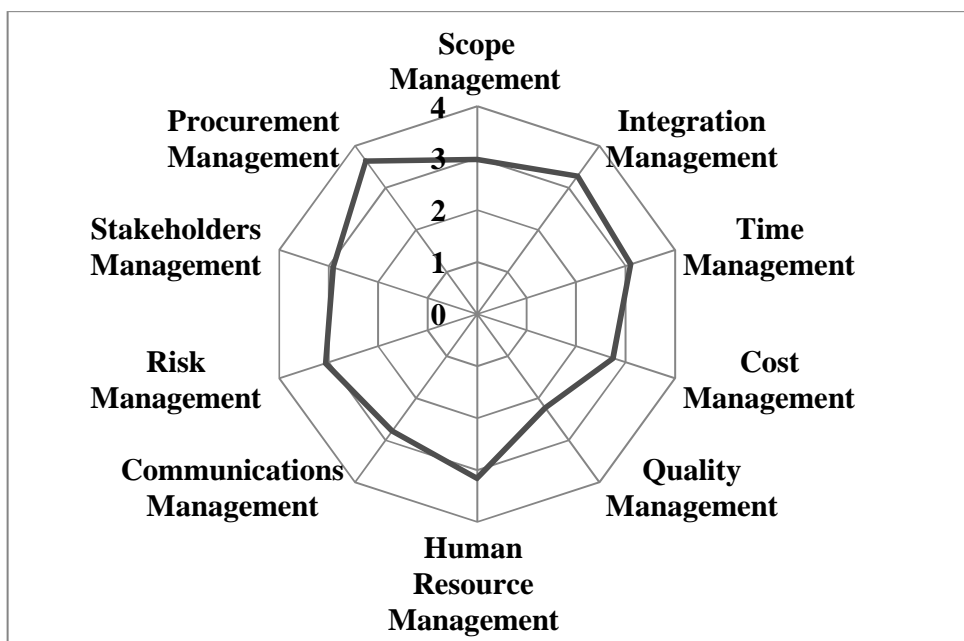
This chapter has presented research results of project management maturity assessment of Ethiopian Railways Corporation. The perceptions of the respondents reflected that overall project management Maturity level of the company is level -3 (Organizational Standards and institutionalized process).

Attaining maturity would not necessarily guarantee that a project would be successful. However, it could increase a project's chances of being successful. It should be noted that the processes of attaining maturity is not a one-time event that is accomplished by declaring a methodology and structure nor it is a quick fix for immediate tactical problems rather, it is a consciously planned and properly managed continuous improvement effort (Supic,2005).

Theories and empirical evidences revealed that there is appositve relationship between project management maturity level and project success. Project success is measured in terms of project constraints and customers“ acceptance that is project completed within budget, schedule, to the expected scope and meets customer requirement is noted as successful project.

For all the models, as moved to the higher level the success factor of projects tend to increase that is the higher project management maturity level has greater chance of success and the higher project management maturity levels the greater chance of project success will be attained. Maturity levels are determined by different project management maturity models. Most models have five growing levels and similar levels of the different models have similar activities and definitions.

**Figure 4.2: PMBOK Areas maturity level of the corporation**



**Source: Own survey (2020)**

Generally, this chapter has discussed characteristics of respondents in detail, and the results of the analysis obtained confirm that there are experienced human resources in project management, experts with somehow good educational background and trainings in project management and optimistic in application of project management knowledge areas. Each process groups and project management body of knowledge areas mean was seen in depth. Overall, the

corporation has not even fully fulfilled the requirements of Level three and is thus still at the start of level three. Knowledge areas of integration management, scope management, human resource management, risk management, and procurement management have shown comparatively higher level of maturity compared with other PM knowledge areas. These knowledge areas are more or less being performed in better maturity by the organization. Whereas the knowledge areas of time management, cost management and project quality management, risk management maturities and project stakeholders' management are comparatively at lower level and could be considered to be performed informally by the organization.

Even though, some processes are in place and management involves in decision making process, there is a huge gap seen in the execution of the project management bodies of knowledge areas, that emanates from inadequate assignment of project human resources with partial or no power to make decisions and accidental assignments in leading teams seen in some of the corporations' projects and involvement of external political officials in decisions which politicize the project and resulting in unsatisfactory deliverables.

# CHAPTER FIVE

## 5. Conclusions and Recommendations

### 5.1 Conclusion

This thesis has tried to assess the maturity of project management processes and practices practiced by Ethiopian Railways Corporation in executing its mega railway projects. In addition, the research has provided bench mark data on the current status of PM practice in the organization which can be used for continuous assessment of future improvement efforts. Organization which are initiating and implementing projects should look forward for better Project management Process and Practice maturity level and strive for better performance.

From the analysis of the results of the study, it became evident that the level of organizational project management maturity of the corporation has reached the third Level of progressive stages of the maturity ranking. This robustly indicates that ERC does have formal project management Processes and Procedures but such processes are however inconsistently implemented or still traditional and Project Management Process Standards are not sufficiently established and practiced. Almost all of the PMBOK areas are implemented with no knowledge of their summative addition in increasing Project management maturity level of the corporation, in that there is no formal procedure in place be managed by the management of the corporation that checks and expect undertaken activities of the projects to convey to the predefined procedures and or give lesson for future improvements.

The Company has to fill the identified gaps that still exist at level three and thereafter it may strive to reach level four. The Company as a whole possesses some project management capabilities required for effective application of the ten Project Management knowledge Areas, but they are fragmented in application and much is still expected to be improved to move forward and deliver projects with up to date procedural performances that will contribute to having mature project management practice in place. The management should have to keep the successful completion of their projects at the centre of the corporations 'goal leaving aside other



political and individual hustles and work hard in laying matured project management foundation rather than being satisfied with what was achieved so far.

Although the overall average maturity value showed Level three, the company still lacks in some knowledge areas satisfactory support systems to fulfill the requirements of Level three, in that the successful execution of one knowledge area will be hindered by poor implementation of others, because most of the PMBOK areas are interlinked.

Generally most PMBOK Areas of the corporation are matured and exist in the organization, but they are not fully considered an organizational standard yet. Documentation exists on all the processes. Management supports the implementation of project management and is regularly involved in input and approval of key decisions. But even though there are basic metrics to track cost, schedule, scope and technical performance collected, mostly the tools and input information's are given by the contractors undertaking the project and the consultants because of the new technology being implemented in which the corporation doesn't have most of the expertise, even when there are experts in place there is a knowledge transfer gap to coup up and evolve for improvements.

## 5.2 Recommendations

According to the findings obtained the project management maturity level of the corporation is low and requires undertaking speedy improvement efforts for future projects successful completion and generally to create strong organization mastered in developing infrastructures. By taking into consideration that the PM maturity has a direct relationship with the project success low matured PMBOK Areas mentioned on the findings should be practiced and improved as much as possible. In this regard this research recommends the following specific actions to be undertaken.

- The corporation should have to practice in detail the PMBOK Areas with intensive follow-ups and maturity measurements. This will help to prioritize areas resulted with lower maturity level ERC should have to emphasize on knowledge areas resulted with lower maturity levels which are time management, cost management, project quality management, risk management maturities and project stakeholders management. These

PMBOK Areas are the backbones of every projects success and the corporation should have to put more effort on them and achieve satisfactory deliverables.

- The corporation should have to engage itself in identifying the right, well experienced and best fit person for the right position, rather than accidentally assigning human resource personnel neither in project teams nor in the corporations' management. The human resource capacity of project offices and the corporation in general should be enhanced and strengthened by providing trainings, mentoring the employees to improve their PM knowledge and practice capacity about project activities for team members because the corporation is dependent in projects.
  
- The old and traditional way of doing things should have to be discarded and new up-to-date organizational project management practices should have to be enormously practiced in all PM process groups; initiation, planning, execution, monitoring or control and closing projects. Planning is the main gap seen in every project executed in Ethiopia; well-planned project is likely to be completed within scope, time and budget. Because all activities to be executed and risks will be identified ahead and the project team will anticipate on them easily. So, it is recommended that the upper management need to understand the importance of systematic and appropriate planning and should take time to draw the blue print of the project rather than rushing into execution.
  
- As the review of literature showed management of projects in developing countries is highly constrained by scarcity of resources and high uncertain environment, fast and less predictable changes. The corporation should have to leave aside interventions from political officials and focus on the management of resource, risk and quality to significantly lower their negative impact and improve performance of projects developed with loans obtained from developed countries which in long term creates huge economic crisis in the country as a whole if not well utilized.

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**APPENDIX: QUESTIONNAIER**  
**ST.MARY’S UNIVERSITY**  
**SCHOOL OF GRADUATE STUDIES**  
**DEPARTMENT OF PROJECT MANAGEMENT**

**Research questionnaire**

Dear Sir/Madam,

I am undertaking a research entitled “Assessment of Project Management Maturity Level: The Case of Ethiopian Railways Corporation” for the partial fulfilment of the requirement of Masters of Arts (MA) degree in Project Management. This survey is part of academic research that aims to assess the current level in project management maturity of Ethiopian Railways Corporation and appraise how project management knowledge areas are being practiced.

The achievement of the research’s aim depends on your cooperation in filling out this survey questionnaire and your precious time and effort in participating in this research will also contribute to the development and improvement of Project Management in your organization. I am grateful for your time and responses. You are NOT expected to write your name and, I thank you in advance, for your cooperation. All the information you provide will be kept in strict confidentiality and it will be only used for this academic research.

Sincerely yours,

Solomon Birhanu

0922-188214

**Part I. Respondent's Profile**

1. Specify your Gender:

a) Male

b) Female

2. Service year in the Corporation:

a) 0-3years

b) 4-6years

c) 7-9years

d) >10years

3. Please state your educational level:

a) Diploma

b) First degree/Bachelor

c) Second degree/Masters

d) Others  if others please specify \_\_\_\_\_.

4. Please state your current position: \_\_\_\_\_.

5. Do you have a formal training, outside the corporation, in Project Management?

a) Yes

b) No

If yes, please specify the type and level of training you received

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_.

6. Have you taken trainings related to Project Management provided by the Corporation?

a) Yes

b) No

If yes, please specify the type of training you received

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_.

7. Have you ever been involved in project management or project teams prior to your current assignment? (It can also be in another organization)

a) Yes

b) No

If yes, please specify the type of company and project you were involved with

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8. Do you believe that applying project management knowledge for Railway projects is necessary to ensure continued process improvement for future railway projects?

a) Yes

b) No

## Part II. Project Management Process and Knowledge Areas

### General direction:

Answer all the Questions that follow based on your knowledge of practice of Project Management in the project you are participating or in the organization you are working. Please consider the following definitions carefully before completing the bellow questionnaire. The following definitions are referred to the maturity levels according to PM solutionsmodel.

### Maturity Level 1-Initial Process

- ❖ **Processes-** No established practices and standards.
- ❖ **Documentation-** Loose and ad-hoc.
- ❖ **Management-** Management understands the definition of a project and is aware of the need for project management.
- ❖ **Metrics-** Collected informally in an ad-hoc basis.

### Maturity Level 2 - Structured process and standards

- ❖ **Processes-** Processes exist, but are not considered an organizational standard.
- ❖ **Documentation-** Documentation exists on the basic processes.



- ❖ **Management-** Management supports the implementation of project management, but understanding and involvement is not consistent/ applied to all projects. Large projects are executed in a systematic fashion and management is involved in such projects.
- ❖ **Metrics-** Basic metrics to track cost, schedule and technical performance exist.

### **Maturity Level 3- Organizational standards and institutionalized process**

- ❖ **Processes-** All project management processes are in place and established as organizational standards. These processes involve the clients as members of the project team. Nearly all projects use these processes.
- ❖ **Documentation-** Documentation exists on all the processes.
- ❖ **Management-** Management is regularly involved in input and approval of key decisions.
- ❖ **Metrics-** Metrics are formally collected and each project is evaluated and managed in light of other projects.

### **Maturity Level 4- Managed Process**

- ❖ **Processes-** Project management processes, standards and supporting systems are integrated with other corporate processes and systems.
- ❖ **Documentation-** Processes and standards are documented to support using metrics to make project decisions.
- ❖ **Management-** Management understands its role in the project management process. There are different management styles and project management requirements for different projects.
- ❖ **Metrics-** Efficiency and effectiveness metrics are used. All projects, changes and issues are evaluated based upon metrics from cost estimates, baseline estimates, and earned value calculations.

### **Maturity Level 5- Optimizing Process**

- ❖ **Processes-** Processes are in place and actively used to improve project management activities.
- ❖ **Documentation-** Lessons learned are regularly examined and used to improve project management processes, standards and documentation.

- ❖ **Management-** Management is focused not only on effectively managing projects but also on continuous improvement.
- ❖ **Metrics-** The metrics collected during project execution are used to understand the performance of a project and to assist in the making of organizational management decisions for the future.

**Note: 1=Maturity Level 1-Initial Process**

**2=Maturity Level 2- Structured process and standards**

**3=Maturity Level 3- Organizational standards and institutionalized process**

**4=Maturity Level 4- Managed Process**

**5=Maturity Level 5- Optimizing Process**

Please rate each of the following project management process or statements according to the maturity levels on the above explanation for each of the maturity level, by making an  in the appropriate box.

**Project Management Process Maturity Level**

No	Five PMBOK Process groups Key Process Characteristics	Maturity Levels				
		1	2	3	4	5
<b>1</b>	<b>Initiating</b>					
	Project/organization defined, standard or generic Project management Process.					
	Policy or direction or guide line that requires or recommends planning and performing projects.					
	Identification of all stake holders					
<b>2</b>	<b>Planning</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
	Comprehensive planning to perform projects to achieve goals.					
	Tailored or adapted organizational guide line to the need of specific projects.					
	Risk Management Plan					
<b>3</b>	<b>Executing</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>

	Organization/project resources needed to perform project activities					
	Knowledge or experience of Peoples involved in performing projects					
	Performance of quality assurance					
<b>4</b>	<b>Controlling</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
	Project monitoring, controlling and review the process to ensure that it complies standards and procedures in the process description/the plan/					
	Updating plan or taking remedial measures after controlling processes					
	Project scope control					
<b>5</b>	<b>Closing</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
	Effectiveness of Contract closes out procedures					
	Project collection of data and lessons learned from planning and performing for the purpose of future use in improvement of the process					
	Effectiveness of Closing Project or phase					

**Project Management practice maturity level in ten Project Management Bodies of Knowledge areas**

PMBOK's Ten Project Management Knowledge Areas	Ascending Maturity level from 1-5				
	1	2	3	4	5
<b>1. Project Scope Management</b>					
Developing a detailed description of the project and product					
Creating a scope management plan that documents how the project scope will be defined, validated, and controlled					
Determining, documenting, and managing stakeholder needs and requirements to meet project objectives					

Subdividing project deliverables and project work into smaller, more manageable components					
Formalizing acceptance of the completed project deliverables					
Monitoring the status of the project and product scope and managing changes to the scope baseline					
<b>2. Project Integration Management</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
Developing a document that formally authorizes the existence of a project and provides the project manager with the authority to apply organizational resources to project activities.					
Defining, preparing, and coordinating all subsidiary plans and integrating them into a comprehensive project management plan.					
Coordinating changes across the entire project.					
Tracking, reviewing, and reporting project progress against the performance objectives defined in the project management plan.					
Leading and performing the work defined in the project management plan and implementing approved changes to achieve the project's objective.					
Finalizing all activities across all of the Project Management Process Groups to formally complete the phase or project.					
<b>3. Project Time Management</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
Establishing the policies, procedures, and documentation for planning, developing, managing, executing, and controlling the project schedule.					
Identifying and documenting relationships among the project activities					
Identifying the specific activities that must be performed to produce various project deliverables					
Estimating the type and quantities of material, human resources, equipment, or supplies required to perform each activity.					
Estimating the number of work periods needed to complete					

individual activities with estimated resources.					
Analyzing activity sequences, durations, resource requirements, and schedule constraints to create the project schedule model.					
Monitoring the status of project activities to update project progress and manage changes to the schedule baseline to achieve the plan.					
<b>4. Project Cost Management</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
Establishes the policies, procedures, and documentation for planning, managing, expending, and controlling project costs.					
Developing an approximation of the monetary resources needed to complete project activities.					
Aggregating the estimated costs of individual activities or work packages to establish an authorized cost baseline.					
Monitoring the status of the project to update the project costs and managing changes to the cost baseline					
<b>5. Project Quality Management</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
Identifying quality requirements and/or standards for the project and its deliverables and documenting how the project will demonstrate compliance with quality requirements.					
Auditing the quality requirements and the results from quality control measurements to ensure that appropriate quality standards and operational definitions are used.					
Monitoring and recording results of executing the quality activities to assess performance and recommend necessary changes.					
<b>6. Project Human resource Management</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
Identifying and documenting project roles, responsibilities, required skills, reporting relationships, and creating a staffing management plan.					
Confirming human resource availability and obtaining the team necessary to complete project activities.					
Improving competencies, team member interaction, and overall team					

environment to enhance project performance.					
Tracking team member performance, providing feedback, resolving issues, and managing changes to optimize project performance.					
<b>7. Project Communications Management</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
Developing an appropriate approach and plan for project communications based on stakeholder’s information needs and requirements, and available organizational assets.					
Creating, collecting, distributing, storing, retrieving and the ultimate disposition of project information in accordance with the communications management plan.					
Monitoring and controlling communications throughout the entire project life cycle to ensure the information needs of the project stakeholders are met.					
<b>8. Project Risk Management</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
Deciding how to approach and plan the risk management activities for a project.					
Determining which risks might affect the project and documenting their characteristics.					
Prioritizing risks for further analysis or action by assessing and combining their probability of occurrence and impact.					
Numerically analyzing the effect of identified risks on overall project objectives.					
Developing options and actions to enhance opportunities and to reduce threats to project objectives.					
Implementing risk response plans, tracking identified risks, monitoring residual risks, identifying new risks, and evaluating risk process effectiveness throughout the project.					
<b>9. Project Stakeholder management</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
Identifying the stakeholders that could impact or be impacted by a decision, activity, or outcome of the project; and analyzing and					

documenting relevant information.					
Developing appropriate management strategies to effectively engage stakeholders throughout the project life cycle, based on the analysis of their needs, interests, and potential impact on project success.					
Communicating and working with stakeholders to meet their needs/expectations, address issues as they occur, and foster appropriate stakeholder engagement in project activities throughout the project life cycle.					
Monitoring overall project stakeholder relationships and adjusting strategies and plans for engaging stakeholders.					
<b>Project Procurement management</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
Documenting project procurement decisions, specifying the approach, and identifying potential sellers.					
Obtaining seller responses, selecting a seller, and awarding a contract.					
Managing procurement relationships, monitoring contract performance, and making changes and corrections as appropriate.					
Completing each project procurement.					

**Thank you for your time!**