ST. MARY'S UNIVERSITY

SCHOOL OF GRADUATE STUDIES

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ST. MARY'S UNIVERSITY

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PROJECT MANAGEMENT MATURITY IN ETHIOPIAN CONSTRUCTION WORKS CORPORATION: THE CASE OF ROAD CONSTRUCTION PROJECTS

BY

TEWODROS ABERE AMBAW

JUNE, 2017

ADDIS ABABA, ETHIOPIA

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STUDENT ID. NO: SGS/0535/2008A

A THESIS SUBMITTED TO SAINT MARY'S UNIVERSITY, SCHOOL OF GRADUATE STUDIES, IN PARTIAL FULFILMENT OF THE REQUIREMENT FOR THE DEGREE OF MASTERS IN BUSINESS ADMINISTRATION: PROJECT MANAGEMNT

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DECLARATION

I, the undersigned, declare that this thesis is my original work, prepared under the guidance of Dereje Teklemariam, PhD. All sources of materials used for the thesis have been duly acknowledged. I further confirm that the thesis has not been submitted either in part or in full to any other higher learning institution for the purpose of earning any degree.

Tewodros Abere _____

St. Mary's University, Addis Ababa Signature

June, 2017

ENDORSEMENT

This thesis has been submitted to St. Mary's university, school of graduate studies for examination with my approval as a university advisor.

Dereje Teklemariam, PhD _____

Advisor Signature

St. Mary's University, Addis Ababa June, 2017

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ABBREVIATIONS/ACRONYMS

PM	Project Management
PMBOK	Project Management Body of Knowledge
PMI	Project Management Institute
GTP	Growth and Transformation Plan
GDP	Gross Domestic Product
KPA	Key Process Area
ECWC	Ethiopian Construction Works Corporation
CMM	Capability Maturity Model
PMMM	Project Management Maturity Model
OPM	Organizational Project Management Maturity Model
ERA	Ethiopia Roads Authority
MOFED	Ministry Of Finance and Economic Development

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Abstract

Many organizations use systematic and sequential project management maturity models to improve their project performance. This study used mainstreamed Project management Institute's PM solution's Maturity model to assess the Project management body of knowledge areas practice and process maturity level in the context of the Ethiopian Construction Works Corporation. Previous literature and government reports depict that time overrun; cost overrun; serious quality defects and poor definition of project scope are among the critical problems of the organization road construction projects. The objective of the study was to assess project management practice and process maturity level and examined the level of maturity of the organization. This is of course considering strong relationship between Project success and project maturity level. The study used standard questionnaires for project managers, project Engineers, contract and procurement specialists with better project management knowledge for sound understanding of the result of the study with directions of future improvement. The model uses levels 1-5 in increasing order. Level 1 is the lowest project performance of the organization without following structured approach to implement projects while level 5 is the highest performance by the organization with continuous improvement. Results indicate that the overall practice on maturity of project management knowledge areas is found to be level 2.76. Among the knowledge areas Cost and time management are with better maturity level of 3.08 and 2.96 respectively. Quality and Risk management are the least matured areas with level 2.5 and 2.28 respectively. This shows, on average, the organization Project Management process and practice maturity is at the basic level. Such low maturity score depicts the case that the organization perform the knowledge areas without following structured approach or guide line, relying solely on the knowledge and experience of the project manager or project team, and on average the contractor are performing only the basic practices under each knowledge area. Thus, improvement efforts should be taken to improve the current low condition of project management maturity with special emphasis on project quality and risk management.

Keywords: Project management models, Project management body of knowledge areas, project management maturity.

CHAPTER ONE
INTRODUCTION

1.1 Background of the Study

Maturity is a comparative level of advancement an organization has achieved with regard to any given process or set of activities. Organizations with more fully defined and actively used policies, standards and practices are considered more mature. The more mature an organization's practices are the more likely the organization meets its project goals successfully (PMI, 2008). Where is the project maturity level of the organization? So, how Ethiopian construction works corporation road construction projects will reach more maturity level? Using the strong argument between maturity and project successfulness it is possible to evaluate project management maturity of organizations using existing maturity models with standard questions derived from Project Management Body of Knowledge.

The construction industry plays a significant role in the economy of developing countries. Ethiopia's first Growth and transformation plan (2010/11 -2014/15) performance report shows average growth of construction sector is 28.7% having 8.5% of Nations GDP contribution. Previous research works by Adams (1997), Long (2004) have indicated poor managerial capability of contractors to be one of the critical problems of the construction industry in developing countries. It is important to study project management practices in the context of developing countries to better understand and able to mange projects successfully in those countries. However, research works on project management in those countries has not yet received enough attention and still they are at infant stage (Wondowessen, 2004).

The objective of the Road Sector Development program is increasing the capacity of local road constructing companies. However, the performance of those local contractors has faced challenges and the immediate consequence of their performance is that increase in project costs than budgeted and delay, among others (ERA, 2007). Mega projects like roads which are being built in Ethiopia are with cost overrun, time over run and serious quality defects which have huge macro economic impact (GTP one Performance Report, 2015, p.37). The report states poor project management practice is one of the problems for such project problems. This shows there

is a gap in project management body of knowledge areas practices in road construction projects. Inadequate planning and scheduling, poor project management system by contractors and late possession of site by the client are identified as the most important factors causing poor time and cost performance of local road construction contractors. Among the subsequent impact of these local contractor poor time and cost performance on the construction industry; it discourages investment on road construction projects by the public authorities Abebe and Rahel (2016).

Maturity models are primarily used internally by organizations to guide their effort of improving their project management capability (Supic, 2005, Saiedia & Kuzara,1995). This is achieved through assessment of the organization's Project management processes to find out strengths, weakness and gaps. The assessment will reveal the Project management maturity level of road constructing company which will indicate what to do to improve its efficiency. Several models exist for the project management maturity which will be reviewed in literature review. Those are Capability Maturity model –CMM, Project management process maturity model –PM2, PM solution's Maturity model, Kerzner's PM maturity model –PMMM, Organizational Project Management Maturity Model-OPM 3.But this study will use key characteristics of PM solutions' maturity model with level 1 up to Level 5 with increasing order of maturity. This is because the model's developers have given a detailed description of the characteristics across the nine knowledge area at each maturity level which is coherent with the purpose of the study.

Assessment of project management maturity will help to identify the level of maturity of the organization which relates with meeting project goals. The result of the assessment is used to guide continuous improvement effort to increase the level of maturity which will directly enhance the competitive position of the organization.

1.2 Statement of the Problem

Completion of a project is considered as the most important factors of successful projects, which help to decrease problems for all parties and give new chances to construct other related projects. It also helps to increase the profits and development of the sector industry. The accomplishment of the first 10 years road sector development program reveals that the execution of most of the road projects resulted in cost and time overruns have also ascertained that the projects were not completed on time, within budget and desired quality Becker and Behailu (2006). Such problems are causing loss of profits, increasing cost and leading to technical and managerial problems between project parties. Abebe and Ayalew (2009) also revealed a gap in practice of basic project management body of knowledge areas. Change in defined scope, lack of proper planning, lack of proper evaluation of tender documents by contractors at tendering phase and contractor's financial problems were identified as major causes which results variations. Abebe and Jemal (2015) stated that the most common effects of cost over run identified are delay, supplementary agreement, adverse relations among stake holders and budget shortfall of project owners. Abebe and Wakjira (2011) revealed that both internal and external aspects of risk factors contribute to cost over runs in local road construction projects. Project team training in regard to procurement, lack of risk consideration and market research is conducted while planning procurement, procurement pre meeting is not held with that of suppliers, specification and source of supply is not confirmed, technical and financial capability and past experience of suppliers are not verified in selecting suppliers and there exists poor monitoring and controlling (Meseret, 2016).

Government reports show there is difficulty in meeting goals of Ethiopian Construction works Corporation road construction project. The main problems identified for not meeting project goals are cost overrun, time overrun, quality defects, improper procurement, ill definition of project scope and others. Reports shows, projects go over budget, beyond their planned schedule, or deliver products that are not satisfying their customers. Abebe and Mohammed (2014) describes is a need to improve planning and scheduling trends because risk factors associated with non-excusable delays have been triggered due to lack of proper planning and scheduling in execution of works.

Organizations facing these challenges are categorized as organizations with low maturity. Therefore, in order to improve project performance and PM maturity, organizations are considering adopting a methodical and sequential framework (PM solutions' maturity model) to help them enhance their project management processes. These project management maturity models can be used as an assessment tool to measure PM maturity levels, as well as a tool to show in which area an organization should focus its effort to improve its PM capabilities. Project management body of knowledge and other researchers already proved that there is direct relationship between project successfulness and the level of project maturity.

The above literatures indicate that there is a gap in assessing and analyzing on the maturity level of project driven organizations like Ethiopian Construction Works Corporation. Assessing the project management body of knowledge areas practice maturity and process groups' maturity will help to know the level of maturity of the organization. This will show directions on how to maximize the level of maturity to improve the practice of the Project Management Body of Knowledge Areas which will enhance better implementation of projects.

1.3 Research Questions

The study is guided by the following questions:

- What is the level of project management knowledge process group maturity of the organization?
- What is the level of project management knowledge areas practice maturity of the organization?

1.4 Objective of the Study

1.4.1 General objective

The main objective of this research is to assess the general level of project management maturity of each PMBOK's Project management body of knowledge areas in Ethiopian Construction Works Corporation managing its road construction projects. The direct relationship between the level of maturity and project successfulness is the main argument in stating this objective.

1.4.2 Specific objectives

- To assess the Project management body of knowledge's areas practice Maturity level of the organization.
- To assess Project management body of knowledge's process groups' maturity levels of the organization.

1.5 Definition of Basic Terms

- **Project:** A project is a temporary endeavor undertaken to create a unique product, service or result (PMI, 2004).
- **Project management**: The application and integration of modern management and project management knowledge, skills, tools and techniques to meet project goals (Fewings, 2005; Carmichael, 2004).
- **Maturity:** is a comparative level of advancement an organization has achieved with regard to any given process or set of activities (PMI, 2008).
- **Project maturity:** is the degree to which an organization practices project management measured by the ability of an organization to successfully complete individual projects. (PMI, 2003).
- **Maturity models:** are process models (measurement tools) that use d as a framework to guide improvement efforts (Jugdev & Thomas, 2002; Cleland & Ireland, 2002).

1.6 Significance of the Study

The major contributions or significance of this research are:

1. The maturity model and its questionnaires can be used in assessing maturity of construction PM. In addition it can serve as a guide in implementing PM and designing improvement efforts.
2. The maturity assessment result of this research can be used as initial benchmark information in prioritizing and designing improvement action. Further the same result can also be used as a baseline to compare the success of or impact of future improvement effort.
3. The study may help in providing clear picture of current state and defines future state.
4. The study is helpful for my professional development goal in two ways. First the study helps me as being thesis of MBA in project management. Second as being highway construction professional, it can help me in the future research, works and consultancy services in the area.
5. The study may open door for other researchers to study project management maturity on different sectors projects.

1.7 Scope and Limitations of the Study

The scope of the study is:

1. The study is limited to assess the project management maturity level and to establish the organization's progress in maturity level and give recommendations for future improvements.
2. The study is limited to the perspective of service providing contractor, Ethiopian Construction Works Corporation. Hence the PM maturity of the industry from the client's (employer) organization perspective may be totally different.

The limitations are: the research adopted only Project Management Institute's standards and models even though there are so many models. The reason behind this is because this model is prepared along with project management body of knowledge areas. More reliable and informative method such as maturity assessment of organization based on artifacts, interview and the use of focus group were not used.

1.8 Organization of the Study

The paper consists of five chapters. The first is introductory chapter. The second chapter contains Review of related literature. Chapter three is concerned with research methodology. The fourth chapter consists of Results and discussion. The fifth chapter which is the closing chapter focuses on conclusions and recommendation.

CHAPTER TWO
REVIEW OF RELATED LITERATURE

2.1 Review of Theoretical/Conceptual Literature

2.1.1 Project and project management

Different authors and references have defined project in different ways emphasizing its different aspects. Summarizing those definitions given, this research defines a project as:A temporary endeavor (that has definite beginning and end 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; Muriithi & Crawford, 2003;Stanleigh, 2007). Among the basic characteristics of projects is its defined scope, time, cost quality definition is constrained by limited resource, involves many people with different skill and, usually progressively elaborated throughout its life cycle (Stanleigh, 2007; Cleland & Ireland, 2002; Wheatley).

Many and different definitions were given for project management similar to the case of project. This research defines project management as: The application and integration of modern management and project management knowledge, skills, tools and techniques to the overall planning, directing , coordinating ,monitoring and control of all dimensions of a project from its inception to completion ,and the motivation of all those involved to produce the product ,service or result of the project on time, within authorized cost, and to the required quality and requirement, and to the satisfaction of participants (Chartered Institute of Building,2002; Fewings, 2005;Carmichael, 2004). Project management deals mainly with coordinating resources and managing people and change. 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, 2004).

The fundamental difference between project management and general management stem from the difference in the type of work they manage. Project management deals with management of projects (which are temporary and unique) whereas, general management deal with management of operations (which are ongoing and repetitive). Generally project organization changes continually as the project progresses through its various phases and terminate when the mission is accomplished; whereas the ongoing organizations that manage operations sustain at least over a period of time and continue assuming a broader outlook (PMI, 2004;Hendrickson, and Carmichael, 2004).

Generally, According to Cleland, and Ireland (2002) and others, Project management can be best applied when resources are to be shared among many units, when special attention or focus is to be given to important undertakings (example to focus attention on specific customers in specific market), when it is desired to have unified management of a project-based contract in order to avoid the customer work with many different functional units, when there is a need to manage change.

Construction project management

The management of construction projects has some differences from the management of other projects. The differences mainly stems from the nature and characteristics of construction projects. The management of construction projects has much in common with the management of similar types of projects in other industries (Hendrickson, 2004). Much of the content of PMBOK guide is also directly applicable to construction projects (PMI, 2007). The consideration of these differences is important for successful management of construction projects.

Generally road construction projects: are usually undertaken outside; hence, they are susceptible to many variables such as weather and traffic Gould, and Joyce (2003). They are usually capital intensive, complex; and require significant management skills, involvement and coordination of a wide range of experts in various fields (Chartered Institute of Building, 2002). They are usually capital intensive, complex; and require significant management skills, involvement and coordination of a wide range of experts in various fields (Chartered Institute of Building, 2002). They are subject to a variety of laws and regulations that aim to ensure public safety and minimize environmental impacts (Bennett, 2003). As compared to most other industries,

construction projects involve relatively intensive labor use, and consume large amount of materials and physical tools (Jekale, 2004).

Project management body of knowledge areas

PMBOK (2008) identified nine core knowledge areas in three functions. These nine knowledge areas are integration, scope, time, cost, risk, quality, human resources, communications, and procurement management. The first is facilitating function, the second is core function and the third is support function.

The first facilitating function consists of 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.

The second core function consists of project scope, time, cost and quality 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. Project time management includes the processes required to manage the timely completion of the project. Plan schedule, define and sequence activity, resource and duration estimation, develop and control schedule are the processes required in project time 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. 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.

The third function is support function consisting of human resource, procurement, communication and risk management. Project human resource management includes the processes that organize, manage, and lead the project team. The project team is comprised of the people with assigned roles and responsibilities for completing the project. Project communication 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. Project risk management: the processes of conducting risk management planning, identification, response planning, and controlling risk on a project. The objectives of project management are to increase the likelihood and impact of positive events, and decrease the likelihood and impact of negative events in the project. Project procurement management: includes the processes necessary to purchase or acquire products, services, or results needed from outside to the project team. The organization can be buyer or seller of the products, services, or results of a project. It includes the contract management and change control processes required to develop and administer contracts or purchase orders issued by authorized project team members.

2.1.2 Project management maturity

Project management maturity describes how a project organization is able to successfully deliver its project performance (i.e. within time, budget, and specifications) in a consistent manner. Maturity is defined by many writers differently in closely related way. Some of the definitions given are presented here under.

Maturity is the extent to which a specific process is explicitly defined, managed, measured, controlled, and effective. Maturity implies a potential for growth in capability and indicates both the richness of an organization's (Project Management) process and the consistency with which it is applied in projects throughout the organization. (Paulk, Curtis,et al (1993). Maturity is a comparative level of advancement an organization has achieved with regard to any given process or set of activities. Organizations with more fully defined policies, standards, and practices are considered more mature (PMI, 2008). Maturity is the level of sophistication that indicates organization’s current project management practices and processes.

Project management is being embraced, to some extent, by most organizations as the best way to develop and deliver new or improved products, services, and organizational process changes Cleland, and Ireland (2002). It has been a continuous effort of researchers and practitioners to look for ways to develop and improve organizations‟ PM capability so that organizations may be able to benefit from project management. The improvement of PM capability of an organization can be realized in many different ways (training, mentoring, benchmarking, the use of new tools

and techniques and use of maturity model, etc). Project Management Maturity models are just one such means that organizations can use in their pursuit of improving their Project Management capability (Cooke-Davies, 2005;Cleland & Ireland, 2002; Skulmoski, 2001). Maturity Models are process models (measurement tools) that are developed to assess the maturity of organization's (can also be business unit, or department) processes and practices to identify opportunities for improvement and point out strengths and weaknesses. Maturity models are also used as a framework to guide improvement efforts (Jugdev & Thomas, 2002; Cleland & Ireland, 2002). Most of the current Maturity models have their origin in the field of total quality management. The concept is built on the Deming, Juran, and Crosby quality paradigm: Quality products are a result of quality processes (Chrissis, Konrad, and Shrum 2003; Paulk et al, 1993). According to Cooke-Davies (2005), the use of maturity models provides a frame work for purposeful and progressive development of project management capability of repeatedly delivering successful projects. In addition, maturity models help frame improvement efforts by identifying priority area and suggesting improvement subjects.

Maturity assessment generally can be conducted either by the organizations internal staff with assistance by a licensed assessor or could be done by an external assessment vendor (Saiedia & Kuzara, 1995; Crawford, 2002). Any thorough assessment of PM maturity includes a minimum personal and/or group interviews, artifact collection and evaluation, survey, and benchmark comparison to established standards Crawford (2002).Typically; organizations start the assessment with a baseline assessment of their current situation. The baseline assessment enables an organization to identify areas that need immediate actions and areas that will have an impact and provide greatest return on investment Crawford (2002). This helps the organization prioritize its improvement actions and plan for continuous improvement.

The majority of maturity models have adapted five levels of maturity stage beginning from lower level of maturity, initial (Level 1), to the highest level of maturity, continuous improvement (level-5). A number of maturity models are available. Capability Maturity Model-CMM, project Management Process Maturity Model-PM2, PM Solution' Maturity Model, Kerzner's PM Maturity Model-PMMM and Organizational Project Management Maturity Model-OPM3 are pertinent maturity models which will be reviewed in this section.

2.1.3 Review of maturity models

Review of some of the maturity models:

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 contractors 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, Finnemore, Haigh, and Goulding (1999). This model has served as a basis for the development of a number of maturity models in different fields including project management .Unlike Project Management maturity models; this model assesses the entire software development process including the PM part and technical parts of software development. The CMM model has five maturity levels beginning from the initial stage (level 1), repeatable (level 2, Defined (level 3), managed (level 4) to the most matured level of optimizing (Level-5). Each maturity level has key processes areas (KPA) that identify it. In addition to the model has a prioritized improvement path for achievement of a higher level capability. However, as the model is descriptive in nature, it does not tell an organization how to improve; rather it describes essential attributes that would be expected to characterize an organization at a particular maturity level (Paulk et al, 1993).

Project Management process maturity model-PM2: The PM2 model is one of the pioneer PM maturity models developed. The model was developed by (William, et al (1997). Like the CMM model, the PM2 model has five levels of maturity with slight difference in its use of terminologies. This model also have five levels starting from Ad-hoc (Level 1), planned (level 2), Managed at project level (level 3), Managed at corporate level (Level 4) and to the most matured continuous matured (level 5). To give some insight on the description of maturity level, key project management process and their Organizational characteristics of level 1 and 5 is given below. Level 1 Key PM process is No PM process or practices are consistently available. Its Major organizational characteristics are functionally isolated, lack of senior management support. Level 5 Key Pm process is PM processes are continuously improved while its major

organizational characteristic is Project driven organization, dynamic energetic with continuous improvement of PM processes and practices.

PM Solutions' Maturity Model: Similar to the PM2 model; this model is developed by mirroring PMBOK‟s knowledge areas with that of CMM‟s five level maturity stage. The model examines an organizations PM implementation across the nine PM knowledge areas, which are in turn broken down in to components Crawford (2002). The model developers have given a detailed description of the characteristics of the knowledge area at each maturity level. This study will use this model to assess the practice and process maturity of road constructing company since it is developed by mirrors PMBOK knowledge areas which are the foundation of the study. PM solutions' five maturity levels and their key attributes are described below.

Level 1(Initial Process): Its key attributes are Ad hoc processes with low management awareness. Level 2 (Structured Process and Standards): Its key attributes are basic processes are not standard on all projects; used on large and highly visible projects. Management supports and encourages use of processes. Estimate and schedules are based on expert knowledge and generic tools. Level 3(Organizational standards and institutionalized process): Its key attributes are All processes, standards for all projects, repeatable with Summary and detailed information. Level 4(Managed Process): Its key attributes are Process integrated with corporate process. Management uses data to make decisions specific. Level 5 (Optimizing Process): Its key attributes are Process to measure project effectiveness and efficiency. Processes are in place to improve project performance. Management focuses on continuous improvement

Organizational Project Management Maturity Model –OPM3: 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 organization's project, program and portfolio management practices. The OPM3 maturity model consists of two main complementary parts: The Foundation and the Product Suite. The Foundation describes in general terms organizational project management and OPM3 maturity models contents and applications. The Product Suite, on the other hand, describes how the OPM3 model is applied and what steps are taken during a maturity assessment.

Kerzner's PM Maturity Model –PMMM: 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. This model also have five levels starting from common language (Level 1), common process (level 2), Singular methodology (level 3), Benchmarking (Level 4) and to the most matured continuous improvement (level 5). To give some insight on the description of maturity level, key Organizational characteristics of level 1 and 5 is given below. Level 1 main characteristic are none or sporadic use of project management, No Executive level support. Level 5 main characteristics are creations of lessons learned files and transfer of knowledge to other projects and teams, corporate wide understanding for project management.

This study used PM solutions' Maturity Model. The reason behind is the model developers have given a detailed description of the characteristics of the knowledge area at each maturity level. It was developed by mainstreaming each of PMBOK knowledge areas.

2.2 Review of Empirical Literature

This research will try to summarize existing literature on the area, most of which are result of Master's thesis done at Addis Ababa University institute of technology in department of road and transport engineering and school of commerce project management department.

The most common reasons of change order encountered during the construction of road projects in Ethiopia are categorized into the following major causes of change orders: Design Errors and Omissions, Change of Scope, Unforeseen Conditions, Value Engineering, Force Majeure and Others. (Mekonnen,2015). Among the nine PMBOK knowledge areas, poor scope management are the main reasons of change according to this study. Poor definition of project scope will result in work variations, delays, cost overrun and improper relationship between n different stake holders.

The most common causes of time overrun in road projects are Delay to deliver the site (Right of way problem), financial problems of contractors, Improper planning, and Site management. And the most common causes of cost overrun are Design change, fluctuation in the cost of materials

and inadequate review for drawings and contract document Abebe et.al(2015. So, among PMBOK knowledge areas difficulty in cost management, scope management and Integration management are obstacles of meeting project goals

That the project plans procurement practice but excludes the risks that have a chance off occurrence when coming to implementation of the plan. Thus, implies there is no mitigation plan set out to overcome on its occurrence (Meseret ,2016). The study concentrates in Alemgena district road maintenance projects under Ethiopian construction works corporation road construction projects which shows difficulty in one of PMBOK knowledge areas which is Procurement management.

The major problems of planning and scheduling in federal road construction projects of Ethiopia are: The absence of project performance data base which could be used to develop project duration estimate, time contingencies are not considered during scheduling of the activities, no standard procedures prepared by the respective authority to the stake holders to determine the durations of project schedules are among others in which such project delays will bring on conflicts in between contractors, clients and consultant (Abebe et.al 2014).

The major factors causing low time performance of Ethiopian road construction companies identified are inadequate planning scheduling, poor management system, poor site and resource management in which such poor performance have great impact on the construction industry in such a way that it will discourage investment on road construction projects by government, erodes mutual trust and respect among the parties and it creates negative attitudes towards public construction authorities (Abebe et.al 2016).This study concentrates on poor time performance of Ethiopian road construction companies which touches all of the nine core PMBOK's project management body of knowledge areas.

Ethiopian federal road construction project face many challenging problems. One of major problem is variation of work which is contractors are more responsible in initiating majority of the specified causes and they are also the most affected party as a result of the consequential effects. The major effects of variation identified are delay in completion time, increase in project cost, suspension (hold on) of work, decrease in productivity, and dispute between parties (Abebe et.al 2009).

Unexpected inflation/ material price escalation, delays on completion time, scope changes, unstable cost of manufactured materials, inadequate site investigation and right of way problems (access to site and quarry) are identified as major factors leading to cost overrun in Ethiopian Federal road construction projects. Both internal and external aspects of risk factors contribute to cost overruns in local road construction projects Abebe et.al (2011).The study basically concentrates in difficulty in managing one of the nine PMBOK's knowledge areas which is risk management.

Empirical researches which are mostly done in Addis Ababa University institute of technology revealed that road construction projects are suffering due to low performance of implementing organizations. Poor scope management, time delays, more cost than budgeted and serious quality defects are among the critical effects of such low performing organizations. So, studying project management performance level of the organization is a basic gap which is not addresses by previous researchers. This research will find out the maturity level of the organization which will be the benchmark for future improvement.

2.3 Conceptual and Theoretical Framework

Project management is being embraced, to some extent, by most organizations as the best way to develop and deliver new or improved products, services, and organizational process changes (Cleland & Ireland, 2002). This research used nine Project management body of knowledge areas mainstreamed PM solutions model to assess the maturity level of the organization. Those are Project integration management, scope, quality, time; cost, Procurement, Human resource, communication and risk management.

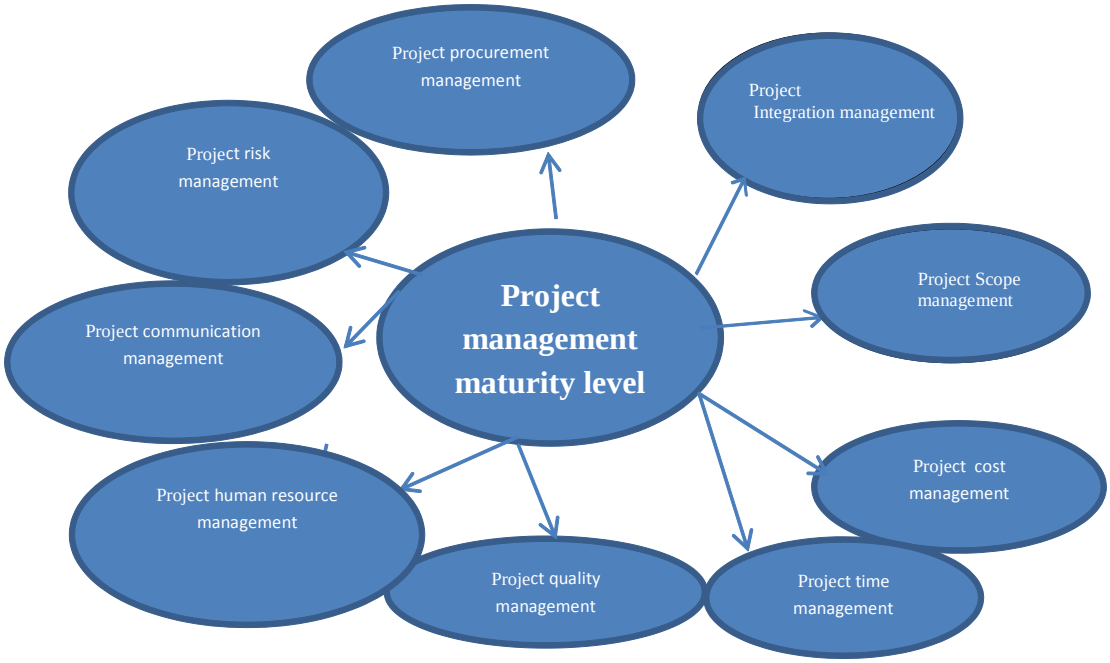

Figure 2.1: Nine Project management Body of knowledge areas.

Maturity models are not meant to provide a quick fix for projects in trouble. Rather, they are primarily used by organizations to guide their effort of improving their project management capability. This is achieved through assessment of the organization's PM processes to find out the strength, weakness and gaps. Later the result of the assessment is used to guide continuous improvement efforts. In addition, the result of the assessment can serve as quantitative baseline against which progress in improvement and its effectiveness is compared.

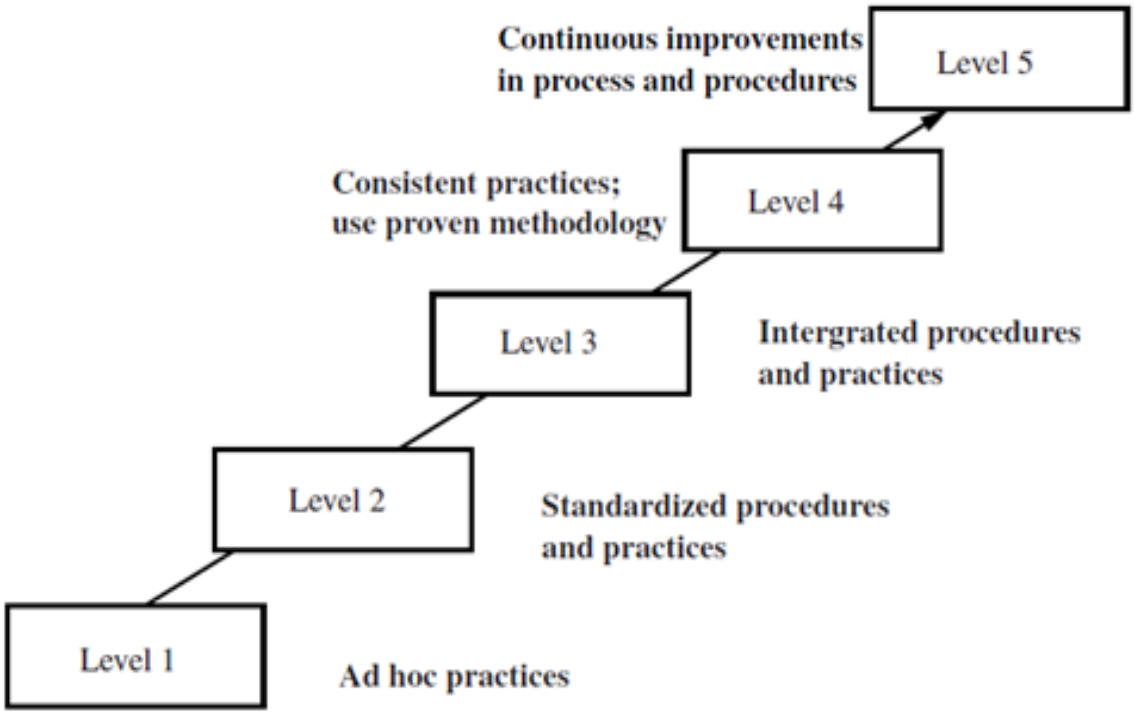

Figure 2.2: Typical five level maturity model (Chrissis, Konard, 2013)

It has been a continuous effort of researchers and practitioners to look for ways to develop and improve organizations PM capability so that organizations may be able to benefit from project management. The improvement of PM capability of an organization can be realized in many different ways (training, mentoring, benchmarking, the use of new tools and techniques and use of maturity model, etc). Project Management Maturity models are just one such means that organizations can use in their pursuit of improving their Project Management capability. According to (Cooke-Davies, 2005), the use of maturity models provides a frame work for purposeful and progressive development of project management capability of repeatedly delivering successful projects. Generally maturity models help an organization know how mature its project management practice is; that is, it helps the organization measure the degree to which it is executing Project management against the practice of its peers in the industry in general or best practice in the industry (Man, 2007).In addition, maturity models help frame improvement efforts by identifying priority area and suggesting improvement subjects.

CHAPTER THREE
RESEARCH METHODOLOGY

This part of the study deals with research methodology. It includes study design, population and sampling, source of data, data collection instruments, Procedures of data collection used and methods of data analysis.

3.1 Research Design and Approach

The research is descriptive research as it tries to describe the current status of PM process and practice maturity in Ethiopian Construction works Corporation road construction projects. The reason behind using descriptive study design is because the researcher is interested in describing the existing situation under study. Standard questionnaires were used to assess the maturity level of the organization through selected employees of the organization. It was conducted because the researcher wants to assess the project management maturity level which helps as the starting benchmark to measure the performance of the organization. Assessing the maturity level of the organization helps to recommend future project implementation improvement efforts.

3.2 Population, Sample and Sampling Technique

The relevant population is all employees working in Ethiopian Construction Works Corporation road projects. The source lists are all employees working in road construction projects. But, this study is basically for project managers and senior level workers with efficient back ground in Project management to respond questions effectively.

Judgmental sampling, One of Non probability sampling techniques, is used considering profession as basic criteria. The infrastructure Construction Sector has three main divisions. The first is Construction and rehabilitation division with three teams called Project Management team one, project management team two and Bridge construction and maintenance team. The Second division is Road Engineering and marketing with four teams called Road design team, planning team, Engineering procurement team and contract administration team. The third division is road maintenance with two teams called Road maintenance team one and maintenance team two.

The organization has a total of nine teams under three divisions. So, seven professionals on each team were target respondents considering the seniority and position they have. So, Project managers, Project Engineers, contract and procurement specialists were target respondents considering profession with the type of projects under study. The organization undertakes an average of eight to fifteen huge new construction projects and ten road maintenance projects yearly under its two maintenance team. The total numbers of respondents were sixty three (63) considering the level of experts and the projects undergoing in the organization with 2898 expected responses. The number of respondents is as such minimal because questions need some sort of project management expertise. But, still they are within the minimum number set by many authors. Thirty six (36) questions on each PMBOK areas were sent to assess practice maturity and fifteen (15) questions to assess process maturity which is a total of fifty one (51) questions per respondents which made difficult to incorporate other data collection mechanisms like interview and focus group discussion.

The research questionnaire was delivered to 63 senior level employees working in Ethiopian Construction Works Corporation Transport Construction sector. The organization has one chief executive officer with three divisions consisting nine teams. So, the study considered seven senior professionals from each team which made 63 total respondents. But, only 52 respondents have returned the questionnaire. The remaining 11 respondents didn't respond due to different reasons. Hence, only responses from 52 respondents were used in performing the maturity analysis.

Ethiopian road construction Corporation (ERCC) is selected because of two reasons. First ECWC is representative in Ethiopian road construction industry since it implements major road construction projects. Second I used to work in ECWC desert road projects as a construction Engineer, four years back, which helps me in data collection considering financial and time constraint.

The following table shows the characteristics of respondents:

Construction and rehabilitation division		Road Engineering and marketing division		Road Maintenance Division	
Teams	**No of respondents**	**Teams**	**No of respondents**	**Teams**	**No of respondents**
Bridge Construction	1-Project manager 2-Project coordinator 4-bridge Engineers	Road design	1-team leader 3-design Engineer 4- M & E specialists	Road maintenance team one	1-team leader 5-Project coordinators 1-senior Engineer
Project Management team one	1-Project manager 1-Project coordinator 5-Senior Engineers	Planning	1-Team leader 4-senior Economists 2-seniorstatsians	Road maintenance team two	1-team leader 5-Project coordinators 1-senior Engineer
Project Management team two	1-Project manager 1-Coordinator 5-Senior Engineers	Engineering procurement	1-team leader 6- procurement coordinators		
		Contract administration	1-team leader 3-contract specialists 3-contract Engineers		

Table 3.1 List of respondents

3.3 Source and Tools/ Instruments of Data Collection

The type of data collection method used was questionnaire survey. For the proper achievement of the objectives of the study; the researcher used both primary and secondary data source. The primary data were obtained from employees of Ethiopian Construction Works Corporation Transport sector employees working in road construction projects. From different data collection method, Questionnaire survey was used because of its lower cost and time. Questions were prepared using Project Management Body of Knowledge considerations in each knowledge areas.

3.4 Procedures of Data Collection

Data collection instrument were basically primary data which started after getting permission from the organization. Standard questions were prepared using PMBOK's considerations in each knowledge areas. Questionnaires were distributed to respondents with brief orientation on how respondents use their perceptions and thoughts to answer questions. The survey pack included a copy of the cover letter with brief introduction on questions.

3.5 Method of Data Analysis

The data gathered were analyzed through descriptive statics. Mean and Percentage were used to calculate the project management maturity level of the organization. Calculating the response rank of each knowledge areas and process groups were undertaken for each respondent by calculating the mean. Taking the mean of all respondents finally indicates the maturity level of the organization. All the knowledge areas were assessed to have equal weight because the relative weight for the contribution of the different knowledge areas due to absence of significant inters rater-agreement. The project management practice and process maturity level of the organization was assessed as per internationally recognized standards which indicates where the organization is. This guides to propose on how to improve the level of maturity to meet project goals. This in turn opens door for the organization and other researchers for further research considering the emerging field of study, Project Management.

CHAPTER FOUR
RESULTS AND DISCUSSION

4.1 Assessment of Project Management Maturity level

Maturity Assessment Result and Discussion

The maturity assessment has been performed for the nine construction Project management body of knowledge areas covered by the research. Those are Integration management, Time management, Cost management, Scope management, Quality management, Communication management, Human resource management, Procurement management and Risk management. The five PMBOK process groups which are under study are Project Initiating group, Project Planning group, Project executing group, Project monitoring and controlling group and Project closing group. The assessment is performed in two dimension of practice maturity dimension and process maturity dimension. Subsequent parts provide assessment summery result and discussion.

4.1.1 Assessment maturity level of PMBOK process group

As can be seen in figure 1, the process maturity level of the organization is at basic process striving to reach the industry standards. The research finding indicates that overall maturity of the process dimension of construction project management is found to be at level 2.72. The analysis calculation on how the maturity level of PMBOK process group was determined is shown in appendix C part in table 3.

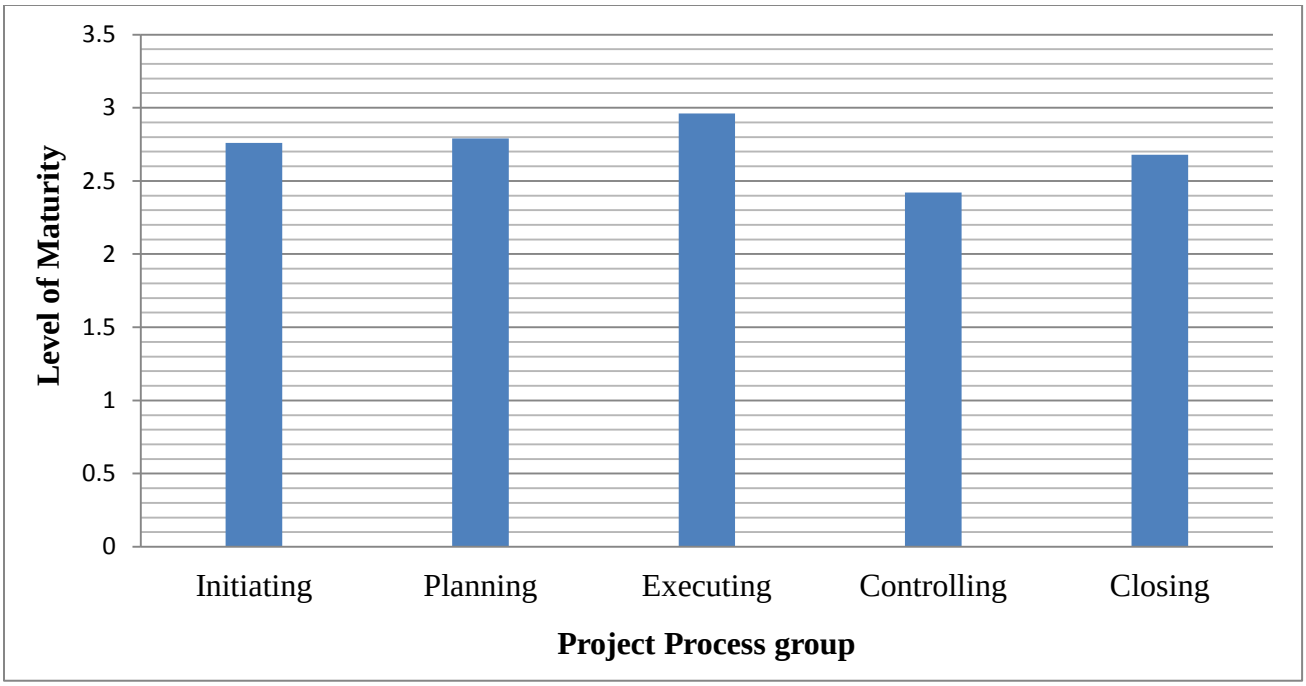

Figure 4.1: Project management process group maturity (level No 1 -5)

4.1.2 Assessment maturity level of PMBOK practices.

The overall maturity of Project management body of knowledge areas practice maturity is 2.76 which shows the organization is at basic level of maturity with better insights to reach construction industry standards. The standard deviation of those knowledge areas is found to be 0.24592 while the variance is 0.06048. So, 100% of all data are within S.D of two. PMBOK advise organizations to exercises all the nine knowledge areas at a comparative level so that projects will be achieved. It may have been better if all of them fall within standard deviation of one. As can be seen in figure 2 the knowledge areas of Cost, Time, scope, Human resource, Communication and integration management have shown comparatively higher level of maturity compared with other PM knowledge areas. These knowledge areas are more or less being performed in better maturity by the organization. Whereas the knowledge areas of procurement and quality management are comparatively at lower level and could be considered to be performed informally by the organization. The remaining one Knowledge areas of Risk management are the least matured knowledge area. The result of each knowledge area is

discussed in detail in the following subsequent section. The analysis calculation on how the maturity level of PMBOK was determined is shown in appendix C part in table 2.

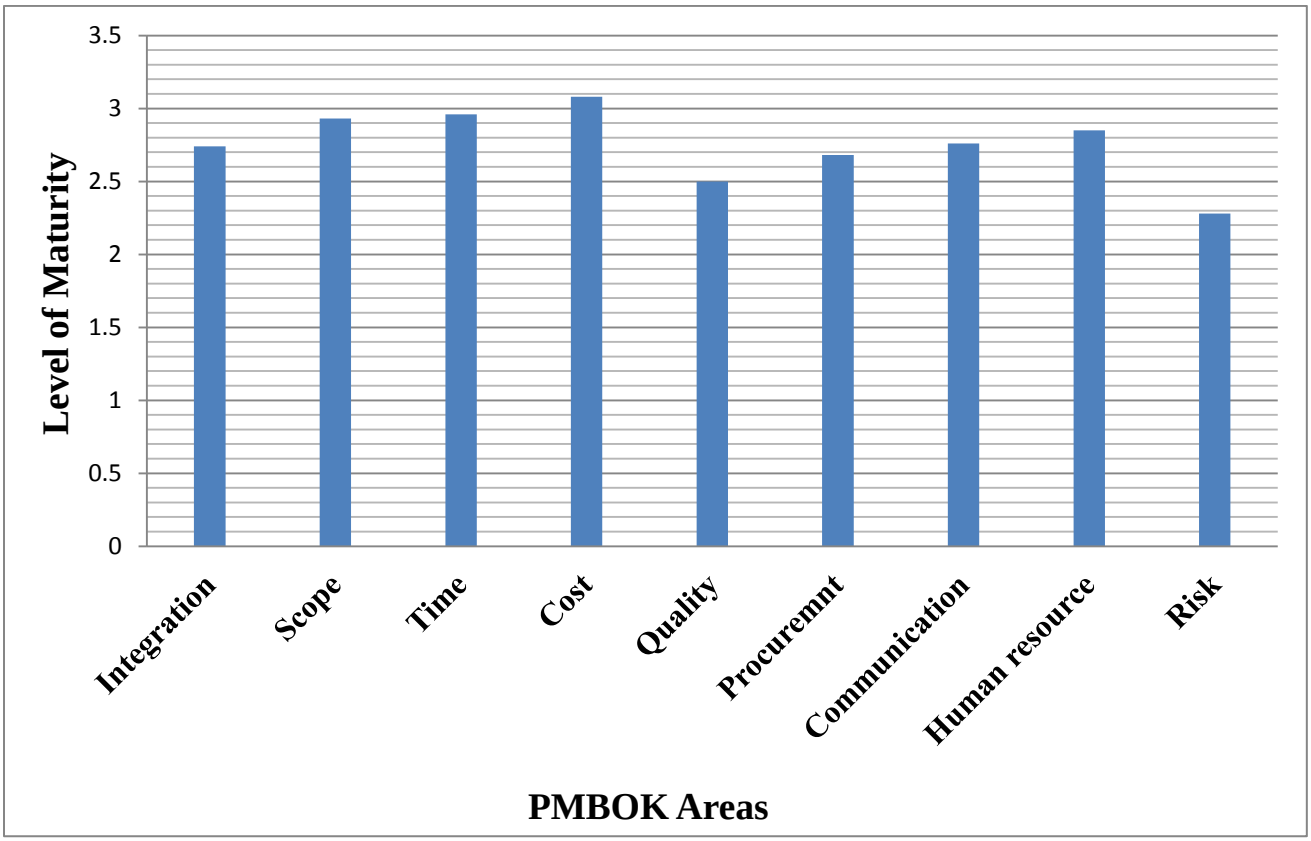

Figure 4.2: Project management practice maturity level of PMBOK areas (level 1-5)

4.2.2.1 Maturity across PM Knowledge Areas

Maturity of Project Scope Management

PMBOK defines Project Scope Management as set of processes required to ensure that the project includes all the work required, and only the work required, to complete the project successfully. The PMBOK‟s project scope management process involves the processes: Identify Requirement, Define scope, Create WBS (Work Breakdown Structure), Verify Scope, and Control scope. From contractors' (Since Ethiopian Construction Works Corporation constructs Roads as a contractor) perspective scope management is mainly about ensuring that all the works the contractor is doing is what originally agreed on and covered by the contract documents.

According to (Sarshar, et al., 2000) “During the construction phase, (Scope management) has no specific meaning, as the (scope) has already been defined by this phase. Thus, at this stage scope management for a contractor is mainly concerned with scope control”.

Figure 3 shows the scope management practice maturity of participating respondents. The overall scope management practice maturity is found to be 2.93. The maturity survey indicates that the scope management practice maturity is found to be at organizational standards with summaries, estimates and schedules done based on industry standards. The analysis calculation on how the project management maturity level of each PMBOK was determined is shown in appendix C part in table 2.

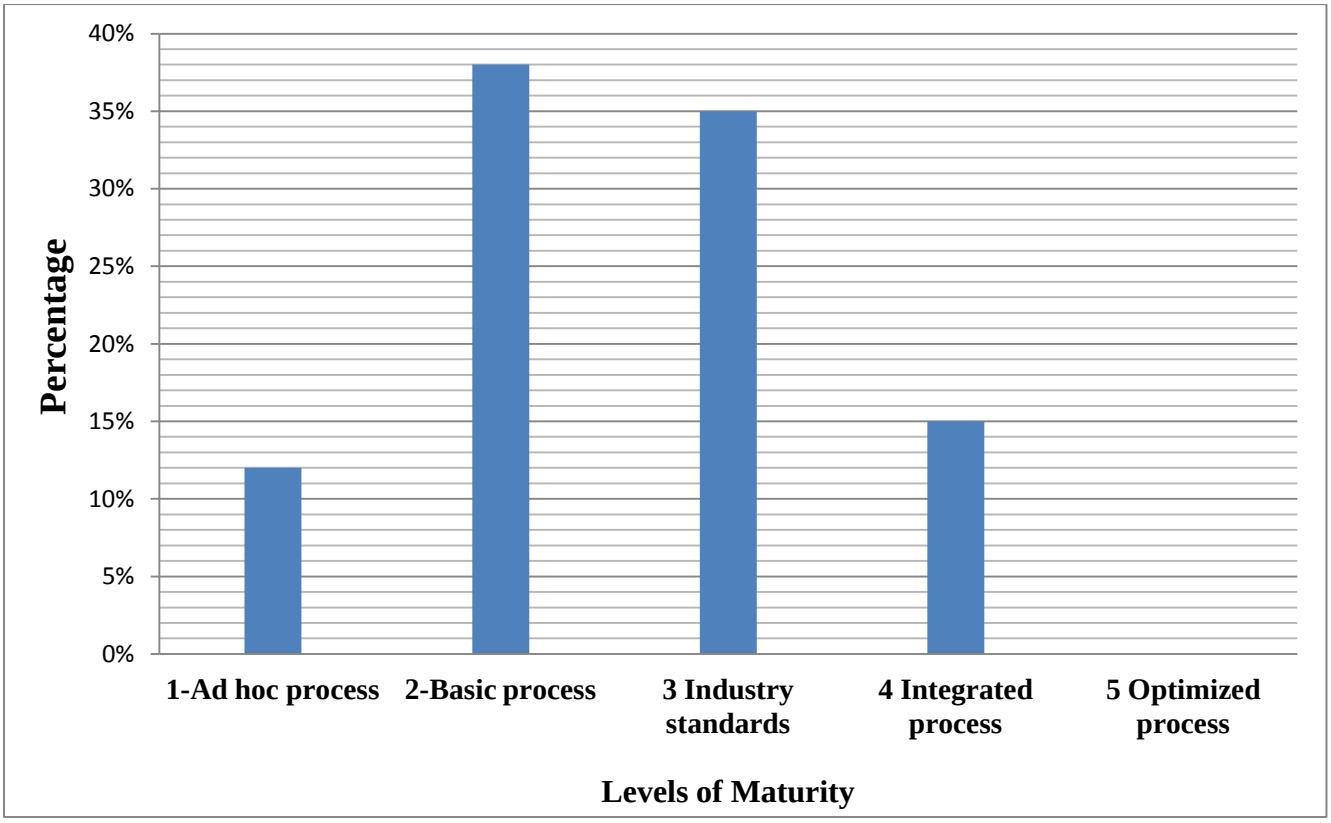

Figure 4.3: Result of scope management practice maturity in (%)

Generally the scope management could be considered to be at medium maturity. According to the result of the study the organization practice / perform scope management formally with processes and standards for all projects are repeatable. But, nothing is shown on processes which

are in place to improve project performance considering focuses given for continuous improvement.

Next to Cost and Time management study ranks scope management as the third most practiced knowledge areas in managing road construction projects by the organization.

Maturity of Project Integration Management

Project Integration management includes the processes and activities needed to identify, define, combine, unify and coordinate the various processes and project management activities within the project management process groups. In the project management context, integration includes characteristics of unification, consolidation, articulation and integrative actions that are crucial to project completion, successfully managing stakeholder expectations and meeting requirements. Project integration management entails making choices about resource allocation, making trade-offs among competing objectives and alternatives, and managing the interdependencies among the project management knowledge areas.

Figure 4 shows the Project Integration management practice maturity of participating respondents. The overall integration management practice maturity is found to be 2.74. The maturity survey indicates that the integration management practice maturity is found to be at management supports and encourage the use of processes striving to accomplish integrated functions based on industry standards.

The Integration management could be considered to be at striving to achieve processes and standards repeatable for all projects. According to the result of the study the organization perform Integration management formally with integrated functions being performed based on industry standards. But, nothing is happening on processes which are in place to improve project performance considering the highest maturity level focusing on continuous improvement.

Next to Cost, Time, Scope, Human resource, and Communication management study ranks Integration management as the sixth most practiced knowledge areas in managing road construction projects by the organization.

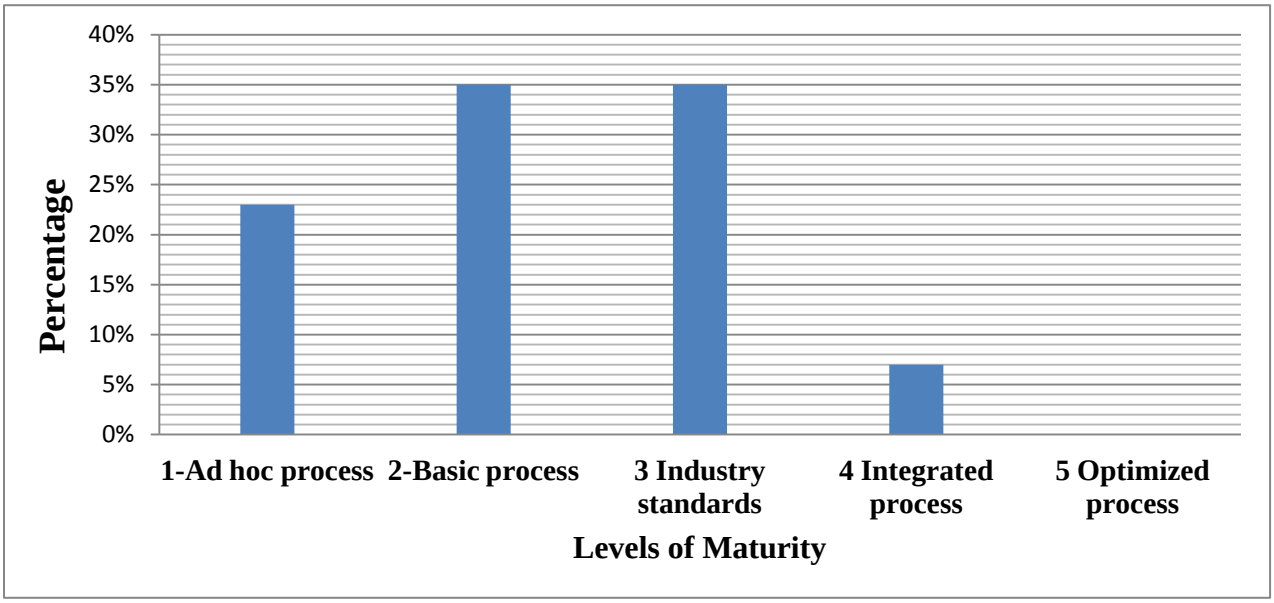

Figure 4.4: Result of Integration management practice maturity (%)

Maturity of Project Time Management

Project time management includes the processes required to ensure timely completion of a project. PMBOK‟s Project time management involves the processes: Define Activity, Sequence activities, Identify and document relationship among project activities, Estimate activity resource, Estimate activity Duration, Develop schedule and Control schedule. PMOBOK‟s construction extension includes three additional processes of Activity Weights Definition, Progress Curves Development, and Progress Monitoring.

Overall, the time management practice maturity of the organization is found to be 2.96 which show somewhat at formally performed level. Figure 5 shows the time management practice maturity of participating respondents. The Time management could be considered to be at processes and standards repeatable for all projects. Summery and detailed information, estimates and schedules are being performed at the industry standard. According to the result of the study the organization perform time management formally with functions being performed based on managed process which shows management uses data to make decisions, estimates and schedules are. But, none of respondents agree processes are in place to improve project performance considering the highest maturity level focusing on continuous improvement.

Next to Cost management study ranks Time management as the second most practiced knowledge areas in managing road construction projects by the organization.

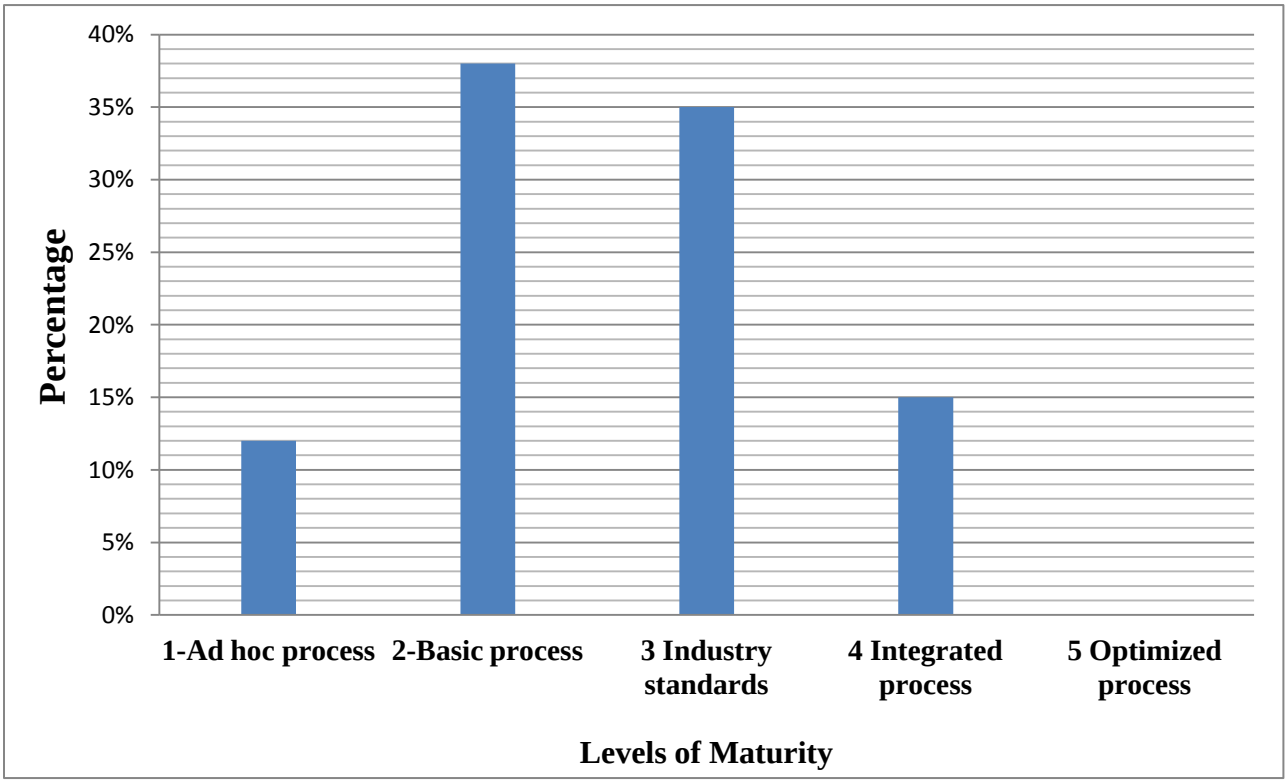

Figure 4.5: Result of Time Management practice maturity (%)

Maturity of Project Cost Management

Project cost management includes the processes involved in estimating, budgeting and controlling costs so that the project can be completed within the approved budget. Project cost management includes the processes of: Estimate costs, Determine Budget and Control Cost.

The research finding indicates that project Cost management is considered to be more important than managing other knowledge areas. In addition, the maturity of Cost management practice is higher compared to others. The overall cost management practice maturity of the organization is found to be 3.08.which means on average the organization perform cost management formally. Generally the cost management could be considered to be at better maturity. According to the result of the study only the organization perform cost management formally with processes integrated with corporate process. Some points are being done by the organization on continuous

improvement to improve project performance considering cost management is basic for the success of projects.

Figure 6 shows cost management practice maturity of participating employees of Ethiopian Construction Works Corporation transport infrastructure Construction sector.

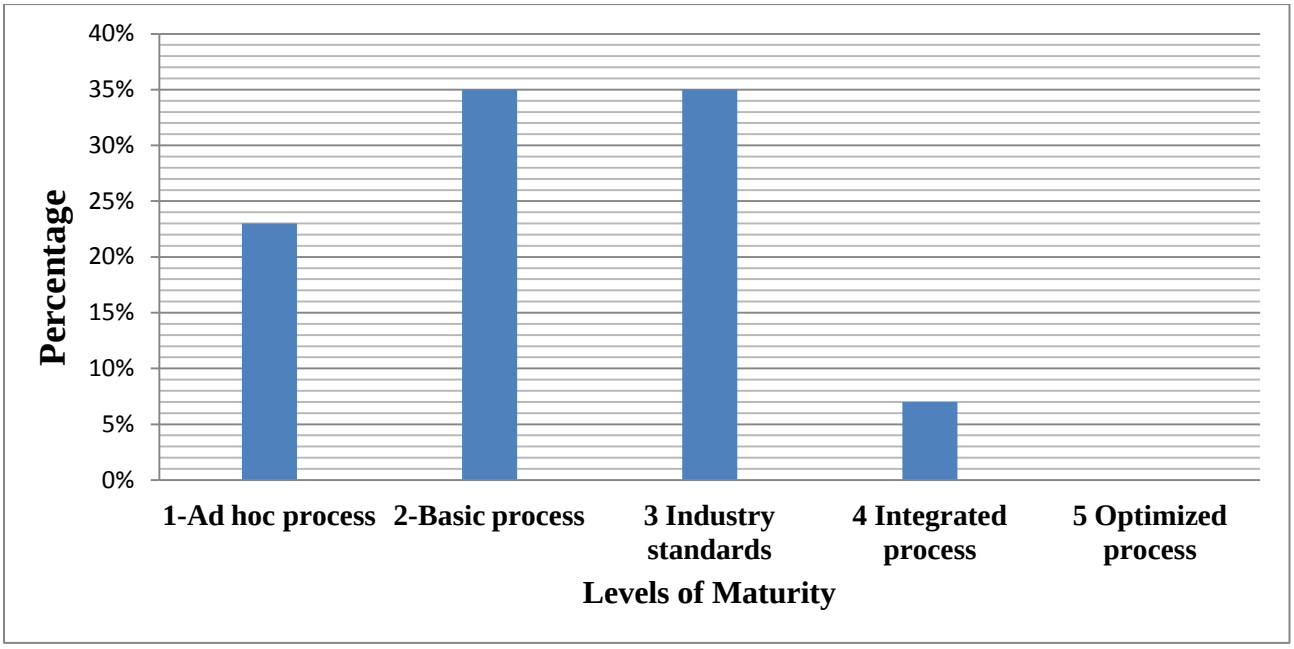

Figure 4.6: Result of Cost management practice maturity (%)

Maturity of Project Quality Management

Project Quality Management includes the processes and activities of the performing organization that determine quality policies, objectives, and responsibilities so that the project will satisfy the needs for which it was undertaken. PMBOK‟s Project quality management includes the processes: Plan Quality, Perform Quality Assurance and Perform Quality control.

Overall the quality management practice of the organization is found to be somewhat at informal performed level of 2.5. Next to Risk management study ranks quality management as the second least practiced knowledge areas in managing road construction projects by the organization.

Figure 7 shows the quality management practice maturity of participants. Majority of respondents are considering project quality management is practiced informally falling at basic

process level where processes and schedules are based on expert knowledge and generic tools. This shows the organization is dependent on quality inspection rather than using the concept of quality at source.

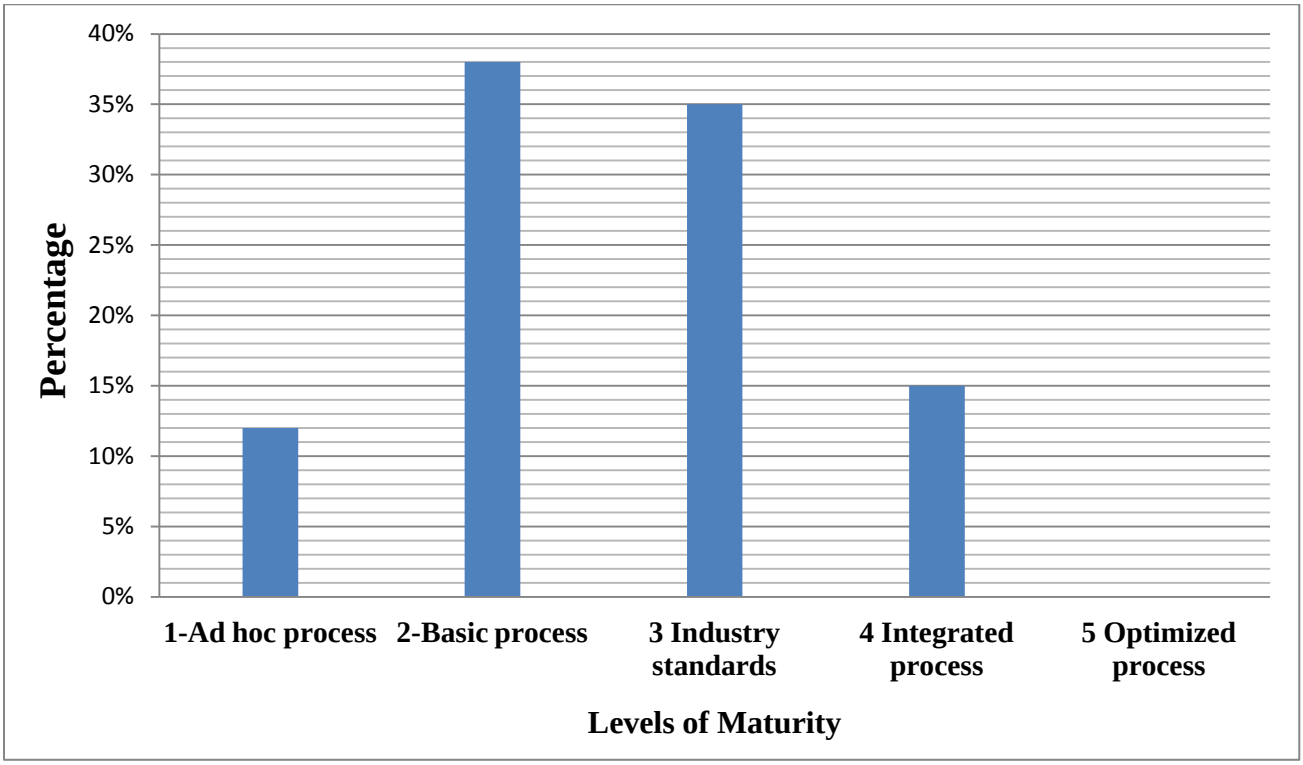

Figure 4.7: Result of quality management practice maturity (%)

Maturity of Project Human Resource Management

Project Human Resource Management includes the processes that organize, manage, and lead the project team. The project human resource management involves the processes: Develop Human Resource Plan, Acquire Project Team, Develop Project Team and Manage Project Team. The Construction extension to PMBOK 3rd edition includes a Fifth construction-related process, of Close Project Team. Overall the human resource management practice maturity of the organization is found to be somewhat at 2.85. Figure 8 shows the Human resource management practice maturity of participants where majority considers Human resource management is practiced formally with processes and standards are set for all projects.

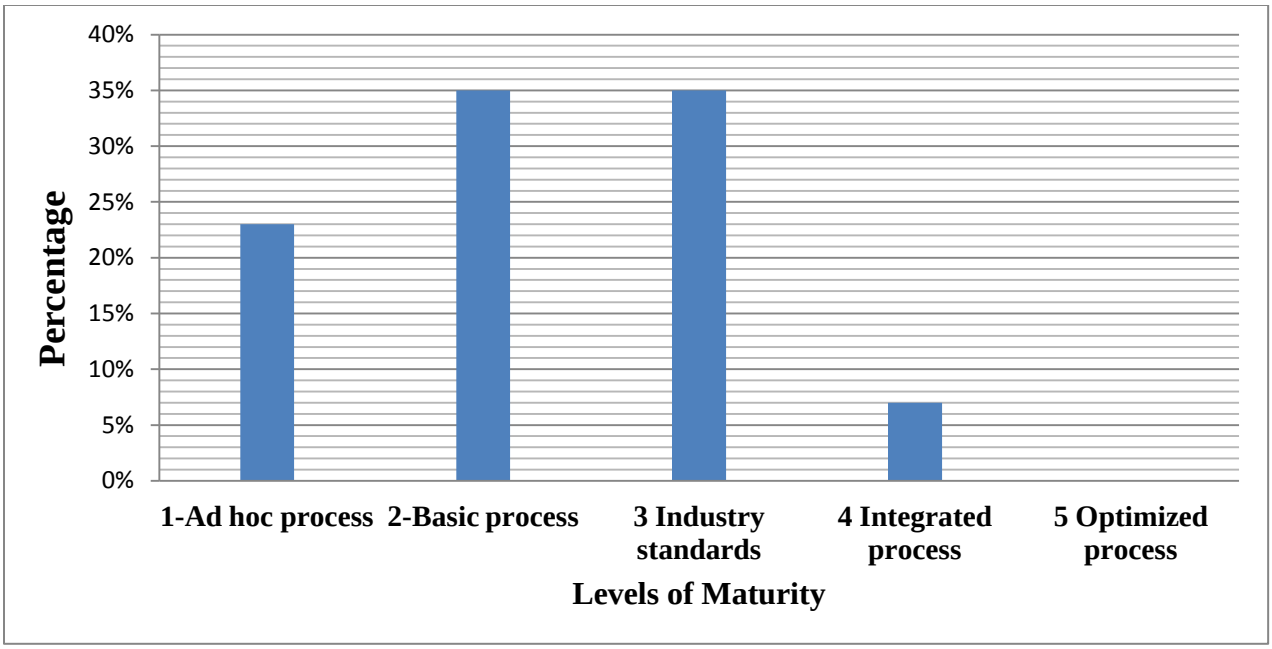

Figure 4.8: Result of human Resource Management practice maturity (%)

Maturity of project Communication Management

Project Communications Management includes the processes required to ensure timely and appropriate generation, collection, distribution, storage, retrieval, and ultimate disposition of project information. PMBOK‟s Project communication management includes the processes: Identify Stakeholders, Plan communications, Distribute Information, Manage Stakeholder Expectations, and Report Performance. Overall the communication management practice maturity of the organization is found to be somewhat at 2.76. Figure 9 shows communication management practice maturity of participants. Majority responses show the organization is at institutionalizing process to adopt project communication management more formally.

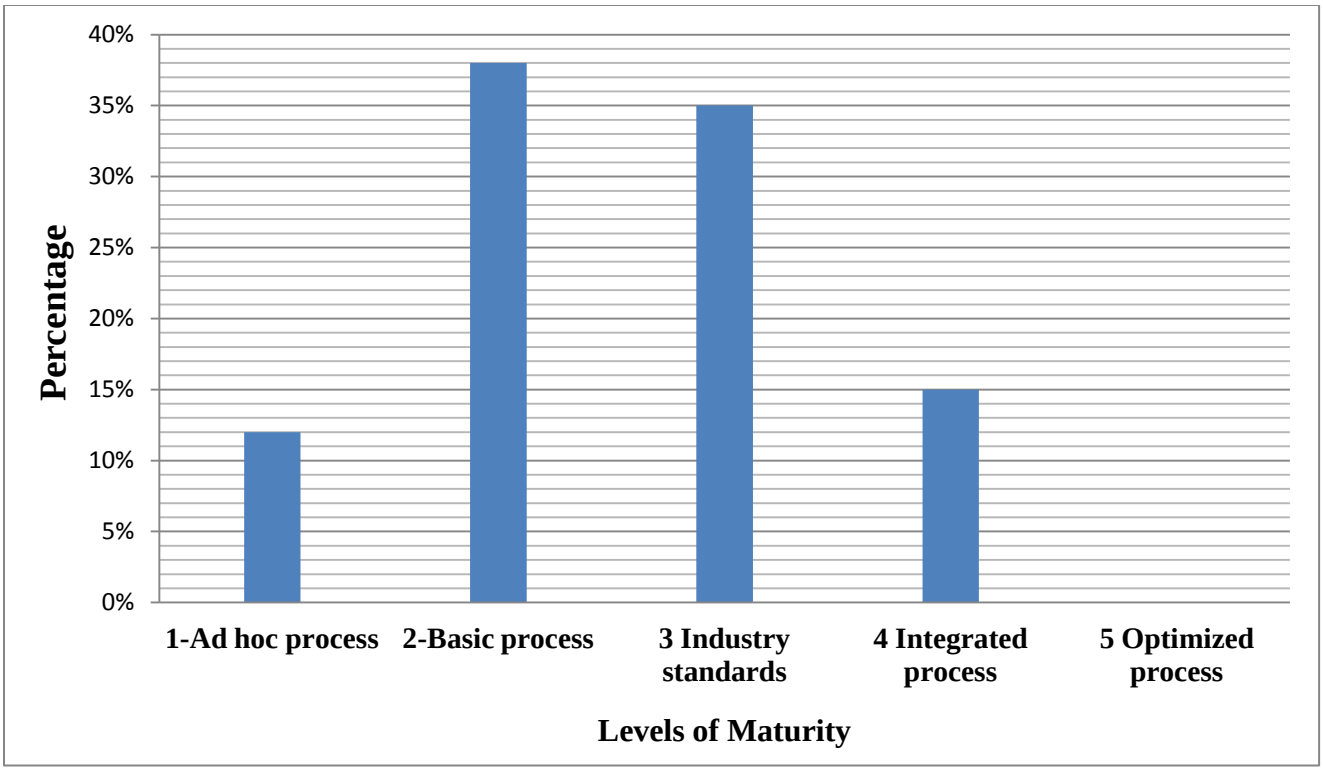

Figure 4.9: Result of project Communication management practice maturity (%)

Maturity of project Procurement management

Project procurement management includes the processes necessary to purchase or acquire products and services. Procurement management includes the contract management issued by an outside organization (Buyer) or issued by the performing organization to an outside organization (sub contract management) and change control processes required to develop and administer contracts or purchase orders issued by authorized project team members. From Contractors perspective procurement management is concerned mainly with subcontract management, supply purchase management and administering the contract that it entered with the client. PMBOK‟s Project procurement management process includes the processes: Plan Procurements, Conduct Procurement, Administer, and Close Procurement.

The overall procurement management practice maturity of the organization is found to be at 2.68 which means on average the organization perform procurement management formally. Procurement management includes claim management, contract administration; standard procurement documents like standard purchase order, supplier agreement are the main works

being done with intermediate maturity. Figure 10 shows the procurement management practice maturity of participants.

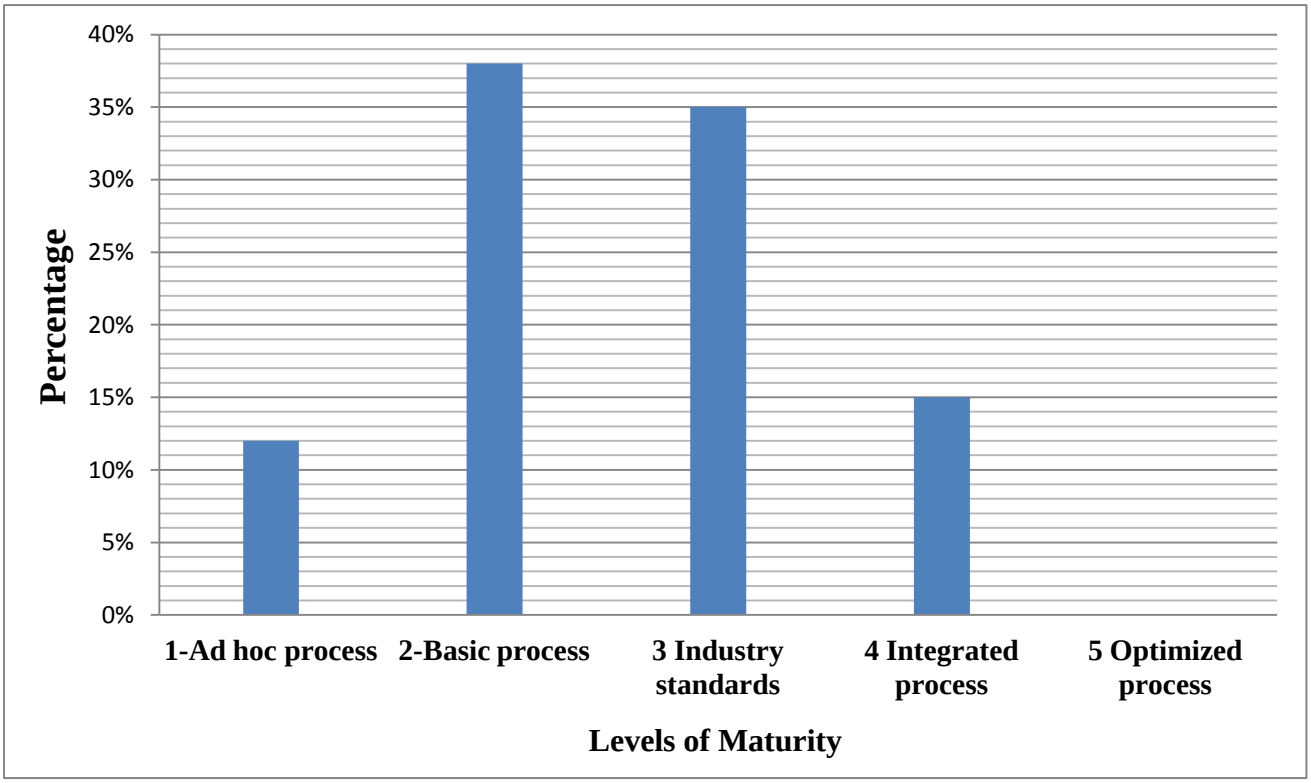

Figure 4.10: Result of procurement management practice maturity (%)

Maturity of Project Risk Management

Project risk management includes the processes of conducting risk management planning, identification, analysis, response planning, and monitoring and control of project risk. The objectives of risk management are to increase the probability and impact of positive events, and decrease the probability and impact of negative events in the project. PMBOK‟s risk management processes are Plan Risk management, Identify Risks, Perform Qualitative risk analysis, Perform Quantitative risk analysis, Plan risk Responses, Monitor and Control risks.

The average risk management practice maturity is found to be at very low (2.28). It could be generalized that there is little or no risk management practice by the organization. The finding shows Risk management is least practiced areas of knowledge relying on expert knowledge and generic tools without standardized process. This result shows the strategic risks and the upside

opportunities should be encompassed by the risk management which helps to provide useful information to decision makers in an uncertain environment.

Figure 11 shows project risk management practice maturity result of participating respondents where majority of them coincides on immature practice of Risk management.

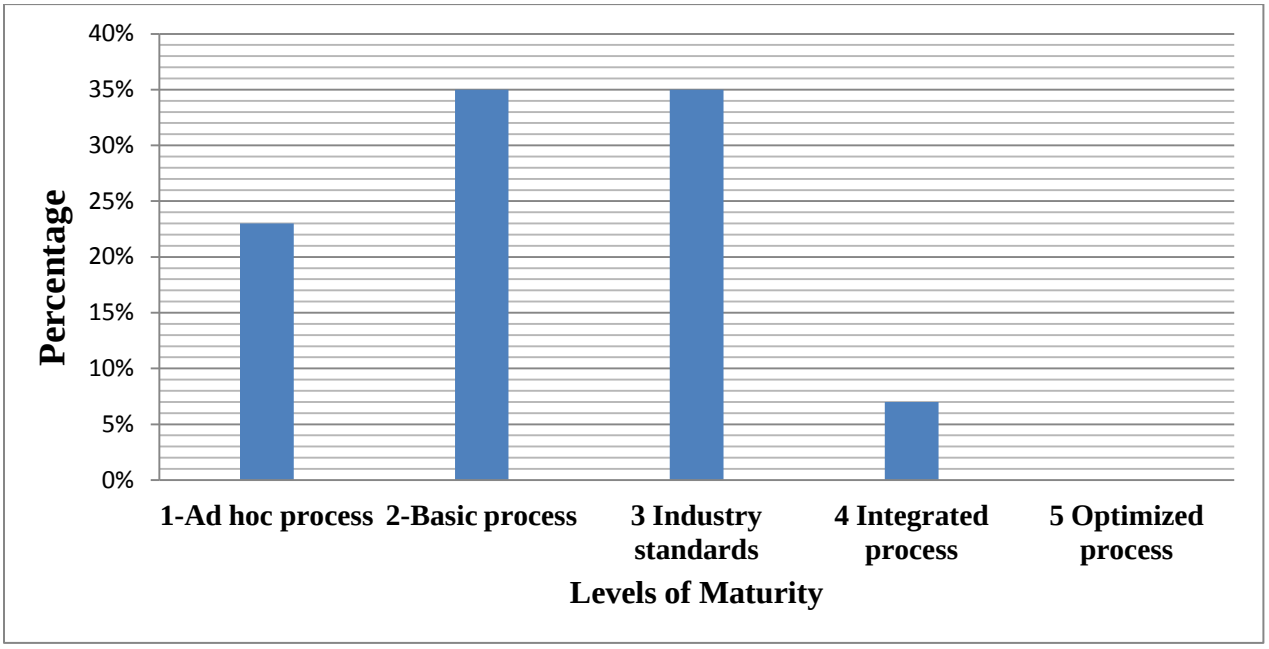

Figure 4.11: Result of project risk management practice maturity (%)

4.2.2.2 Maturity of Project management process groups

The five Project management process groups are required for any project. The five groups are Initiating, Planning, Executing, Monitoring and Controlling and closing Process groups. These five groups have clear dependencies and are typically performed in the same sequence on each project.

Maturity of Initiating Process Group

The initiating process group consists of those processes performed to define anew project or a new phase of an existing project by obtaining authorization to start the project or phase. Within the initiating processes, the initial scope is defined and initial financial resources are committed. Internal and external stakeholders who will interact and influence the overall outcome of the

project are identified. If not already assigned, the project manager will be selected. This information is captured in the project charter and stake holder register. When the project charter is approved, the project becomes officially authorized. Generally the over all process maturity level of project imitation shows at 2.76. Project/organization defined, standard or generic Project management Process, Policy or direction or guide line that requires or recommends planning and performing projects and Identification of all stake holders are being done with medium maturity.

Maturity of planning process group

The planning process group consists of those processes performed to establish the total scope of the effort, define and refine the objectives, and develop the course of action required to attain those objectives. The planning processes develop the project management plan and the project documents that will be used to carry out the project. The multi dimensional nature of project management creates repeated feedback loops for additional analysis. As more project information or characteristics are gathered and understood, additional planning may be required. Generally the over all process maturity level of project planning shows at 2.79. Comprehensive general and risk management plan are being done formally to achieve project goals.

Maturity of Executing process Group

The Executing process group consists of those processes performed to complete the work defined in the project management plan to satisfy the project specifications. This process group involves coordinating people and resources, as well as integrating and performing the activities of the project in accordance with the project management plan. Generally the over all process maturity level of project execution shows at 2.96. The organization/project coordinates resources needed to perform project activities; Knowledge or experience of Peoples involved in performing projects is at medium level. But, executing process group is the highest matured group among the five processes.

Maturity of Monitoring and Controlling Process Group

The Monitoring and controlling process group consists of those processes required to track, review and regulate the progress and performance of the project; identify any areas in which changes to the plan are required; and initiate the corresponding changes. The key benefit of this

process group is that project performance is observed and measured regularly and consistently to identify variances from the project management plan. Generally the over all process maturity level of project monitoring and controlling shows at 2.42. Project monitoring, controlling and review the process to ensure that it meet standards and procedures in the process description/the plan/. The result shows this process group practice is at basic level. Monitoring and controlling process group is the least matured processes group which shows a gap in updating plan or taking remedial measures after controlling processes

Maturity of Closing Process Group

The closing process group consists of those processes performed to finalize all activities across all project management process groups to formally complete the project, phase or contractual obligations. This process group, when completed, verifies that the defined processes are completed within all the process groups to close the project or a project phase, as appropriate and formally establishes that the project or project phase is complete. Generally the over all process maturity level of project closing shows at 2.68. Effectiveness of Contract closes out procedures is somehow at basic stage which shows Project collection of data and lessons learned from planning and performing for the purpose of future use in improvement of the process is at some low to medium maturity.

4.2 Discussion

The research has tried to assess the PM maturity of the Ethiopian Construction Works Corporation Transport infrastructure construction sector road projects. Thus in this regard this research result has found the following major points.

Generally, the construction PM process maturity and practice maturity of the organization is found to be at almost low level. Average maturity of 2.72 for the Project management process maturity and 2.76 for PMBOK practice maturity dimensions. This shows on average the organization PM process and practice maturity is at basic level which needs striving for better maturity to reach organizational standards. This means on average the organization perform the knowledge areas without following structured approach or guide line, relying solely on the knowledge and experience of the project manager or project team, and on average the contractor are performing only the basic practices under each knowledge area. These findings are indicative of the low to medium level of PM development in the organization.

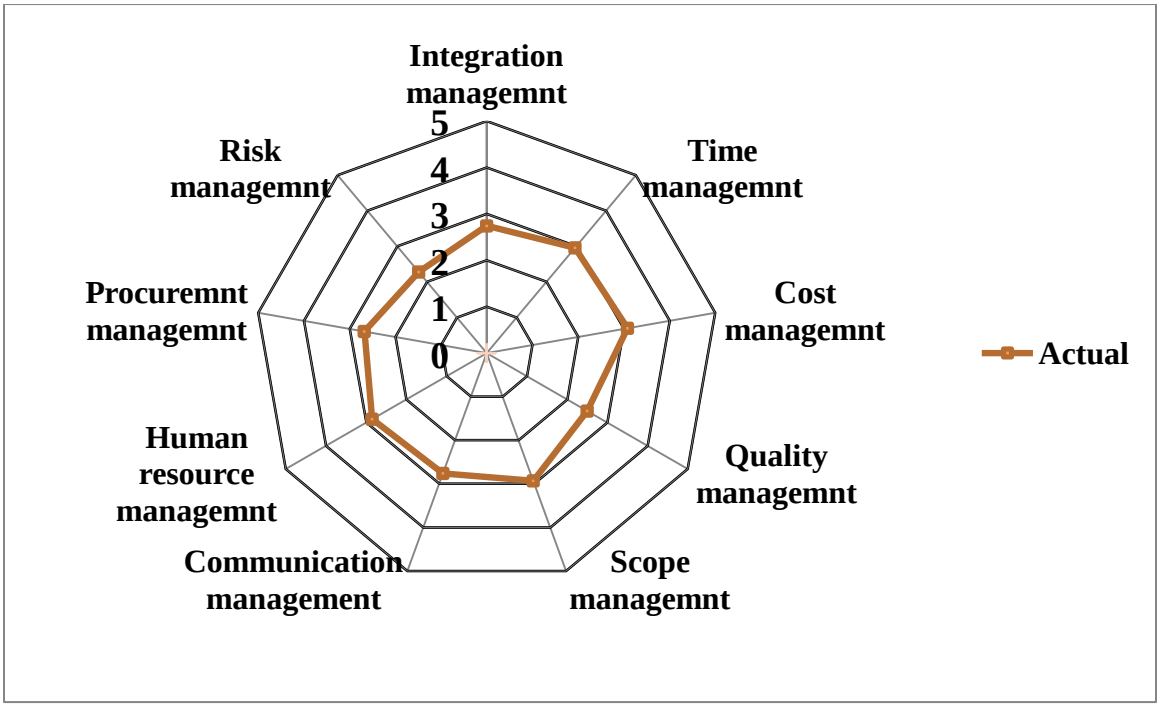

Figure 4.12: Actual result of maturity level of each knowledge areas (Level No 1-5)

Generally, the knowledge areas of Cost, Time, Scope and human resource management have shown comparatively higher maturity compared with other PM knowledge areas. These knowledge areas are more or less being performed formally by the contractor. Further, the respondents consider the above knowledge areas are being practiced well whereas the knowledge areas of Communication and Integration management are found to be comparatively at lower level of maturity and could be considered generally to be performed informally by the contractor. In addition, the respondents consider them to be, somehow, less practiced in the construction PM than the former four knowledge areas. The remaining two knowledge area of procurement and Quality management are the least matured knowledge areas. Respondents consider them to be the least practiced in the management of construction projects. This is perhaps due to the low level of awareness and importance given to the two knowledge areas. Next to the above two knowledge areas, Risk management is another knowledge area which is comparatively at lower level of maturity. This is due to the absence separated Risk management in the organization due to risk allocation of works in each division.

The result of the study is coherent with other researchers result. Professor Miroslaw J. Skibniewski study in 2011 finds that; Project management maturity in construction industry of developing countries like Ethiopia is found to be at low to medium maturity level.

Quality and Risk management are the two areas which needs immediate action. Quality of construction projects are the main point for competitive position of the organization. The organization's final constructed products should satisfy the needs for which it was undertaken. It is to be noted that finishing a project with in time and cost while comprising quality is dangerous. The main argument for this is that if a product is not functional for its design life/period/ the initial investment are without return which is against the goal of the project intervention. Construction projects are done in difficult natural environment, far away from head office, with many interdisciplinary skilled and non skilled labours, with huge amount of capital. So, risk management should be given better concern so that it embeds in each works. Associated with this mitigation measure cost, time, and quality achievement of the project will be the result which are the ultimate principle of project intervention.

CHAPTER FIVE
CONCLUSION AND RECOMMENDATIONS

5.1 Conclusion

This thesis research has tried to assess the extent of use (maturity) of project management processes and practices in the Ethiopian Construction Works Corporation road infrastructure projects. Further, the research has provided bench mark data on the current status of PM practice in the organization for use in continuous assessment of future improvement efforts. Organization which are initiating and implementing projects should look forward for better Project management Process and Practice maturity as empirical studies shows strong relation between Project management maturity level and meeting project goals. The second to third level of maturity is the suitable to describe this moment the maturity level in the organization. Processes and standards are repeatable across projects with basic project management processes being used to keep track of cost, schedule and quality. The study leads to the conclusion with the note that the current survey report supports the need for a methodology that can bridge the existing gap in the maturity of project management of the organization and highest matured organization of developed countries. Nevertheless, this thesis research is meant only a starting work only to assess the existing maturity situation of the Ethiopian construction works corporation road projects. The research presumed that future works will address the rest and the details.

5.2 Recommendation

5.2.1 Recommendation for action

The low level of construction PM maturity found shows how poor the PM practice is. Thus, improvement efforts need be under taken to improve the current condition. In this regard this research recommends the following specific actions to be undertaken.

1. Giving special attention to risk and Quality management. As the review of literature showed management of projects in developing countries is highly constrained by scarcity of resources and high uncertainty (very volatile environment, extremely fast and less predictable changes). Thus, focusing on the management of resource, risk and quality can significantly help lower their negative impact and improve performance of projects through better planning and use of the resources; planning and monitoring of the risks and management of change.
2. Encouraging the organization to attain at least higher level of process maturity and practice maturity in order to obtain successful result and ensure control of their projects. As the review of literature showed, the high uncertainty avoidance and power distance common in developing countries means workers in developing countries have a tendency to avoid risk and tend to prefer clarity and rules, and defer making decision to their superiors. At formal level of process maturity; structured approach, guides and standards are used, and expectations are more or less clarified, thus helping create clarity and lowering risks assumed by subordinates and increase their confidence to make decision. Further, the use of guides ensures consideration of important aspects, thus significantly contributing to the performance of the knowledge areas. The use of generic guides such as PMBOK in this regard may significantly help. The attainment of higher level of practice maturity means that the organization is performing all the practices that are basic (must) to attain the goal of the knowledge areas, thus maximizing the chance of attaining knowledge area goals and hence, attainment of project objectives.

3. Conducting continuous assessment of maturity by the organization /contractor/ to know the success of improvement efforts it undertook and to chart a new action plan for further improvement measures. Here according to project human resource management, providing training and mentoring to the employees of the contractor helps to improve their PM knowledge and practice capacity.

5.2.2 Recommendation for further research

The main goal was to do a starting work and open the door for further refinement and investigation and demonstrate the application of the concepts raised. This research work is a starting one and needs be followed by a number of researches to investigate scopes which are not considered in this research and to refine the concepts raised and further enhance our understanding, and contribute to the construction PM knowledge pool. Thus this research recommends the following for further research and investigation:

1. To determine the overall PM capability of the industry, conducting similar studies by including contractors at different grades or categories and from the perspective of clients /employer/ and or all stakeholders. Conducting PM maturity of major public clients to determine the PM maturity of the clients and hence contribute to development of PM in the construction industry overall.
2. Conduct research to Improve /increase listing of practices under each of the construction PM knowledge areas. Extend the proposed model to include other knowledge areas left such as environmental management, safety management, material, Equipment management and Stake holder Management.
3. Conducting in-depth research to determine in detail how each of the construction PM knowledge area is being performed by the contractors so as to be able to prepare a detailed improvement framework .possibly using case study approach to get a deeper insight.
4. Conduct further research to refine the models and the assessment questionnaire through active involvement of academicians and practitioners using focus group discussion, interview and further extensive literatures review.

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Appendices

Appendix A

Letter sent to the respondents

Dear Respondent:

The student at the Saint Mary university Project management department is conducting research on maturity of project management in road construction projects of Ethiopian Construction Works Corporation.

The research will investigate the following issues:

1. Whether and to what extent each of the Project Management knowledge areas and processes are being applied in managing road construction projects.
2. The areas that need focus for development and improvement of Project Management practice.

The research output will provide information about Project Management Maturity and Capability in all areas of project management: scope, time, cost, quality, risk, communication, procurement, etc. In addition, the result provides a framework for prioritization and development of project management improvement.

Your precious time and effort in participating in this research will also contribute to the development and improvement of Project Management in your organization. Thus, you are kindly invited to fill out the questionnaire and return to the researcher.

Thank you for your interest in participating in the research.

Sincerely yours

Tewodros Abere

Mobile – 0920-255504

Appendix B

Part one- General Information

Direction: Please provide the required information on the space provided

Name of the person filling the questionnaire (Optional)----------

1. Position/role in the company----------
2. Have you received any project Management related training? A. yes B. No

   If yes what was the highest level of training you received?

   A. Masters level B. Bachelors C. Certificate D. Short - term training

   E. As a course in related program of study F, Others

Part two – project management practice maturity questions

General direction

Answer all the Questions that follow based on your knowledge of practice of Project Management in the project you are participating or in the organization you are working. Please choose the ascending maturity level one up to five based on the key characteristics which were taken from project management maturity model (Crawford, J.K., 2006).

Level 1: Initial process

- Ad hoc process (formed, arranged or done for particular purpose only) without consistent and standardized procedures.

Level 2: structured process and standards

- Basic processes, not standard on all projects, used on large, highly visible projects
- Management supports and encourages use of processes, Estimates and schedules are based on expert knowledge and generic tools.

Level 3: organizational standards and institutionalized management

- All processes, standards for all projects and are repeatable
- Summary and detailed information, Estimates and schedules based on Industry standard.

Level 4: Managed process

- Process integrated with corporate process
- Management uses data to make decisions, estimates and schedules are normally based on organization.

Level 5: Optimizing process

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

Project Management practice maturity level in nine Project management bodies of knowledge areas.

No	Nine Project Management body of Knowledge areas Key Practice Characteristics.	PM Solutions Maturity levels						Remarks
		1	2	3	4	5	6	
		Initial process	Struct. Process	Org. Standard	Managed Process	Optim. Process	N.A	
1.	**Project Scope Management**							
	1.1 The importance of project scope management in your organization or project team.							
	1.2 Definition of project scope/ End to end definition of all works in projects							
	1.3 Quality of Work break down structure prepared in defining scope in your project							
	1.4 Effort of Monitoring and controlling scope in your project							
2.	**Project Integration Management**							
	2.1 Standard project management processes and methodologies							
	2.2 Develop Project management plan and change control work							
	2.3 Solid knowledge of project managers in project management							
	2.4 Support of Management in project management development							
3.	**Project Time Management**							
	3.1 Schedule or plan prepared for your project							
	3.2 Estimate of resource (Materials, people, equipment….) needed scheduled separately							
	3.3 WBS used when defining the schedule activities							

	3.4 Progress of project activities continuously monitored and controlled							
4.	**Project Cost Management**							
	4.1 Estimate of detail cost for project							
	4.2 Estimate of detail cost of labor, material and machinery separately							
	4.3 Efficiency of projects meeting project cost							
	4.4 Effort of monitoring and controlling project cost							
5.	**Project Quality Management**							
	5.1 Quality management policies, procedures and guide lines							
	5.2 Implementation of quality assurance							
	5.3 project inspection and control of quality							
	5.4 Quality department or employees specializing in quality management							
6.	**Project Procurement Management**							
	6.1 Planning for procurement of goods and services needed for your project							
	6.2 Standard procurement document for your project/organization like standard purchase order, subcontract/supplier agreement							
	6.3 Contract management/administration process							
	6.4 Status Claim management							

7.	**Project Communication Management**							
	7.1 Plan/strategy prepared to address communication needs							
	7.2 System of collecting and distributing project information							
	7.3 Performance reports prepared and provided to relevant stake holders							
	7.4 Standard format for preparation of reports							
8.	**Project Human Resource Management**							
	8.1 Planning for acquisition and management of human resource							
	8.2 Organizational structure of your project							
	8.3 training/formal or informal/ for capacity building of project team members							
	8.4 Human resource cost and time formally tracked, monitored in your project							
9.	**Project Risk Management**							
	9.1 Identification and documentation of project risk							
	9.2 Risk analysis to determine their project impact							
	9.3 detail risk response plan for identified and analyzed risks							
	9.4 Monitoring and controlling of project risk							

WBS: is the breakdown of the project work into smaller, more manageable pieces of work, with each descending level of the WBS representing an increasing detailed definition of the project work.

NA: Not applicable

Project management process maturity level

No	Five PMBOK Process groups Key Process Characteristics.	Maturity levels						Remarks
		1	2	3	4	5	6	
1.	**Initiating**							
	1.1 Project/organization defined, standard or generic Project management Process							
	1.2 Policy or direction or guide line that requires or recommends planning and performing projects							
	1.3 Identification of all stake holders							
2.	**Planning**							
	2.1 comprehensive planning to perform projects to achieve goals.							
	2.2 Tailored or adapted organizational guide line to the need of specific projects.							
	2.3 Risk Management Plan							
3.	**Executing**							
	3.1 organization/project resources needed to perform project activities							
	3.2 Knowledge or experience of Peoples involved in performing projects							
	3.3 Performance of quality assurance							

4.	**Controlling**							
	4.1 Project monitoring, controlling and review the process to ensure that it complies standards and procedures in the process description/the plan/.							
	4.2 Updating plan or taking remedial measures after controlling processes							
	4.3 Project scope control							
5.	**Closing**							
	5.1 Effectiveness of Contract closes out procedures.							
	5.2 Project collection of data and lessons learned from planning and performing for the purpose of future use in improvement of the process							
	5.3 Effectiveness of Closing Project or phase.							

Thank You!

Appendix C

Analysis Result

Table 2: Project management Knowledge areas practice maturity of each respondent

Project management Knowledge areas maturity level									
Respondents	**Integration**	**Scope**	**Time**	**Cost**	**Quality**	**Procurement**	**Communication**	**Human resource**	**Risk Management**
1	3.25	3.5	4.25	3.75	2	3.75	3.5	4	1.75
2	3.25	2.25	2.5	2	3	2.5	2.75	2.75	2.5
3	0.75	3.25	2.75	3.75	2	3.25	3	3.25	2
4	2.75	3.5	3.5	3	1.25	3.25	3	2.75	1.75
5	3	2.5	1.75	2.5	1.75	2.5	3.25	3.5	2
6	1.25	1.25	1.75	3.25	2	1.75	2	1	0.75
7	3.25	4.25	3.25	4.5	4.5	3.25	2.5	4	2.25
8	2.75	3	2.5	2.25	3	1.75	2.25	1.5	1
9	1	3.25	1.75	1.5	1	1	2.75	2	1
10	4	4.5	2.5	4	2.75	3	2.5	3.25	3.75
11	4.25	4.25	3.5	4.75	3.75	3.75	3.5	3.75	3
12	4	2.5	4	4	3	3.5	4	3	3.5
13	2	1.25	3.5	3.25	4	3.25	2.5	2.5	2

14	2.5	1.75	1.75	3.75	2.5	2	2	1.75	1.25
15	2.25	2	1.75	3.5	1.75	2.5	2.5	3.25	3
16	2.75	4.5	3.25	3.25	2.5	2.25	2.25	1.75	1
17	2.5	3	2.5	2.75	1.25	2.75	2.75	1	2.75
18	3.5	3.5	1.75	3.5	4.75	2.5	2.5	3	3
19	4	2.75	2.5	2.75	1	3.5	3.5	2.5	1
20	2.5	3.75	2.25	3.5	1	4	2.75	1	3
21	1.75	3	2.75	4.5	3.75	2.5	2	4.5	1.75
22	3	3	2.5	3	3	1.75	4.5	2.25	2.5
23	3	3	3.5	3.25	2	2.5	3	1.5	1.25
24	3	3.25	2.75	1.5	4.5	1.25	3	4	2
25	3.25	2	3.25	2	3	4.25	2.75	4.75	1
26	2	2.5	2.75	3.25	1	3	3.75	4	3
27	2.5	2.25	3.5	3.75	2.75	1.75	3	3.5	2
28	2.25	2.75	4.25	3	2.25	1.75	3	2.75	4
29	2	2.5	4	4.25	2.75	4.25	3	3.25	1.5
30	4.5	3	4.5	3	2.5	2.5	3.25	2.75	1
31	3	2.5	3	1.75	3.5	1.25	2	3.5	1
32	1	3.75	2.5	1.75	4	2.5	4	3.25	2.5
33	2.75	4.5	4.25	4.25	2.5	3.5	1.5	4	3
34	3.75	3.5	4.5	2.5	1	4	3	1.5	3.5
35	3	3	2.25	2.75	3	2.5	2.5	3	2

36	3	4	3.5	3.5	2.5	1.75	3.5	3.5	2.5
37	3	1.5	2.5	2.75	1	3	4.5	4	3
38	3.25	2	3.25	3.5	4.5	3	2.25	1.5	3
39	3.5	3.25	3.25	1.75	2.25	3	1.5	2	2.5
40	1	2	2.5	1.75	1.5	3.25	2.5	3.25	1.75
41	4	2.5	1.75	3.25	2.5	1	2.5	2	3
42	1.5	2.25	3.25	1.5	1.75	4	1	3	3
43	3	2.75	1.75	2	3.25	1.5	4.5	3	3
44	2.5	2.5	2.5	3.25	1.75	2	3.5	3.25	3.25
45	1	3	1.25	3.75	1	3.25	1	2	2
46	4.5	3	4.25	3	3	2	4	2.5	2.5
47	3	3	3	4.25	2.5	2.5	1.5	3	1.75
48	2.5	4	4.5	2.75	3	2.25	2	2.5	3
49	1	3.25	3.5	3	2.5	3	1	4	3
50	4.5	3	3	3	1	4	4	3	3
51	1	2.5	4.5	3.25	4.5	1.5	1.5	2.5	3.25
52	4	3	2	4	1	3	3	3	1
Sum	142.50	152.50	153.75	160.25	129.75	139.25	143.75	148.00	118.75
Average	2.74	2.93	2.96	3.08	2.50	2.68	2.76	2.85	2.28
Total Mean		**2.75**							

Table 3: Project management process groups maturity of each respondent

Project management Process Group Maturity levels					
Respondents	**Initiating**	**Planning**	**Executing**	**Controlling**	**Closing**
1	3.67	4.00	3.33	2.33	2.00
2	2.00	2.00	2.33	2.67	2.67
3	2.33	3.00	2.33	2.00	1.33
4	4.33	3.67	2.67	0.67	4.00
5	2.33	2.33	2.67	2.00	2.00
6	0.67	0.00	1.33	1.33	0.00
7	2.33	4.00	3.67	3.00	5.00
8	2.67	2.33	2.00	1.00	1.67
9	3.00	2.00	2.00	1.67	2.00
10	1.67	3.00	3.00	3.33	2.33
11	3.67	3.33	3.00	3.33	2.67
12	4.00	4.00	4.00	4.00	4.00
13	2.00	2.67	4.00	2.67	2.33

14	3.00	2.67	2.00	3.00	2.67
15	2.00	1.33	3.00	1.67	3.00
16	4.33	3.67	4.33	3.67	1.67
17	2.67	2.00	2.00	2.67	3.67
18	5.00	2.00	1.33	2.67	4.00
19	3.67	3.00	5.00	1.33	2.00
20	2.00	1.67	3.00	3.67	3.00
21	2.00	3.67	3.67	2.00	2.00
22	4.00	2.67	2.33	2.00	4.33
23	2.67	2.00	3.33	3.00	4.00
24	2.67	4.33	3.33	1.67	2.67
25	2.67	2.00	4.00	2.00	2.67
26	3.67	4.33	2.33	2.67	1.33
27	2.00	2.67	2.67	1.33	3.67
28	2.00	5.00	3.00	3.67	2.00
29	3.00	3.67	1.67	2.00	2.00
30	3.00	2.00	3.67	2.00	3.00

31	2.33	2.00	2.67	3.67	1.67
32	2.00	4.00	2.00	2.67	3.67
33	3.00	2.67	4.33	2.00	4.00
34	3.33	2.67	2.00	2.00	2.67
35	2.00	2.67	4.33	2.00	2.67
36	2.67	3.67	2.00	3.00	2.67
37	2.67	2.00	1.33	3.00	3.67
38	2.67	2.00	5.00	2.67	2.00
39	1.33	3.00	3.00	2.67	2.00
40	3.67	3.00	3.67	1.33	3.00
41	2.00	2.67	2.33	2.00	3.00
42	2.00	2.67	3.33	3.00	2.00
43	3.67	1.33	4.00	2.00	4.00
44	2.67	3.67	2.00	4.33	2.67
45	2.00	2.00	3.00	2.67	2.67
46	4.33	2.00	4.33	2.00	2.67
47	4.00	3.00	2.00	3.67	3.67

48	2.00	3.00	4.33	2.00	2.00
49	3.00	3.00	2.67	2.00	2.33
50	3.67	3.67	2.00	1.33	2.67
51	2.33	2.33	4.33	2.00	2.67
52	1.33	3.33	2.00	3.00	1.33
Sum	143.67	145.33	153.67	126.00	139.33
Average	2.76	2.79	2.96	2.42	2.68
Total Mean		**2.72**			