St. MARY'S UNIVERSITY

SCHOOL OF GRADUATE STUDIES

ASSESSMENT OF PROJECT MANAGEMENT LEVEL OF MATURITY OF FEDERAL ROAD PROJECTS IN ETHIOPIA: A DISAGGRIGATED ANALYSIS BASED ON STAKEHOLDERS

By

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A Thesis Submitted to the School of Graduate Studies of St. Mary's University in partial fulfillment of the requirements for the degree of Masters of Arts in Project Management

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THESIS APPROVAL SHEET

This is to certify that the thesis prepared by Eyasu Hailu, entitled: "Maturity of stakeholders in project management of Road construction projects; the case of federal road construction projects of Ethiopia" is submitted in partial fulfilment of the requirements for the degree of Masters of Arts in project management complies with the regulations of the university and meets the accepted standard with respect to the originality and quality.

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STATEMENT OF DECLARATION

I, Eyasu Hailu, declare that this Master's research " Maturity of stakeholders in project management of Road construction projects; the case of federal road construction projects of Ethiopia" is submitted in partial fulfilment of the requirements for the degree of Masters of Arts in project management at School of Graduate Studies of St.Mary's University. This thesis is my original work and all source materials used for the thesis have been acknowledged duly.

Declared by:

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This is to certify that Eyasu Hailu has carried out his research work on the topic entitled:" Maturity of stakeholders in project management of Road construction; the case of federal road construction projects of Ethiopia" is his original work and is suitable for submission for the award of Masters of Art Degree in Project management.

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ACRONYMS AND ABBREVIATIONS

APM ……Association for Project Management

CMMI ……...Capability Maturity Model Integration

DB ……Design Build

DBB……...Design Bid Build

F.D.R.E……..Federal Democratic Republic of Ethiopia

PDS ……...Project delivery system

HRM ……. Human Resource Management

IMSI ……...Integrated Management System Incorporated

IPMA……. International Project Management Association

NPC ……National Plan Commission

K-PMMM ……. Project Management Process Maturity Model

OPM3 ……Organizational Project Management Maturity Model

PM ……. Project Management

PMBOK ……. Project Management Body of Knowledge

PMI ……Project Management Institute

PMMM ……...Project Management Maturity Model

RSDP ……. Road sector development program

WBS……...Work Breakdown Structure

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ABSTRACT

The F.D.R.E government has allocated large portion of the capital budget for the construction of federal road projects. The project management of the federal road projects has three major stakeholders which are the Ethiopian Roads Authority, Consultants and construction companies. The objective of the study is to assess the level of project management level of maturity of federal road projects in Ethiopia: a disaggregated analysis based on stakeholders. The study is conducted following quantitative research design using structured questionnaire as primary source of data and previously conducted researches, books, organizational publications and reports used as secondary source data.

The collected data had been analyzed quantitatively through five-levels of project management maturity assessment model. The stakeholders' project management level of maturity with respect to project management of integration, scope, time, cost, quality, human resource, communication, risk, procurement and stakeholders is analyzed. According to the assessment made, the project management maturity level of stakeholders is found in different level. The Ethiopian Roads Authority and the consulting firms are found in level 3. Whereas, the construction companies are in level 2. Since higher level of project management maturity ensures effective project delivery and has a direct impact on project efficiency, this study also recommend some points on observed gaps by referring literatures in each project management knowledge areas.

Key Words: Maturity, model and stakeholders

CHAPTER ONE

1. INTRODUCTION

1.1 Background of the study

In Ethiopia, the government has allocated the lion share of the capital budget of the country for the construction of infra-structure. Construction of the Federal road projects is one of the huge contracts that are currently under progress. (NPC, 2018) Construction delivery can be undertaken mainly in two ways. These are Design Build and Design Bid Build. Each of the project delivery systems has positive side and certain limitation. The delivery system of the project is subjective and it is selected in order to meet the three basic pillars which are schedule, cost and quality concurrently. The public procurement of any project has many stakeholders and the construction of Federal Road Projects belong to such category. In such kind of procurement and contract, the main stakeholders are the employer, the contractor, the consultant, the financer and the end users (ERA, 2015)

The project management level of maturity of stakeholders is expected to be the same at least to the level of the base line of the project scope. Such level of maturity will induce synergy for the best completion of the project with respect to quality, schedule and cost. The capacity, duty and responsibility of each stakeholder is limited to the contract they entered. However, the total effect of every contract shall be for the proper accomplishment of the project. (Mariano, 2015)

Maturity in project management is the development of systems and processes that are repetitive in nature and provide a high probability that each project will be a success. Project management maturity is a collection of the maturity of nine project knowledge areas which are project integration management, Project scope management, Project time management, Project cost management, Project quality management, Project human resource management, Project communications management, Project risk management and Project procurement management. (PMI, 2013)

Lack of delivering federal projects as per the intended completion time and cost significantly depends on the major stakeholders understanding of project management. (RSDP, 2015).

This study plans to go through how the maturity of the major stake holders and the performance

of the federal road construction related and to rate each stake holder with respect to the knowledge areas of project management body of knowledge and to present recommendations which will enables the stakeholders and related partners to use it as benchmark for their future implementation of project management of the federal road construction projects.

1.2 Statement of the Problem

The fundamental or the core value of any project management is to deliver the project according to the planned budget, intended completion time and with planned quality. Failure in any of the three will induce cost overrun, time overrun and compromising scope of the project (Yoseph, 2017). Many of the Federal road projects have been suffering from such failures and due to this, the completion time of the project is extended, additional budget is allocated and quality of the project significantly compromised. The basic reasons are arising from the first stage of the project management cycle which is planning (ERA, 2015). The project management level of the employer is expected to be at higher scale in setting the terms of reference to set the baseline of the project which enables the consultant to prepare proper planning, design, specification and other parts of the tender and contract documents by deploying the necessary human resource and appropriate tools. In the subsequent project management cycles such as implementation, the contractor is decisive stakeholder to realize the goal of the employer by allocating the required resources such as human, equipment and finance and also using the contract document. In addition to these stakeholders, employer, consultant & contractor, at the end financers have major role in maintaining the cash flow of the project that is disbursing the required budget timely (Hailemeskel, 2020).

However, in the Federal Road projects, time overrun, cost overrun and change in scope are significantly observed. Such problems are arising from poor tender and contract document preparation which mainly address the consultant, poor construction and financial management of the contractor, delay in accessing the construction site and delaying in effecting the certified payment to the contractor which is the sole responsibility of the client. This study is therefore designed to examine how the maturity of stakeholders with respect to road construction project management affects the performance or delivery of project (ERA, 2015).

1.3 Research Gap

The existing literatures published on assessment of maturity of project management (Eyerusalem, 2018) and assessment of project management maturity level of Ethiopian roads authority (Maru 2017) did not study the project management maturity level of the major stakeholders at a time while rating the project management maturity level. Rather the two research papers were rating level the project management level of maturity single stakeholder. Therefore, one of the aim of this study is to minimize the research gap by incorporating the major stakeholders in the research and participating representatives of the major stakeholders to respond specifically to the questionnaires with respect to the firm which the representatives are belonged. Accordingly, the project management level of the Ethiopian Roads Authority, Consulting firms and Construction companies is rated in this paper and corresponding findings and recommendation is suggested.

1.4 Research Questions

The current practices of rating stakeholders of the federal construction projects regarding level of project management knowledge is strongly relay on the progress reports and correspondences made among stakeholders (ERA, 2015). In short, guide line of PMI or the knowledge areas of project management has not been used. Accordingly, the research questions are formulated considering to fill such gap and aimed to measure the project management level of each stakeholder with respect to the project management body of knowledge. The study has addressed the following research questions:-

- What is the project management maturity level of each stakeholder with respect to each knowledge areas of Project management?
- What is the gap among stakeholders in line with level of maturity of project management of road construction projects?
- What are the essential tools and techniques to be used by stakeholders in improving their level of project management?

1.5 Objectives of the Study

1.5.1 General Objective

The objective of the study is to assess the project management level of stakeholders in project management of federal rad construction projects.

1.5.2 Specific Objective

- To set the project management level of each stakeholder as baseline for the next road sector development program
- To assess the project management level gap among stakeholders
- To indicate the tools, techniques and applications to be used to maximize the project management level of each stakeholder.

1.6 Significance of the Study

The assessment result of this research can be used as initial benchmark information in prioritizing and designing improvement action in each project management knowledge areas of the stakeholders. Further the same result can also be used as a baseline to compare the success or impact of future improvement efforts. In addition, the proposed model can serve as a guide line in implementing the best practice of project management and in designing improvement effort. Therefore conducting this study help the selected organization to identify the current ways of managing it is projects regarding on each project management knowledge areas and help the organization to compare its level of maturity with standard best practices for better project performance.

1.7 Scope of the Study

The scope of this study is limited on projects implemented by the Ethiopian Roads Authority and analyzing the project management level of each stakeholders with respect to knowledge areas of project management.

1.8 Limitation of the study

The research could face a number of limitations listed below

- Project management at professional level in Ethiopia is recent phenomenon and nearly none of the professionals at project organization are certified project management professionals

to date. As a result, the professionals of stakeholders could have lower level of understanding for responding the questionnaires.

- Today project details of project activities and performances could not be well documented hence, respondents could not be confident as they respond to the questionnaires.
- Project is one time activity, complex and dynamic. Hence, managing project needs in-depth and detail understanding of project activities. It needs to see all details related to the project management but few months period of time limited researcher to be attached with only office level data (information) and has not cover all project management areas in detail. Hence the result could be too specific.
- The respondent might be careless as they respond to questionnaires and accuracy to the leveling of maturity could be possible limitations.
- The questionnaires are closed ended and would not allow respondents for free discussion to narrate additional imputes for leveling.

1.9 Organization of the study

The thesis is organized in to five chapters. The first chapter presents the introduction where the back ground of the study, statement of the problem, research questions, research objectives both general and specific, significance of the study& scope are clearly described. The second chapter deals with review of related literature on maturity of stakeholders in project management. In this chapter, previously conducted studies are reviewed in order to explore basic concepts and main practical activities both at global and local level. The third chapter presents the research design and methodology which is administered in the research where the intended research approach, design, population, sampling, data source and analysis methods are stated. The fourth chapter constituents of results which come out from the analysis of the collected data and discussion on the outcome. The fifth chapter incorporates major findings of the study, conclusion and recommendation.

CHAPTER TWO

2. LITERATURE REVIEW

This chapter includes three sections which are theoretical review, empirical review of related literature and conceptual frame work. Under the theoretical review terms are defined. Under empirical literature the reviews of previous related literatures on project management maturity level and project management maturity model are described. Under the conceptual frame relationship between project management maturity level and the ten knowledge area has described and each of knowledge area has discussed.

Theoretical Literature review

2.1 Definitions of Project

A temporary endeavor (that has definite beginning and ending time) undertaken following specific cycle of Initiation, Definition, Planning, Execution and Close to create a unique product, service, or result through novel organization and coordination of human, material and financial resources(PMI, 2004).

The Project Management Institute (PMI) defines project as a temporary endeavor undertaken to produce a unique product, service, or result (PMI, 2013).

A project has a defined scope, is constrained by limited resource, involves many people with different skill and, usually progressively elaborated throughout its life cycle (Cleland & Ireland, 2002)

2.2 Definitions of Project Management

Project management is the application of processes, methods, knowledge, skills and experience to achieve the project objectives. (PMI, 2012)

Project management is the application of knowledge, skills, tools, and techniques to project activities to meet the project requirements.(PMI, 2013)

Project management can be described as a general purpose management tool that can bring projects to successful completion and to the satisfaction of the project stakeholders, given the traditional constraints of defined scope, desired quality, budgeted cost, and a schedule deadline. Project management deals mainly with coordinating resources and managing people and

changes. Generally "Managing a project includes: identifying requirements, establishing clear and achievable objectives, balancing the competing demands for quality, scope, time and cost; adapting specifications, plans, and approach to the different concerns and expectations of the various stakeholders" (PMI, 2013).

2.3 Definition & Concept of Maturity

According to (Cooke-Davies, 2005), there is neither a common understanding nor definition of the concept of maturity or the route to gain in maturity in most of PM maturity models. Thus, an analogy of maturity in a practice of profession is used here to get better understanding of the concept. Maturity in practice of a profession is generally developed in two dimensions; one is through acquiring the capability of using different, more advanced and effective processes, practices, methods, tools, techniques, and procedures; the other is through systematizing ,standardizing , and continuously refining and improving the overall practice from deeper understanding of the relationships and functionalities of the practices .

The analogy shows two aspects of maturity, one which is gained through knowledge and skills, through learning and use of new or more advanced way of doing things; the other is gain in maturity through standardizing, systematizing and refining the process, practices ,methods and tools. The former one will help us to improve our effectiveness as our capability of using different and advanced method, thus we can select the appropriate method and employ it. Whereas; the later one impacts more the efficiency of attaining a goal as the standardization and systemization help complete the work fast and help avoid most of rework and ensure consideration of every aspects (Hailemeskel,2020).

The degree to which an organization practices project management measured by the ability of an organization successfully to initiate, plan, execute, monitor and control individual projects (PMI, 2013). PM maturity assessments are typically divided into two key assessment processes: audit and self- assessment. Audits collect and compare data against a reference standard, evaluating the degree to which the criteria have been fulfilled, whereas self-assessments are designed to evaluate the strengths, weaknesses, and opportunities for improvement against a number of dimensions. Audits are primarily designed to support an external driver of compliance, whereas self-assessments are typically more internally focused on improvement (Mullay, 2006).

2.4 Project Management Body of Knowledge

The PM body of knowledge is a standard for managing most projects. It is an inclusive term which describes the overall knowledge with in the profession of project management. It includes proven tools and techniques used to manage project management processes towards successful project outcome. The body of knowledge identifies key knowledge areas of project management skills and activities that every practitioners need to know and master in order to become fully trained in their profession. This knowledge area encompasses a broader overview of the project management processes. There are nine knowledge areas according to PMBOK guide (PMI, 2008).

2.4.1 Project Scope Management

Project scope management includes the processes required to ensure that the project includes all the work required and to complete the project successfully. Managing the project scope is primarily concerned with defining and controlling what is and is not included in the project (PMI, 2013). The project scope management includes four critical activities; Scope definition, Work break-down structure (WBS), Requirements Definition, Deliverables Identification and scope change control (IMSI, 2005). A good scope management ensures that the scope is well defined and communicated clearly with all stakeholders.

2.4.2 Project Time Management

Project time management includes the processes required to manage the timely completion of the project. The time management like in project management is framed into three key activities; Schedule Development (including activity definition and sequencing), Schedule Control and schedule integration (IMSI, 2005).

2.4.3 Project Cost Management

Project cost management includes the processes involved in planning, budgeting, financing, funding, managing, and controlling costs so that the project can be completed within the approved budget. According IMSI (2005) Project cost management contain project Cost Definition (Estimating & Budgeting), Resource Planning, Performance Measurement and project Cost Control.

2.4.4 Project Quality Management

Project quality management includes the process and activities of the performing organization that determine quality polices, objectives, and responsibilities so that the project will satisfy the needs for which it was undertaken. It works to ensure that the project requirements, including product requirements, are met and validated (PMI, 2013). Quality planning, quality assurance and quality control are the main processes in project quality management (IMSI, 2005).

2.4.5 Project Human Resource Management

Human resource management is core element of the project management knowledge areas and critical for project success. It is the process required to make the most effective use of the people competence for a project. HRM has three main processes which is organizational planning, staff acquisition and team development (PMI, 2008) (IMSI, 2005).

2.4.6 Project Risk Management

Project risk management is the process concerned with identifying and responding to project risk. Risk management maintains a balance of focus on threats and opportunities and with proper management actions the likelihood of identified risks can be reduced or eliminated. The project risk management includes risk identification, risk analysis, risk response and contingency plans and risk ownership. Risk Identification, quantification, Risk Response development and documentation (IMSI, 2005).

2.4.7 Project Communication Management

Project communications management includes the processes required to ensure timely and appropriate planning, collection, creation and distribution, storage, retrieval, management, control, monitoring and the ultimate disposition of project information (PMI, 2013). Project communication management includes communication planning, information distribution, performance reporting, issue tracking and management (IMSI, 2005).

2.4.8 Project Procurement Management

Project procurement management also known as Contract Management. It involves processes required to acquire goods and services from vendors. It is also concerned with procurement planning, soliciting bids for products and services, selecting potential vendors, contract administration and contract close-out. According IMSI (2005) Project procurement management

includes procurement planning, requisition, solicitation and contract management.

2.4.9 Project Integration Management

Project integration management includes the processes and activities to identify, define, combine, unify, and coordinate the various processes and project management activities within the project management process groups. This knowledge area is used to integrate the outputs of other project management body of knowledge for project planning process and creation of consistent, comprehensive and well-designed project processes and activities and coordinating of the various activities of the project planning, execution and control of the project (PMI, 2013).

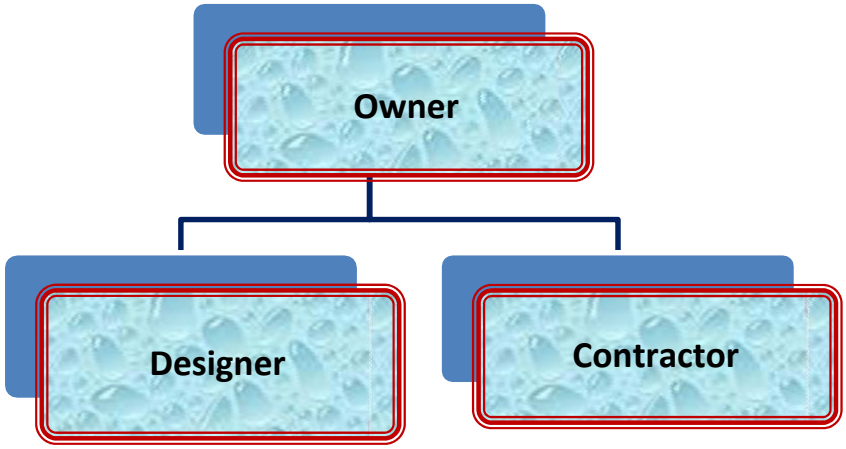
2.5 Project delivery system

2.5.1 DBB Project Delivery System

According to Department of the Air Force, (2000) DBB is defined as the project delivery approach where the Owner commissions an architect or engineer to prepare drawings and specifications under a design services contract, and separately contracts for at-risk construction, by engaging a contractor through competitive bidding or negotiation. (DBIA, 2007)

Under the DBB delivery method, the owner selects a design firm to create contract documents consisting of project drawings (the design) and job specifications. After the design is completed, the project drawings become the contract documents and the project is awarded to the low bidder. The job specifications can be listed on the drawings in note form; however, they are typically listed in special groups with section numbers designated by Construction When the designer completes the contract documents (100% design completion), the job is advertised and/or delivered to selected companies to begin the bidding process. General Contracting (GCs) companies acquire the contract documents and meticulously go through the plans and specifications to note all materials and work that need to be completed. Then the GCs prepare their final cost for all labor and materials, and submit this to the owner.

Figure 2.1 the contractual relationship in the DBB delivery method



Source: Moore, (1998)

Major Stakeholders in DBB

In a typical public construction project, the contractual arrangement with an employer contractor agreement involves some of the primary stakeholders such as employer, contractor, engineer, financial institutions, subcontractors etc. The following table (Table 2.1) shows some of the major roles of the above three primary stakeholders for a typical public construction project under a DBB contract delivery system.

Table 2.1 Major Stakeholders of the DBB Project Delivery Method

Major Stakeholder	Major Responsibilities
Employer	Provides financial support to develop the project
	Determines the scope of the work
	Creates the necessity to build the facility
	Most important player of the process
Engineer	Develops drawings and specifications and prepares other contract documents
	Administers the contract and supervises the Works
	Responsible for the project design
	Idealizes the final result of the project
Contractor	Brings the project into reality
	Manages different resources to build the facility
	Creates the facility based on the design

Source: - PDS on Major US Construction Project David M, 2004.

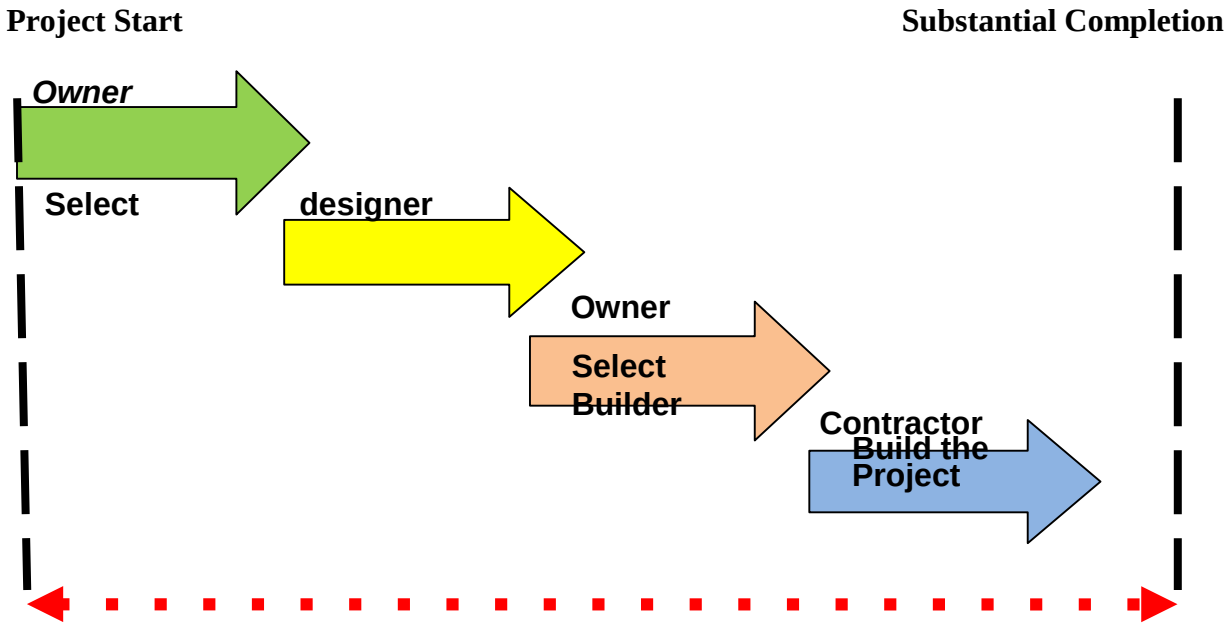
Collections in recent studies on the DBB method, for instance, the study conducted by AIA signify that the method is identified by the following defining (i.e. unique) characteristics:

- ✓ Three prime players, namely, owner, designer, and builder.
- ✓ Two separate contracts, that is, the contract between the owner and the designer, and between the owner and the builder.
- ✓ Final contractor selection is based on lowest responsive bidder.

Time Line of DBB

The owner first selects and made a contract with a designer. The designer is then prepares the design documents for the project under consideration. Next the owner must prepare bid package and solicit for bids to build the construction. Several contractors may bid on the project and the owner usually selects and contracts the contractor with the lowest bid. The owner takes possession of the project upon substantial completion. Fig 2.2 shows the typical sequence of events for a DBB (Tenah, 2001 Project Delivery Systems for Construction).

Fig 2.2 DBB timeline

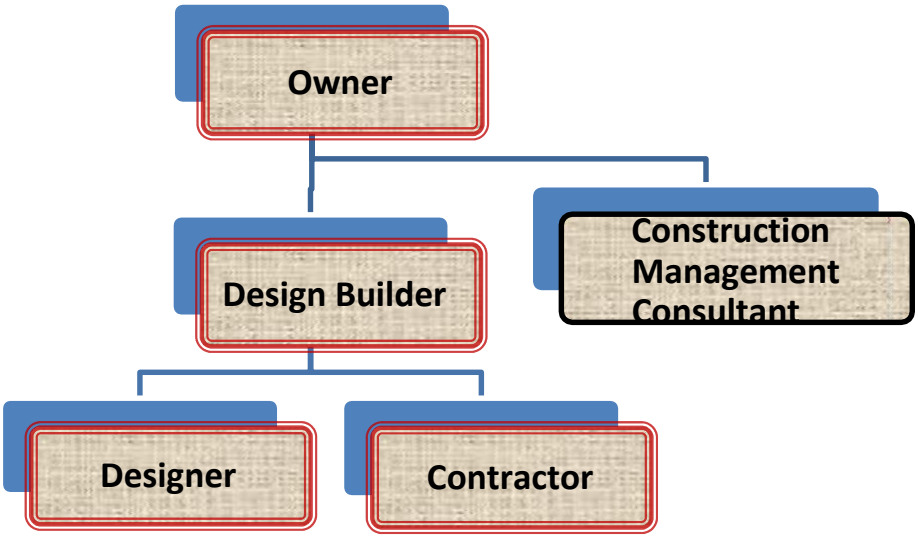


2.5.2 DB Project Delivery System

The DB form of project delivery system is a system of contracting whereby one entity performs both design/engineering and construction under one single contract. Under this arrangement, the design-builder warrants to the contracting agency that it will produce design documents that are complete and as much as possible free from error (DBIA 1994). According to (KDOT, 2012) DB is an alternative project delivery tool that will allow the flexibility to deliver selected projects more efficiently and cost-effectively by selecting a design-builder to complete the design and construction of the project. The difference, and a key advantage, with DB is: plans are not 100% complete for the entire project when construction starts. DB allows the contractor and designer to collaborate early and develop innovative and efficient solutions to meet the project goals.

Figure 2.3 illustrates the basic contractual relationships for DB project delivery (Moore, 1998) where the owner holds only one contract with a design-build entity.

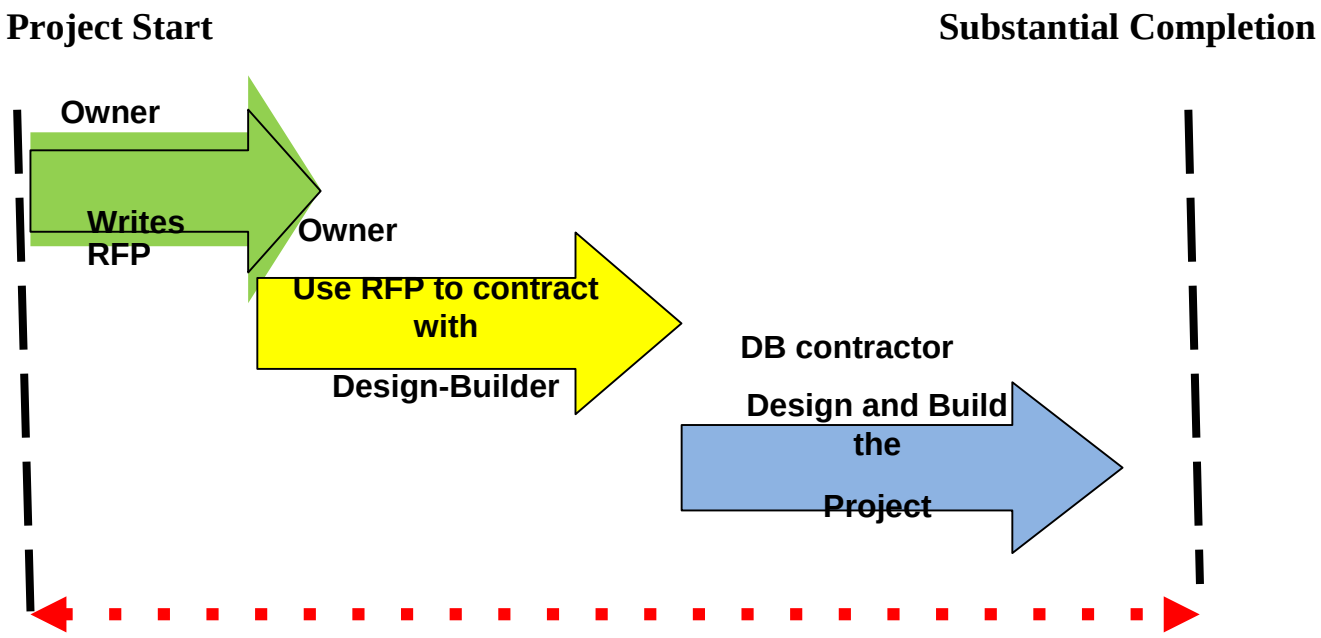
Fig 2.3: Contractual relationships for DB projects.



Timeline of DB

The owner or the agent first writes a request for proposal or RFP, and then select the contractor with a firm that performs both design and construction. The DB firm works with the owner and other interested agencies to prepare a preliminary design to firm up requirements then continues preparing design for the construction. The contractor or the builder may start construction before the design is 100% completed. For example the design-build firm may prepare the site design such as rough grading, site utilities etc. for a new facility. When a site work design is at a level of completion to allow start of construction, the contractor might begin that portion of the construction. The designer continues while the construction is already under way. The owner takes possession of the project upon substantial completion. Fig 2.4 shows a sequence of events for DB contract (Tenah, 2001).

Fig 2.4 DB timeline



2.6 Review of Maturity Models

2.6.1 Project Management Maturity Model (PMMM)

Project management maturity refers to the progressive development of an enterprise-wide project management approach, methodology, strategy and decision making process. Maturity models provide framework to organizations for improving their performance across different business areas. According to (Mullaly, 2014), framework provided by maturity model enables organizations to access and improve its processes. Once the initial level of maturity and areas for improvement are identified, the PMMM provides a roadmap, outlining the necessary steps to take toward project management maturity advancement and performance improvement (Crawford, 2006).

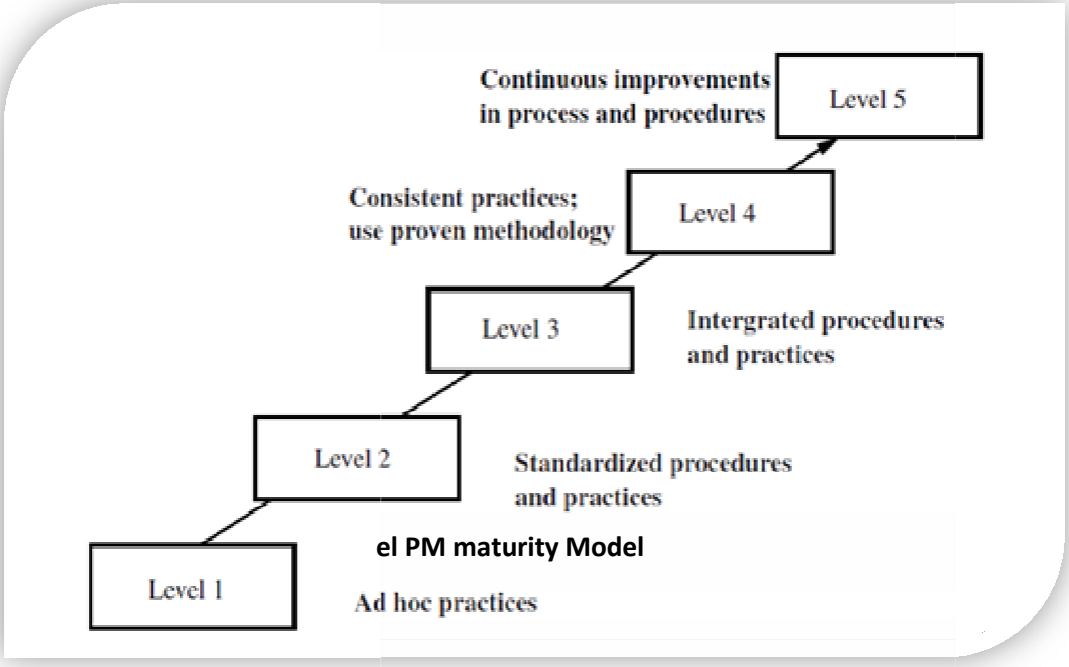
For the purpose of this paper shortlisted following project maturity models from various literatures which have been developed so far by different organizations and individuals.

1. The IMSI Project Management Assessment Model

2. Organizational Project Management Maturity Model (OPM3)
3. Capability Maturity Model Integration (CMMI)
4. Kerzner Project Management Maturity Model (K-PMMM)
5. PM Solution'S Maturity Model
6. Project Management Process Maturity Model-PM2

The majority of maturity models have adapted the CMM's five levels of maturity stage beginning from the lower level of maturity, initial (Level 1), to the highest level of maturity, continuous improvement(level-5)

Fig 2.5 A typical five level PM maturity model



Attaining a higher level of maturity is an effort that requires significant investment and the commitment of senior management. Not every organization is expected to reach the highest maturity level; rather each organization should decide a level that would be optimal for its context and aim for attaining that (Crawford, 2002). Generally, to derive the benefits of maturity, organizations should exert continuous and consistent effort , have strong executive management support for the process ,emphasis on project management best practices ,set reasonable goals, implement changes step by step, conduct project management training , create opportunity for

sharing knowledge across the organization and always target incremental improvement. It should be noted that, achieving a higher maturity level does not mean that the organization should always use sophisticated tools and methodologies. Rather, the organization can and should still be able to use tools and methods that are typical of lower level depending on the complexity and nature of each project. A higher maturity level mean only the organization has the capability to selectively choose and apply the proper PM processes, practices and tools (Kwak & Ibbs, 2002).

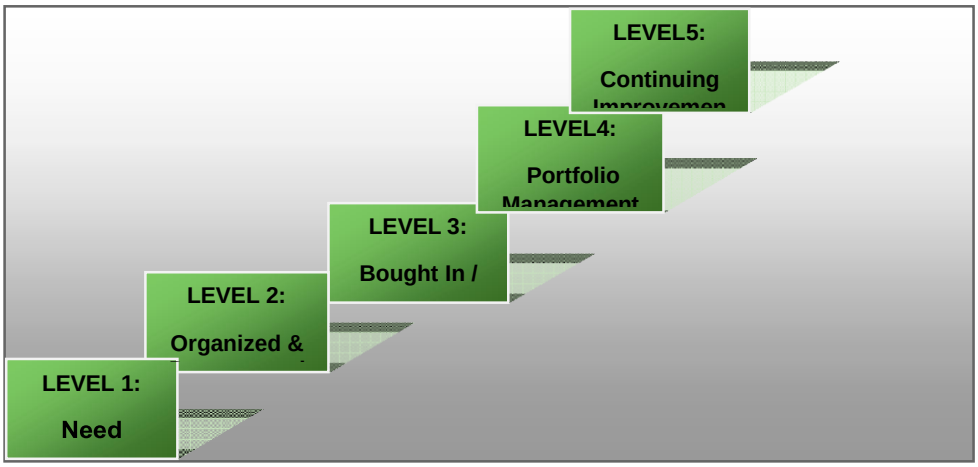
2.6.2 IMSI Project management assessment model

IMSI's project management assessment model is a typical, five-step maturity model, as this form provides a solid foundation from which to build. IMSI uses this model to guide an evaluation of the levels of sophistication contained in various processes used by an organization to manage its projects. The IMSI assessment model is employed to identify incremental steps to improve how a company manages its projects and to increase the likelihood of achieving project success. The IMSI assessment model looks at each of the project management knowledge areas and the enablers, critical elements and processes associated with them. If, as asserted earlier, the benefits derived from project management increase in proportion to how well project management processes are used, the intent of the IMSI project management assessment model is to help organizations better use the project management processes, elements, and enablers.

IMSI's assessment model, segmented by the eight key knowledge areas. This project management body of knowledge is project scope management, project time management, project cost management, project quality management, project risk management, project human resource management, project communication management and project procurement management. In IMSI each knowledge area is broken into significant sub elements, and for each sub-element, the model describes touch- points on the continuum of improvement. And the model is characterized as a stair-step process as it is showed graphically on figure 2.6.

Project management is complex process, which requires more than a cursory sharing of Lessons Learned or simple declaration of Best Practices to identify and institutionalize improvements that will benefit all future projects. Maturity assessments of organizational development have been created and applied to a number of different companies and industries to help manage the challenges of technological, economic, and competitive change and to point the way to institutional improvements. The result of a Project Management Assessment will lead management towards setting goals and prioritizing the areas that require improvement. It will further provide a baseline by which the IMSI assessment model has five step maturity levels regard to the application of eighty project management body of knowledge for the projects the organization is managing as described on the following figure

Figure2.6 IMSI's Project Management Assessment Model



2.6.3 Organizational Project Management Maturity Model

The OPM3 maturity model is a PM maturity model developed by PMI through worldwide volunteer contribution of PM practitioners and consultants in diverse industries. The model defines knowledge, assessment, and improvement processes for organizations project, program and portfolio management practices. Organizational project management provides a framework that integrates project, program and portfolio management of organization for all the best practices (PMI-OPM3, 2013). OPM3 has defined five maturity levels for performing maturity assessment of Project, Program or Portfolio Management either collective or individual.

Description of maturity levels for OPM3 is:

Level 1: None – no such practice exist

Level 2: Standardize – a standardized process of doing projects have been documented and communicated within organization. This practice is not used by all the projects but only few.

Level 3: Measure – Standardized process is used by all the projects within organization and processes are measured to evaluate effectiveness for organization.

Level 4: Control – measured process is corrected for poor application of the standardized practice. Upper and lower limits are established and process is analyzed.

Level 5: Improve – Continuous improvement of process becomes a practice for outcome of Best Practice standard.

Organizational project management maturity is measured in *OPM3* by assessing the existence of Best Practices within the OPM domains (Project, Program, and Portfolio). In general, the term Best Practices refers to the optimal methods, currently recognized within a given industry or discipline, to achieve a stated goal or objective (Yimam, 2011)

2.6.4 Capability Maturity Model

Capability maturity model is the first maturity model to be developed. The model was developed by the software Engineering Institute at Carnegie Mellon University. The model was initially developed for use in improvement of software development processes. Later it was extended for use in other areas of systems, and software engineering and procurement. The model was primarily developed to evaluate software contractor's capability for contract award and administration purpose. Later the model has been used by software developers as a guide for the improvement of their processes (Sarshar et al., 2000).

The five maturity levels according CMM are the following.

1- Initial: The software process is characterized as ad hoc, and occasionally even chaotic. Few processes are defined, and success depends on individual effort.

2- Repeatable: Basic project management processes are established to track cost, schedule, and functionality. The necessary process discipline is in place to repeat earlier successes on projects with similar applications.

3- Defined: The software process for both management and engineering activities is

documented, standardized, and integrated into a standard software process for the organization. All projects use an approved, tailored version of the organization's standard software process for developing and maintaining software.

4- Managed: Detailed measures of the software process and product quality are collected. Both the software process and products are quantitatively understood and controlled.

5- Optimizing: Continuous process improvement is enabled by quantitative feedback from the process and from piloting innovative ideas and technologies (Yimam, 2011).

2.6.5 Kerzner's PM Maturity Model

Like most of the other maturity models this model has also five levels of maturity; however, the naming and the attributes of the levels slightly differ from the others. Unlike the other models, this model emphasis benchmarking and make benchmarking the forth level on its maturity model. (Yimam, 2011).

Level 1-Common Language (Initial Process): In this level, the organization recognizes the importance of project management and the need for a good understanding of the basic knowledge on project management and the accompanying language or terminology. In the first level, project definition and awareness are important (Kerzner, 2002*)*.

Level 2-Common Processes (Repeatable Process): In this level, the organization recognizes that common processes need to be defined and developed such that successes on the project can be repeated on other projects. Also the recognition of the application and support of the project management principles to other methodologies employed by the company is included. In this level, the key process areas are business case development, project establishment, project planning, monitoring and control, stakeholder management and communications, requirements management, risk management, configuration management, management of suppliers and external parties (Kerzner, 2002*)*.

Level 3-Singular Methodology (Defined Process): In this level, the organization recognizes the synergistic effect of combining all corporate methodologies into a singular methodology, the center of which is project management. The synergistic effects also make process control easier

with a single methodology than with multiple methodologies. This level provides these key areas; benefits management, transition, information management, organizational focus, process definition, training, skills and competency development, integrated management and reporting, lifecycle control, inter-group co- ordination and networking, quality assurance, center of Excellence (COE) role deployment (Kerzner, 2002).

Level 4-Benchmarking (Managed Process): This level contains the recognition that process improvement is necessary to maintain a competitive advantage. Benchmarking must be performed on a continuous basis. The company must decide whom to benchmark and what to benchmark. Within this level, management metrics, quality management, organizational cultural growth and capacity management are the key process areas (Kerzner, 2002).

Level 5- Continuous Improvement (Optimized Process): In this level, the organization evaluates the information obtained through benchmarking and must then decides whether or not this information will enhance the singular methodology. The key process areas are proactive problem management, technology management and continuous process improvement in this level (Kerzner, 2002).

Levels	**General descriptions**	**Main characteristics**
Level 1 Common Language	Organizations recognize the importance of project management and the need for a good understanding of the basic knowledge of PM and its language/ Terminology.	□None or sporadic use of project Management. □No Executive-level support. □No investment or support for project management training.
Level 2 Common Processes	Organizations recognize the need for common processes and they make a concerted effort to use project management and develop processes and methodologies to support its effective use.	□Recognition of benefits of PM. □Organizational support at all levels. □Recognition of need for processes/ methodologies. □Recognition of the need for cost control. □Development of a project management Training Curriculum.

Level 3 Singular Methodology	Organizations develop singular methodologies (rather than using multiple methodologies) to best achieve synergy and process control.	□ Total commitment to the concept of PM. □ Integrated processes: Example integrated PM and TQM. □ Cooperative culture. □ Visible management support at all level. □ Informal project management based upon guidelines and checklists with little paper work, rather than rigid policies and procedures. □ Training and education.
Level 4 Benchmarking	Organizations perform benchmarking on a continuous basis against those practiced in similar and non-similar industries. Few selected critical success factors are benchmarked.	□ Establishment of project office (PO) or a center of excellence (COE) that is dedicated to the project management improvement process □ Performance of both quantitative and qualitative benchmarking.
Level 5 Continuous improvement	Organizations evaluate the information learned during benchmarking and implement the changes necessary to improve the PM process. Especially on existing Process Improvements, Integrated Process Improvements, and Behavioral, Benchmarking and Managerial Issues.	□ Creation of lessons learned files and transfer of knowledge to other projects and teams □ Recognition of the need for and implementation of a mentorship program for future project managers □ A corporate-wide understanding that strategic planning for project management is a continuous, ongoing process.

Table 2.2: Summary of Kerzner 's PM Maturity Model (Yimam, 2011).

2.6.6 PM Solutions Maturity Model

This model is developed by mirroring PMBOK's knowledge areas with that of CMM's five level maturity stage. The model examines an organization's PM implementation across the nine PM knowledge areas, which are in turn broken down in to components (Crawford, 2002).

Levels and their Key attributes Maturity Level	**Key attributes**
Level 1 **Initial Process**	Ad hoc processes. Management awareness.
Level 2 **Structured Process and Standards**	Basic processes; not standard on all projects; used on large and highly visible projects. Management supports and encourages use of processes. Mix of intermediate and summary-level information. Estimates and schedules are based on expert knowledge and generic tools. Mostly a project-centric focus.
Level 3 **Organizational Standards and Institutionalized Process**	All processes are standard for all projects and are repeatable Institutionalized processes. 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.
Level 4 **Managed Processes**	Processes are integrated with corporate processes. Management mandates compliance. Management takes an organizational entity view.

	Solid analysis of project performance. Estimates and schedules are normally based on organization. Management uses data to make decisions.
Level 5 **Optimizing Process**	Use of Processes to measure project effectiveness and efficiency. Processes in place to improve project performance.

Table 2.3: PM solution's five Maturity summary (Yimam, 2011)

2.6.7 Project Management Process Maturity Model-PM2

The PM2 model is one of the pioneer PM maturity models developed. The model was developed by Ibbs and Kwak (1997). Like the CMM model, the PM2 model has five levels of maturity with slight difference in its use of terminologies. The model divides PM processes and practices into eight PM knowledge areas and the model evaluates organization's PM maturity through the assessment of these knowledge areas.

Maturity Level	**Key PM Processes**	**Major Organizational Characteristics**	**Key Focus Area**
Level-1 **(Ad-hoc Level)**	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.
Level-2 **(planned** **Level)**	Informal PM processes are defined. Informal PM problems are identified. Informal PM data are	Level-2 (planned Level)	Informal PM processes are defined. Informal PM problems are

	collected.		identified. Informal PM data are collected.
Level-3 (managed)at project Level)	Formal project planning and control system are managed. Formal PM data are managed.	Team oriented (medium). Informal training of PM skills and practices.	Systematic and structure planning and control for individual project.
Level-4 (Manag at ed corporat e level)	Multiple PM (program Management). PM data and processes are integrated. PM processes data are quantitatively analyzed, measured and stored.	Strong team work Formal PM training for project team	Planning and controlling Multiple projects in a professional manner
Level-5 (Continuous learning)	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 practices	Innovative ideas to improve PM processes and practices

Table 2.4: PM2 Maturity Models Summary

2.7 Maturity levels

Maturity levels enable organization to identify a roadmap for improvement and it mainly focuses on continuously improvement in the long term strategic commitment. But also, short term improvements can be targeted to achieve specific goals. However, real benefits can be acquired through continual process improvements (Office of Government Commerce, 2010). There are five

maturity levels developed by CMMI and P3M3 while, OPM3 has four levels of maturity. Other maturity models developed by several private project management consultancies or professional project organizations also uses five levels of maturity, despite some differences in terminology; each maturity model has a clear pattern and adopted from the generic model of progression toward project management maturity (Weldemariam, 2013).

The basics of maturity level starts with the assumption of project management practices with in the firm are not planned and are not collectively employed. The last stage of maturity assumes that project management techniques and procedures are institutionalized and actively exploring continuous improvement and seeking to move beyond these in innovative ways. The maturity levels described in each maturity assessment models are similar on the context contain in each levels as described below (Weldemariam, 2013).

Level 1: Initial Process

‘‘There is some recognition about the project management processes. Management has little awareness of the need for project management. There are not established practice and standards of project management. Documentation and other supportive project management processes are loose and not well established within the organization. Organizations are not able to repeat past successes consistently mostly due to the fact that process description and lack of documentation. At level 1 maturity, organization can deliver projects successfully but these success factors are linked to key individual contributions rather than enterprise-wide knowledge and capability’’ (Pennypaker, 2001). Key characteristics

Projects are handled differently / informal approach

Projects are highly dependent on the project manager

Little management support for project management

No formal way to gather lessons learned and used to other projects

Project outcomes are unpredictable

Level 2: Structure, Process and Standard

‘At this level, basic project management processes and standards are established and mainly used on large and visible projects. The standard is repeatable and is applied to basic project management

process. The standard is not considered at organization level and mostly focus on projects. There exists proper documentation to the basic processes. Management supports and encourages the implementation of project management processes though there lacks consistency and involvement to comply for all projects. Functional management get involved in key projects and executed in a systematic approach. Some basic tools and techniques are applied for example tracking project cost, estimates; schedules are based on expert knowledge and generic tools (Pennypaker, 2001, 25)

Key characteristics

• Managed support for project management

• Repeatable processes are adapted to basic project management process

• Use of common tools and techniques to key processes

• Predictable project outcomes are predictable

• Project management processes tools and techniques are applied

Level 3: organizational standard and institutionalized process

'Project management processes are well established and exist at organizational level. At this level, stake holders are actively involved and considered as integral members of the project team. All processes and standards are institutionalized with formal documentation. Management is involved in key project issues and decisions. Each project is evaluated and managed in light of other projects'. (Pennypaker, 2001)

Key characteristics

• Management support for project management processes

• Efficiently plan, organize, manage, integrate and control each projects

• Project team members are well trained in project management

• Consistent use of tools and techniques for project management process

• Lessons learned and previous project experiences are well organized and utilized for other projects

Level 4– Managed process:

Project management processes and standards are well established, matured and quantitatively

managed. It is also integrated with other corporate processes and systems. All projects and changes are evaluated based on different efficiency and effectiveness metrics from cost estimates, baselines estimates and earned value. Projects are managed from past experience and future expectations. Project information is available to optimize the business decisions and integrated with the other corporate systems. At this level, there is holistic view and considering projects as organization entity. Project portfolio management is integrated into the organizational business strategy (Pennypaker, 2001).

Key characteristics

- Active Management support for integration of business strategy and project execution
- Efficiently plan, organize, manage, integrate and control several projects
- Database of previous project data is well maintained and utilized

Level 5 – Optimizing process:

Processes are well institutionalized approach to continuously improve the project management processes and project performance. There is continuously examining of lessons learned and this is used for improvement of project management processes, standards and documentation. The intention of management and the organization at this level is not only for managing projects effectively but also focused on continuous improvement. (Pennypaker, 2001, p.25)

Key characteristics

• Actively encouraged of project management improvement

• Flexible, project-centered organization structure

• Adopted career program for project managers

• Project management training is key and crucial in staff development.

2.8 Empirical review of literatures

Review of related literatures on project management maturity level and project performance

Empirical evidence on Measuring Project Management Maturity - A framework for better and efficient Projects delivery by Muhammad Mateen (2015) conducted by survey questions examining internal document and by informal participation revealed that project management maturity has a direct impact on project performance. A high value of project management maturity ensures high performance for delivering projects whereas project performance will be low for less mature project management processes.

Research report by PM solutions(2014) on title of project management maturity &bench marking concluded that project with High performers are more likely to have project management processes established than low performers (95% vs 84%). High performers are also much more likely to have project management processes in place more than 5 years (49% vs. 24%).

A research report on Project Management Maturity & Value Benchmark 2014 by pm solutions conducted on assessments of project performances and their maturity level from 2001 to 2014 revealed that Organizations have seen considerable value by increasing the level of their project management maturity. An increase maturity level of project management resulted in a significant percentage of improvement in projects aligned with business objectives (37%), decrease in failed projects (29%), customer satisfaction (26%), projects delivered under budget (23%), and productivity (21%). Organizations at the highest levels of project management maturity (Levels 4-5) have seen the greatest value by increasing the level of their project management maturity, especially in improvements in aligning projects with business objectives (53%) and bringing products/services to market (45%).

A study on management of project knowledge in a project-based Organization a case study of research enterprise by Sokhanvar, Shahram, Matthews, Judy, and Yarlagadda, Prasad (2014) with objective to investigate for KM practices at the existing PMMMs. it was exploratory and inductive nature , qualitative methods using case studies. It under took by selecting three cases

from different industries: research; mining and government organizations, to provide broad categories for research and research questions were examined using the developed framework. The result revealed that PMOs with higher maturity level have better knowledge management; however, some improvement is needed. In addition, the importance of KM processes varies at different levels of maturity. From KM process point of view, knowledge creation and capturing are the most important processes, while knowledge transferring and reusing received less attention. In addition, it was revealed that provision of "knowledge about client" and "project management knowledge" is the most important types of knowledge that are required at low level of maturity. A research report on Project Management Maturity & Value Benchmark 2014 by pm solutions revealed that average value organizations have seen by increasing their level of project management maturity resulted in a decrease in failed projects by 29%, an improvement in Projects delivered ahead of schedule by16%, Projects delivered under budget by 23% Improvement in projects aligned with objectives by 37% , Improvement in productivity by 21% Cost savings per project (% of total project cost) by16% , an Increase in customer satisfaction by 26% and Cost savings per project US $71K

A study on assessing project management maturity by Young HoonKwak, and Wil- liam Ibbs, (2013) used a PM Maturity Model and assess the maturity of PM processes. The research is conducted by preparing 148 multiple choice questions that measure PM Maturity. Those questions cover eight Knowledge Areas and six Project Phases. PM Maturity Model and methodology were then applied by benchmarking 38 different companies and government agencies in four different industries. It revealed that the PM Maturity assessment for all companies averaged 3.26 on a relative scale of 1 (lowest) to 5 (highest). Company scores varied considerably, so industry wide composite averages are somewhat misleading. Even industries and companies with the highest scores have substantial opportunity to improve. Risk Management and the Project execution Phase are areas of low maturity and Cost management and the Project Planning Phase are areas of high maturity. It concluded that PM Maturity assessment methodology provides solid and comparative studies on PM practices across industries and companies within an industry.

A research on the maturity level of the project management, In e-commerce projects in Greece by Ilia‟s K. Filias (2008) used maturity model to assess the maturity model of e- commerce at Greece so as to move from one maturity model to the next.it determined the average maturity level 2.92 on 1-5 maturity level rating proved that the success rate of the projects was linked closely with the maturity level.

The paper on project maturity in organizations by Erling. Andersen and Svein Arne Jessen(2002) with the purpose developing an understanding of what project maturity is and investigating the level of project maturity in organizations today . Developed the hypothesis that project maturity develops through a maturity ladder where the ladder steps are proposed to be project management, program management, and portfolio management. Maturity itself was measured along three dimensions knowledge (capability to carry out different tasks), attitudes (willingness to carry them out), and actions (actually doing them). It further divided different dimensions of maturity into sub-concepts, which should provide a good understanding of the project maturity of an organization. It developed questionnaire on a preliminary understanding of project maturity, and conducted initial survey. The survey had given some support to the ladder construct, and shows that attitudes and knowledge are stronger than the actions taken. It recommended that further work on the questionnaire and surveys.

A major study of project management maturity at a global level was conducted by Price Water House Coopers (2004) in which two hundred responses were gathered from a balanced group of companies from thirty different countries across the globe. Some of the relevant key findings for the study were as follows: That there was a positive correlation between project maturity and project performance. A higher project management level would most likely deliver superior performance in terms of overall project delivery and business benefits; that the current level of maturity is 2.5 indicating that the current state of project management in organizations is at the level of informal processes; that many of the project failures are due to an imbalanced organization; Organizational structure has a big influence in overall project performance. Organization structure influences the performance and outcome of projects.

A study of project management maturity in public sector Organizations: the case of Botswana on public sector organizations responsible for infrastructure development in most developing countries are project oriented organizations (POO). It suggested that a number of public project failures in Botswana are symptoms of PM immaturity of public sector infrastructure organizations. Developed questionnaires and administered through a cross section of 20 randomly selected employees involved in project management at various capacities and also administered to another randomly selected sample of private project management practitioners who normally conduct business who formed some form of check on the level of project management maturity. Follow up interviews on some of the aspects that were answered in the questionnaire were also done. The findings strongly suggested that an average maturity of 2.3 (on a scale of 5, where level 1 is the lowest level of maturity) being across all PM knowledge areas. Generally the results revealed serious inadequacies in project risk management maturity.it recommended that project management capacity building through training should be strengthened and the process need to start from identification of PM training needs in the organization.

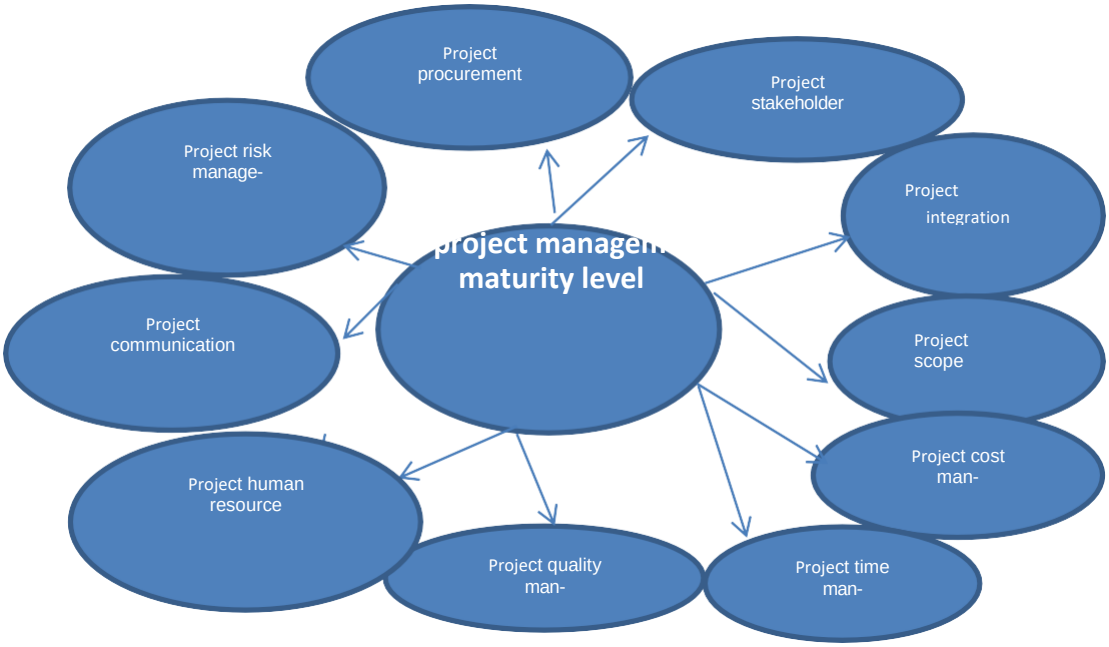
2.9 Synthesis of the reviewed literature

The concept of maturity, project management and the knowledge areas have strong relation in leveling of project management maturity of stakeholders. Regarding project management maturity leveling, there are six maturity models discussed in the literature review part and the models and summarized as little or no change, some elements of change management, comprehensive approach for managing change, organization wide standards applications and change management competency. In addition to this, the relation among project delivery system, stakeholders and maturity levels of project management is discussed.

2.10 Conceptual frame work

The diagram below shows ten project management knowledge areas to measure for project management maturity level as project management maturity level is determined by project management knowledge areas. The project management knowledge areas are defined by Project management body of knowledge (PMI, 2013).

Figure 2.7 conceptual frame work.



2.11 Chapter Summary

In this chapter different project delivery systems, model of project management maturity and the knowledge areas of project management discussed thoroughly. In the next chapter, the method of the research which incorporates data collection, target population identification and determination of the sample size are explained in depth.

CHAPTER THREE

3. RESEARCH DESIGN AND METHEDOLOGY

3.1 Introduction

This chapter describes the research design and the method used to produce the required source of data so that the maturity of stakeholders in project management and specifically in the case of the federal Roads projects of Ethiopia can be analyzed. The procedures which have been used by this study is organized into three sections: data source, data collection, and data analysis. Each section has explained the definitions, decisions, and criteria used for the data analysis.

In this chapter, the research design and methodology has been followed to achieve the ultimate goal of the research which is specified at the beginning chapter of this study paper. In addition to data and information sources, research instruments, sample size and method of analysis also presented. The following section provides a general description of the research strategy adopted for this thesis, as well as justification of the methodology.

.

3.2 Research Design and Approach

According to Kombo and Delno (2009), a survey design used as a form of data collection through interviews and questionnaires in a research study that raises questions. The same Author further explained and quoted Orodho (2003) as defining descriptive survey as a means of gathering data by interviewing a sample of individuals or conducting questionnaires. This research conducted using quantitative research design approach focusing on assessment of project management level of maturity of federal road projects: a disaggregated analysis based on stakeholders. .

The questionnaire used as primary source of data is designed to consider the project management knowledge areas as variables of the study so that respondents can give the rating or leveling for each stakeholder accordingly. Secondary source of data is attributed to research papers, journals, reports, and textbooks.

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3.3 Data Type, Source and methods of Data collection

3.3.1 Data Type

The study used both primary and secondary types of data sources. Primary and secondary data sources are complementary. Hence, the researcher used primary and secondary data source approaches so as to make the analysis more reliable.

3.3.2 Data Collection Methods and Tools

The questionnaire applying the likert scale with the variables of the project management knowledge area to be rated from level 1 to 5 is used to collect the primary source of data.

3.4 Population and Sampling Techniques (Controlled Quota Sampling)

Controlled quota sampling involves introduction of certain restrictions in order to limit researcher's choice of sample (Yang et al., 2014)

For the purpose of this study, the federal Road projects which are executed within 5 years (2015 to 2019) are considered in determining the population and controlled quota sampling. According to the organizational structure of the Ethiopian Roads Authority, the project management directorate has five sub divisions. These are central, Eastern, Western, Southern and Northern. The core processers and project managers assigned in each divisions are 10 people. (ERA, 2015). Therefore, 50 (5 *10) individuals are selected as representatives of Ethiopian roads authority to respond the questionnaire.

In most projects, the managerial staffs of the Consulting firms assigned for single project is 1 Resident Engineers and 1 core processers.Total of 2 person per project. Likewise, the managerial staff of the contractor are 1 project manager and 1 core processor. Total of 2 person per project.

Table 3.4.1 Federal Road projects executed within 5 years (2015 to 2019). Source Ethiopian Roads Authority

Division	No. projects
Central	2
Eastern	6
Western	4
Southern	8

Northern	5
Total	**25**

The total number of projects executed in the past five years (2015 -2019) are 25 and the total number of managerial staff of consultant firm is 50 (25 projects * 2 managerial staff/ project). Likewise the managerial staff of the construction company is 50 (25 projects * 2 Managerial staff/ Project).

In DB and DBB project delivery system the major stakeholders are the Ethiopian Roads Authority, the consulting Firms and the construction companies. The major stakeholders have equivalent contribution in project management of federal projects. Therefore, by applying controlled quota sampling method 50 respondent from each stakeholder is assigned and the total number of sample size is 150.

.

3.5 Data Analysis and Presentation

SPSS and Excel software applications were implemented to simplify the analysis of the collected data. The relative importance index for each factor was calculated by applying the formula. The relative importance index is computed by:

RII= ∑W/ A*N

Where

W, Stands for the weight given by each respondent's response;

A, The highest weight, and

N, The total number of respondents.

3.6 Reliability and Validity

In developing a questionnaire, two aspects are considered very important: its validity and reliability. According to Richardson (1999), validity can be considered as the degree to which the scores from a test relate to some criterion that is external to the test. Hayes (1995) defined reliability as the degree to which the measured result reflects the true result, i.e., the degree to which a measurement is free from the variance of random errors. Cronbach's alpha coefficient has been used in this study to investigate the reliability of the questionnaires used. Lee J. Cronbach (1951), described the alpha coefficient. This test represents an estimate of questionnaire reliability that has been applied in many studies. Given that all of the items in the questionnaire used the

same measurement scale, the Alpha Co-efficient, restricted to the [0, 1] interval, was calculated from the variance of the individual items and the covariance between items. For the purpose of this test , 19 respondents have been asked to complete the questionnaire to identify the problem with the questions clarity. Finally, as all dimensions of the variables of the study were with a Cronbach's alpha of 0.899.

3.6.1 Reliability

Scale: All variables

Case Processing Summary

		N	%
Cases	Valid	19	100.0
	Excluded[a]	0	.0
	Total	19	100.0

Reliability Statistics

Cronbach's Alpha	N of Items
.899	50

Knowledge area	**Cronbach's Alpha**	**N of Items**
Project integration management	0.947	7
Project Scope Management	0.832	5
Project Time Management	0.894	7
Project Cost Management	0.847	3
Project Quality Management	0.914	3
Project Human Resource Management	0.911	4
Project Communications Management	0.911	4
Project Risk Management	0.93	7
Project Procurement Management	0.891	10
Stakeholder Management	0.921	4
Average Cronbach's alpha	**0.899**	

3.6.2 Validity

The validity of the data collecting instrument, questionnaire, has been reviewed and tested by using continuous discussion with my advisor and correcting incorporating his comments, making continuous discussion with team of experts who are working in the stakeholders' office and interviewed some of the respondents of questionaries' distributed for the reliability test. Therefore, all the way which the researcher go through indicates that the data collecting instrument, the questionnaire, is valid for the purpose of it has designed.

CHAPTER FOUR

4. DATA ANALYSIS

The major objectives of the data analysis is to prepare the fertile ground for the next chapter which is dealing about the summary of findings, conclusion and recommendations of the study.

In this chapter the data collected was organized into a systematic format to enable analysis. Analysis refers to examining coded data critically and making inferences while presentation refers to ways of arranging data to make it clearly understood (Kombo and Tromp, 2006). The researcher analyzed the data in line with the three objectives of the study which are

- To benchmarking the project management maturity level of stakeholders for the next road sector development program
- To examine the strength and weakness of stakeholders in project management of Federal road construction projects.
- To indicate the techniques to be used in improvement of the core values which are essential for the maturity of stakeholders in upgrading the maturity of project management federal road projects.

4.1 Response Rate

Table 4.1 Summary of the response rate in this study.

Stakeholder	Frequency of Returned	Frequency of Un returned	Total Population	Response rate in %	Non Response rate %
Employer	45	5	50		
Consultant	43	7	50		
Contractor	40	10	50		
Total	**128**	**22**	150	**85.33%**	**14.67%**

Response rate refers to the number of people who participated in survey. A total of 150 questionnaires were distributed for the stakeholders' representatives. Accordingly, 50 questionnaires were distributed for each stakeholder representatives. Accordingly, the number of responses from employer, consultant and Contractor are 45,43 and 40 respectively. The total respond is 128 which is 85.3% and this is adequate for analysis according to Mugenda and Mugenda (1999) that states a response rate of 50% is adequate for analysis and reporting.

4.2 Characteristics of respondents

Table 4.2 Characteristics of respondents

Respondents Postion						Respondents Proffesion				
Stakeholder	Core officer	Project Manager	Resident Enginner	Total	In %	Civil Enginner	CoTM	Ecnomics	Total	In %
Employer	37	8	0	45	35%	11	34	0	45	35%
Consultant	14	0	29	43	34%	33	10	0	43	34%
Contractor	6	34	0	40	31%	21	19	0	40	31%
Total	57	42	29	128	100%	65	63	0	128	100%
In %	45%	33%	23%			51%	49%	0		

The respondents combination is from the three stakeholders and the representation is 45 (35%) from the employer, 43 (34%) from the consultant and 40 (31%) from the contractor. Meanwhile, the diversity of respondents in terms of their academic status is 65 (51%) from Civil Engineering and 63(49%) from Construction Technology and management. The respondents current position in their respective firm is 57(45%) are core officers, 42 (33%) project managers and 29 (23%) Resident Engineers.

4.3 Stakeholders management maturity level

The result is tabulated for every stakeholder based on the rating of each respondent who are working or serving in Ethiopian Roads Authority, Construction Companies and Consulting Firms. Accordingly, each Knowledge area has three sub tables which are sited for Consulting firms, Construction Companies and Ethiopian Roads authority from top to bottom respectively.

Table 4.3.1 Project integration management

Consulting Firms

Knowledge Area	**Frequency of Respondents**								
Project Integration management	Level 1	Level 2	Level 3	Level 4	Level 5	No of Respondents	RII	Average RII	Level out of 5
Develop Project Charter	3	10	18	12	0	43	0.58		
Develop Preilimnary project scope	5	10	23	5	0	43	0.53		
Develop project management plan	4	19	12	8	0	43	0.51		
Develop and manage project execution	3	15	21	4	0	43	0.52		
Monitor and control	2	14	24	3	0	43	0.53		
Work Integrated Change Control	2	9	27	5	0	43	0.56		
Close project	10	7	24	2	0	43	0.48	**0.53**	**2.66**

Construction Companies

Knowledge area	Frequncy of Respondents								
Project integration management	Level 1	Level 2	Level 3	Level 4	Level 5	No. of Respondents	RII	Average RII	Level out of 5
Develop Project Charter	25	10	5		0	40	0.30		
Develop Preliminary Project Scope	23	10	7	0	0	40	0.32		
Develop Project Management Plan	15	19	6	0	0	40	0.36		
Develop and Manage Project Execution	20	15	5	0	0	40	0.33		
Monitor and Control Project	22	16	2	0	0	40	0.30		
Work Integrated Change Control	27	11	2	0	0	40	0.28		
Close Project	21	9	10	0	0	40	0.35	0.32	1.59

Ethiopian Roads Authority

Knowledge area	Frequncy of Respondents								
Project integration management	Level 1	Level 2	Level 3	Level 4	Level 5	No. of Respondents	RII	Average RII	Level out of 5
Develop Project Charter	6	9	23	7	0	45	0.54		
Develop Preliminary Project Scope	2	17	14	12	0	45	0.56		
Develop Project Management Plan	4	8	19	14	0	45	0.59		
Develop and Manage Project Execution	1	5	14	25	0	45	0.68		
Monitor and Control Project	0	7	21	17	0	45	0.64		
Work Integrated Change Control	5	19	17	4	0	45	0.49		
Close Project	8	25	12	0	0	45	0.42	0.56	2.80

The purpose of project integration management is to initiate the project, to coordinate the project activities and integrate all efforts into a project, to integrate, analyze and report the project results in carrying out the project, to control the changes to the base- line, to collect, integrate and organize project information system and to close the project in an orderly and disciplined system.

The result showed the average maturity level of the consulting firms, construction companies and Ethiopian Roads Authority is 2.66, 1.59 and 2.88 respectively. From this output, the Ethiopian Roads Authority & the Consulting firms are classified in level 3. Whereas, the Construction companies situated in level 2 with respect to project integration management.

Project integration management is used to integrate the outputs of other project management body of knowledge for project planning and creation of consistent, comprehensive and well-designed project processes and activities and also coordinating of the various activities of the project planning, execution and control of the project. However, the three stakeholders are found in different and lower level of maturity. Due to this, the project performance significantly affected in terms of quality of planning, execution and controlling and this will affect the end product of the project in terms of schedule, quality and cost.

Table 4.3.2 Project scope management

Consulting Firms

Project Scope Management	Level 1	Level 2	Level 3	Level 4	Level 5	No. of Respondents	RII	Average RII	Level out of 5
Scope Planning	6	16	13	8	0	43	0.51		
Scope Definition	7	13	20	3	0	43	0.49		
Create WBS	5	9	22	7	0	43	0.54		
Scope Verification	3	9	25	6	0	43	0.56		
Scope Control	3	13	22	5	0	43	0.53	0.53	2.63

Construction Companies

Project Scope Management	Level 1	Level 2	Level 3	Level 4	Level 5	No. of Respondents	RII	Average RII	Level out of 5
Scope Planning	16	18	6	0	0	40	0.35		
Scope Definition	18	15	7	0	0	40	0.35		
Create WBS	24	11	5	0	0	40	0.31		
Scope Verification	26	11	3	0	0	40	0.29		
Scope Control	22	15	3	0	0	40	0.31	0.32	1.59

Ethiopian Roads Authority

Project Scope Management	Level 1	Level 2	Level 3	Level 4	Level 5	No. of Respondents	RII	Average RII	Level out of 5
Scope Planning	0	5	23	17	0	45	0.65		
Scope Definition	0	12	24	9	0	45	0.59		
Create WBS	0	15	19	11	0	45	0.58		
Scope Verification	0	11	21	13	0	45	0.61		
Scope Control	3	12	24	6	0	45	0.55	0.60	2.98

The average maturity level of consulting firm, the construction companies and the Ethiopian Roads Authority is 2.63, 1.59 and 2.98 respectively. The Ethiopian Roads Authority and the consulting Firms are in level 3 and the construction companies belong to level 2. Here, the stakeholders are found in lower level of maturity and due to this significant gap is observed in ensuring the organizational and project level requirements of the scope planning, definition, verification and control. This gap will induce variation in works quality, project cost and prolongation of completion time of the project.

Table 4.3.3 Project Time management

Consulting Firms

Project Time Management	**Level 1**	**Level 2**	**Level 3**	**Level 4**	**Level 5**	No. of Respondents	RII	Average RII	Level out of 5
Processes Activity	11	23	6	3	0	43	0.40		
Definition Activity	5	29	5	4	0	43	0.44		
Sequencing Activity	6	22	8	7	0	43	0.47		
Resource Estimating	8	26	5	4	0	43	0.42		
Activity Duration Estimating	4	27	7	5	0	43	0.46		
Schedule Development	7	25	6	5	0	43	0.44		
Schedule Control	3	26	7	7	0	43	0.48	0.45	2.23

Construction Companies

Project Time Management	**Level 1**	**Level 2**	**Level 3**	**Level 4**	**Level 5**	No. of Respondents	RII	Average RII	Level out of 5
Processes Activity	14	15	11	0	0	40	0.39		
Definition Activity	18	17	5	0	0	40	0.34		
Sequencing Activity	20	13	7	0	0	40	0.34		
Resource Estimating	17	17	6	0	0	40	0.35		
Activity Duration Estimating	18	15	7	0	0	40	0.35		
Schedule Development	16	18	6	0	0	40	0.35		
Schedule Control	19	14	7	0	0	40	0.34	0.35	1.74

Ethiopian Roads Authority

Project Time Management	**Level 1**	**Level 2**	**Level 3**	**Level 4**	**Level 5**	No. of Respondents	RII	Average RII	Level out of 5
Processes Activity	3	9	18	15	0	45	0.60		
Definition Activity	3	8	16	18	0	45	0.62		
Sequencing Activity	4	6	13	22	0	45	0.64		
Resource Estimating	6	5	17	17	0	45	0.60		
Activity Duration Estimating	8	2	14	21	0	45	0.61		
Schedule Development	5	9	11	20	0	45	0.60		
Schedule Control	3	6	10	26	0	45	0.66	0.62	3.10

Project time management is described by processing activities, defining activities duration, sequencing activities, estimating resource duration, estimating which activity is accomplished when, scheduling development and controlling schedules.

The result stated in table 4.3.3 showed that all activities under project time management are 2.23, 1.74 &3.10 and the leveling for the consulting firms, construction companies and Ethiopian roads authority are 3, 2 & 4 respectively.

The output indicates that three parties are low in their level of maturity of time management and such deficiency has significant effect on the completion of the project with in the intended finishing time. Accordingly, delay

will be exhibited and due to this cost overrun follows in addition to extension of time to hand over the project to the end users.

Table 4.3.4 Project Cost management

Consulting Firms

Project Cost Management	**Level 1**	**Level 2**	**Level 3**	**Level 4**	**Level 5**	No. of Respondents	RII	Average RII	Level out of 5
Processes Cost Estimating	13	27	3	0	0	43	0.35		
Cost Budgeting	15	21	7	0	0	43	0.36		
Cost Control	17	22	4	0	0	43	0.34	**0.35**	**1.76**

Construction Companies

Project Cost Management	**Level 1**	**Level 2**	**Level 3**	**Level 4**	**Level 5**	No. of Respondents	RII	Average RII	Level out of 5
Processes Cost Estimating	4	30	6	0	0	40	0.41		
Cost Budgeting	10	23	7	0	0	40	0.39		
Cost Control	12	24	4	0	0	40	0.36	**0.39**	**1.93**

Ethiopian Roads Authority

Project Cost Management	**Level 1**	**Level 2**	**Level 3**	**Level 4**	**Level 5**	No. of Respondents	RII	Average RII	Level out of 5
Processes Cost Estimating	1	23	14	7	0	45	0.52		
Cost Budgeting	4	19	21	1	0	45	0.48		
Cost Control	5	29	8	3	0	45	0.44	**0.48**	**2.41**

Project cost management determines the total cost of the projects, ensures the project to be with in the approved budget, estimates the cost of identified resources and involves in developing a project baseline, comparing progress against baseline and controlling costs. The result stated in table 4.3.4 shows project cost management are 1.76, 1.93 &2.41 and the leveling for the consulting firms, construction Companies and Ethiopian roads authority is 2, 2 & 3 respectively. Here, all the three parties are in lower level of maturity. This indicates that estimating, budgeting and controlling cost is not exercised in proper and detailed way and due to this the planned value of the project and the actual cost of the project will vary. Such variance beyond the allowable limit will incur additional cost on the project.

Table 4.3.5 Project Quality management

Consulting Firms

Project Quality Management	**Level 1**	**Level 2**	**Level 3**	**Level 4**	**Level 5**	No. of Respondents	RII	Average RII	Level out of 5
Processes Quality Planning	10	21	7	5	0	43	0.43		
Perform Quality Assurance	12	23	4	4	0	43	0.40		
Perform Quality Control	11	26	5	1	0	43	0.38	**0.40**	**2.02**

Construction Companies

Project Quality Management	Level 1	Level 2	Level 3	Level 4	Level 5	No. of Respondents	RII	Average RII	Level out of 5
Processes Quality Planning	10	23	7	0	0	40	0.39		
Perform Quality Assurance	13	22	5	0	0	40	0.36		
Perform Quality Control	10	27	3	0	0	40	0.37	0.37	1.85

Ethiopian Roads Authority

Project Quality Management	Level 1	Level 2	Level 3	Level 4	Level 5	No. of Respondents	RII	Average RII	Level out of 5
Processes Quality Planning	7	23	15	0	0	45	0.44		
Perform Quality Assurance	11	27	7	0	0	45	0.38		
Perform Quality Control	5	27	13	0	0	45	0.44	0.42	2.09

Project quality management is measured and determined by process quality planning, performing quality assurance and performing quality control. The result revealed that consulting firms, construction Companies and Ethiopian roads authority are rated as 2.02, 1.85 & 2.09 respectively. Consulting firms and Ethiopian Roads Authority are in level 3 and construction companies are in level 2.

All the stake holders are in lower level of maturity. However, the construction companies are even in the lowest level. This indicates that regarding quality management the contractor which is expected to convert the design to realistic element has minimal regard or knowledge of quality and this makes the end product to be inferior in quality. Such lower performance will produce less durable product and affect the end user or the owner by claiming extra cost of maintenance.

Table 4.3.6 Project Human Resource management

Consulting Firms

Project Human Resource Management	Level 1	Level 2	Level 3	Level 4	Level 5	No. of Respondents	RII	Average RII	Level out of 5
Processes Human Resource Planning	6	26	5	6	0	43	0.45		
Acquire Project Team	9	22	7	5	0	43	0.44		
Develop Project Team	11	25	3	4	0	43	0.40		
Manage Project Team	14	17	5	7	0	43	0.42	0.43	2.14

Construction Companies

Project Human Resource Management	Level 1	Level 2	Level 3	Level 4	Level 5	No. of Respondents	RII	Average RII	Level out of 5
Processes Human Resource Planning	10	25	5	0	0	40	0.38		
Acquire Project Team	13	20	7	0	0	40	0.37		
Develop Project Team	16	21	3	0	0	40	0.34		
Manage Project Team	18	17	5	0	0	40	0.34	0.35	1.77

Ethiopian Roads Authority

Project Human Resource Management	Level 1	Level 2	Level 3	Level 4	Level 5	No. of Respondents	RII	Average RII	Level out of 5
Processes Human Resource Planning	3	15	22	5	0	45	0.53		
Acquire Project Team	5	19	13	8	0	45	0.51		
Develop Project Team	2	21	16	6	0	45	0.52		
Manage Project Team	7	16	19	3	0	45	0.48	0.51	2.54

Project human resource management is about processing human resource planning, acquiring, developing and managing project teams. In Table 4.3.6 Project human resource management maturity result revealed that all the requirements to project human resource management in the consulting firms, construction companies and at Ethiopian road authority scored 2.14, 1.77 & 2.54. Following the output, the consulting firms & Ethiopian roads authority are found in level 3 and the construction companies are rated in level 2.

As it is discussed in the literature review part of this study, the human resource management is one of the key elements of project management. However, all the three stake holders are in lower level of maturity regarding human resource management. The success of any road construction projects strongly relays on the availability of well experienced and qualified human resources. The researcher has more than 10 years of experience in road construction projects in the position of project manager and observed failure or lower maturity in human resource management has affected the quality and progress of the project.

Table 4.3.7 Project Communication management

Consulting Firms

Project Communications Management	Level 1	Level 2	Level 3	Level 4	Level 5	No. of Respondents	RII	Average RII	Level out of 5
Processes Communications Planning	7	19	12	4	0	42	0.46		
Information Distribution	8	18	14	3	0	43	0.46		
Performance Reporting	6	13	18	6	0	43	0.51		
Manage Stakeholders	5	23	9	6	0	43	0.47	0.48	2.38

Construction Companies

Project Communications Management	Level 1	Level 2	Level 3	Level 4	Level 5	No. of Respondents	RII	Average RII	Level out of 5
Processes Communications Planning	14	22	4	0	0	40	0.35		
Information Distribution	17	20	3	0	0	40	0.33		
Performance Reporting	19	15	6	0	0	40	0.34		
Manage Stakeholders	12	25	3	0	0	40	0.36	0.34	1.71

Ethiopian Roads Authority

Project Communications Management	Level 1	Level 2	Level 3	Level 4	Level 5	No. of Respondents	RII	Average RII	Level out of 5
Processes Communications Planning	1	13	25	6	0	45	0.56		
Information Distribution	7	20	13	5	0	45	0.47		
Performance Reporting	3	29	10	3	0	45	0.46		
Manage Stakeholders	6	25	11	3	0	45	0.45	0.48	2.42

The data in table 4.3.7 revealed that the consulting firm, the construction Company and Ethiopian Road authorities are rated 2.38, 1.71&2.42. Accordingly, Consulting firms & Ethiopian roads authority are in level 3. The construction companies are in level 2.

Project evaluation and monitoring strongly relays on project communication management. As we can see from the output of the analysis, all stakeholders are in lower level. Such level of maturity will create knowledge gap with in the organization regarding the project performance and progress which resulted in unrelated and retarded decisions.

Table 4.3.8 Project Risk management

Consulting Firms

Project Risk Management	Level 1	Level 2	Level 3	Level 4	Level 5	No. of Respondents	RII	Average RII	Level out of 5
Processes Risk Management	18	13	12	0	0	43	0.37		
Risk Identification	12	18	13	0	0	43	0.40		
Planning Risk Identification	11	23	9	0	0	43	0.39		
Qualitative Risk Analysis	15	20	8	0	0	43	0.37		
Quantitative Risk Analysis	11	19	13	0	0	43	0.41		
Risk Response Planning	13	18	12	0	0	43	0.40		
Risk Monitoring and Control	12	20	11	0	0	43	0.40	0.39	1.95

Construction Companies

Project Risk Management	Level 1	Level 2	Level 3	Level 4	Level 5	No. of Respondents	RII	Average RII	Level out of 5
Processes Risk Management	25	15	0	0	0	40	0.28		
Risk Identification	30	10	0	0	0	40	0.25		
Planning Risk Identification	32	8	0	0	0	40	0.24		
Qualitative Risk Analysis	30	10	0	0	0	40	0.25		
Quantitative Risk Analysis	28	12	0	0	0	40	0.26		
Risk Response Planning	33	7	0	0	0	40	0.24		
Risk Monitoring and Control	34	6	0	0	0	40	0.23	0.25	1.24

Ethiopian Roads Authority

Project Risk Management	Level 1	Level 2	Level 3	Level 4	Level 5	No. of Respondents	RII	Average RII	Level out of 5
Processes Risk Management	12	23	10	0	0	45	0.39		
Risk Identification	17	21	7	0	0	45	0.36		
Planning Risk Identification	23	18	4	0	0	45	0.32		
Qualitative Risk Analysis	20	15	10	0	0	45	0.36		
Quantitative Risk Analysis	25	11	9	0	0	45	0.33		
Risk Response Planning	29	13	3	0	0	45	0.28		
Risk Monitoring and Control	30	13	2	0	0	45	0.28	0.33	1.65

The result stated in table 4.3.8 describes that all stakeholders are almost in the similar project risk management maturity level and the average computed value is 2.00. Risk plan and management is one of the key elements in ensuring the achievement of a project by providing the required mitigation and alleviation of risks using different approaches. Being in the lower level of maturity regarding project risk management will have significant negative effect on the delivery of the required project objective.

Table 4.3.9 Project Procurement management

Consulting Firms

Project Procurement Management	Level 1	Level 2	Level 3	Level 4	Level 5	No. of Respondents	RII	Average RII	Level out of 5
Processes Plan Purchase and Acquisitions	3	21	12	7	0	43	0.51		
Plan Contracting	4	17	12	10	0	43	0.53		
Request Seller Responses	7	10	15	11	0	43	0.54		
Select Sellers	6	15	12	10	0	43	0.52		
Contract Administration	5	13	14	11	0	43	0.54		
Contract Closure	4	12	16	11	0	43	0.56	0.53	2.67

Construction Companies

Project Procurement Management	Level 1	Level 2	Level 3	Level 4	Level 5	No. of Respondents	RII	Average RII	Level out of 5
Processes Plan Purchase and Acquisitions	2	26	12	0	0	40	0.45		
Plan Contracting	1	34	5	0	0	40	0.42		
Request Seller Responses	1	30	9	0	0	40	0.44		
Select Sellers	4	36	0	0	0	40	0.38		
Contract Administration	2	38	0	0	0	40	0.39		
Contract Closure	5	35	0	0	0	40	0.38	0.41	2.05

Ethiopian Roads Authority

Project Procurement Management	Level 1	Level 2	Level 3	Level 4	Level 5	No. of Respondents	RII	Average RII	Level out of 5
Processes Plan Purchase and Acquisitions	0	5	25	15	0	45	0.64		
Plan Contracting	0	1	27	17	0	45	0.67		
Request Seller Responses	0	2	35	8	0	45	0.63		
Select Sellers	0	5	37	3	0	45	0.59		
Contract Administration	0	3	35	7	0	45	0.62		
Contract Closure	3	15	25	2	0	45	0.52	0.61	3.06

It can be seen in table 4.3.9 Project procurement maturity level of consulting firms and construction companies is 3 and Ethiopian road authority is computed to level 4. The Ethiopian Roads Authority is in higher level of maturity which is 4 and this indicates that the process of purchase, plan of contract, selecting sellers, contract administration and contract closing are executed in synchronized way of considering the organization and as well as the stakeholders. Such level of maturity ensures the delivery of the project objective as planned. However, the consulting and construction companies are in lower level of maturity and this will have negative effect on the delivery of the project.

Table 4.3.10 Project Stakeholder management

Consulting Firms

Stakeholder Management	**Level 1**	**Level 2**	**Level 3**	**Level 4**	**Level 5**	No. of Respondents	RII	Average RII	Level out of 5
Stakeholders identification	23	15	5	0	0	43	0.32		
Assessment in stakeholders interest and	24	13	6	0	0	43	0.32		
Develop stakeholders communication plan	27	7	9	0	0	43	0.32		
Engaging and influencing stakeholders	25	10	8	0	0	43	0.32	0.32	1.59

Construction Companies

Stakeholder Management	**Level 1**	**Level 2**	**Level 3**	**Level 4**	**Level 5**	No. of Respondents	RII	Average RII	Level out of 5
Stakeholders identification	22	18	0	0	0	40	0.29		
Assessment in stakeholders interest and	25	15	0	0	0	40	0.28		
Develop stakeholders communication plan	13	27	0	0	0	40	0.34		
Engaging and influencing stakeholders	20	20	0	0	0	40	0.30	0.30	1.50

Ethiopian Roads Authority

Stakeholder Management	**Level 1**	**Level 2**	**Level 3**	**Level 4**	**Level 5**	No. of Respondents	RII	Average RII	Level out of 5
Stakeholders identification	0	5	27	13		45	0.64		
Assessment in stakeholders interest and	5	15	20	5		45	0.51		
Develop stakeholders communication plan	7	25	10	3		45	0.44		
Engaging and influencing stakeholders	5	30	8	2		45	0.43	0.50	2.52

The computation in table 4.3.10 explains consulting firms and construction companies are in level 2, Ethiopian Roads authority is in level 3. All the stakeholders are found in lower level of maturity. However, the construction of federal road projects demands the integration of stakeholders. One way of integration is having matured way of stakeholders' management. Being in the lower level of maturity means there is no integration among stakeholder. The end result of such lower level of maturity will make the project to spend beyond planned value, extension of the intended completion time of the project and quality of the project will be compromised.

4.4 Summary of the analysis

In the above tables each stakeholder is rated for its project management maturity based on the project management knowledge areas. However, each stakeholder shall be rated by synchronizing the output of individual knowledge areas together so that the organization status of maturity with respect to the whole knowledge area can be identified.

Table 4.4.1 Project Management Maturity Level of Consultant for the ten knowledge areas

S.No	Knowledge Areas	Maturity Levels					
		Level 1	Level 2	Level 3	Level 4	Level 5	Average
		Ad-hoc	Abbreviated	Organized	Managed	Adaptive	
1	Project integration management			2.66			
2	Project Scope Management			2.63			
3	Project Time Management			2.23			
4	Project Cost Management		1.76				
5	Project Quality Management			2.02			
6	Project Human Resource Management			2.14			
7	Project Communications Management			2.38			
8	Project Risk Management		1.95				
9	Project Procurement Management			2.67			
10	Stakeholder Management		1.59				
	Project Management Maturity Level of Consultants						**2.20**

The average maturity level of the consulting firms is 3. As stated in table 4.5.1, maturity level 3 is characterized by the capacity of managing in project level not as having organizational standards and competency. Such level affects the performance of the company due to the fact that the dynamism of the market and the demand of the end-users is always looking the firm which can deliver the best from other competitors with in the market. However, the consulting firms are below organizational standard levels and they suffer to satisfy the demand.

Table 4.4.2 Project Management Maturity Level of Contractor for the ten knowledge areas

S.No	Knowledge Areas	Maturity Levels					
		Level 1	Level 2	Level 3	Level 4	Level 5	Average
		Ad-hoc	Abbreviated	Organized	Managed	Adaptive	
1	Project integration management		1.59				
2	Project Scope Management		1.59				
3	Project Time Management		1.74				
4	Project Cost Management		1.93				
5	Project Quality Management		1.85				
6	Project Human Resource Management		1.77				
7	Project Communications Management		1.71				
8	Project Risk Management		1.24				
9	Project Procurement Management			2.05			
10	Stakeholder Management		1.50				
	Project Management Maturity Level of Contractors						**1.70**

The average maturity level 2 is characterized by isolated project management and such level is too low to perform and deliver the required product to the end-users as it has no even the capacity to manage multiple projects simultaneously. This indicates the construction companies are in lowest position of maturity. It has no organizational standard and competency. Such position will affect the demand of the end users due to poor performance and construction company sustainability in the competitive market of the construction industry as it lacks synchronizing the project management knowledge areas at the same time.

Table 4.4.3 Project Management Maturity Level of Employer (ERA) for the ten knowledge areas

S.No	Knowledge Areas	Maturity Levels					
		Level 1	Level 2	Level 3	Level 4	Level 5	Average
		Ad-hoc	Abbreviated	Organized	Managed	Adaptive	
1	Project integration management			2.80			
2	Project Scope Management			2.98			
3	Project Time Management				3.10		
4	Project Cost Management			2.41			
5	Project Quality Management			2.09			
6	Project Human Resource Management			2.54			
7	Project Communications Management			2.42			
8	Project Risk Management		1.65				
9	Project Procurement Management				3.06		
10	Stakeholder Management			2.52			
	Project Management Maturity Level of ERA						**2.56**

The average maturity level of the contractor is in level 3. According to the description stated table 4.5.1, the Ethiopian Roads Authority is not in the level of having organizational standards and organizational competency. Such level affects the strategic plans of the road sector development the authority due to the fact that limitation in the organizational standards and competency will lead to highest rate of project failure and loss of productivity.

4.5 Discussion

Table 4.5.1 Summary of Levels of Maturity Models (IMIS, OPM3, CMMI, K-PMMM, PM2 and PM solution)

Level 5	Organizational Competency	Change management competency is evident in all levels of the organization and is part of the organization's intellectual property and competitive edge
Level 4	Organizational Standards	Organization-wide standards and methods are broadlly deployed for managing and leading change
Level 3	Multiple Projects	Comprehensive approach for managing change is being applied in multiple projects
Level 2	Isolated Projects	Some elements of change management are being applied in isoloated projects
Level 1	Ad Hoc or Absent	LIttle or no change management applied

One of the basic part of this study is to compare or evaluate the output which is resulted from the analysis of the row data with the models elaborated in the literature review part of the study. As it is summarized in the table 4.5.1, there are six models of project management maturity levels. According to the models, level 4 and 5 are the reflection of exercising the ten project management knowledge areas in proper and efficient manner. However, this study elaborates that all stakeholders are below lever 4 and this indicates that the stakeholders are not in a position of customizing organizational standards and competency in Project management of federal road construction projects.

4.6 Chapter summary

The major constituents of this chapter is analyzing the data collected from the respondents and indicating the levels of maturity of each stakeholder with respect to each knowledge area and also total summary of maturity level of each stakeholders. By synchronizing all the knowledge areas together. In the next chapter, summary of findings, recommendations, conclusion and the gap area which can be addressed in the future study which can be made by other researchers is indicated.

CHAPTER FIVE

5. SUMMARY OF FINDINGS, CONCLUSION AND RECOMMENDATIONS

5.1 Summary of Findings

The main objective of this study is to rate the maturity level of stakeholders who are involved in the project management process of construction of road projects which are owned by Ethiopian Roads authority. The research questioner which incorporates 10 project management body of knowledge area is used to get the required respond. Accordingly, the project management maturity level of each stakeholder is defined using the sum of the rating or leveling given by the respondents for each variables. The finding of the analysis is explained as below:-

5.1.1 Consultants

The maturity of the consultant with respect to project management for the construction of federal road construction project is in level 3. This indicates that the firm uses standardized &repeatable process for all projects by which all the process including estimation and schedules can be prepared based on formal & informal data available in the industry and this can be customized for the specific purpose of the firm or in short it is centered to the firm. However, the consulting firms has no organizational standards and organizational competency which enables to have continuous improvement in best project accomplishment and create satisfaction of the end users. Such achievements will improve the firms to have good market share in their future prospect.

5.1.2 Contractors

The maturity of contractors is in level 2. Such level of maturity is characterized by informal and incomplete procedures, basic process are not standard for all projects, the management encourages the use of mix of intermediate & summary level of information, estimates and schedules are prepared based on expert knowledge and it is project focus. Such level of maturity is almost oriented in single project management which will affect the efficient use of resources and due to this the construction companies are forced to spend extra cost due to there is no integration of resource usage in the organizational level.

5.1.3 Ethiopia Roads Authority

The maturity level of Ethiopian Roads Authority is 3 and it is characterized by uses of standardized and repeatable process for all projects; estimation and schedules can be prepared based on formal and informal data

available in the industry and this can be customized for the specific purpose of the authority or in short it is centered to the authority. According to the road sector development strategic plan of the authority, such level of maturity is inconsistent with the strategy due to the fact that organizational standard and organization competency are the critical requirements to satisfy the plan.

5.2 Conclusion

Literatures revealed that organizations at the highest levels of project management maturity (Levels 4-5) have seen the greatest value by increasing the level of their project management maturity, especially improvements in aligning projects with business objectives and bringing products/services to market Muhammad Mateen (2015).

The findings of the study indicates that consulting firms and Ethiopian Roads Authority are found in level 3 for their project management maturity. Whereas, the construction companies are in level 2. As it is well explained in the literature review part of this study, the different stages of project management of the federal road construction demands the highest level of maturity of stakeholders for the best achievement of the project success. However, this study elaborates the following basic points

The stakeholders were expected in the highest level of maturity. In short, the maturity level of the Consulting firms, the construction companies and the Ethiopian Roads Authority to be in level 4 and above. However, consulting firms and Ethiopian Roads Authority are in level 3 and Construction Companies are in level 2. All stakeholders are in the lowest level of Maturity.

In every project management knowledge areas leveling, big gap in maturity among stakeholders was observed and all are in the lowest level of maturity which has significant influence in the accomplishment of the project with in the required scope, quality, cost and schedule.

5.3 Recommendation

The methodology developed in this study is expected to assess the project management maturity level of consulting firms, construction companies and Ethiopian Roads Authority. In order to provide necessary information and to make improvement in their project management processes and activities, it should be stressed that the development of the project management maturity models was the most important issue. Regarding consulting firms and Ethiopian Roads Authority, most of the knowledge areas are at maturity level 3 that is all activities are institutionalized and standardized. However, these stakeholders are expected to enhance their performance of project management through continuous improvements on the project

management body of knowledge areas where they scored below 4 in maturity leveling by using trainings of short term or long term focusing in the project management knowledge areas by which the organization can develop organizational standards and organizational competencies in due course.

The maturity of the construction companies are in level 2 and this is in the lowest level of maturity. The construction companies are the key stakeholders' in achieving best accomplishment of road construction projects. However, their current status of maturity doesn't reflect the required position. Hence, more is expected in improving their maturity by conducting continuous trainings on the project management knowledge areas and also integrating the training with the real experience of the sector. In addition, arranging sharing of experience from companies who are performing better and developed organizational standards and organizational competency enables the construction companies in raising their maturity level to 4 and above. .

5.4 Future research direction

This study significantly focused on the level of maturity of stakeholders in project management of road construction projects. The basic parameters used in the study are the 10 knowledge areas of project management body of knowledge. However, in the future interested researcher can conduct detail investigation on the specific types of Road Construction projects. Such as Flexible Pavements, Rigid Pavements, Gravel Road projects and the like. These study areas shall be used to identify the maturity of Stakeholders with respect to specific type of Road construction projects.

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APPENDICES

Questionaries'

Questionnaires listed below are standard questioners prepared by PMI and listed under PMBOK guide line to measure project management maturity levels of project driven organization. The level enables the project driven organization where its position is in terms of project management and project success. To level each list of question there are benchmarking references listed above the table.

Hence, please refer to the reference criteria's for each of leveling to undertake. Your prompt and genuine response to each of the questionaries' helps the genuine leveling of Project management maturity of Ethiopian roads authority, the contractors & Consultants who are the major stakeholders of the construction of the federal road projects. Therefore, it is your genuine response which drives to effective analysis and conclusion then fruitful recommendations. Confidentiality of the response and data you provided to the research will strictly be protected. Your information will be used only for this research purpose. The research is conducted for master's thesis of project management at **Saint Mary's University**.

Please be noted that you are kindly requested to replay the questioner with respect to your current job location

I would like to thank you in advance for all your collaboration in the participation of the research in filling the questionaries'

No need of writing your name and address on this paper

Part A. General Information

1. What is your profession

a) Civil Engineer b) CoTM c) Economics d) other

2. Current Job Location
   a) in Construction b) in Consulting Firm c) in Employer (ERA or AACRA)
3. What is your position

a. Core Officer b. project manager c. Resident Engineer d) Other

Part B. Project management maturity leveling

Please level each of the issues raised under table based on the characteristics of the levels listed below

Level 1 If;-

- It is Getting Started but disorganized
- Awareness is developed and ad hock
- It is at its initial stage
- Do not use formal procedure

Level 2 if;-

- informal and incomplete procedures are applied
- Basic processes; not standard on all projects; used on large, highly visible projects
- Management supports and encourages use
- Mix of intermediate and summary-level information
- Estimates and schedules based on expert knowledge and generic tools
- Project-centric focus

Level 3 if;-

- All processes standard for all projects and repeatable
- Management has institutionalized processes
- Summary and detailed information
- Baseline and informal collection of actual data

- Estimates and schedules may be based on industry standards and organizational specifics
- Organizational focus
- Informal analysis of project performance

Level 4 if;-

- Processes integrated with corporate processes
- Management mandates compliance
- Management takes organizational entity view
- Solid analysis of project performance
- Estimates and schedules normally based on organization specifics
- Management uses data to make decisions

Level 5 if;-

- Processes to measure project effectiveness and efficiency
- Processes in place to improve project performance
- Management focuses on continuous improvement

Put mark, under leveling for each of the questionaries'

Knowledge area	**Maturity levels**				
Project integration management	Level 1	Level 2	Level 3	Level 4	Level 5
Develop Project Charter					
Develop Preliminary Project Scope Statement					
Develop Project Management Plan					
Develop and Manage Project Execution					
Monitor and Control Project					
Work Integrated Change Control					
Close Project					

Project Scope Management	**Level 1**	**Level 2**	**Level 3**	**Level 4**	**Level 5**
Scope Planning					
Scope Definition					
Create WBS					
Scope Verification					
Scope Control					
Project Time Management	**Level 1**	**Level 2**	**Level 3**	**Level 4**	**Level 5**
Processes Activity					
Definition Activity					
Sequencing Activity					
Resource Estimating					
Activity Duration Estimating					
Schedule Development					
Schedule Control					
Project Cost Management	**Level 1**	**Level 2**	**Level 3**	**Level 4**	**Level 5**
Processes Cost Estimating					
Cost Budgeting					
Cost Control					
Project Quality Management	**Level 1**	**Level 2**	**Level 3**	**Level 4**	**Level 5**
Processes Quality Planning					
Perform Quality Assurance					
Perform Quality Control					
Project Human Resource Management	**Level 1**	**Level 2**	**Level 3**	**Level 4**	**Level 5**
Processes Human Resource Planning					
Acquire Project Team					
Develop Project Team					
Manage Project Team					
Project Communications Management	**Level 1**	**Level 2**	**Level 3**	**Level 4**	**Level 5**
Processes Communications Planning					
Information Distribution					
Performance Reporting					

Manage Stakeholders					
Project Risk Management	**Level 1**	**Level 2**	**Level 3**	**Level 4**	**Level 5**
Processes Risk Management					
Risk Identification					
Planning Risk Identification					
Qualitative Risk Analysis					
Quantitative Risk Analysis					
Risk Response Planning					
Risk Monitoring and Control					
Project Procurement Management	**Level 1**	**Level 2**	**Level 3**	**Level 4**	**Level 5**
Processes Plan Purchase and Acquisitions					
Plan Contracting					
Request Seller Responses					
Select Sellers					
Contract Administration					
Contract Closure					
Stakeholder Management	**Level 1**	**Level 2**	**Level 3**	**Level 4**	**Level 5**
Stakeholders identification					
Assessment in stakeholders interest and influence					
Develop stakeholders communication plan					
Engaging and influencing stakeholders					